



Fairbanks North Star Borough School District

**Fairbanks North Star Borough School District**

# Mathematics Curriculum

**Grades K-5: Adopted January 21, 2014**

**Grades 6-12: Adopted June 7, 2022**

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# **Acknowledgements for the K-5 Math Curriculum**

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# Philosophy & Mission Statement

## Philosophy

Students will be confident mathematical thinkers with the ability to navigate, communicate and persevere as they encounter problems in their lives.

## Mission Statement

- All students can enjoy learning math.
- There are many paths to learning and understanding.
- Continued and diverse practice helps to further growth and understanding.
- Students will be encouraged to think and to connect current learning to prior knowledge.
- All students will utilize productive struggle to progress their mathematical skills.
- Students will be actively involved in the learning process through collaboration.
- Students' experiences, voices, and thinking are valued in the classroom as they communicate their understanding.
- Classroom communities need to feel safe and equitable in order for students to learn.

# Explanation of Terms

## **Alaska Content Standards**

High academic standards adopted by the Alaska State Board of Education. These standards are general statements of what Alaskans want their students to know and be able to do as a result of their public school experience. The standards reflect the collaborative work of Alaskan educators and national experts from the nonprofit National Center for the Improvement of Educational Assessment, and are informed by the input of Alaskan teachers and public comment.

## **Alaska Performance Standards**

Standards adopted by the Alaska State Board of Education as specific statements of what students should know and be able to do. They were adopted in reading, writing, mathematics, and science at four benchmark levels.

## **Competency**

A student's ability to apply clusters of standards to execute a particular performance task.

## **Competency-Based Learning**

Competency-based learning has the following components:

- Learners are empowered to make important decisions about their learning experiences, how they will create and apply knowledge, and how they will demonstrate their learning.
- Assessment is a meaningful, positive, and empowering learning experience for learners that yields timely, relevant, and actionable evidence.
- Learners receive timely, differentiated support based on their individual learning needs.
- Learners progress based on evidence of mastery.
- Students learn actively using different pathways and varied pacing.
- Strategies to ensure equity for all learners are embedded in the culture, structure, and pedagogy of schools and education systems.
- Rigorous, common expectations for learning (knowledge, skills, and dispositions) are explicit, transparent, measurable, and transferable.

## **Content Objectives**

Statements that document specific, essential tasks that learners are expected to accomplish in a given grade level or course.

## **Course/ Grade Competency**

Competency statements customized to the content of a particular grade level, grade span, or course. These competencies represent the major concept areas within a discipline.

## **Graduate-Level Competency**

A set of competencies that may include academic and personal success skills in which all graduates of the Fairbanks North Star Borough School District should know and/or be able to do.

# Standards Alignment Coding

The Mathematics Curriculum is aligned with the Alaska Mathematics Standards adopted in 2012. The complete standards may be found in the appendix. The following coding is used throughout this document to correlate to these standards.

## K-8 Mathematics Content Standards:

This example is grade 7, domain “Expressions and Equations,” and standard number.

**7.EE.3** ← Standard  
 ← K-8 Grade Level      ↑ Domain

### Domain

- **CC** – Counting and Cardinality
- **OA** – Operations and Algebraic Thinking
- **NBT** – Number and Operations in Base Ten
- **MD** – Measurement
- **NF** – Number and Operations – Fractions
- **G** – Geometry
- **RP** – Ratios and Proportional Relationships
- **NS** – The Number System
- **EE** – Expressions and Equations
- **F** – Functions

## High School Mathematics Content Standards:

This example is the high school conceptual category “Number and Quantity”, domain “Quantities,” and standard number.

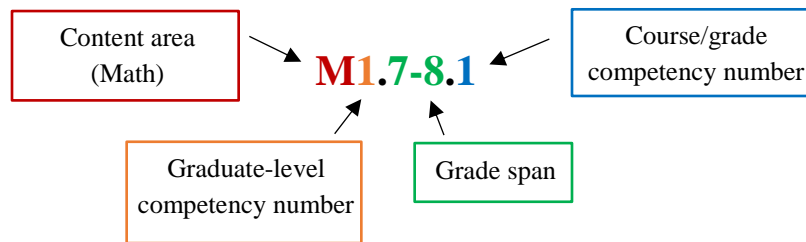
**N-Q.3** ← Standard  
 ↑ High School Conceptual Categories      ↑ Domain

### High School Conceptual Categories

- **N** – Number and Quantity
  - **RN** – The Real Number System
  - **Q** – Quantities
  - **CN** – The Complex Number System
  - **VM** – Vector and Matrix Quantities
- **A** – Algebra
- **F** – Functions
- **G** – Geometry
- **P** – Statistics and Probability
- Number and Quantity
  - **SE** – Seeing Structure in Expressions
  - **APR** – Arithmetic with Polynomials and Rational Expressions
  - **CEI** – Creating Equations and Inequalities
  - **REI** – Reasoning with Equations and Inequalities
- Functions
  - **IF** – Interpreting Functions
  - **BF** – Building Functions
  - **LE** – Linear, Quadratic, and Exponential Models
  - **TF** – Trigonometric Functions
- Geometry
  - **CO** – Congruence
  - **SRT** – Similarity, Right Triangles, and Trigonometry
  - **C** – Circles
  - **GPE** – Expressing Geometric Properties with Equations
  - **GMD** – Geometric Measurement and Dimension
  - **MG** – Modeling with Geometry
- Statistics and Probability
  - **ID** – Interpreting Categorical and Quantitative Data
  - **IC** – Making Inferences and Justifying Conclusions
  - **CP** – Conditional Probability and the Rules of Probability
  - **MD** – Using Probability to Make Decisions

# Grades K-12 Mathematics Competencies

## Competency Coding



## Symbolic Expression

### Graduate-Level Competencies:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

### Course/ Grade Competencies:

- **M1.K-2.1:** The learner will reason abstractly and quantitatively, recognizing and making appropriate use of mathematical symbols and expressions for different purposes.
- **M1.3-4.1:** The learner will reason abstractly and quantitatively, recognizing and making appropriate use of mathematical symbols and expressions for a variety of purposes, including variables.
- **M1.5-6.1:** The learner will reason abstractly and manipulate symbolic expressions to represent relationships and interpret expressions and equations in terms of a given context for determining an unknown value.
- **M1.7-8.1:** The learner will reason abstractly and manipulate symbolic expressions to represent relationships and interpret expressions and equations in terms of a given context for determining an unknown value.
- **M1.9-12.1:** The learner will write, apply, and provide a rationale for a mathematical model representing a given situation.
- **M1.9-12.2:** The learner will interpret and use symbols to express relationships and justify reasoning when solving problems.

## Numbers and Number Systems

### Graduate-Level Competencies:

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

### Course/ Grade Competencies:

- **M2.K-2.1:** The learner will demonstrate an understanding of the nature of numbers, thinking flexibly and attending to precision and reasonableness when solving problems using whole numbers.
- **M2.3-4.1:** The learner will demonstrate an understanding of number systems, thinking flexibly and attending to precision and reasonableness when solving problems using whole numbers, fractions, and decimals.
- **M2.5-6.1:** The learner will expand their understanding of number systems, thinking flexibly and attending to precision and reasonableness when solving problems using rational numbers.
- **M2.7-8.1:** The learner will expand their understanding of number systems thinking flexibly and attending to precision and reasonableness when solving problems using rational and irrational numbers.
- **M2.9-12.1:** The learner will justify how to apply properties of real number systems to variable expressions in a variety of contexts.

## Reasoning and Strategic Thinking

### Graduate-Level Competencies:

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

### Course/ Grade Competencies:

- **M3.K-2.1:** The learner will apply additive reasoning using multiple strategies (algorithms, models, & manipulatives) to solve authentic applied problems.
- **M3.K-2.2:** The learner will use reasoning and self-monitoring to analyze and explain a solution pathway.
- **M3.3-4.1:** The learner will apply additive, multiplicative, and fractional reasoning using multiple strategies (algorithms, models, & manipulatives) to solve authentic applied problems.
- **MS.3-4.2:** The learner will use reasoning and self-monitoring to analyze and justify one or more solution pathways.
- **M3.5-6.1:** The learner will expand the use of computational strategies, algorithms, and proportional reasoning to rational numbers.
- **M3.5-6.2:** The learner will use reasoning and metacognitive skills through making conjectures, justifying, and communicating mathematical solutions and arguments.

- **M3.7-8.1:** The learner will expand the use of computational strategies, algorithms, and proportional reasoning to rational and irrational numbers.
- **M3.7-8.2:** The learner will use reasoning and metacognitive skills through making conjectures, justifying, and effectively communicating mathematical solutions and arguments.
- **M3.9-12.1:** The learner will use computational strategies and algorithms and provide rationale for their use.
- **M3.9-12.2:** The learner will reason quantitatively when analyzing, representing, and solving problems.
- **M3.9-12.3:** The learner will compare the effectiveness or logic of two plausible arguments or models.

## Measurement

### Graduate-Level Competencies:

**M4 - Measurement:** The learner will explain reasoning when applying and modeling geometric principles.

### Course/ Grade Competencies:

- **M4.K-2.1:** The learner will use standard and nonstandard measurement tools, units, and attributes to describe and compare objects, authentic applied situations or events, and to solve measurement problems.
- **M4.3-4.1:** The learner will use measurement tools, units, and attributes to describe and compare objects, situations, or events, and to solve authentic applied measurement problems.
- **M4.5-6.1:** The learner will use tools and apply precision and reasoning to solve measurement problems in authentic applied contexts.
- **M4.7-8.1:** The learner will strategically use tools and apply proportional reasoning and precision to solve measurement problems in pure/ theoretical and authentic applied contexts.
- **M4.9-12.1:** The learner will provide rationale for solving measurement problems that require making conversions among various units and measurement systems, or applying the effect of a scale factor.

## Algebraic Functions, Patterns, and Relations

### Graduate-Level Competencies:

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

### Course/ Grade Competencies:

- **M5.K-2.1:** The learner will make use of structure to represent, interpret, and analyze change or patterns in various contexts using models, rules, and explanations.
- **M5.3-4.1:** The learner will make use of structure to represent, analyze, and generalize change or patterns in various contexts using models and justification.
- **M5.5-6.1:** The learner will make use of structure to describe and compare situations that involve change or patterns, and use the information to make conjectures and justify conclusions/ solutions.
- **M5.7-8.1:** The learner will make use of structure to describe and compare situations that involve proportionality, change, or patterns, and use the information to make conjectures and justify conclusions/ solutions.
- **M5.9-12.1:** The learner will apply properties of arithmetic and algebra to simplify and manipulate symbolic expressions or models.
- **M5.9-12.2:** The learner will write and apply algebraic modes to represent and answer questions about a given situation.
- **M5.9-12.3:** The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.
- **M5.9-12.4:** The learner will analyze relations and functions, using multiple representations.
- **M5.9-12.5:** The learner will identify, build, and perform operations on relations and functions and justify their reasoning.

## Geometry

### Graduate-Level Competencies:

**M6 - Geometry:** The learner will solve problems involving spatial reasoning and model geometric concepts in applied contexts.

### Course/ Grade Competencies:

- **M6.K-2.1:** The learner will recognize and use attributes of two- and three-dimensional figures to solve problems.
- **M6.3-4.1:** The learner will use attributes of two-dimensional shapes and complex figures to solve authentic applied problems.
- **M6.5-6.1:** The learner will solve problems involving reasoning using properties two- and three- dimensional shapes to analyze, represent, and model geometric relationships in authentic applied contexts.
- **M6.7-8.1:** The learner will solve problems involving reasoning using properties of two- and three- dimensional shapes to analyze, represent, and model geometric relationships in pure/ theoretical and authentic applied contexts.
- **M6.9-12.1:** The learner will apply geometric theorems and postulates to solve problems, create arguments, and support their reasoning.

- **M6.9-12.2:** The learner will use geometric theorems and postulates to construct and apply viable arguments.
- **M6.9-12.3:** The learner will create and use a formal geometric construction, using appropriate tools, to illustrate geometric properties.

## **Data, Analysis, Probability, and Statistics**

### **Graduate-Level Competencies:**

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

### **Course/ Grade Competencies:**

- **M7.K-2.1:** The learner will gather, represent, and interpret data related to a particular/ single unit scale, including authentic applications.
- **M7.3-4.1:** The learner will gather, represent, and interpret data related to a particular/ single context, including authentic applications.
- **M7.5-6.1:** The learner will design investigations and gather data involving populations (data sets).
- **M7.7-8.1:** The learner will design investigations and conduct probability experiments involving populations.
- **M7.9-12.1:** The learner will formulate questions to clarify the problem at hand and formulate one (or more) questions that can be answered with data.
- **M7.9-12.2:** The learner will design and implement a plan to collect the appropriate data to answer the statistical question.
- **M7.9-12.3:** The learner will summarize data using appropriate statistics.
- **M7.9-12.4:** The learner will select appropriate graphical and numerical methods, and use these methods to represent the data in a way that supports interpretation.
- **M7.9-12.5:** The learner will interpret descriptive statistics and linear models within the context of the data and the original question.
- **M7.9-12.6:** The learner will apply probability concepts to analyze and evaluate potential decisions and strategies.

# Alaska Standards for Mathematical Practice

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education. The first of these are the NCTM process standards of problem solving, reasoning and proof, communication, representation, and connections. The second are the strands of mathematical proficiency specified in the National Research Council’s report *Adding It Up*: adaptive reasoning, strategic competence, conceptual understanding (comprehension of mathematical concepts, operations and relations), procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently and appropriately), and productive disposition (habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one’s own efficacy).

- Make sense of problems and persevere in solving them
- Reason abstractly and quantitatively
- Construct viable arguments and critique the reasoning of others
- Model with mathematics
- Use appropriate tools strategically
- Attend to precision
- Look for and make use of structure
- Look for and express regularity in repeated reasoning

Each Standard for Mathematical Practice listed below is followed by a set of grade-span descriptors. These descriptors of the Standards of Mathematical Practice are meant to help students, parents and educators to picture how these practices might be demonstrated by students. Within the grade span, students should apply the practices using specific grade-level content. Additionally, students at higher-grade spans may revisit earlier grade-span proficiencies as the rigor of the content increases.

## Connecting the Standards for Mathematical Practice and Mathematical Content

The Standards for Mathematical Practice describe ways in which developing student practitioners of the discipline of mathematics increasingly ought to engage with the subject matter as they grow in mathematical maturity and expertise throughout the elementary, middle and high school years. Designers of curricula, assessments, and professional development should all attend to the need to connect the mathematical practices to mathematical content in mathematics instruction. The Standards for Mathematical Content are a balanced combination of procedure and understanding. Expectations that begin with the word “understand” are often especially good opportunities to connect the practices to the content. Students who lack understanding of a topic may rely on procedures too heavily. Without a flexible base from which to work, they may be less likely to consider analogous problems, represent problems coherently, justify conclusions, apply the mathematics to practical situations, use technology mindfully to

work with the mathematics, explain the mathematics accurately to other students, step back for an overview, or deviate from a known procedure to find a shortcut. In short, a lack of understanding effectively prevents a student from engaging in the mathematical practices. In this respect, those content standards, which set an expectation of understanding are potential “points of intersection” between the Standards for Mathematical Content and the Standards for Mathematical Practice. These points of intersection are intended to be weighted toward central and generative concepts in the school mathematics curriculum that most merit the time, resources, innovative energies, and focus necessary to qualitatively improve the curriculum, instruction, assessment, professional development, and student achievement in mathematics.

### **1. Make sense of problems and persevere in solving them.**

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

#### **In grades 6-8 mathematically proficient students will:**

- explain correspondences between a new problem and previous problems
- represent algebraic expressions numerically, graphically, concretely/with manipulatives, verbally/written
- explain connections between the multiple representations
- determine the question that needs to be answered
- analyze a problem and make a plan for solving it
- choose a reasonable strategy
- identify the knowns and unknowns in a problem
- use previous knowledge and skills to simplify and solve problems
- break a problem into manageable parts or simpler problems
- solve a problem in more than one way

## **2. Reason abstractly and quantitatively.**

Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

### **In grades 6-8 mathematically proficient students will:**

- represent a situation symbolically and carry out its operations
- create a coherent representation of the problem
- translate an algebraic problem to a real world context
- explain the relationship between the symbolic abstraction and the context of the problem
- compute using different properties
- consider the quantitative values, including units, for the numbers in a problem

## **3. Construct viable arguments and critique the reasoning of others.**

Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

### **In grades 6-8 mathematically proficient students will:**

- construct arguments using both concrete and abstract explanations
- justify conclusions, communicate conclusions, and respond to the arguments
- listen to arguments, critique their viability, and ask questions to clarify the argument

- compare effectiveness of two arguments by identifying and explaining both logical and/or flawed reasoning
- recognize general mathematical truths and use statements to justify the conjectures
- identify special cases or counter-examples that don't follow the mathematical rules
- infer meaning from data and make arguments using its context

#### **4. Model with mathematics.**

Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

#### **In grades 6-8 mathematically proficient students will:**

- apply mathematics to solve problems arising in everyday life and society
- identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, and formulas
- interpret their mathematical results in the context of the situation and reflect on whether the results make sense
- make assumptions and approximations to simplify a situation, realizing the final solution will need to be revised
- analyze quantitative relationships to draw conclusions
- reflect on whether their results make sense
- improve the model if it has not served its purpose

#### **5. Use appropriate tools strategically.**

Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high

school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

**In grades 6-8 mathematically proficient students will:**

- select and use tools appropriate to the task: pencil and paper, protractor, visual and physical fraction models, algebra tiles, geometric models, calculator, spreadsheet, and interactive geometry software.
- use estimation and other mathematical knowledge to confirm the accuracy of their problem solving
- identify relevant external and digital mathematical resources and use them to pose or solve problems
- represent and compare possibilities visually with technology when solving a problem
- explore and deepen their understanding of concepts through the use of technological tools

**6. Attend to precision.**

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

**In grades 6-8 mathematically proficient students will:**

- use clear definitions in explanations
- understand and use specific symbols accurately and consistently: equality, inequality, ratios, parenthesis for multiplication and division, absolute value, square root
- specify units of measure, and label axes to clarify the correspondence with quantities in a problem
- calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context

## **7. Look for and make use of structure.**

Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see  $7 \times 8$  equals the well-remembered  $7 \times 5 + 7 \times 3$ , in preparation for learning about the distributive property. In the expression  $x^2 + 9x + 14$ , older students can see the 14 as  $2 \times 7$  and the 9 as  $2 + 7$ . They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see  $5 - 3(x - y)^2$  as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers  $x$  and  $y$ .

### **In all grade levels mathematically proficient students will:**

- discern a pattern or structure
- understand complex structures as single objects or as being composed of several objects
- check if the answer is reasonable

## **8. Look for and express regularity in repeated reasoning.**

Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation  $(y - 2)/(x - 1) = 3$ . Noticing the regularity in the way terms cancel when expanding  $(x - 1)(x + 1)$ ,  $(x - 1)(x^2 + x + 1)$ , and  $(x - 1)(x^3 + x^2 + x + 1)$  might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

### **In all grade levels mathematically proficient students will:**

- identify if calculations or processes are repeated
- use alternative and traditional methods to solve problems
- evaluate the reasonableness of their intermediate results, while attending to the details

# Elementary Math Courses



**Grades K – 5**

**Adopted January 21, 2014**

# Kindergarten

<p><b>Instructional Focus:</b> In Kindergarten, instructional time should focus on two critical areas:</p> <ul style="list-style-type: none"> <li>• Representing, relating and operating on whole numbers, initially with sets of objects.</li> <li>• Describing shapes and space.</li> </ul>	<p><b>Readiness Standards:</b></p> <ul style="list-style-type: none"> <li>• Must be 5 years old by September 1. (School Board Policy: 1021.2)</li> </ul>
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## Kindergarten Mathematical Content Standards

Strand	Standard	Examples and Resources
<b>Domain: Counting and Cardinality</b>		
<b>Know number names and the count sequence</b>	<ul style="list-style-type: none"> <li>• (K.CC.1) Count to 100 by ones and by tens.</li> <li>• (K.CC.2) Count forward beginning from a given number within the known sequence.</li> <li>• (K.CC.3) Write numbers from 0 to 20. Represent a number of objects with a written numeral 0-2- (with 0 representing a count of no objects).</li> </ul>	<p><u>Use:</u></p> <ul style="list-style-type: none"> <li>• counters</li> <li>• number line</li> <li>• 100's chart</li> <li>• manipulatives</li> <li>• songs</li> <li>• rhymes</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>12 Ways to 11</i> by Eve Merriam</li> <li>• <i>3 Little Firefighters</i> by Stuart J. Murphy</li> <li>• <i>Animals on Board</i> by Stuart J. Murphy</li> </ul>
<b>Count to tell the number of objects.</b>	<ul style="list-style-type: none"> <li>• (K.CC.4) Understand the relationship between numbers and quantities; connect counting to cardinality.               <ol style="list-style-type: none"> <li>When counting objects, say the number names in standard order, pairing each object with one and only one number name and each number name with one and only one object.</li> <li>Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted.</li> <li>Understand that each successive number name refers to a quantity that is one larger.</li> </ol> </li> <li>• (K.CC.5) Count to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array or a circle, or</li> </ul>	<p><u>Use:</u></p> <ul style="list-style-type: none"> <li>• counters</li> <li>• number line</li> <li>• 100's chart</li> <li>• manipulatives</li> <li>• songs</li> <li>• rhymes</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>Anno's Counting Book</i> by Mitsumasa Anno</li> <li>• <i>Anno's Counting House</i> by Mitsumasa Anno</li> <li>• <i>Caps For Sale</i> by Esphyr Slobodkina</li> </ul>

Strand	Standard	Examples and Resources
<b>Count to tell the number of objects (cont.)</b>	as many as 10 things in a scattered configuration; given a number from 1-20, count out that many objects.	<ul style="list-style-type: none"> <li>• <i>Changes, Changes</i> by Pat Hutchins</li> </ul>
<b>Compare Numbers</b>	<ul style="list-style-type: none"> <li>• (K.CC.6) Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group (e.g., by using matching counting, or estimating strategies).</li> <li>• (K.CC.7) Compare and order two numbers between 1 and 10 presented as written numerals.</li> </ul>	<u>Literature Connections:</u> <ul style="list-style-type: none"> <li>• <i>Mouse Count</i> by Ellen Stoll Walsh</li> </ul>
<b>Domain: Operations and Algebraic Thinking</b>		
<b>Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from</b>	<ul style="list-style-type: none"> <li>• (K.OA.1) Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.</li> <li>• (K.OA.2) Add or subtract whole numbers to 10 (e.g., by using objects or drawings to solve word problems).</li> <li>• (K.OA.3) Decompose numbers less than or equal to 10 into pairs in more than one way (e.g., by using objects or drawings, and record each decomposition by a drawing or equation).</li> <li>• (K.OA.4) For any number from 1-4, find the number that makes 5 when added to the given number and, for any number from 1-9, find the number that makes 10 when added to the given number (e.g., by using objects, drawings or 10 frames) and record the answer with a drawing or equation.</li> <li>• (K.OA.5) Fluently add and subtract numbers up to 5.</li> </ul>	<u>Examples:</u> <ul style="list-style-type: none"> <li>• (K.OA.3) <math>5 = 2 + 3</math> and <math>5 = 4 + 1</math></li> </ul>
<b>Identify and continue patterns.</b>	<ul style="list-style-type: none"> <li>• (K.OA.6) Recognize, identify and continue simple patterns of color, shape, and size.</li> </ul>	<u>Literature Connections:</u> <ul style="list-style-type: none"> <li>• <i>The Grouchy Ladybug</i> by Eric Carle</li> </ul>
<b>Domain: Number and Operations in Base Ten</b>		
<b>Work with numbers 11-19 to gain foundations for place value</b>	<ul style="list-style-type: none"> <li>• (K.NBT.1) Compose and decompose numbers from 11 to 19 into ten ones and some further ones (e.g., by using objects or drawings) and record each composition and decomposition by a drawing or equation (e.g., <math>18 = 10 + 8</math>); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight or nine ones.</li> </ul>	<u>Use:</u> <ul style="list-style-type: none"> <li>• counters</li> <li>• unifix cubes</li> <li>• snap cubes</li> <li>• drawing</li> </ul> <u>Literature Connections:</u> <ul style="list-style-type: none"> <li>• <i>The Button Box</i> by Margarette Reid</li> <li>• <i>The April Rabbits</i> by David Cleveland</li> </ul>

Strand	Standard	Examples and Resources
<b>Domain: Measurement and Data</b>		
<b>Describe and compare measurable attributes</b>	<ul style="list-style-type: none"> <li>• (K.MD.1) Describe measurable attributes of objects (e.g., length or weight). Match measuring tools to attribute (e.g., ruler to length). Describe several measurable attributes of a single object.</li> <li>• (K.MD.2) Make comparisons between two objects with a measurable attribute in common to see which object has “more or”/”less of” the attribute, and describe the difference.</li> </ul>	<p><u>Examples:</u></p> <ul style="list-style-type: none"> <li>• (K.MD.2) Directly compare the heights of two children and describe one child as taller/shorter.</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>More, Fewer, Less</i> by Tana Hoban</li> <li>• <i>Mighty Maddie</i> by Stuart Murphy</li> </ul>
<b>Classify objects and count the number of objects in each category</b>	<ul style="list-style-type: none"> <li>• (K.MD.3) Classify objects into given categories (attributes). Count the number of objects in each category (limit category counts to be less than or equal to 10).</li> </ul>	<p><u>Use:</u></p> <ul style="list-style-type: none"> <li>• manipulatives</li> <li>• pictures</li> <li>• counters</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>I Spy</i> books by Jean Marzollo &amp; Walter Wick</li> </ul>
<b>Work with time and money</b>	<ul style="list-style-type: none"> <li>• (K.MD.4) Name in sequence the days of the week.</li> <li>• (K.MD.5) Tell time to the hour using both analog and digital clocks.</li> <li>• (K.MD.6) Identify coins by name.</li> </ul>	<p><u>Use:</u></p> <ul style="list-style-type: none"> <li>• real and fake coins</li> <li>• clocks</li> <li>• games</li> <li>• calendars</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>Jesse Bear, What Will You Wear?</i> by Nancy White Carlstrom</li> <li>• <i>Rosie’s Walk</i> by Pat Hutchins</li> <li>• <i>Gingerbread Boy</i> by various authors</li> <li>• <i>My Grandmother’s Clock</i> by Geraldine McCaughrean</li> </ul>
<b>Domain: Geometry</b>		
<b>Identify and describe shapes</b>	<ul style="list-style-type: none"> <li>• (K.G.1) Describe objects in the environment using names of shapes and describe their relative positions (e.g., above, below, beside, in front of, behind, next to).</li> <li>• (K.G.2) Name shapes regardless of their orientation or overall size.</li> <li>• (K.G.3) Identify shapes as two-dimensional (flat) or three-dimensional (solid).</li> </ul>	<p><u>Examples:</u></p> <ul style="list-style-type: none"> <li>• Shapes include squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres.</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>I Spy</i> books by Jean Marzollo &amp; Walter Wick</li> <li>• <i>Splash!</i> by Ann Jonas</li> </ul>

Strand	Standard	Examples and Resources
<p><b>Analyze, compare, create, and compose shapes</b></p>	<ul style="list-style-type: none"> <li>• (K.G.4) Analyze and compare two-and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices), and other attributes (e.g., having sides of equal lengths).</li> <li>• (K.G.5) Build shapes (e.g., using sticks and clay) and draw shapes.</li> <li>• (K.G.6) Put together two-dimensional shapes to form larger shapes (e.g., join two triangles with full sides touching to make a rectangle).</li> </ul>	<p><u>Use:</u></p> <ul style="list-style-type: none"> <li>• geo solids</li> <li>• shape manipulatives</li> <li>• geo boards</li> <li>• blocks</li> <li>• straws</li> <li>• K'NEX™</li> <li>• popsicle sticks</li> <li>• clay/playdough</li> </ul>



# First Grade

**Instructional Focus:**

In Grade 1, instructional time should focus on four critical areas:

- Developing understanding of addition, subtraction, and strategies for addition and subtraction within 20.
- Developing understanding of whole number relationships and place value, including grouping in tens and ones.
- Developing understanding of linear measurement and measuring lengths as iterating length units.
- Reasoning about attributes of, and composing and decomposing geometric shapes.

**Readiness Standards:**

- Students use numbers, including written numerals, to represent quantities and to solve quantitative problems, such as counting objects in a set; counting out a given number of objects; comparing sets or numerals; and modeling simple joining and separating situations with sets of objects, or eventually with equations such as  $5 + 2 = 7$  and  $7 - 2 = 5$ .
- Students describe their physical world using geometric ideas (e.g., shape, orientation, spatial relations) and vocabulary.

*(See Kindergarten Instructional Focus in Appendix)*

## Grade 1 Mathematical Content Standards

Strand	Standard	Examples and Resources
<b>Domain: Counting and Cardinality</b>		
<b>Know ordinal names and counting flexibility</b>	<ul style="list-style-type: none"> <li>• (1.CC.1) Skip count by 2s and 5s.</li> <li>• (1.CC.2) Use ordinal numbers correctly when identifying object position (e.g., first, second, third).</li> <li>• (1.CC.3) Order numbers from 1-100. Demonstrate ability in counting forward and backward.</li> </ul>	<p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>26 Letters and 99 Cents</i> by Tana Hoban</li> <li>• <i>Anno’s Counting Book</i> by Mitsumasa Anno</li> <li>• <i>Anno’s Counting House</i> by Mitsumasa Anno</li> </ul>
<b>Count to tell the number of objects</b>	<ul style="list-style-type: none"> <li>• (1.CC.4) Count a large quantity of objects by grouping into 10s and counting by 10s and 1s to find the quantity.</li> </ul>	<p><u>Use:</u></p> <ul style="list-style-type: none"> <li>• counters</li> <li>• number grids</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>One Hundred Hungry Ants</i> by Elinor Pinczes</li> </ul>
<b>Compare numbers</b>	<ul style="list-style-type: none"> <li>• (1.CC.5) Use the symbols for greater than, less than or equal to when comparing two numbers or groups of objects.</li> <li>• (1.CC.6) Estimate how many and how much in a given set to 20 and then verify estimate by counting.</li> </ul>	<p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>More or Less</i> by Stuart Murphy</li> <li>• <i>Alfie the Alligator</i> by Sandy Turley</li> <li>• <i>Greater-Than Gator and Less-Than Lovebird</i> by Rachel Warren-Stauffer</li> </ul>

Strand	Standard	Examples and Resources
<b>Domain: Operations and Algebraic Thinking</b>		
<b>Represent and solve problems involving addition and subtraction</b>	<ul style="list-style-type: none"> <li>• (1.OA.1) Use addition and subtraction strategies to solve word problems (using numbers up to 20), involving situations of adding to, taking from, putting together, taking apart and comparing, with unknowns in all positions, using a number line (e.g., by using objects, drawings and equations). Record and explain using equation symbols and a symbol for the unknown number to represent the problem.</li> <li>• (1.OA.2) Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20 (e.g., by using objects, drawings and equations). Record and explain using equation symbols and a symbol for the unknown number to represent the problem.</li> </ul>	<p><u>Use:</u></p> <ul style="list-style-type: none"> <li>• counters</li> <li>• unifix cubes</li> <li>• connecting cubes</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>City By Numbers</i> by Stephen Johnson</li> <li>• <i>The Great Pet Sale</i> by Mick Inkpen</li> </ul>
<b>Understand and apply properties of operations and the relationship between addition and subtraction</b>	<ul style="list-style-type: none"> <li>• (1.OA.3) Apply properties of operations as strategies to add and subtract (students need not know the name of the property).</li> <li>• (1.OA.4) Understand subtraction as an unknown-addend problem.</li> </ul>	<p><u>Examples:</u></p> <ul style="list-style-type: none"> <li>• (1.OA.3) If <math>8 + 3 = 11</math> is known, then <math>3 + 8 = 11</math> is also known (commutative property of addition). To add <math>2 + 6 + 4</math>, the second two numbers can be added to make a ten, so <math>2 + 6 + 4 = 2 + 10 = 12</math> (associative property of addition). Demonstrate that when adding zero to any number, the quantity does not change (identity property of addition).</li> <li>• (1.OA.4) Subtract <math>10 - 8</math> by finding the number that makes 10 when added to 8.</li> </ul>
<b>Add and subtract using numbers up to 20</b>	<ul style="list-style-type: none"> <li>• (1.OA.5) Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).</li> <li>• (1.OA.6) Add and subtract using numbers up to 20, demonstrating fluency for addition and subtraction up to 10. Use strategies such as: <ul style="list-style-type: none"> <li>✓ counting on</li> <li>✓ making ten (<math>8 + 6 = 8 + 2 + 4 = 10 + 4 = 14</math>)</li> <li>✓ decomposing a number leading to a ten (<math>13 - 4 = 13 - 3 - 1 = 10 - 1 = 9</math>)</li> <li>✓ using the relationship between addition and subtraction, such as fact families, (<math>8 + 4 = 12</math> and <math>12 - 8 = 4</math>)</li> <li>✓ creating equivalent but easier or known sums (e.g., adding <math>6 + 7</math> by creating the known equivalent <math>6 + 6 + 1 = 12 + 1 = 13</math>).</li> </ul> </li> </ul>	<p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>20 is Too Many</i> By Kate Duke</li> <li>• <i>Pigs on a Blanket</i> by Amy Axelford</li> </ul>

Strand	Standard	Examples and Resources
<b>Work with addition and subtraction equations</b>	<ul style="list-style-type: none"> <li>• (1.OA.7) Understand the meaning of the equal sign (e.g., read equal sign as “same as”) and determine if equations involving addition and subtraction are true or false.</li> <li>• (1.OA.8) Determine the unknown whole number in an addition or subtraction equation.</li> </ul>	<p><u>Examples:</u></p> <ul style="list-style-type: none"> <li>• (1.OA.7) Which of the following equations are true and which are false? (<math>6 = 6</math>, <math>7 = 8 - 1</math>, <math>5 + 2 = 2 + 5</math>, <math>4 + 1 = 5 + 2</math>).</li> <li>• (1.OA.8) Determine the unknown number that makes the equation true in each of the equations (<math>8 + ? = 11</math>, <math>6 + 6 = ?</math>, <math>5 = ? - 3</math>).</li> </ul>
<b>Identify and continue patterns</b>	<ul style="list-style-type: none"> <li>• (1.OA.9) Identify, continue and label patterns (e.g., aabb, abab). Create patterns using number, shape, size, rhythm or color.</li> </ul>	<p><u>Use:</u></p> <ul style="list-style-type: none"> <li>• pattern blocks</li> <li>• manipulatives</li> <li>• quilt patterns</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>Pattern Bugs</i> by Trudy Harris</li> <li>• <i>A-B-A-B-A A Book of Pattern Play</i> by Brian Cleary</li> <li>• <i>Mr. Noisy’s Book of Patterns</i> by Rozanne Lanczak</li> </ul>
<b>Domain: Number and Operations in Base Ten</b>		
<b>Extend the counting sequence</b>	<ul style="list-style-type: none"> <li>• (1.NBT.1) Count to 120. In this range, read, write and order numerals and represent a number of objects with a written numeral.</li> </ul>	<p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>Let’s Count</i> by Tana Hoban</li> </ul>
<b>Understand place value</b>	<ul style="list-style-type: none"> <li>• (1.NBT.2) Model and identify place value positions of two digit numbers. Include: <ul style="list-style-type: none"> <li>a) 10 can be thought of as a bundle of ten ones, called a “ten.”</li> <li>b) The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight or nine ones.</li> <li>c) The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90, refer to one, two, three, four, five, six, seven, eight or nine tens (and 0 ones).</li> </ul> </li> <li>• (1.NBT.3) Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols <math>&gt;</math>, <math>=</math>, <math>&lt;</math>.</li> </ul>	<p><u>Use:</u></p> <ul style="list-style-type: none"> <li>• bundled straws</li> <li>• place value cards</li> <li>• place value flip charts</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>The Father Who Had Ten Children</i> by Benedicte Guettier</li> <li>• <i>The Warlord’s Beads</i> by Virginia Pilegard</li> </ul>

Strand	Standard	Examples and Resources
<p><b>Use place value understanding and properties of operations to add and subtract</b></p>	<ul style="list-style-type: none"> <li>• (1.NBT.4) Add using numbers up to 100 including adding a two-digit number and a one-digit number and adding a two-digit number and a multiple of 10. Use:               <ul style="list-style-type: none"> <li>✓ concrete models or drawings and strategies based on place value.</li> <li>✓ properties of operations.</li> <li>✓ and/or relationship between addition and subtraction.</li> </ul>               Relate the strategy to a written method and explain the reasoning used. Demonstrate in adding two-digit numbers, ten and tens are added, ones and ones are added and sometimes it is necessary too compose a ten from ten ones.             </li> <li>• (1.NBT.5) Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.</li> <li>• (1.NBT.6) Subtract multiples of 10 up to 100. Use:               <ul style="list-style-type: none"> <li>✓ concrete models or drawings and strategies based on place value.</li> <li>✓ properties of operations.</li> <li>✓ and/or relationship between addition and subtraction.</li> </ul>               Relate the strategy to a written method and explain the reasoning used.             </li> </ul>	
<p><b>Domain: Measurement and Data</b></p>		
<p><b>Measure lengths indirectly and by iterating length units</b></p>	<ul style="list-style-type: none"> <li>• (1.MD.1) Measure and compare three objects using standard or non-standard units.</li> <li>• (1.MD.2) Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps.</li> </ul>	<p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>How Big Is a Foot?</i> by Rolf Myller</li> <li>• <i>How Many Feet in the Bed?</i> by Diane Johnston Hamm</li> <li>• <i>Jim and the Beanstalk</i> by Raymond Briggs</li> </ul>
<p><b>Work with time and money</b></p>	<ul style="list-style-type: none"> <li>• (1.MD.3) Tell and write time in half hours using both analog and digital clocks.</li> <li>• (1.MD.4) Read a calendar distinguishing yesterday, today and tomorrow. Read and write a date.</li> <li>• (1.MD.5) Recognize and read money symbols including \$ and ¢.</li> </ul>	<p><u>Use:</u></p> <ul style="list-style-type: none"> <li>• real coins</li> <li>• daily calendar activities</li> <li>• daily activity time charts</li> <li>• sorting maps</li> <li>• Double Bubble Thinking Maps</li> </ul>

Strand	Standard	Examples and Resources
<b>Work with time and money (cont.)</b>	<ul style="list-style-type: none"> <li>• (1.MD.6) Identify values of coins (e.g., nickel = 5 cents, quarter = 25 cents). Identify equivalent values of coins up to \$1 (e.g., 5 pennies = 1 nickel, 5 nickels = 1 quarter).</li> </ul>	<u>Literature Connections:</u> <ul style="list-style-type: none"> <li>• <i>Follow the Money!</i> by Loreen Leedy</li> <li>• <i>It's About Time, Max!</i> by Kitty Richards</li> <li>• <i>Just Enough Carrots</i> by Stuart Murphy</li> </ul>
<b>Represent and interpret data</b>	<ul style="list-style-type: none"> <li>• (1.MD.7) Organize, represent and interpret data with up to three categories. Ask and answer comparison and quantity questions about the data.</li> </ul>	
<b>Domain: Geometry</b>		
<b>Reason with shapes and their attributes.</b>	<ul style="list-style-type: none"> <li>• (1.G.1) Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes. Identify shapes that have non-defining attributes (e.g., color, orientation, overall size). Build and draw shapes given specified attributes.</li> <li>• (1.G.2) Compose (put together) two-dimensional or three-dimensional shapes to create a larger, composite shape, and compose new shapes from the composite shape.</li> <li>• (1.G.3) Partition circles and rectangles into two and four equal shares. Describe the shares using the words, <i>halves</i>, <i>fourths</i>, and <i>quarters</i> and phrases <i>half of</i>, <i>fourth of</i> and <i>quarter of</i>. Describe the whole as two of or four of the shares. Understand for these examples that decomposing (break apart) into more equal shares create smaller shares.</li> </ul>	<u>Use:</u> <ul style="list-style-type: none"> <li>• pattern blocks</li> <li>• tangrams</li> </ul> <u>Literature Connections:</u> <ul style="list-style-type: none"> <li>• <i>Three Pigs, One Wolf &amp; Seven Magic Shapes</i> by Grace Maccarone</li> <li>• <i>Each Orange had 8 Slices</i> by Paul Giganti Jr.</li> <li>• <i>Cubes, Cones, Cylinders &amp; Spheres</i> by Tana Hoban</li> <li>• <i>Eating Fractions</i> by Brice McMillan</li> <li>• <i>Ed Emberley's Picture</i> by Ed Emberley</li> <li>• <i>Round is a Mooncake: A Book of Shapes</i> by Roseanne Thong</li> </ul>



# Second Grade

**Instructional Focus:**

In Grade 2, instructional time should focus on four critical areas:

- Extending understanding of base-ten notation.
- Building fluency with addition and subtraction.
- Using standard units of measure.
- Describing and analyzing shapes.

**Readiness Standards:**

- Students develop strategies for adding and subtracting whole numbers based on their prior work with small numbers.
- Students develop, discuss, and use efficient, accurate, and generalizable methods to add within 100 and subtract multiples of 10.
- Students develop an understanding of the meaning and processes of measurement, including underlying concepts such as iterating (the mental activity of building up the length of an object with equal-sized units) and the transitivity principle for indirect measurement.
- Students compose and decompose plane or solid figures (e.g., put two triangles together to make a quadrilateral) and build understanding of part-whole relationships as well as the properties of the original and composite shapes.

*(See First Grade Instructional Focus in Appendix)*

## Grade 2 Mathematical Content Standards

Strand	Standard	Examples and Resources
<b>Domain: Operations and Algebraic Thinking</b>		
<b>Represent and solve problems involving addition and subtraction</b>	<ul style="list-style-type: none"> <li>• (2.OA.1) Use addition and subtraction strategies to estimate, then solve one- and two-step word problems (using numbers up to 100) involving situation of adding to, taking from, putting together, taking apart and comparing, with unknowns in all positions (e.g., by using objects, drawings and equations). Record and explain using equation symbols and a symbol for the unknown number to represent the problem.</li> </ul>	<p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>Only One</i> by Marc Harshman</li> </ul>
<b>Add and subtract using numbers up to 20</b>	<ul style="list-style-type: none"> <li>• (2.OA.2) Fluently add and subtract using numbers up to 20 using mental strategies. Know from memory all sums of two one-digit numbers.</li> </ul>	<p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>Hershey's Kisses Subtraction Book</i> by Jerry Pallotta</li> <li>• <i>The Big Buck Adventure</i> by Shelley Gill</li> </ul>

Strand	Standard	Examples and Resources
<b>Work with equal groups of objects to gain foundations for multiplication</b>	<ul style="list-style-type: none"> <li>• (2.OA.3) Determine whether a group of objects (up to 20) is odd or even (e.g., by pairing objects and comparing, counting by 2s). Model an even number as two equal groups of objects and then write an equation as a sum of two equal addends.</li> <li>• (2.OA.4) Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns. Write an equation to express the total as repeated addition (e.g., array of 4 by 5 would be <math>5 + 5 + 5 + 5 = 20</math>).</li> </ul>	<p><u>Use:</u></p> <ul style="list-style-type: none"> <li>• graph paper</li> <li>• counters</li> <li>• manipulatives</li> </ul>
<b>Identify and continue patterns</b>	<ul style="list-style-type: none"> <li>• (2.OA.5) Identify, continue and label number patterns (e.g., aabb, abab). Describe a rule that determines and continues a sequence or pattern.</li> </ul>	<p><u>Use:</u></p> <ul style="list-style-type: none"> <li>• pattern blocks</li> <li>• 100's chart</li> </ul>
<b>Domain: Number and Operations in Base Ten</b>		
<b>Understand place value</b>	<ul style="list-style-type: none"> <li>• (2.NBT.1) Model and identify place value positions of three digit numbers. Include: <ul style="list-style-type: none"> <li>a. 100 can be thought of as a bundle of ten tens – called a “hundred.”</li> <li>b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or none hundreds (and 0 tens and 0 ones).</li> </ul> </li> <li>• (2.NBT.2) Count up to 1000, skip-count by 5s, 10s and 100s.</li> <li>• (2.NBT.3) Read, write, order up to 1000 using base-ten numerals, number names and expanded form.</li> <li>• (2.NBT.4) Compare two three-digit numbers based on the meanings of the hundreds, tens and ones digits, using <math>&gt;</math>, <math>=</math>, <math>&lt;</math> symbols to record the results.</li> </ul>	<p><u>Use:</u></p> <ul style="list-style-type: none"> <li>• counters</li> <li>• hundreds chart</li> <li>• number lines</li> <li>• unifix cubes</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>One Hundred Hungry Ants</i> by Elinor Pinczes</li> <li>• <i>Pigs will be Pigs</i> by Amy Axelrod</li> <li>• <i>The Grapes of Math</i> by Greg Tang</li> </ul>
<b>Use place value understanding and properties of operations to add and subtract</b>	<ul style="list-style-type: none"> <li>• (2.NBT.5) Fluently add and subtract using numbers up to 100. Use: <ul style="list-style-type: none"> <li>✓ strategies based on place value,</li> <li>✓ properties of operations,</li> <li>✓ and/or the relationship between addition and subtraction.</li> </ul> </li> <li>• (2.NBT.6) Add up to four two-digit numbers using strategies based on place value and properties of operations.</li> </ul>	<p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>A Place for Zero: A Math Adventure</i> by Angeline Sparagna Lopresti</li> <li>• <i>A Remainder of One</i> by Elinor J. Pinczes</li> <li>• <i>Hershey's Kisses Subtraction Book</i> by Jerry Pallotta</li> </ul>

Strand	Standard	Examples and Resources
<p><b>Use place value understanding and properties of operations to add and subtract (cont.)</b></p>	<ul style="list-style-type: none"> <li>• (2.NBT.7) Add and subtract using numbers up to 1000. Use:               <ul style="list-style-type: none"> <li>✓ concrete models or drawings and strategies based on place value,</li> <li>✓ properties of operations,</li> <li>✓ and/or relationship between addition and subtraction.</li> </ul> <p>Relate the strategy to a written method and explain the reasoning used. Demonstrate in adding or subtracting three-digit numbers, hundreds and hundreds are added or subtracted, tens and tens are added or subtracted, ones and ones are added or subtracted and sometimes it is necessary to compose a ten from ten ones or a hundred from ten tens.</p> </li> <li>• (2.NBT.8) Mentally add 10 or 100 to a given number 100-900 and mentally subtract 10 or 100 from a given number.</li> <li>• (2.NBT.9) Explain or illustrate the processes of addition or subtraction and their relationship using place value and the properties of operations.</li> </ul>	
<p><b>Domain: Measurement and Data</b></p>		
<p><b>Measure and estimate lengths in standard units</b></p>	<ul style="list-style-type: none"> <li>• (2.MD.1) Measure the length of an object by selecting and using standard tools such as rulers, yardsticks, meter sticks, and measuring tapes.</li> <li>• (2.MD.2) Measure the length of an object twice using different length units for the two measurements. Describe how the two measurements relate to the size of the units chosen.</li> <li>• (2.MD.3) Estimate, measure and draw lengths using whole units of inches, feet, yards, centimeters and meters.</li> <li>• (2.MD.4) Measure to compare lengths of two objects, expressing the difference in terms of a standard length unit.</li> </ul>	<p><u>Use:</u></p> <ul style="list-style-type: none"> <li>• meter sticks</li> <li>• rulers</li> <li>• yard sticks</li> <li>• measuring tape</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>Measuring Penny</i> by Loreen Leedy</li> <li>• <i>Millions to Measure</i> by David M. Schwartz</li> </ul>
<p><b>Relate addition and subtraction to length</b></p>	<ul style="list-style-type: none"> <li>• (2.MD.5) Solve addition and subtraction word problems using numbers up to 100 involving length that are given in the same units (e.g., by using drawings of rulers). Write an equation with a symbol for the unknown to represent the problem.</li> <li>• (2.MD.6) Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram.</li> </ul>	<p><u>Use:</u></p> <ul style="list-style-type: none"> <li>• number lines</li> <li>• 100's chart</li> <li>• graph paper</li> <li>• counters</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>On Beyond a Million: An Amazing Math Journey</i> by David M. Schwartz</li> </ul>

Strand	Standard	Examples and Resources
Work with time and money	<ul style="list-style-type: none"> <li>• (2.MD.7) Tell and write time to the nearest five minutes using a.m. and p.m. from analog and digital clocks.</li> <li>• (2.MD.8) Solve word problems involving dollar bills and coins using the \$ and ¢ symbols appropriately.</li> </ul>	<p><u>Use:</u></p> <ul style="list-style-type: none"> <li>• clocks</li> <li>• real and fake money</li> <li>• store advertisements</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>Alexander, Who Used to Be Rich Last Sunday</i> by Judith Viorst</li> <li>• <i>Pigs Go to Market: Fun with Math and Shopping</i> by Amy Axelrod</li> <li>• <i>Pigs in the Pantry: Fun with Math and Cooking</i> by Amy Axelrod</li> <li>• <i>Sold! A Mathematics Adventure</i> by Nathan Zimelman</li> </ul>
Represent and interpret data	<ul style="list-style-type: none"> <li>• (2.MD.9) Collect, record, interpret, represent, and describe data in a table, graph or line plot.</li> <li>• (2.MD.10) Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put together, take-apart and compare problems using information presented in a bar graph.</li> </ul>	<p><u>Use:</u></p> <ul style="list-style-type: none"> <li>• graph paper</li> <li>• informational text</li> <li>• cubes</li> <li>• pattern blocks</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>One Grain of Rice: A Mathematical Folktale</i> by Demi</li> <li>• <i>Pattern: (Math Counts)</i> by Henry Pluckrose</li> </ul>
<b>Domain: Geometry</b>		
Reason with shapes and their attributes	<ul style="list-style-type: none"> <li>• (2.G.1) Identify and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces compared visually, not by measuring. Identify triangles, quadrilaterals, pentagons, hexagons and cubes.</li> <li>• (2.G.2) Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.</li> <li>• (2.G.3) Partition circles and rectangles into shares, describe the shares using the words <i>halves</i>, <i>thirds</i>, <i>half of</i>, <i>a third of</i>, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.</li> </ul>	<p><u>Use:</u></p> <ul style="list-style-type: none"> <li>• geo shapes</li> <li>• geo boards</li> <li>• geo solids</li> <li>• blocks</li> <li>• straws</li> <li>• popsicle sticks</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>Shapes, Shapes, Shapes</i> by Tana Hoban</li> <li>• <i>The Art of Shapes: For Children and Adults</i> by Margaret Steele</li> <li>• <i>The Greedy Triangle</i> by Marilyn Burns</li> <li>• <i>Three Pigs, One Wolf, &amp; Seven Magic Shapes</i> by Grace MacCrone</li> </ul>



# Third Grade

**Instructional Focus:**

In Grade 3, instructional time should focus on four critical areas:

- Developing understanding of multiplication and division and strategies for multiplication and division within 100.
- Developing understanding of fractions, especially unit fractions (fractions with numerator 1).
- Developing understanding of the structure of rectangular arrays and of area.
- Describing and analyzing two-dimensional shapes.

**Readiness Standards:**

- Students extend their understanding of base-ten system. This includes ideas of counting in fives, tens, and multiples of hundreds, tens, and ones, as well as number relationships involving these units, including comparing.
- Students use their understanding of addition to develop fluency with addition and subtraction within 100.
- Students recognize the need for standard units of measure (centimeter and inch) and they use rulers and other measurement tools with the understanding that linear measure involves an iteration of units.
- Students describe and analyze shapes by examining their sides and angles. Students investigate, describe, and reason about decomposing and combining shapes to make other shapes.

*(See Second Grade Instructional Focus in Appendix)*

## Grade 3 Mathematical Content Standards

Strand	Standard	Examples and Resources
<b>Domain: Operations and Algebraic Thinking</b>		
<p><b>Represent and solve problems involving multiplication and division</b></p>	<ul style="list-style-type: none"> <li>• (3.OA.1) Interpret products of whole numbers (e.g., interpret <math>5 \times 7</math> as the total number of objects in 5 groups of 7 objects each).</li> <li>• (3.OA.2) Interpret whole-number quotients of whole numbers (e.g., interpret <math>56 \div 8</math> as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each).</li> <li>• (3.OA.3) Use multiplication and division numbers up to 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem).</li> <li>• (3.OA.4) Determine the unknown whole number in a multiplication or division equation relating three whole numbers.</li> </ul>	<p><u>Examples:</u></p> <ul style="list-style-type: none"> <li>• (3.OA.1) Show objects in rectangular arrays or describe a context in which a total number of objects can be expressed as <math>5 \times 7</math>.</li> <li>• (3.OA.2) Deconstruct rectangular arrays or describe a context in which a number of shares or a number of groups can be expressed as <math>56 \div 8</math>.</li> <li>• (3.OA.4) Determine the unknown number that makes the equation true in each of the equations (<math>8 \times ? = 48</math>, <math>5 = ? \div 3</math>, <math>6 \times 6 = ?</math>).</li> </ul>

Strand	Standard	Examples and Resources
<p><b>Understand properties of multiplication and the relationship between multiplication and division</b></p>	<ul style="list-style-type: none"> <li>• (3.OA.5) Make, test, support, draw conclusions, and justify conjectures about properties of operations as strategies to multiply and divide (students need not use formal terms for these properties). <ul style="list-style-type: none"> <li>✓ Commutative property of multiplication: If <math>6 \times 4 = 24</math> is known, then <math>4 \times 6 = 24</math> is also known.</li> <li>✓ Associative property of multiplication: <math>3 \times 5 \times 2</math> can be found by <math>3 \times 5 = 15</math>, then <math>15 \times 2 = 30</math>, or by <math>5 \times 2 = 10</math>, then <math>3 \times 10 = 30</math>.</li> <li>✓ Distributive property: Knowing that <math>8 \times 5 = 40</math> and <math>8 \times 2 = 16</math>, one can find <math>8 \times 7</math> as <math>8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56</math>.</li> <li>✓ Inverse property (relationship) of multiplication and division.</li> </ul> </li> <li>• (3.OA.6) Understand division as an unknown-factor problem.</li> </ul>	<p><u>Examples:</u></p> <ul style="list-style-type: none"> <li>• (3.OA.6) Find <math>32 \div 8</math> by finding the number that makes 32 when multiplied by 8.</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>The I Hate Mathematics! Book</i> by Marilyn Burns</li> <li>• <i>The King's Chessboard</i> by David Birch</li> </ul>
<p><b>Multiply and divide up to 100</b></p>	<ul style="list-style-type: none"> <li>• (3.OA.7) Fluently multiply and divide numbers up to 100, using strategies such as the relationship between multiplication and division (e.g., knowing that <math>8 \times 5 = 40</math>, one knows <math>40 \div 5 = 8</math>) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.</li> </ul>	<p><u>Use:</u></p> <ul style="list-style-type: none"> <li>• counters</li> <li>• graph paper</li> <li>• arrays</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>Hershey's Mik Chocolate Multiplication Book</i> by Jerry Pallotta</li> <li>• <i>M&amp;M's Brand Chocolate Candies Math</i> by Barbara McGrath</li> <li>• <i>Movin' Through Multiplication</i> by Karen Allen</li> </ul>
<p><b>Solve problems involving the four operations, and identify and explain patterns in arithmetic</b></p>	<ul style="list-style-type: none"> <li>• (3.OA.8) Solve and create two-step word problems using any of the four operations. Represent these problems using equations with a symbol (box, circle, question mark) standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.</li> <li>• (3.OA.9) Identify arithmetic patterns (including patterns in the addition table or multiplication table) and explain them using properties of operations.</li> </ul>	<p><u>Examples:</u></p> <ul style="list-style-type: none"> <li>• (3.OA.9) Observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>Who Sank the Boat?</i> by Pamela Allen</li> </ul>

Strand	Standard	Examples and Resources
<b>Domain: Number and Operations in Base Ten</b>		
Use place value understanding and properties of operations to perform multi-digit arithmetic	<ul style="list-style-type: none"> <li>• (3.NBT.1) Use place value understanding to round whole numbers to the nearest 10 or 100.</li> <li>• (3.NBT.2) Use strategies and/or algorithms to fluently add and subtract with numbers up to 1000, demonstrating understanding of place value, properties of operations, and/or the relationship between addition and subtraction.</li> <li>• (3.NBT.3) Multiply one-digit whole numbers by multiples of 10 in the range 10-90 (e.g., <math>9 \times 80</math>, <math>10 \times 60</math>) using strategies based on place value and properties of operations.</li> </ul>	<p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>The Best of Times</i> by Gregory Tang</li> <li>• <i>Anno's Mysterious Multiplying Jar</i> by Masaichiro &amp; Mitsumasa Anno</li> <li>• <i>If You Made a Million</i> by David M. Schwartz</li> </ul>
<b>Domain: Numbers and Operations – Fractions</b> (Limited in this grade to fractions with denominators 2, 3, 4, 6, and 8)		
Develop understanding of fractions as numbers	<ul style="list-style-type: none"> <li>• (3.NF.1) Understand a fraction <math>1/b</math> (e.g., <math>1/4</math>) as the quantity formed by 1 part when a whole is partitioned into <math>b</math> (e.g., 4) equal parts; understand a fraction <math>a/b</math> (e.g., <math>2/4</math>) as the quantity formed by <math>a</math> (e.g., 2) parts of size <math>1/b</math> (e.g., <math>1/4</math>).</li> <li>• (3.NF.2) Understand a fraction as a number on the number line; represent fractions on a number line diagram. <ul style="list-style-type: none"> <li>a. Represent a fraction <math>1/b</math> (e.g., <math>1/4</math>) on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into <math>b</math> (e.g., 4) equal parts. Recognize that each part has size <math>1/b</math> (e.g., <math>1/4</math>) and that the endpoint of the part based at 0 locates the number <math>1/b</math> (e.g., <math>1/4</math>) on the number line.</li> <li>b. Represent a fraction <math>a/b</math> (e.g., <math>2/8</math>) on a number line diagram or ruler by marking off a lengths <math>1/b</math> (e.g., <math>1/8</math>) from 0. Recognize that the resulting interval has size <math>a/b</math> (e.g., <math>2/8</math>) and that its endpoint locates the number <math>a/b</math> (e.g., <math>2/8</math>) on the number line.</li> </ul> </li> <li>• (3.NF.3) Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. <ul style="list-style-type: none"> <li>a. Understand two fractions as equivalent if they are the same size (modeled) or the same point on a number line.</li> <li>b. Recognize and generate simple equivalent fractions (e.g., <math>1/2 = 2/4</math>, <math>4/6 = 2/3</math>). Explain why the fractions are equivalent (e.g., by using a visual fraction model).</li> </ul> </li> </ul>	<p><u>Examples:</u></p> <ul style="list-style-type: none"> <li>• (3.NF.3c) Express 3 in the form <math>3 = 3/1</math>; recognize that <math>6/1 = 6</math>; locate <math>4/4</math> and 1 at the same point of a number line diagram.</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>Eating Fractions</i> by Bruce McMillan</li> <li>• <i>Lao Lao of Dragon Mountain</i> by Margaret Bateson Hill</li> </ul>

Strand	Standard	Examples and Resources
Develop understanding of fractions as numbers (cont.)	<ul style="list-style-type: none"> <li>c. Express and model whole numbers as fractions, and recognize and construct fractions that are equivalent to whole numbers.</li> <li>• Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols <math>&gt;</math>, <math>=</math>, or <math>&lt;</math>, and justify the conclusions (e.g., by using a visual fraction model).</li> </ul>	
<b>Domain: Measurement and Data</b>		
Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects	<ul style="list-style-type: none"> <li>• (3.MD.1) Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes or hours (e.g., by representing the problem on a number line diagram or clock).</li> <li>• (3.MD.2) Estimate and measure liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). (Excludes compound units such as <math>\text{cm}^3</math> and finding the geometric volume of a container.) Add, subtract, multiply, or divide to solve and create one-step word problems involving masses or volumes that are given in the same units (e.g., by using drawings, such as a beaker with a measurement scale, to represent the problem). (Excludes multiplicative comparison problems [problems involving notions of “times as much.”]).</li> <li>• (3.MD.3) Select an appropriate unit of English, metric, or non-standard measurement to estimate the length, time, weight, or temperature.</li> </ul>	
Represent and interpret data	<ul style="list-style-type: none"> <li>• (3.MD.4) Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs.</li> <li>• (3.MD.5) Measure and record lengths using rulers marked with halves and fourths of an inch. Make a line plot with the data, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.</li> <li>• (3.MD.6) Explain the classification of data from real-world problems shown in graphical representations. Use the terms minimum and maximum.</li> </ul>	<p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>• (3.MD.4) Draw a bar graph in which each square in the bar graph might represent 5 pets.</li> </ul> <p><b>Literature Connections:</b></p> <ul style="list-style-type: none"> <li>• <i>How Big Is a Foot?</i> by Rolf Myller</li> <li>• <i>Millions to Measure</i> by David M. Schwartz</li> <li>• <i>A Million Fish... More or Less</i> by Patricia C. McKissack</li> <li>• <i>Anno's Magic Seeds</i> by Mitsumasa Anno</li> <li>• <i>On Beyond a Million: An Amazing Math Journey</i> by David M. Schwartz</li> </ul>

Strand	Standard	Examples and Resources
<p><b>Geometric measurement: understand concepts of area and relate area to multiplication and to addition</b></p>	<ul style="list-style-type: none"> <li>• (3.MD.7) Recognize area as an attribute of plane figures and understand concepts of area measurement.               <ol style="list-style-type: none"> <li>a. A square with side length 1 unit is said to have “one square unit” and can be used to measure area.</li> <li>b. Demonstrate that a plane figure which can be covered without gaps or overlaps by <math>n</math> (e.g., 6) unit squares is said to have an area of <math>n</math> (e.g., 6) square units.</li> </ol> </li> <li>• (3.MD.8) Measure areas by tiling with unit squares (square centimeters, square meters, square inches, square feet, and improvised units).</li> <li>• (3.MD.9) Relate area to the operations of multiplication and addition.               <ol style="list-style-type: none"> <li>a. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.</li> <li>b. Multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.</li> <li>c. Use area models (rectangular arrays) to represent the distributive property in mathematical reasoning. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths <math>A</math> and <math>B + C</math> is the sum of <math>A \times B</math> and <math>A \times C</math>.</li> <li>d. Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.</li> </ol> </li> </ul>	<p><u>Examples:</u></p> <ul style="list-style-type: none"> <li>• (3.MD.9a) After tiling rectangles, develop a rule for finding the area of any rectangle.</li> <li>• (3.MD.9d) The area of a 7 by 8 rectangle can be determined by decomposing it into a 7 by 3 rectangle and a 7 by 5 rectangle.</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>Ben Franklin and the Magic Squares</i> by Frank Murphy</li> <li>• <i>Math-terpieces: The Art of Problem-Solving</i> by Greg Tang</li> <li>• <i>Sir Cumference and the Great Knight of Angleland</i> by Cindy Neuschwander</li> </ul>
<p><b>Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures</b></p>	<ul style="list-style-type: none"> <li>• (3.MD.10) Solve real world and mathematical problems involving perimeters of polygons, including:               <ul style="list-style-type: none"> <li>✓ finding the perimeter given the side lengths,</li> <li>✓ finding an unknown side length,</li> <li>✓ exhibiting rectangles with the same perimeter and different areas, and</li> <li>✓ exhibiting rectangles with the same area and different perimeters.</li> </ul> </li> </ul>	<p><u>Use:</u></p> <ul style="list-style-type: none"> <li>• geo solids</li> <li>• geo boards</li> <li>• graph paper</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>The Art of Shapes: For Children and Adults</i> by Margaret Steele</li> <li>• <i>Cubes, Cones, Cylinders, &amp; Spheres</i> by Tana Hoban</li> </ul>

Strand	Standard	Examples and Resources
<b>Domain: Geometry</b>		
Reason with shapes and their attributes	<ul style="list-style-type: none"> <li>• (3.G.1) Categorize shapes by different attribute classifications and recognize that shared attributes can define a larger category. Generalize to create examples or non-examples.</li> <li>• (3.G.2) Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole.</li> </ul>	<p><u>Examples:</u></p> <ul style="list-style-type: none"> <li>• (3.G.2) Partition a shape into 4 parts with equal area, and describe the area of each part as <math>\frac{1}{4}</math> of the area of the shape.</li> </ul>



# Fourth Grade

## Instructional Focus:

In grade 4, instructional time should focus on three critical areas:

- Developing understanding and fluency with multi-digit multiplication, and developing understanding of dividing to find quotients involving multi-digit dividends.
- Developing an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers.
- Understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, and symmetry.

## Readiness Standards:

- Students develop an understanding of the meanings of multiplication and division of whole numbers through activities and problems involving equal-sized groups, arrays, and area models; multiplication is finding an unknown product, and division is finding an unknown factor in these situations.
- Students develop an understanding of fractions, beginning with unit fractions.
- Students recognize area as an attribute of two-dimensional regions.
- Students describe, analyze, and compare properties of two-dimensional shapes.

*(See Third Grade Instructional Focus in Appendix)*

## Grade 4 Mathematical Content Standards

Strand	Standard	Examples and Resources
<b>Domain: Operations and Algebraic Thinking</b>		
<p><b>Use the four operations with whole numbers to solve problems</b></p>	<ul style="list-style-type: none"> <li>• (4.OA.1) Interpret a multiplication equation as a comparison (e.g., interpret <math>35 = 5 \times 7</math> as a statement that 35 is 5 groups of 7 and 7 groups of 5). (Commutative property) Represent verbal statements of multiplicative comparisons as multiplication equations (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem or missing numbers in an array).</li> <li>• (4.OA.2) Multiply or divide to solve word problems involving multiplicative comparison. Distinguish multiplicative comparison from additive comparison.</li> <li>• (4.OA.3) Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.</li> </ul>	<p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>The I Hate Mathematics! Book</i> by Marilyn Burns</li> <li>• <i>The Everything Kids' Joke Book: Side-Splitting, Rib-Tickling Fun</i> by Michael Dahl</li> </ul>

Strand	Standard	Examples and Resources
Gain familiarity with factors and multiples	<ul style="list-style-type: none"> <li>• (4.OA.4)               <ul style="list-style-type: none"> <li>✓ Find all factor pairs for a whole number in the range 1–100.</li> <li>✓ Explain the correlation/differences between multiples and factors.</li> <li>✓ Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number.</li> <li>✓ Determine whether a given whole number in the range 1–100 is prime or composite.</li> </ul> </li> </ul>	<p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>The History of Counting</i> by Denise Schmandt-Besserat</li> <li>• <i>12 Ways to Get to 11</i> by Eve Merriam</li> </ul>
Generate and analyze patterns	<ul style="list-style-type: none"> <li>• (4.OA.5) Generate a number, shape pattern, table, t-chart, or input/output function that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. Be able to express the pattern in algebraic terms.</li> <li>• (4.OA.6) Extend patterns that use addition, subtraction, multiplication, division or symbols, up to 10 terms, represented by models (function machines), tables, sequences, or in problem situations.</li> </ul>	<p><u>Examples:</u></p> <ul style="list-style-type: none"> <li>• (4.OA.5) Given the rule “Add 3” and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.</li> </ul>
<b>Domain: Number and Operations in Base Ten</b>		
Generalize place value understanding for multi-digit whole numbers	<ul style="list-style-type: none"> <li>• (4.NBT.1) Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.</li> <li>• (4.NBT.2) Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on the value of the digits in each place, using <math>&gt;</math>, <math>=</math>, and <math>&lt;</math> symbols to record the results of comparisons.</li> <li>• (4.NBT.3) Use place value understanding to round multi-digit whole numbers to any place using a variety of estimation methods; be able to describe, compare, and contrast solutions.</li> </ul>	<p><u>Examples:</u></p> <ul style="list-style-type: none"> <li>• (4.NBT.1) Recognize that <math>700 \div 70 = 10</math> by applying concepts of place value and division.</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>A Remainder of One</i> by Elinor J. Pinczes</li> </ul>
Use place value understanding and properties of operations to perform multi-digit arithmetic	<ul style="list-style-type: none"> <li>• (4.NBT.4) Fluently add and subtract multi-digit whole numbers using any algorithm. Verify the reasonableness of the results.</li> <li>• (4.NBT.5) Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.</li> </ul>	<p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>Count Your Way Through Africa</i> by Jim Haskins</li> <li>• <i>Count Your Way Through Brazil</i> by Jim Haskins &amp; Kathleen Benson</li> <li>• <i>Count Your Way Through China</i> by Jim Haskins</li> <li>• <i>Count Your Way Through India</i> by Jim Haskins</li> <li>• <i>Count Your Way Through Israel</i> by Jim Haskins</li> <li>• <i>Count Your Way Through Japan</i> by Jim Haskins</li> <li>• <i>Count Your Way Through Mexico</i> by Jim Haskins</li> </ul>

Strand	Standard	Examples and Resources
Use place value understanding and properties of operations to perform multi-digit arithmetic (cont.)	<ul style="list-style-type: none"> <li>(4.NBT.6) Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.</li> </ul>	<ul style="list-style-type: none"> <li><i>Count Your Way Through Russia</i> by Jim Haskins</li> </ul>
<b>Domain: Number and Operations – Fractions</b> (Limited in this grade to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100)		
Extend understanding of fraction equivalence and ordering	<ul style="list-style-type: none"> <li>(4.NF.1) Explain why a fraction <math>a/b</math> is equivalent to a fraction <math>(n \times a)/(n \times b)</math> by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.</li> <li>(4.NF.2) Compare two fractions with different numerators and different denominators (e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as <math>\frac{1}{2}</math>). Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols <math>&gt;</math>, <math>=</math>, or <math>&lt;</math>, and justify the conclusions (e.g., by using a visual fraction model).</li> </ul>	
Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers	<ul style="list-style-type: none"> <li>(4.NF.3) Understand a fraction <math>a/b</math> with <math>a &gt; 1</math> as a sum of fractions <math>1/b</math>.             <ol style="list-style-type: none"> <li>Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.</li> <li>Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions (e.g., by using a visual fraction model).</li> <li>Add and subtract mixed numbers with like denominators (e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction).</li> <li>Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators (e.g., by using visual fraction models and equations to represent the problem).</li> </ol> </li> </ul>	<p><u>Examples:</u></p> <ul style="list-style-type: none"> <li>(4.NF.3b) <math>3/8 = 1/8 + 1/8 + 1/8</math>; <math>3/8 = 1/8 + 2/8</math>; <math>2 \frac{1}{8} = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8</math>.</li> <li>(4.NF.4a) Use a visual fraction model to represent <math>5/4</math> as the product <math>5 \times (1/4)</math>, recording the conclusion by the equation <math>5/4 = 5 \times (1/4)</math>.</li> <li>(4.NF.4b) Use a visual fraction model to express <math>3 \times (2/5)</math> as <math>6 \times (1/5)</math>, recognizing this product as <math>6/5</math>. (In general, <math>n \times (a/b) = (n \times a)/b</math>.)</li> <li>(4.NF.4c) If each person at a party will eat <math>3/8</math> of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li><i>Fannie in the Kitchen: The Whole Story from Soup to Nuts of How Fannie Farmer Invented Recipes with Precise Measurements</i> by Deborah Hopkinson</li> </ul>

Strand	Standard	Examples and Resources
<p>Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers (cont.)</p>	<ul style="list-style-type: none"> <li>• (4.NF.4) Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.               <ol style="list-style-type: none"> <li>a. Understand a fraction <math>a/b</math> as a multiple of <math>1/b</math>.</li> <li>b. Understand a multiple of <math>a/b</math> as a multiple of <math>1/b</math>, and use this understanding to multiply a fraction by a whole number.</li> </ol> </li> <li>• Solve word problems involving multiplication of a fraction by a whole number (e.g., by using visual fraction models and equations to represent the problem). Check for the reasonableness of the answer.</li> </ul>	
<p>Understand decimal notation for fractions, and compare decimal fractions</p>	<ul style="list-style-type: none"> <li>• (4.NF.5) Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.</li> <li>• (4.NF.6) Use decimal notation for fractions with denominators 10 or 100.</li> <li>• (4.NF.7) Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols <math>&gt;</math>, <math>=</math>, or <math>&lt;</math>, and justify the conclusions (e.g., by using a visual model).</li> </ul>	<p><u>Examples:</u></p> <ul style="list-style-type: none"> <li>• (4.NF.5) Express <math>3/10</math> as <math>30/100</math>, and add <math>3/10 + 4/100 = 34/100</math>.</li> <li>• (4.NF.6) Rewrite <math>0.62</math> as <math>62/100</math>; describe a length as <math>0.62</math> meters; locate <math>0.62</math> on a number line diagram.</li> </ul>
<p><b>Domain: Measurement and Data</b></p>		
<p>Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit, and involving time</p>	<ul style="list-style-type: none"> <li>• (4.MD.1) Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb., oz.; l, ml; hr., min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table.</li> <li>• (4.MD.2) Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.</li> <li>• (4.MD.3) Apply the area and perimeter formulas for rectangles in real world and mathematical problems.</li> <li>• (4.MD.4) Solve real-world problems involving elapsed time between U.S. time zones (including Alaska Standard time).</li> </ul>	<p><u>Examples:</u></p> <ul style="list-style-type: none"> <li>• (4.MD.1) Know that 1 ft. is 12 times as long as 1 in. Express the length of a 4 ft. snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36).</li> <li>• (4.MD.3) Find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>Gregory and the Magic Line</i> by Dawn Piggot</li> <li>• <i>Inchworm and a Half</i> by Elinor J. Pinczes</li> <li>• <i>Is a Blue Whale the Biggest Thing There Is?</i> by Robert E. Wells</li> <li>• <i>Millions to Measure</i> by David M. Schwartz</li> </ul>

Strand	Standard	Examples and Resources
<p><b>Represent and interpret data</b></p>	<ul style="list-style-type: none"> <li>• (4.MD.5) Make a line plot to display a data set of measurements in fractions of a unit (<math>\frac{1}{2}</math>, <math>\frac{1}{4}</math>, <math>\frac{1}{8}</math>). Solve problems involving addition and subtraction of fractions by using information presented in line plots.</li> <li>• (4.MD.6) Explain the classification of data from real-world problems shown in graphical representations including the use of terms range and mode with a given set of data.</li> </ul>	<p><u>Examples:</u></p> <ul style="list-style-type: none"> <li>• (4.MD.5) From a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.</li> </ul>
<p><b>Geometric measurement: understand concepts of angle and measure angles</b></p>	<ul style="list-style-type: none"> <li>• (4.MD.7) Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand the following concepts of angle measurement: <ul style="list-style-type: none"> <li>a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through <math>\frac{1}{360}</math> of a circle is called a “one-degree angle,” and can be used to measure angles.</li> <li>b. An angle that turns through <math>n</math> one-degree angles is said to have an angle measure of <math>n</math> degrees.</li> </ul> </li> <li>• (4.MD.8) Measure and draw angles in whole-number degrees using a protractor. Estimate and sketch angles of specified measure.</li> <li>• (4.MD.9) Recognize angle measure as additive. When an angle is divided into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems (e.g., by using an equation with a symbol for the unknown angle measure).</li> </ul>	<p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>The Greedy Triangle</i> by Marilyn Burns</li> <li>• <i>Shape Up!</i> by David A. Adler</li> <li>• <i>Actual Size</i> by Steve Jenkins</li> <li>• <i>Mummy Math: An Adventure in Geometry</i> by Cindy Neuschwander</li> <li>• <i>Piece=Part=Portion: Fractions=Decimals=Percents</i> by Scott Gifford</li> </ul>
<p><b>Domain: Geometry</b></p>		
<p><b>Draw and identify lines and angles, and classify shapes by properties of their lines and angles</b></p>	<ul style="list-style-type: none"> <li>• (4.G.1) Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular, parallel, and intersecting line segments. Identify these in two-dimensional (plane) figures.</li> <li>• (4.G.2) Classify two-dimensional (plane) figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.</li> </ul>	<p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>Reflections</i> by Ann Jonas</li> <li>• <i>Sea Squares</i> by Joy N. Hulme</li> <li>• <i>Shadows and Reflections</i> by Tana Hoban</li> <li>• <i>Mummy Math: An Adventure in Geometry</i> by Cindy Neuschwander</li> <li>• <i>My Full Moon Is Square</i> by Elinor J. Pinczes</li> </ul>

Strand	Standard	Examples and Resources
<p><b>Draw and identify lines and angles, and classify shapes by properties of their lines and angles</b></p>	<ul style="list-style-type: none"> <li>• (4.G.3) Recognize a line of symmetry for a two-dimensional (plane) figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.</li> </ul>	



# Fifth Grade

<p><b>Instructional Focus:</b> In grade 5, instructional time should focus on three critical areas:</p> <ul style="list-style-type: none"> <li>• Developing fluency with addition and subtraction of fractions, and developing understanding of the multiplication of fractions and of division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions).</li> <li>• Extending division to 2-digit divisors, integrating decimal fractions into the place value system and developing understanding of operations with decimals to hundredths, and developing fluency with whole number and decimal operations.</li> <li>• Developing understanding of volume.</li> </ul>	<p><b>Readiness Standards:</b></p> <ul style="list-style-type: none"> <li>• Students generalize their understanding of place value to 1,000,000, understanding the relative sizes of numbers in each place.</li> <li>• Students develop understanding of fraction equivalence and operations with fractions.</li> <li>• Students describe, analyze, compare, and classify two-dimensional shapes.</li> </ul> <p style="text-align: center;"><i>(See Fourth Grade Instructional Focus in Appendix)</i></p>
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## Grade 5 Mathematical Content Standards

Strand	Standard	Examples and Resources
<b>Domain: Operations and Algebraic Thinking</b>		
<b>Write and interpret numerical expressions.</b>	<ul style="list-style-type: none"> <li>• (5.OA.1) Use parentheses to construct numerical expressions, and evaluate numerical expressions with these symbols.</li> <li>• (5.OA.2) Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.</li> </ul>	<p><u>Examples:</u></p> <ul style="list-style-type: none"> <li>• (5.OA.2) Express the calculation “add 8 and 7, then multiply by 2” as <math>2 \times (8 + 7)</math>. Recognizing that <math>3 \times (18932 + 921)</math> is three times as large as <math>18932 + 921</math>, without having to calculate the indicated sum or product.</li> </ul>
<b>Analyze patterns and relationships</b>	<ul style="list-style-type: none"> <li>• (5.OA.3) Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane.</li> </ul>	<p><u>Examples:</u></p> <ul style="list-style-type: none"> <li>• (5.OA.3) Given the rule “Add 3” and the starting number 0, and given the rule “Add 6” and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.</li> </ul>
<b>Domain: Number and Operations in Base Ten</b>		
<b>Understand the place value system</b>	<ul style="list-style-type: none"> <li>• (5.NBT.1) Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.</li> </ul>	<p><u>Use:</u></p> <ul style="list-style-type: none"> <li>• multiplication charts</li> <li>• number lines</li> <li>• graph paper</li> </ul>

Strand	Standard	Examples and Resources
<p><b>Understand the place value system (cont.)</b></p>	<ul style="list-style-type: none"> <li>• (5.NBT.2) Explain and extend the patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain and extend the patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.</li> <li>• (5.NBT.3) Read, write, and compare decimals to thousandths.               <ul style="list-style-type: none"> <li>a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form [e.g., <math>347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 (1/10) + 9 (1/100) + 2 (1/1000)</math>].</li> <li>b. Compare two decimals to thousandths place based on meanings of the digits in each place, using <math>&gt;</math>, <math>=</math>, and <math>&lt;</math> symbols to record the results of comparisons.</li> </ul> </li> <li>• (5.NBT.4) Use place values understanding to round decimals to any place.</li> </ul>	<p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>12 Ways to Get to 11</i> by Eve Merriam</li> <li>• <i>A Cloak for the Dreamer</i> by Aileen Friedman</li> <li>• <i>Math Talk: Mathematical Ideas in Poems for Two Voices</i> by Theoni Pappas</li> <li>• <i>Mr. Archimedes' Bath</i> by Pamela Allen</li> <li>• <i>One Hundred Hungry Ants</i> by Elinor J. Pinczes</li> </ul>
<p><b>Perform operations with multi-digit whole numbers and with decimals to hundredths</b></p>	<ul style="list-style-type: none"> <li>• (5.NBT.5) Fluently multiply multi-digit whole numbers using a standard algorithm.</li> <li>• (5.NBT.6) Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, number lines, real life situations, and/or area models.</li> <li>• (5.NBT.7) Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between the operations. Relate the strategy to a written method and explain their reasoning in getting their answers.</li> </ul>	
<p><b>Domain: Number and Operations - Fractions</b></p>		
<p><b>Use equivalent fractions as a strategy to add and subtract fractions</b></p>	<ul style="list-style-type: none"> <li>• (5.NF.1) Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.</li> </ul>	<p><u>Examples:</u></p> <ul style="list-style-type: none"> <li>• (5.NF.1) <math>2/3 + 5/4 = 8/12 + 15/12 = 23/12</math>. (In general, <math>a/b + c/d = (ad + bc)/bd</math>.)</li> <li>• (5.NF.2) Recognize an incorrect result <math>2/5 + 1/2 = 3/7</math>, by observing that <math>3/7 &lt; 1/2</math>.</li> </ul>

Strand	Standard	Examples and Resources
<p><b>Use equivalent fractions as a strategy to add and subtract fractions (cont.)</b></p>	<ul style="list-style-type: none"> <li>• (5.NF.2) Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators (e.g., by using visual fraction models or equations to represent the problem). Use benchmark fractions and number sense of fractions to estimate mentally and check the reasonableness of answers.</li> </ul>	<p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>Spaghetti and Meatballs for All!</i> by Marilyn Burns</li> <li>• <i>Speed Mathematics: Secret Skills for Quick Calculation</i> by Bill Handley</li> </ul>
<p><b>Apply and extend previous understandings of multiplication and division to multiply and divide fractions</b></p>	<ul style="list-style-type: none"> <li>• (5.NF.3) Interpret a fraction as division of the numerator by the denominator (<math>a/b = a \div b</math>). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers (e.g., by using visual fraction models or equations to represent the problem).</li> <li>• (5.NF.4) Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. <ul style="list-style-type: none"> <li>a. Interpret the product <math>(a/b) \times q</math> as a parts of a partition of <math>q</math> into <math>b</math> equal parts; equivalently, as the result of a sequence of operations <math>a \times q \div b</math>.</li> <li>b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.</li> </ul> </li> <li>• (5.NF.5) Interpret multiplication as scaling (resizing), by: <ul style="list-style-type: none"> <li>a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.</li> <li>b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence <math>a/b = (n \times a)/(n \times b)</math> to the effect of multiplying <math>a/b</math> by 1 (division of a fraction by a fraction is not a requirement at this grade).</li> </ul> </li> <li>• (5.NF.6) Solve real world problems involving multiplication of fractions and mixed numbers (e.g., Use visual fraction models or equations to represent the problem).</li> </ul>	<p><u>Examples:</u></p> <ul style="list-style-type: none"> <li>• (5.NF.3) Interpret <math>3/4</math> as the result of dividing 3 by 4, noting that <math>3/4</math> multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size <math>3/4</math>. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?</li> <li>• (5.NF.4a) Use a visual fraction model to show <math>(2/3) \times 4 = 8/3</math>, and create a story context for this equation. Do the same with <math>(2/3) \times (4/5) = 8/15</math>. (In general, <math>(a/b) \times (c/d) = ac/bd</math>).</li> <li>• (5.NF.7a) Create a story context for <math>(1/3) \div 4</math>, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that <math>(1/3) \div 4 = 1/12</math> because <math>(1/12) \times 4 = 1/3</math>.</li> <li>• (5.NF.7b) Create a story context for <math>4 \div (1/5)</math>, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that <math>4 \div (1/5) = 20</math> because <math>20 \times (1/5) = 4</math>.</li> <li>• (5.NF.7c) How much chocolate will each person get if 3 people share <math>1/2</math> lb. of chocolate equally? How many <math>1/3</math>-cup servings are in 2 cups of raisins?</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>Anno's Mysterious Multiplying Jar</i> by Masaichiro &amp; Mitsumasa Anno</li> <li>• <i>Eating Fractions</i> by Bruce McMillan</li> </ul>

Strand	Standard	Examples and Resources
<p>Apply and extend previous understandings of multiplication and division to multiply and divide fractions (cont.)</p>	<ul style="list-style-type: none"> <li>• (5.NF.7) Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.               <ol style="list-style-type: none"> <li>a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients.</li> <li>b. Interpret division of a whole number by a unit fraction, and compute such quotients.</li> </ol> </li> <li>• Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions (e.g., by using visual fraction models and equations to represent the problem).</li> </ul>	
<b>Domain: Measurement and Data</b>		
<p>Convert like measurement units within a given measurement system and solve problems involving time</p>	<ul style="list-style-type: none"> <li>• (5.MD.1) Identify, estimate measure, and convert equivalent measures within systems English length (inches, feet, yards, miles) weight (ounces, pounds, tons) volume (fluid ounces, cups, pints, quarts, gallons) temperature (Fahrenheit) Metric length (millimeters, centimeters, meters, kilometers) volume (milliliters, liters), temperature (Celsius), (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems using appropriate tools.</li> <li>• (5.MD.2) Solve real-world problems involving elapsed time between world time zones.</li> </ul>	<p><u>Examples:</u></p> <ul style="list-style-type: none"> <li>• (5.MD.1) Given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.</li> <li>• (5.MD.2) Yukon Quest and Iditarod Sled Dog Races.</li> </ul> <p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>Esio Trot</i> by Roald Dahl</li> <li>• <i>Gator Pie</i> by Louise Mathews</li> </ul>
<p>Represent and interpret data</p>	<ul style="list-style-type: none"> <li>• (5.MD.3) Make a line plot to display a data set of measurements in fractions of a unit (<math>\frac{1}{2}</math>, <math>\frac{1}{4}</math>, <math>\frac{1}{8}</math>). Solve problems involving information presented in line plots.</li> <li>• (5.MD.4) Explain the classification of data from real-world problems shown in graphical representations including the use of terms mean and median with a given set of data.</li> </ul>	<p><u>Use:</u></p> <ul style="list-style-type: none"> <li>• graph paper</li> <li>• geo boards</li> </ul> <p><u>Examples:</u></p> <ul style="list-style-type: none"> <li>• (5.MD.3) Given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.</li> </ul>
<p>Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition</p>	<ul style="list-style-type: none"> <li>• (5.MD.5) Recognize volume as an attribute of solid figures and understand concepts of volume measurement.               <ol style="list-style-type: none"> <li>a. A cube with side length 1 unit, called a “unit cube,” is said to have “one cubic unit” of volume, and can be used to measure volume.</li> <li>b. A solid figure, which can be packed without gaps or overlaps using <math>n</math> unit cubes is said to have a volume of <math>n</math> cubic units.</li> </ol> </li> </ul>	<p><u>Use:</u></p> <ul style="list-style-type: none"> <li>• cubes</li> <li>• counters</li> <li>• geo solids</li> <li>• geo boards</li> <li>• straws</li> <li>• popsicle sticks</li> </ul>

Strand	Standard	Examples and Resources
<p><b>Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition (cont.)</b></p>	<ul style="list-style-type: none"> <li>• (5.MD.6) Estimate and measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft., and non-standard units.</li> <li>• (5.MD.7) Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.               <ul style="list-style-type: none"> <li>d. Estimate and find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Demonstrate the associative property of multiplication by using the product of three whole numbers to find volumes (length x width x height).</li> <li>d. Apply the formulas <math>V = l \times w \times h</math> and <math>V = b \times h</math> for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real world and mathematical problems.</li> </ul> </li> <li>• Recognize volume as additive. Find volumes of solid figures composed of two, non-overlapping, right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.</li> </ul>	<p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>Jim and the Beanstalk</i> by Raymond Briggs</li> <li>• <i>Flatland</i> by Edwin Abbott</li> <li>• <i>Jumanji</i> by Chris Van Allsburg</li> <li>• <i>Sir Cumference and the Dragon of Pi</i> by Cindy Neuschwander</li> <li>• <i>Sir Cumference and the First Round Table</i> by Cindy Neuschwander</li> </ul>
<p><b>Domain: Geometry</b></p>		
<p><b>Graph points on the coordinate plane to solve real-world and mathematical problems</b></p>	<ul style="list-style-type: none"> <li>• (5.G.1) Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y coordinate).</li> <li>• (5.G.2) Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.</li> </ul>	<p><u>Literature Connections:</u></p> <ul style="list-style-type: none"> <li>• <i>Grandfather Tang's Story</i> by Ann Tompert</li> <li>• <i>The King's Chessboard</i> by David Birch</li> <li>• <i>The Librarian Who Measured the Earth</i> by Kathryn Lasky</li> <li>• <i>The Boy Who Reversed Himself</i> by William Sleator</li> <li>• <i>Sea Clocks: The Story of Longitude</i> by Louise Borden</li> </ul>

Strand	Standard	Examples and Resources
<p><b>Classify two-dimensional (plane) figures into categories based on their properties</b></p>	<ul style="list-style-type: none"> <li>• (5.G.3) Understand that attributes belonging to a category of two-dimensional (plane) figures also belong to all subcategories of that category.</li> <li>• (5.G.4) Classify two-dimensional (plane) figures in a hierarchy based on attributes and properties.</li> </ul>	<p><u>Use:</u></p> <ul style="list-style-type: none"> <li>• geo solids</li> <li>• geo boards</li> <li>• paper models</li> </ul> <p><u>Examples:</u></p> <ul style="list-style-type: none"> <li>• (5.G.3) All rectangles have four right angles and squares are rectangles, so all squares have four right angles.</li> </ul>



# Middle School Math Courses



**Grades 6 – 8**

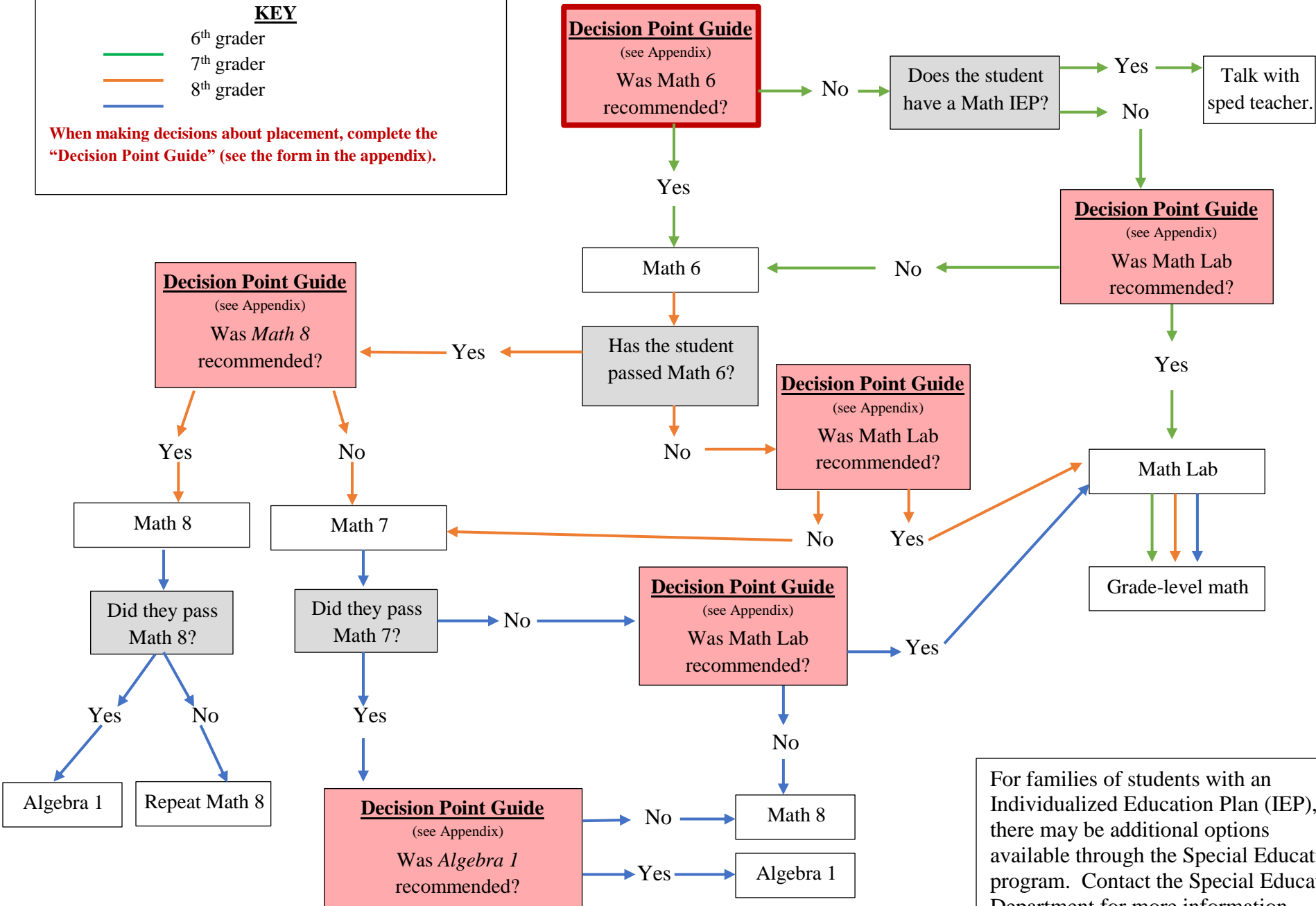
*Adopted June 7, 2022*

# Recommended Middle School Pathways

**KEY**

- 6<sup>th</sup> grader
- 7<sup>th</sup> grader
- 8<sup>th</sup> grader

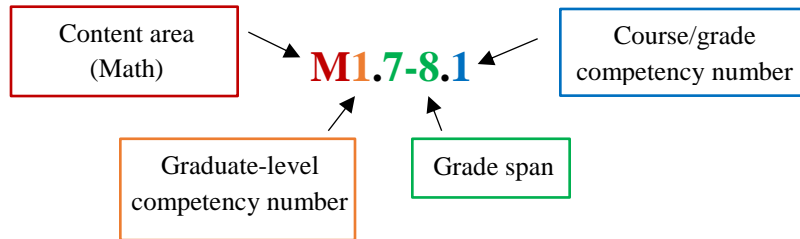
When making decisions about placement, complete the “Decision Point Guide” (see the form in the appendix).



For families of students with an Individualized Education Plan (IEP), there may be additional options available through the Special Education program. Contact the Special Education Department for more information.

# Grades 6-8 Math Competencies

## Competency Coding



## Middle School Math Competency Checklist

Competencies	Math 6	Middle School Math Lab	Math 7	Math 8
<b>Symbolic Expression:</b> M1: Graduates of the FNSBSD will be able to reason abstractly and utilize symbolic expressions and mathematical models.	✓		✓	✓
M1.3-4.1: The learner will reason abstractly and quantitatively, recognizing and making appropriate use of mathematical symbols and expressions for a variety of purposes, including variables.				
M1.5-6.1: The learner will reason abstractly and manipulate symbolic expressions to represent relationships and interpret expressions and equations in terms of a given context for determining an unknown value.	✓			
M1.7-8.1: The learner will reason abstractly and manipulate symbolic expressions to represent relationships and interpret expressions and equations in terms of a given context for determining an unknown value.			✓	✓

Competencies	Math 6	Middle School Math Lab	Math 7	Math 8
<b>Numbers and Number Systems:</b> M2: Graduates of the FNSBSD will develop an applied knowledge of numbers and number systems to solve problems.	✓	✓	✓	✓
M2.3-4.1: The learner will demonstrate an understanding of number systems, thinking flexibly and attending to precision and reasonableness when solving problems using whole numbers, fractions, and decimals.		✓		
M2.5-6.1: The learner will expand their understanding of number systems, thinking flexibly and attending to precision and reasonableness when solving problems using rational numbers.	✓			
M2.7-8.1: The learner will expand their understanding of number systems thinking flexibly and attending to precision and reasonableness when solving problems using rational and irrational numbers.		✓	✓	✓
<b>Reasoning and Strategic Thinking:</b> M3: Graduates of the FNSBSD will use evidence to support authentic application of concepts and support mathematical arguments.	✓	✓	✓	✓
M3.3-4.1: The learner will apply additive, multiplicative, and fractional reasoning using multiple strategies (algorithms, models, & manipulatives) to solve authentic applied problems.				
MS.3-4.2: The learner will use reasoning and self-monitoring to analyze and justify one or more solution pathways.		✓		
M3.5-6.1: The learner will expand the use of computational strategies, algorithms, and proportional reasoning to rational numbers.	✓			
M3.5-6.2: The learner will use reasoning and metacognitive skills through making conjectures, justifying, and communicating mathematical solutions and arguments.	✓			
M3.7-8.1: The learner will expand the use of computational strategies, algorithms, and proportional reasoning to rational and irrational numbers.		✓	✓	✓
M3.7-8.2: The learner will use reasoning and metacognitive skills through making conjectures, justifying, and effectively communicating mathematical solutions and arguments.		✓	✓	✓

Competencies	Math 6	Middle School Math Lab	Math 7	Math 8
<b>Measurement:</b> M4: Graduates of the FNSBSD will explain reasoning when applying and modeling geometric principles.	✓	✓	✓	✓
M4.3-4.1: The learner will use measurement tools, units, and attributes to describe and compare objects, situations, or events, and to solve authentic applied measurement problems.				
M4.5-6.1: The learner will use tools and apply precision and reasoning to solve measurement problems in authentic applied contexts.	✓	✓		
M4.7-8.1: The learner will strategically use tools and apply proportional reasoning and precision to solve measurement problems in pure/ theoretical and authentic applied contexts.		✓	✓	✓
<b>Algebraic Functions, Patterns, and Relations:</b> M5: Graduates of the FNSBSD will utilize patterns, relations, and functions to compare, interpret, and analyze situations.	✓	✓	✓	✓
M5.3-4.1: The learner will make use of structure to represent, analyze, and generalize change or patterns in various contexts using models and justification.				
M5.5-6.1: The learner will make use of structure to describe and compare situations that involve change or patterns, and use the information to make conjectures and justify conclusions/solutions.	✓			
M5.7-8.1: The learner will make use of structure to describe and compare situations that involve proportionality, change, or patterns, and use the information to make conjectures and justify conclusions/ solutions.		✓	✓	✓

Competencies	Math 6	Middle School Math Lab	Math 7	Math 8
<b>Geometry:</b> M6: Graduates of the FNSBSD will solve problems involving spatial reasoning and model geometric concepts in applied contexts.	✓	✓	✓	✓
M6.3-4.1: The learner will use attributes of two-dimensional shapes and complex figures to solve authentic applied problems.				
M6.5-6.1: The learner will solve problems involving reasoning using properties of two- and three- dimensional shapes to analyze, represent, and model geometric relationships in authentic applied contexts.	✓			
M6.7-8.1: The learner will solve problems involving reasoning using properties of two- and three- dimensional shapes to analyze, represent, and model geometric relationships in pure/ theoretical and authentic applied contexts.		✓	✓	✓
<b>Data, Analysis, Probability, and Statistics:</b> M7: Graduates of the FNSBSD will apply statistical methods to summarize, represent, analyze, and interpret data.	✓	✓	✓	✓
M7.3-4.1: The learner will gather, represent, and interpret data related to a particular/ single context, including authentic applications.		✓		
M7.5-6.1: The learner will design investigations and gather data involving populations (data sets).	✓			
M7.7-8.1: The learner will design investigations and conduct probability experiments involving populations.		✓	✓	✓

# Math 6

<p><b>Grade(s):</b> 6  <b>Length:</b> two semesters  <b>Prerequisite:</b> Math 5</p>	<p><b>Overview:</b>            In <i>Math 6</i>, instructional time should focus on four critical areas:</p> <ol style="list-style-type: none"> <li>1. Connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems;</li> <li>2. Completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers;</li> <li>3. Writing, interpreting, and using expressions and equations; and</li> <li>4. Developing understanding of statistical thinking.</li> </ol>
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Mathematical Topics (Recommended Order)	
Semester 1	Semester 2
<ul style="list-style-type: none"> <li>• Number Systems</li> <li>• Expressions and Equations</li> </ul>	<ul style="list-style-type: none"> <li>• Writing Ratios, Finding Unit Rates, and Solving Proportions</li> <li>• Perimeter, Area, Surface Area, Volume of Polygons and Rectangular Prisms</li> <li>• Statistics and Probability</li> </ul>

Course/ Grade Competencies	
Semester 1	Semester 2
<ul style="list-style-type: none"> <li>• <b>M1.5-6.1:</b> The learner will reason abstractly and manipulate symbolic expressions to represent relationships and interpret expressions and equations in terms of a given context for determining an unknown value.</li> <li>• <b>M2.5-6.1:</b> The learner will expand their understanding of number systems, thinking flexibly and attending to precision and reasonableness when solving problems using rational numbers.</li> <li>• <b>M3.5-6.2:</b> The learner will use reasoning and metacognitive skills through making conjectures, justifying, and communicating mathematical solutions and arguments.</li> <li>• <b>M5.5-6.1:</b> The learner will make use of structure to describe and compare situations that involve change or patterns and use the information to make conjectures and justify conclusions/solutions.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>M3.5-6.1:</b> The learner will expand the use of computational strategies, algorithms, and proportional reasoning to rational numbers.</li> <li>• <b>M4.5-6.1:</b> The learner will use tools and apply precision and reasoning to solve measurement problems in authentic applied contexts.</li> <li>• <b>M6.5-6.1:</b> The learner will solve problems involving reasoning using properties of two- and three-dimensional shapes to analyze, represent, and model geometric relationships in authentic applied contexts.</li> <li>• <b>M7.5-6.1:</b> The learner will design investigations and gather data involving populations (data sets).</li> </ul>

## NUMBER SYSTEMS

**Graduate-Level Competency:**

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

Course/ Grade Competency	Content Objectives	Standards
<b>M2.5-6.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Add and subtract rational numbers (fractions and decimals).</li> <li>• Find and use the greatest common factor for adding fractions.</li> <li>• Find and use least common multiple for reducing fractions.</li> </ul>	<p><b><u>AKSS</u></b> 6.NS.1-4</p> <p><b><u>Mathematical Practices</u></b> Rational Numbers Arithmetic</p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Multiply and divide rational numbers (fractions and decimals).</li> <li>• Find and use least common multiple for reducing fractions.</li> </ul>	<p><b><u>AKSS</u></b> 6.NS.1-4</p> <p><b><u>Mathematical Practices</u></b> Rational Numbers Arithmetic</p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Understand and order of rational numbers on a number line.</li> <li>• Understand absolute value.</li> <li>• Graph points on a coordinate plane.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Add and subtract integers.</li> </ul>	<p><b><u>AKSS</u></b> 6.NS.5-8</p> <p><b><u>Mathematical Practices</u></b> Rational Numbers Arithmetic</p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• Number tiles for positive and negative integers.</li> <li>• “Good Guys (+) and Bad Guys (-)” and they battle it out for addition and subtraction.</li> <li>• Khan Academy</li> <li>• <i>iReady</i> unit 2, lesson 6</li> <li>• <i>iReady</i> unit 6</li> </ul>	

## EXPRESSIONS & EQUATIONS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

Course/ Grade Competency	Content Objectives	Standards
<b>M1.5-6.1</b> <b>M3.5-6.2</b>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>Write and solve exponential problems, including expanded form.</li> </ul>	<p><b><u>AKSS</u></b>                      6.EE.1</p> <p><b><u>Mathematical Practices</u></b></p>
	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>Write, read and solve expressions with variables.</li> <li>Use distributive property and factoring to simplify expressions.</li> <li>Write mathematical expressions and equations from real-world problems.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>Write two-step equations for real-world problems.</li> </ul>	<p><b><u>AKSS</u></b>                      6.EE.2-3, 6</p> <p><b><u>Mathematical Practices</u></b></p>
	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>Solve one-step equations with integers and rational numbers.</li> <li>Show the relationship between the dependent and independent variables in an equation.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>Solve two-step equations with integers.</li> </ul>	<p><b><u>AKSS</u></b>                      7.EE.5, 7-9</p> <p><b><u>Mathematical Practices</u></b></p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>Khan Academy</li> <li><i>iReady</i> lesson 5 and unit 5</li> </ul>	

## WRITING RATIOS, FINDING UNIT RATES, & SOLVING PROPORTIONS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

Course/ Grade Competency	Content Objectives	Standards
<b>M1.5-6.1</b> <b>M3.5-6.1</b> <b>M5.5-6.1</b>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>Simplify proportions and know how to write them three different ways.</li> </ul>	<p><b><u>AKSS</u></b>                      6.RP.1</p> <p><b><u>Mathematical Practices</u></b></p>
	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>Calculate unit rates using the same units with rational numbers (decimals and fractions).</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>Calculate unit rates using the different units with rational numbers (decimals and fractions).</li> </ul>	<p><b><u>AKSS</u></b>                      6.RP.2</p> <p><b><u>Mathematical Practices</u></b></p>
	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>Write and solve proportions including real-world problems.</li> </ul>	<p><b><u>AKSS</u></b>                      6.RP.3</p> <p><b><u>Mathematical Practices</u></b></p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>Compare unit rates for groceries (unit prices), cars (MPG), and wood prices (dollars per cord).</li> <li>Khan Academy</li> <li><i>iReady</i> units 3-4</li> </ul>	

## PERIMETER, AREA, SURFACE AREA, VOLUME OF POLYGONS, & RECTANGULAR PRISMS

### Graduate-Level Competency:

**M6 - Geometry:** The learner will solve problems involving spatial reasoning and model geometric concepts in applied contexts.

Course/ Grade Competency	Content Objectives	Standards
<b>M6.5-6.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Calculate the area of regular polygons (including on coordinate planes).</li> <li>• Identify the different parts of a circle.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Calculate the circumference and area of circles.</li> </ul>	<p><b><u>AKSS</u></b> 6.G.1, 3, 5</p> <p><b><u>Mathematical Practices</u></b></p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Represent three-dimensional figures as nets.</li> <li>• Calculate the volume and surface area of rectangular prisms.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Calculate the volume and surface area of triangular prisms.</li> </ul>	<p><b><u>AKSS</u></b> 6.G.2, 4</p> <p><b><u>Mathematical Practices</u></b></p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• Calculate the volume of fuel and water tanks used at students' homes.</li> <li>• Calculate the surface area and volume of their bedroom at home.</li> <li>• Khan Academy</li> <li>• <i>iReady</i> unit 1</li> </ul>	

## STATISTICS & PROBABILITY

### Graduate-Level Competency:

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<b>M7.5-6.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Write valid and invalid statistical questions, and be able to explain identify why they are valid or invalid.</li> <li>Identify the distribution of a data set.</li> </ul>	<p><b><u>AKSS</u></b> 6.SP.1-2</p> <p><b><u>Mathematical Practices</u></b></p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Calculate measures of center, including range and finding outliers.</li> <li>Identify when to use the different measures of center.</li> <li>Explain the effect of adding or removing an outlier to the measures of center.</li> </ul>	<p><b><u>AKSS</u></b> 6.SP.3, 5</p> <p><b><u>Mathematical Practices</u></b></p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Calculate interquartile range and create box plots.</li> <li>Read and create dot plots, histograms, and pie charts.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Calculate the standard deviations.</li> </ul>	<p><b><u>AKSS</u></b> 6.SP.4-5</p> <p><b><u>Mathematical Practices</u></b></p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Calculate simple and compound theoretical probability.</li> <li>Determine whether a game is fair or unfair based on probability.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Calculate the experimental probability.</li> </ul>	<p><b><u>AKSS</u></b> 6.SP.6-7</p> <p><b><u>Mathematical Practices</u></b></p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>Create a game that involves probability.</li> <li>Khan Academy</li> <li><i>iReady</i> unit 7</li> </ul>	

# Math 7

<p><b>Grade(s):</b> 7-8  <b>Length:</b> two semesters  <b>Prerequisite:</b> <i>Math 6</i></p>	<p><b>Overview:</b>  <i>Math 7</i> is for students to extend and apply many of the concepts they have learned in the previous year, to discover new types of relationships, new and efficient ways to solve problems, and new ways to analyze and look at data and associations. Students will investigate proportional relationships and use this understanding to solve real-world problems involving discounts, interest, taxes, and scale drawings. Building off their understanding of integers, students will apply the properties of operations to all rational numbers in order to efficiently and thoughtfully work with the number system, including how it applies to expressions and equations.</p>
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Mathematical Topics (Recommended Order)	
Semester 1	Semester 2
<ul style="list-style-type: none"> <li>• Rational numbers arithmetic, including percent problems</li> <li>• Order of operations with rational numbers, including exponents</li> <li>• Unit rates, proportions, and constant of proportionality (k), including graphing k</li> <li>• Solving two-step equations, including distributive property equations</li> </ul>	<ul style="list-style-type: none"> <li>• Scale factors (proportions)</li> <li>• Supplemental and complementary angles and triangle measures</li> <li>• Perimeter, area, surface area, and volume of two- and three-dimensional figures (formulas forward and backward)</li> <li>• Statistical displays and measure of central tendencies</li> </ul>

Course/ Grade Competencies	
Semester 1	Semester 2
<ul style="list-style-type: none"> <li>• <b>M1.7-8.1:</b> The learner will reason abstractly and manipulate symbolic expressions to represent relationships and interpret expressions and equations in terms of a given context for determining an unknown value.</li> <li>• <b>M2.7-8.1:</b> The learner will expand their understanding of number systems thinking flexibly and attending to precision and reasonableness when solving problems using rational and irrational numbers.</li> <li>• <b>M3.7-8.2:</b> The learner will use reasoning and metacognitive skills through making conjectures, justifying, and effectively communicating mathematical solutions and arguments.</li> <li>• <b>M5.7-8.1:</b> The learner will make use of structure to describe and compare situations that involve proportionality, change, or patterns, and use the information to make conjectures and justify conclusions/ solutions.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>M3.7-8.1:</b> The learner will expand the use of computational strategies, algorithms, and proportional reasoning to rational and irrational numbers.</li> <li>• <b>M4.7-8.1:</b> The learner will strategically use tools and apply proportional reasoning and precision to solve measurement problems in pure/ theoretical and authentic applied contexts.</li> <li>• <b>M6.7-8.1:</b> The learner will solve problems involving reasoning using properties of two- and three- dimensional shapes to analyze, represent, and model geometric relationships in pure/ theoretical and authentic applied contexts.</li> <li>• <b>M7.7-8.1:</b> The learner will design investigations and conduct probability experiments involving populations.</li> </ul>

## NUMBER SYSTEMS

**Graduate-Level Competency:**

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

Course/ Grade Competency	Content Objectives	Standards
<b>M2.7-8.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Add and subtract integers.</li> <li>• Add and subtract rational numbers (fractions and decimals).</li> </ul>	<p><b><u>AKSS</u></b> 7.NS.1</p> <p><b><u>Mathematical Practices</u></b> Rational Numbers Arithmetic</p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Multiply and divide integers.</li> <li>• Multiple and divide rational numbers (fractions and decimals).</li> </ul>	<p><b><u>AKSS</u></b> 7.NS.2</p> <p><b><u>Mathematical Practices</u></b> Rational Numbers Arithmetic</p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Understand the order of operations with integers.</li> <li>• Understand the order of operations with rational numbers (fractions and decimals).</li> </ul>	<p><b><u>AKSS</u></b> 7.NS.3</p> <p><b><u>Mathematical Practices</u></b> Rational Numbers Arithmetic</p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• Number tiles for positive and negative integers</li> <li>• “Good Guys (+) and Bad Guys (-)” and they battle it out for addition and subtraction</li> <li>• Khan Academy</li> <li>• iReady units 2 – 3</li> </ul>	

## RATIOS, RATES, & PROPORTIONS – CONSTANT OF PROPORTIONALITY (K), INCLUDING GRAPHING K

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<b>M1.7-8.1</b> <b>M5.7-8.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Calculate unit rates using the same units with rational numbers (decimals and fractions).</li> </ul>	<p style="text-align: center;"><u>AKSS</u> 7.PR.1</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b></p>
	<p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Calculate unit rates using the different units with rational numbers (decimals and fractions).</li> </ul>	
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Determine if fractions, tables, and graphs are proportional and justify their answer.</li> <li>Calculate and write an equation for the constant of proportionality from tables, graphs, equations and real-world problems.</li> </ul>	<p style="text-align: center;"><u>AKSS</u> 7.PR.2</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b></p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Graph the constant of proportionality from tables, equations, and real-world problems.</li> </ul>	<p style="text-align: center;"><u>AKSS</u> 7.PR.2</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b></p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>Compare unit rates for groceries (unit prices), cars (MPG), and wood prices (dollars per cord).</li> <li>Khan Academy</li> <li>iReady unit 1</li> </ul>	

## PERCENT PROBLEMS

**Graduate-Level Competency:**

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<b>M5.7-8.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Calculate percent of a number.</li> <li>• Determine a number when given the percent.</li> <li>• Calculate percent increase or decrease.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 7.PR.3</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b></p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Solve real-world problems involving percent off, and items with and without a sales tax.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Calculate simple interest.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 7.PR.3</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b></p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• Calculate sale prices with percent off and include sales tax.</li> <li>• Compare simple interest versus compound interest on final cost of cars, mortgages, etc.</li> <li>• Khan Academy</li> <li>• iReady lessons 20 – 21</li> </ul>	

## EXPRESSIONS & EQUATIONS

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

Course/ Grade Competency	Content Objectives	Standards
<b>M1.7-8.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Add, subtract, factor, expand, and simplify expressions and linear equations.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Simplify expressions and equations with fractions and decimals by multiplying each term by the greatest common factor.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 7.EE.1, 7.EE.2</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b></p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Solve multi-step problems with rational numbers.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Solve two-step equations with the integer on both sides.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 6.EE.3</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b></p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Solve two-step equations with integers.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Solve two-step equations with fractions and decimals.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 7.EE.4a</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b></p>
	<p><b>Suggested Activities, Materials, and Resources:</b></p> <ul style="list-style-type: none"> <li>Plan a holiday party for the class that includes the total cost of pizza, snacks, and drinks.</li> <li>Plan potluck with the necessary utensils included in the final cost.</li> <li>Khan Academy</li> <li>iReady unit 4</li> </ul>	

## EXPRESSIONS & EQUATIONS (continued)

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

Course/ Grade Competency	Content Objectives	Standards
<b>M1.7-8.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Solve two-step equations with distributive property.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Solve two-step equations with the integer on both sides.</li> </ul>	<p><b><u>AKSS</u></b> 7.EE.4a</p> <p><b><u>Mathematical Practices</u></b></p>
<b>M1.7-8.1</b> <b>M3.7-8.2</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Solve and graph two-step inequalities and check for reasonableness.</li> </ul>	<p><b><u>AKSS</u></b> 7.EE.4b</p> <p><b><u>Mathematical Practices</u></b></p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• Students expand or reduce the holiday party by adding another classroom to the plan, or break the party into two or three smaller groups.</li> <li>• Khan Academy</li> <li>• iReady unit 4</li> </ul>	

## SCALE DRAWINGS

**Graduate-Level Competency:**

**M4 - Measurement:** The learner will explain reasoning when applying and modeling geometric principles.

Course/ Grade Competency	Content Objectives	Standards
<b>M4.7-8.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Solve problems involving scale drawings.</li> <li>• Adjust to the appropriate unit as needed.</li> </ul>	<p><b><u>AKSS</u></b> 7.G.1</p> <p><b><u>Mathematical Practices</u></b></p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Bisect a line segment using a compass.</li> <li>• Draw various polygons (triangle, square, hexagon, and octagon) with given conditions using a compass and ruler.</li> </ul>	<p><b><u>AKSS</u></b> 7.G.2</p> <p><b><u>Mathematical Practices</u></b></p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• Recreate a picture that is a different scale.</li> <li>• Draw and calculate ratios to determine various side lengths of polygons based on the initial circle.</li> <li>• Khan Academy</li> <li>• iReady lesson 1</li> </ul>	

## ANGLES & CIRCLES

**Graduate-Level Competency:**

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

Course/ Grade Competency	Content Objectives	Standards
<b>M3.7-8.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Calculate area and circumference of circles with given conditions.</li> <li>• Calculate volume and surface area of cylinders.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Calculate volume and surface area of cones.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 7.G.4</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b></p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Calculate supplemental and complementary angles with given conditions.</li> <li>• Calculate angles of triangles with given conditions.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Alternate and same-side angles with transversals.</li> <li>• Calculate remote interior angles.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 7.G.5</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b></p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• Lab using milliliters of water to fill a cylinder and then calculate the volume of the same cylinder in cubic centimeters for comparison.</li> <li>• Determine the area of a cross-section of boys’ and girls’ basketball.</li> <li>• Create a scale drawing of a parking lot with angled and perpendicular parking spaces, and justify which is the better use of space within a given area.</li> <li>• Khan Academy</li> <li>• iReady lessons 6, 28, and 29</li> </ul>	

## PERIMETER, AREA, SURFACE AREA, & VOLUME OF PRISMS & PYRAMIDS

### Graduate-Level Competency:

**M6 - Geometry:** The learner will solve problems involving spatial reasoning and model geometric concepts in applied contexts.

Course/ Grade Competency	Content Objectives	Standards
<b>M6.7-8.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Calculate the volume and surface area of rectangular and triangular prisms.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Calculate the volume and surface area of other regular prisms.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 7.G.6</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b></p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Determine the different types of cross-sections of three-dimensional figures.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 7.G.3</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b></p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>Calculate the volume of fuel and water tanks used at students' homes.</li> <li>Determine the best practice per capacity for new water and fuel tanks.</li> <li>Create a regular polyhedron.</li> <li>Khan Academy</li> <li>Shodor's interactive cross section flyer: <a href="http://www.shodor.org/interactivate/activities/CrossSectionFlyer">http://www.shodor.org/interactivate/activities/CrossSectionFlyer</a></li> <li>Polyhedron: <a href="http://www.polytope.net/hedrondude/regular3.htm">http://www.polytope.net/hedrondude/regular3.htm</a></li> <li>iReady lessons 25 – 27</li> </ul>	

## STATISTICS & PROBABILITY

### Graduate-Level Competency:

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<b>M7.7-8.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Understand valid and invalid samples, and why they are valid or invalid.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Create valid and invalid samples of a population.</li> <li>Write valid and invalid sample questions.</li> </ul>	<p><b><u>AKSS</u></b> 7.SP.1, 7.SP.2</p> <p><b><u>Mathematical Practices</u></b></p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Calculate interquartile range</li> <li>Calculate standard deviation</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Calculate mean absolute deviation</li> </ul>	<p><b><u>AKSS</u></b> 7.SP.3, 7.SP.4</p> <p><b><u>Mathematical Practices</u></b></p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Calculate simple and compound probability.</li> <li>Create a theoretical simple and compound probability model.</li> <li>Complete an experimental simple and compound probability model.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Calculate the probability of flipping specific suits, numbers, or specific cards in a deck followed by a different suit, number, or specific card.</li> </ul>	<p><b><u>AKSS</u></b> 7.SP.5, 7.SP.6, 7.SP.7, 7.SP.8</p> <p><b><u>Mathematical Practices</u></b></p>
	<p><b>Suggested Activities, Materials, and Resources:</b></p> <ul style="list-style-type: none"> <li>Create a game that involves probability.</li> <li>Khan Academy</li> <li>iReady unit 7</li> </ul>	

# Math 8

<p><b>Grade(s):</b> 7-8</p> <p><b>Length:</b> two semesters</p> <p><b>Prerequisite:</b></p> <ul style="list-style-type: none"> <li>• Math 7 or</li> <li>• Math 6 and teacher recommendation</li> </ul> <p><b>Placement recommendation:</b> When making decisions about placement, always consider student reflection, assessment data, teacher recommendation, and parent input. (See the <a href="#">flowchart</a>.)</p>	<p><b>Overview:</b></p> <p>In <i>Math 8</i>, students make several advances in their algebraic reasoning, particularly as it relates to linear equations. Students extend their understanding of proportional relationships to include all linear equations, and they consider what a “solution” looks like when it applies to a linear equation. They learn that linear equations can be a useful representation to model bivariate data and to make predictions. Lastly, students study figures, lines, and angles in two-dimensional and three-dimensional space, investigating how these figures move, and how they are measured. This course prepares students to take <i>Algebra 1</i>.</p>
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Mathematical Topics (Recommended Order)	
Semester 1	Semester 2
<ul style="list-style-type: none"> <li>• Solving Linear Equations and Inequalities (One Variable)</li> <li>• Rigid Transformations, Congruence, and Similarity</li> <li>• Angle Relationships</li> <li>• Linear Equations and Graphs</li> </ul>	<ul style="list-style-type: none"> <li>• Integer Exponents and Scientific Notation</li> <li>• Numeracy (Rational and Irrational Numbers): can easily be covered within other units</li> <li>• Pythagorean Theorem</li> <li>• Volumes (Cylinders, Cones and Spheres)</li> <li>• Two-Way Categorical Tables and Associations</li> </ul>

Course/ Grade Competencies	
Semester 1	Semester 2
<ul style="list-style-type: none"> <li>• <b>M1.7-8.1:</b> The learner will reason abstractly and manipulate symbolic expressions to represent relationships and interpret expressions and equations in terms of a given context for determining an unknown value.</li> <li>• <b>M2.7-8.1:</b> The learner will expand their understanding of number systems thinking flexibly and attending to precision and reasonableness when solving problems using rational and irrational numbers.</li> <li>• <b>M3.7-8.1:</b> The learner will expand the use of computational strategies, algorithms, and proportional reasoning to rational and irrational numbers.</li> <li>• <b>M3.7-8.2:</b> The learner will use reasoning and metacognitive skills through making conjectures, justifying, and effectively communicating mathematical solutions and arguments.</li> <li>• <b>M4.7-8.1:</b> The learner will strategically use tools and apply proportional reasoning and precision to solve measurement problems in pure/ theoretical and authentic applied contexts.</li> <li>• <b>M5.7-8.1:</b> The learner will make use of structure to describe and compare situations that involve proportionality, change, or patterns, and use the information to make conjectures and justify conclusions/ solutions.</li> <li>• <b>M6.7-8.1:</b> The learner will solve problems involving reasoning using properties of two- and three- dimensional shapes to analyze, represent, and model geometric relationships in pure/ theoretical and authentic applied contexts.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>M1.7-8.1:</b> The learner will reason abstractly and manipulate symbolic expressions to represent relationships and interpret expressions and equations in terms of a given context for determining an unknown value.</li> <li>• <b>M2.7-8.1:</b> The learner will expand their understanding of number systems thinking flexibly and attending to precision and reasonableness when solving problems using rational and irrational numbers.</li> <li>• <b>M3.7-8.1:</b> The learner will expand the use of computational strategies, algorithms, and proportional reasoning to rational and irrational numbers.</li> <li>• <b>M3.7-8.2:</b> The learner will use reasoning and metacognitive skills through making conjectures, justifying, and effectively communicating mathematical solutions and arguments.</li> <li>• <b>M4.7-8.1:</b> The learner will strategically use tools and apply proportional reasoning and precision to solve measurement problems in pure/ theoretical and authentic applied contexts.</li> <li>• <b>M5.7-8.1:</b> The learner will make use of structure to describe and compare situations that involve proportionality, change, or patterns, and use the information to make conjectures and justify conclusions/ solutions.</li> <li>• <b>M6.7-8.1:</b> The learner will solve problems involving reasoning using properties of two- and three- dimensional shapes to analyze, represent, and model geometric relationships in pure/ theoretical and authentic applied contexts.</li> <li>• <b>M7.7-8.1:</b> The learner will design investigations and conduct probability experiments involving populations.</li> </ul>

## SOLVING LINEAR EQUATIONS & INEQUALITIES WITH ONE VARIABLE

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<b>M1.7-8.1</b> <b>M2.7-8.1</b> <b>M3.7-8.1</b> <b>M3.7-8.2</b>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Know the definitions of a constant and a coefficient.</li> <li>• Know the difference between an expression and an equation.</li> <li>• Be able to evaluate expressions using substitution.</li> <li>• Be able to simplify expressions by combining like terms and or applying the distributive property.</li> <li>• Know that for the expression <math>x</math>, the coefficient is 1 and the constant is 0.</li> </ul>	<p><b><u>AKSS</u></b></p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<b>M1.7-8.1</b> <b>M2.7-8.1</b> <b>M3.7-8.2</b> <b>M5.7-8.1</b>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Solve one- or two-step equations by isolating <math>x</math>, or changing the associated constant to 0 with addition or subtraction and the coefficient to 1 with multiplication or division.</li> <li>• Solve multistep equations and understand there are multiple ways to do this.</li> <li>• Solve equations with variables on both sides.</li> <li>• Solve equations involving simplifying one or both sides by distributing and or combining like terms.</li> <li>• Recognize when equations have infinite or no solutions.</li> <li>• Write and solve equations based on word problems, including those where one variable must be written in terms of another.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Solving equations where clearing of fractions or cross-multiplying is involved.</li> </ul>	<p><b><u>AKSS</u></b></p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Understand inequalities and their symbols.</li> <li>• Graph inequalities on the number line.</li> <li>• Write inequalities given a graph on the number line.</li> <li>• Solve simple multi-step inequalities, including those where the inequality must be flipped.</li> </ul>	<p><b><u>AKSS</u></b></p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• <i>iReady</i> unit 3, lessons 10 and 11</li> </ul>	

## RIGID TRANSFORMATIONS, CONGRUENCE, & SIMILARITY

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M4 - Measurement:** The learner will explain reasoning when applying and modeling geometric principles.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M6 - Geometry:** The learner will solve problems involving spatial reasoning and model geometric concepts in applied contexts.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M3.7-8.2</b>  <b>M4.7-8.1</b>  <b>M6.7-8.1</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Know what congruent means and be able to recognize congruent figures.</li> <li>• Know that if two figures are congruent, then one can be mapped onto the other with a sequence of rigid transformations</li> <li>• Know the three rigid transformations are translations, reflections, and rotations.</li> <li>• Be able to perform each transformation given the specific rule and graph paper (reflections will be over simple vertical or horizontal lines, and rotations will be in increments of 90 degrees).</li> <li>• Be able to write the rule for transformations given an image on the coordinate plane (reflections will be over simple vertical or horizontal lines, and rotations will be in increments of 90 degrees).</li> <li>• Be able to perform or write rules for simple sequences of translations.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      8.G.1,                      8.G.2</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>M1.7-8.1</b>  <b>M3.7-8.1</b>  <b>M4.7-8.1</b>  <b>M5.7-8.1</b>  <b>M6.7-8.1</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Define, describe, and perform dilations in the coordinate plane.</li> <li>• Determine if two figures are similar using transformations and dilations.</li> <li>• Understand angle measurement and parallel or perpendicular relationships are preserved under similarity.</li> <li>• Find and use scale factor.</li> <li>• Use properties of similar triangles to model and solve problems.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      8.G.3,                      8.G.4</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Tessellation art project</li> <li>• <i>iReady</i> units 1 and 2 (not lessons 6 and 7)</li> </ul>	

## ANGLE RELATIONSHIPS

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M4 - Measurement:** The learner will explain reasoning when applying and modeling geometric principles.

**M6 - Geometry:** The learner will solve problems involving spatial reasoning and model geometric concepts in applied contexts.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.7-8.1</b>  <b>M2.7-8.1</b>  <b>M3.7-8.2</b>  <b>M4.7-8.1</b>  <b>M6.7-8.1</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Identify vertical, supplementary, and complementary angles.</li> <li>• Identify corresponding angles, alternate interior and alternate exterior angles in parallel lines and transversals.</li> <li>• Know the relationships between all of the above angles.</li> <li>• Define and use the interior angle sum for triangles.</li> <li>• Define and use the exterior angle sum for triangles.</li> <li>• Define and use the angle-angle criterion for similar triangles.</li> <li>• Solve for missing angles and or variables using equations.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Use the interior angle sum to derive the formula <math>(n-2)180</math> for finding the sum of interior angles for any polygon with <math>n</math> sides.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      8.G.5</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>iReady</i> unit 2, lessons 6 and 7</li> </ul>	

## LINEAR EQUATIONS & GRAPHS

### Graduate-Level Competency:

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<b>M5.7-8.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Know that linear equations can be represented in tables, graphs, and equations.</li> <li>• Know the four quadrants of the coordinate plane.</li> <li>• Know the x and y axes and the origin.</li> <li>• Be able to interpret scale for both axes.</li> <li>• Understand that x is the independent variable and y is the dependent variable.</li> <li>• Be able to graph linear equations from a table of values.</li> <li>• Understand slope as rise over run or a unit rate.</li> <li>• Determine slopes from graphs or word problems.</li> <li>• Understand the meaning of y intercept as the value of y when x is 0.</li> <li>• Be able to identify the y intercept from graphs or simple word problems</li> <li>• Recognize slope intercept form as <math>y = mx + b</math>, where m or slope is the coefficient of x.</li> <li>• Recognize the effect of slope on the steepness or direction of a graph.</li> <li>• Graph equations written in slope intercept form or written in word problems.</li> <li>• Know that proportional relationships are linear equations where the constant of proportionality is the slope and the y intercept is 0.</li> <li>• Know horizontal lines are linear equations where slope is 0 leading to the form <math>y = b</math>.</li> <li>• Know vertical lines have undefined slope because the change in x is 0 and division by 0 is undefined.</li> <li>• Know vertical lines are written as <math>x = a</math> constant.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Find the slope from a table or two coordinate pairs.</li> <li>• Write the slope intercept form of a linear equation when only given two points.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 8.EE.5, 8.F.2, 8.F.4</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• <i>iReady</i> unit 3 (not lessons 10 and 11)</li> </ul>	

## INTEGER EXPONENTS & SCIENTIFIC NOTATION

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<b>M1.7-8.1</b> <b>M2.7-8.1</b> <b>M3.7-8.1</b> <b>M5.7-8.1</b>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Identify equivalent exponential expressions.</li> <li>• Evaluate numerical or algebraic expressions with exponents using the order of operations.</li> <li>• Understand the effect of positive and negative bases with odd and even exponents.</li> <li>• Understand the properties of exponents including product property, quotient property, and power to a power property.</li> <li>• Recognize zero and negative (integer) exponents.</li> <li>• Simplify exponential expressions using all properties.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      8.EE.1, 8.EE.2</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Write small or large numbers as powers of 10.</li> <li>• Write numbers in scientific notation.</li> <li>• Convert numbers written in scientific notation into standard form.</li> <li>• Compare numbers written in either form.</li> <li>• Multiply, divide, add, and subtract numbers written in scientific notation, using exponential properties.</li> <li>• Interpret scientific notation values on calculators.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      8.EE.1, 8.EE.3,                      8.EE.4</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>iReady</i> unit 5</li> </ul>	

## NUMERACY

**Graduate-Level Competency:**

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M2.7-8.1</b> <b>M3.7-8.1</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Define, evaluate, or estimate square and cube roots.</li> <li>• Understand that squares and square roots and cubes and cube roots are inverse operations.</li> <li>• Define and be able to identify rational numbers.</li> <li>• Define and be able to identify irrational numbers, including pi and square roots of nonperfect squares.</li> <li>• Approximate the value of irrational numbers and locate on a number line.</li> <li>• Compare values of rational and irrational numbers.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Know why there is no real square root to a negative number, and that square roots of negative numbers are classified as imaginary numbers.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 8.NS.1, 8.NS.2, 8.EE.2</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>M2.7-8.1</b> <b>M3.7-8.2</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Understand that division of zero is not possible; for example a vertical line has undefined slope because the “run” in “rise over run” is 0.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b></p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>iReady</i> unit 6, lessons 23-25</li> </ul>	

## PYTHAGOREAN THEOREM

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M4 - Measurement:** The learner will explain reasoning when applying and modeling geometric principles.

**M6 - Geometry:** The learner will solve problems involving spatial reasoning and model geometric concepts in applied contexts.

Course/ Grade Competency	Content Objectives	Standards
<b>M1.7-8.1</b> <b>M2.7-8.1</b> <b>M3.7-8.1</b> <b>M3.7-8.2</b> <b>M4.7-8.1</b> <b>M6.7-8.1</b>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Learn the Pythagorean Theorem.</li> <li>• Use the converse to determine if a triangle is a right triangle.</li> <li>• Use the Pythagorean Theorem to find missing side lengths of right triangles, slant height of cones, or distance between points in the coordinate plane.</li> <li>• Apply the Pythagorean Theorem in area and perimeter problems and other real-world problems.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      8.EE.2, 8.G.6,                      8.G.7, 8.G.8</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• <i>iReady</i> unit 6, lessons 26-27</li> </ul>	

## VOLUME OF CYLINDERS, CONES, & SPHERES

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M4 - Measurement:** The learner will explain reasoning when applying and modeling geometric principles.

**M6 - Geometry:** The learner will solve problems involving spatial reasoning and model geometric concepts in applied contexts.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.7-8.1</b>  <b>M2.7-8.1</b>  <b>M3.7-8.1</b>  <b>M4.7-8.1</b>  <b>M6.7-8.1</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Find the volume of cylinders, cones, and spheres.</li> <li>• Understand the proportional relationship between a cylinder and cone with equal radius and height.</li> <li>• Be able to find missing dimensions when given the volume of cones, cylinders, or spheres.</li> <li>• Find the volumes of composite shapes that include cylinders, cones, or spheres.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      8.EE.2, 8.G.9</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Lab to derive volume of cones based on cylinders.</li> <li>• <i>iReady</i> unit 6, lessons 28-29</li> </ul>	

## TWO-WAY CATEGORICAL TABLES & ASSOCIATIONS

**Graduate-Level Competency:**

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<b>M7.7-8.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Know the difference between numerical and categorical data.</li> <li>• Create and analyze two-way tables of bivariate categorical data for associations.</li> <li>• Calculate relative frequencies in two-way tables to investigate associations.</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u> 8.SP.4</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• Gather data on “the dress” (is it black and blue or white and gold), and look for associations between gender and color seen or age and color seen.</li> <li>• <i>iReady</i> unit 7</li> </ul>	

# Middle School Math Lab

<p><b>Grade(s):</b> 6-8</p> <p><b>Length:</b> two semesters</p> <p><b>Prerequisite:</b> Teacher recommendation</p> <p><b>Placement recommendation:</b> Student scored below the 20<sup>th</sup> percentile on the most recent MAP test and more than one grade level below their current grade level on iReady. Complete the “Decision Point” form.</p>	<p><b>Overview:</b></p> <p><i>Middle School Math Lab</i> is for any middle school student struggling to achieve math success. The goal of this course is to help students be successful with minimum intervention. <i>Math Lab</i> provides students with individualized instruction designed to support success in completing mathematics content. It will relate and reinforce mathematic skills students have learned previously, fill in gaps and misconceptions of previous content, and present the current content in concrete and hands-on methods. Completion of this course will place the student in current grade-level math or higher.</p>
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Mathematical Topics (Recommended Order)	
Semester 1	Semester 2
<ul style="list-style-type: none"> <li>• Place Value</li> <li>• Basic Computation</li> <li>• Integers</li> <li>• Fractions</li> <li>• Decimals</li> <li>• Order of Operations</li> <li>• Conversions</li> </ul>	<ul style="list-style-type: none"> <li>• Solving</li> <li>• Formulas</li> <li>• Financial</li> <li>• Coordinate Plane</li> <li>• Statistics</li> </ul>

Course/ Grade Competencies	
Semester 1	Semester 2
<ul style="list-style-type: none"> <li>• <b>M2.3-4.1:</b> The learner will demonstrate an understanding of number systems, thinking flexibly and attending to precision and reasonableness when solving problems using whole numbers, fractions, and decimals.</li> <li>• <b>M2.7-8.1:</b> The learner will expand their understanding of number systems thinking flexibly and attending to precision and reasonableness when solving problems using rational and irrational numbers.</li> <li>• <b>M4.5-6.1:</b> The learner will use tools and apply precision and reasoning to solve measurement problems in authentic applied contexts.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>MS.3-4.2:</b> The learner will use reasoning and self-monitoring to analyze and justify one or more solution pathways.</li> <li>• <b>M3.7-8.1:</b> The learner will expand the use of computational strategies, algorithms, and proportional reasoning to rational and irrational numbers.</li> <li>• <b>M3.7-8.2:</b> The learner will use reasoning and metacognitive skills through making conjectures, justifying, and effectively communicating mathematical solutions and arguments.</li> <li>• <b>M4.7-8.1:</b> The learner will strategically use tools and apply proportional reasoning and precision to solve measurement problems in pure/ theoretical and authentic applied contexts.</li> <li>• <b>M5.7-8.1:</b> The learner will make use of structure to describe and compare situations that involve proportionality, change, or patterns, and use the information to make conjectures and justify conclusions/ solutions.</li> <li>• <b>M6.7-8.1:</b> The learner will solve problems involving reasoning using properties of two- and three- dimensional shapes to analyze, represent, and model geometric relationships in pure/ theoretical and authentic applied contexts.</li> <li>• <b>M7.3-4.1:</b> The learner will gather, represent, and interpret data related to a particular/ single context, including authentic applications.</li> <li>• <b>M7.7-8.1:</b> The learner will design investigations and conduct probability experiments involving populations.</li> </ul>

## PLACE VALUE

### Graduate-Level Competency:

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

Course/ Grade Competency	Content Objectives	Standards
<b>M2.7-8.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Estimate a number to check to see if their answer makes sense.</li> <li>• Determining the reasonableness of their answer.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li>• <i>iReady</i> grade 2, lesson 23</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 4.NBT.3, 7.EE.3</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 3, 6</p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Round a number to a given place.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li>• <i>iReady</i> grade 3, lesson 1</li> <li>• <i>iReady</i> grade 4, lesson 9</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 4.NBT.3, 5.NBT.4, 6.NS.3</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 3, 6</p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Determine the difference between estimating &amp; rounding.</li> <li>• Determine when to estimate and when to round.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 4.NBT.3</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 3, 5, 6</p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• <i>iReady</i> grade 2, lesson 23</li> <li>• <i>iReady</i> grade 3, lesson 1</li> <li>• <i>iReady</i> grade 4, lesson 9</li> </ul>	

## BASIC COMPUTATION

### Graduate-Level Competency:

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

Course/ Grade Competency	Content Objectives	Standards
<b>M2.3-4.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Add multi-digit numbers using multiple scenarios and determine the reasonableness of their answer.</li> <li>Add multi-digit numbers with regrouping and determine the reasonableness of their answer.</li> </ul> <p>Suggested Materials:</p> <ul style="list-style-type: none"> <li><i>iReady</i> grade 3, lesson 2</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 4.NBT.4</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 2, 3, 6</p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Subtract multi-digit numbers using multiple scenarios and determine the reasonableness of their answer.</li> <li>Subtract multi-digit numbers with borrowing and determine the reasonableness of their answer.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li><i>iReady</i> grade 3, lesson 3</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 4.NBT.4</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 2, 3, 6</p>
<b>M2.3-4.1</b> <b>M2.7-8.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Multiply multi-digit numbers using multiple scenarios and determine the reasonableness of their answer.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Simplify exponents (squares and cubes) and determine the reasonableness of their answer.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li><i>iReady</i> grade 3, lesson 8</li> <li><i>iReady</i> grade 3, lesson 9</li> <li><i>iReady</i> grade 4, lesson 12</li> <li><i>iReady</i> grade 5, lesson 4</li> <li><i>iReady</i> grade 6, lesson 5</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 5.NBT.5</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 2, 3, 6</p>

## BASIC COMPUTATION (continued)

Course/ Grade Competency	Content Objectives	Standards
<b>M2.3-4.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Divide multi-digit numbers using multiple scenarios and determine the reasonableness of their answer.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Simplify roots (squares and cubes) and determine the reasonableness of their answer.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li><i>iReady</i> grade 4, lesson 15</li> <li><i>iReady</i> grade 5, lesson 5</li> <li><i>iReady</i> grade 8, lesson 23</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 5.NBT.5</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 2, 3, 6</p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li><i>iReady</i> grade 3, lesson 2</li> <li><i>iReady</i> grade 3, lesson 3</li> <li><i>iReady</i> grade 3, lesson 8</li> <li><i>iReady</i> grade 3, lesson 9</li> <li><i>iReady</i> grade 4, lesson 12</li> </ul>	<ul style="list-style-type: none"> <li><i>iReady</i> grade 4, lesson 15</li> <li><i>iReady</i> grade 5, lesson 4</li> <li><i>iReady</i> grade 5, lesson 5</li> <li><i>iReady</i> grade 6, lesson 5</li> <li><i>iReady</i> grade 8, lesson 23</li> </ul>

# INTEGERS

**Graduate-Level Competency:**

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

Course/ Grade Competency	Content Objectives	Standards
<b>M2.7-8.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Add integers using manipulatives and visuals.</li> <li>• Add integers using multiple scenarios and determine the reasonableness of their answer.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li>• <i>iReady</i> grade 7, lesson 10</li> <li>• <i>iReady</i> grade 7, lesson 14</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 6.NS.5, 6.NS.6, 7.NS.2</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 3, 4, 6</p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Subtract integers using manipulatives and visuals.</li> <li>• Subtract integers using multiple scenarios and determine the reasonableness of their answer.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li>• <i>iReady</i> grade 7, lesson 10</li> <li>• <i>iReady</i> grade 7, lesson 14</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b></p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b></p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Multiply integers using manipulatives and visuals.</li> <li>• Multiply integers using multiple scenarios and determine the reasonableness of their answer.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li>• <i>iReady</i> grade 7, lesson 12</li> <li>• <i>iReady</i> grade 7, lesson 14</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b></p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b></p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Divide integers using manipulatives and visuals.</li> <li>• Divide integers using multiple scenarios and determine the reasonableness of their answer.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li>• <i>iReady</i> grade 7, lesson 12</li> <li>• <i>iReady</i> grade 7, lesson 14</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b></p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b></p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• Alaskan temperature – above/ below zero</li> <li>• Protons/ neutrons – positive and negative charge</li> <li>• Sea level</li> <li>• <i>iReady</i> grade 7, lesson 10</li> <li>• <i>iReady</i> grade 7, lesson 12</li> <li>• <i>iReady</i> grade 7, lesson 14</li> </ul>	

## FRACTIONS

### Graduate-Level Competency:

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

Course/ Grade Competency	Content Objectives	Standards
<b>M2.3-4.1</b> <b>M2.7-8.1</b>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Use least common multiple to find common denominators.</li> <li>• Add/subtract fractions using manipulatives and visuals.</li> <li>• Add/subtract fractions using multiple scenarios and determine the reasonableness of their answer.</li> <li>• Use greatest common factor to simplify fractions.</li> <li>• Understand improper fractions versus mixed numbers.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li>• <i>iReady</i> grade 4, lesson 8</li> <li>• <i>iReady</i> grade 4, lesson 20</li> <li>• <i>iReady</i> grade 4, lesson 21</li> <li>• <i>iReady</i> grade 5, lesson 12</li> <li>• <i>iReady</i> grade 5, lesson 13</li> <li>• <i>iReady</i> grade 5, lesson 14</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      4.OA.4, 5.NF.2,                      7.NS.3</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b>                      1, 2, 3, 4, 6</p>
	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Multiply fractions using manipulatives and visuals.</li> <li>• Multiply fractions using multiple scenarios and determine the reasonableness of their answer.</li> <li>• Use greatest common factor to simplify fractions.</li> <li>• Understand improper fractions versus mixed numbers.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Cancel before multiplying.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li>• <i>iReady</i> grade 4, lesson 24</li> <li>• <i>iReady</i> grade 5, lesson 19</li> <li>• <i>iReady</i> grade 5, lesson 21</li> <li>• <i>iReady</i> grade 5, lesson 22</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      5.NF.6, 7.NS.3</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b>                      1, 2, 3, 4, 6</p>

## FRACTIONS (continued)

Course/ Grade Competency	Content Objectives	Standards
<b>M2.3-4.1</b> <b>M2.7-8.1</b>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Divide fractions using manipulatives and visuals.</li> <li>• Divide fractions using multiple scenarios and determine the reasonableness of their answer.</li> <li>• Use greatest common factor to simplify fractions.</li> <li>• Understand improper fractions versus mixed numbers.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Cancel before dividing.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li>• <i>iReady</i> grade 5, lesson 23</li> <li>• <i>iReady</i> grade 5, lesson 24</li> <li>• <i>iReady</i> grade 6, lesson 9</li> <li>• <i>iReady</i> grade 6, lesson 10</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      5.NF.7, 6.NS.1,                      7.NS.3</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b>                      1, 2, 3, 4, 6</p>
	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Solve equivalent fractions using greatest common factor (simplifying).</li> <li>• Solve equivalent fractions using least common multiple.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li>• <i>iReady</i> grade 5, lesson 23</li> <li>• <i>iReady</i> grade 5, lesson 24</li> <li>• <i>iReady</i> grade 6, lesson 9</li> <li>• <i>iReady</i> grade 6, lesson 10</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      6.NS.4</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b>                      1, 2, 3, 6</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Cooking</li> <li>• Construction</li> <li>• <i>iReady</i> grade 3, lesson 23</li> <li>• <i>iReady</i> grade 4, lesson 8</li> <li>• <i>iReady</i> grade 4, lesson 17</li> <li>• <i>iReady</i> grade 4, lesson 20</li> <li>• <i>iReady</i> grade 4, lesson 21</li> <li>• <i>iReady</i> grade 4, lesson 24</li> <li>• <i>iReady</i> grade 5, lesson 12</li> <li>• <i>iReady</i> grade 5, lesson 13</li> </ul>	<ul style="list-style-type: none"> <li>• <i>iReady</i> grade 5, lesson 14</li> <li>• <i>iReady</i> grade 5, lesson 19</li> <li>• <i>iReady</i> grade 5, lesson 21</li> <li>• <i>iReady</i> grade 5, lesson 22</li> <li>• <i>iReady</i> grade 5, lesson 23</li> <li>• <i>iReady</i> grade 5, lesson 24</li> <li>• <i>iReady</i> grade 6, lesson 9</li> <li>• <i>iReady</i> grade 6, lesson 10</li> <li>• <i>iReady</i> grade 6, lesson 13</li> </ul>

## DECIMALS

**Graduate-Level Competency:**

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M2.3-4.1</b> <b>M2.7-8.1</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Add multi-digit decimals with regrouping and determine the reasonableness of their answer.</li> <li>• Add decimals using multiple scenarios and determine the reasonableness of their answer.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li>• <i>iReady</i> grade 5, lesson 10</li> <li>• <i>iReady</i> grade 5, lesson 14</li> <li>• <i>iReady</i> grade 6, lesson 7</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 6.NS.3, 7.NS.3</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 2, 3, 4, 6</p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Subtract multi-digit numbers with borrowing and determine the reasonableness of their answer.</li> <li>• Subtract decimals using multiple scenarios and determine the reasonableness of their answer.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li>• <i>iReady</i> grade 5, lesson 11</li> <li>• <i>iReady</i> grade 5, lesson 14</li> <li>• <i>iReady</i> grade 6, lesson 7</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 6.NS.3, 7.NS.3</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 2, 3, 4, 6</p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Multiply multi-digit decimals using multiple scenarios and determine the reasonableness of their answer.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li>• <i>iReady</i> grade 5, lesson 16</li> <li>• <i>iReady</i> grade 6, lesson 7</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 6.NS.3, 7.NS.3</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 2, 3, 4, 6</p>

## DECIMALS (continued)

Course/ Grade Competency	Content Objectives	Standards
<p><b>M2.3-4.1</b> <b>M2.7-8.1</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Divide multi-digit decimals using multiple scenarios and determine the reasonableness of their answer.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li>• <i>iReady</i> grade 5, lesson 17</li> <li>• <i>iReady</i> grade 5, lesson 18</li> <li>• <i>iReady</i> grade 6, lesson 8</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 6.NS.3, 7.NS.3</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 2, 3, 4, 6</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>iReady</i> grade 5, lesson 10</li> <li>• <i>iReady</i> grade 5, lesson 11</li> <li>• <i>iReady</i> grade 5, lesson 14</li> <li>• <i>iReady</i> grade 5, lesson 16</li> <li>• <i>iReady</i> grade 5, lesson 17</li> <li>• <i>iReady</i> grade 5, lesson 18</li> <li>• <i>iReady</i> grade 6, lesson 7</li> <li>• <i>iReady</i> grade 6, lesson 8</li> </ul>	

## ORDER OF OPERATIONS

### Graduate-Level Competency:

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

Course/ Grade Competency	Content Objectives	Standards
<b>M2.7-8.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Simplify two-step expressions (including integers, fractions, &amp; decimals) and determine the reasonableness of their answer.</li> <li>Simplify three-step expressions (including integers, fractions, &amp; decimals) and determine the reasonableness of their answer.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 6.EE.2, 7.EE.1, 7.EE.2</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 3, 6, 8</p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Simplify expressions with Distributive Property (including integers, fractions, &amp; decimals) and determine the reasonableness of their answer.</li> <li>Simplify expressions with various grouping symbols (including integers, fractions, &amp; decimals) and determine the reasonableness of their answer.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 6.EE.2, 7.EE.1, 7.EE.2</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 3, 6, 8</p>
<b>Suggested Activities, Materials, and Resources:</b>		

## CONVERSIONS

### Graduate-Level Competency:

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M4 - Measurement:** The learner will explain reasoning when applying and modeling geometric principles.

Course/ Grade Competency	Content Objectives	Standards
<b>M2.7-8.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Convert fractions to decimals and determine the reasonableness of their answer.</li> <li>• Convert fractions to percent and determine the reasonableness of their answer.</li> <li>• Convert decimals to fractions and determine the reasonableness of their answer.</li> <li>• Convert decimals to percent and determine the reasonableness of their answer.</li> <li>• Convert percent to decimals and determine the reasonableness of their answer.</li> <li>• Convert percent to fractions and determine the reasonableness of their answer.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li>• <i>iReady</i> grade 4, lesson 26</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 7.NS.2</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 2, 3, 4, 6, 7</p>
<b>M2.7-8.1</b> <b>M4.5-6.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Convert units of length and determine the reasonableness of their answer.</li> <li>• Convert units of liquid and determine the reasonableness of their answer.</li> <li>• Convert units of weight and determine the reasonableness of their answer.</li> <li>• Convert units of time and determine the reasonableness of their answer.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li>• <i>iReady</i> grade 3, lesson 27</li> <li>• <i>iReady</i> grade 3, lesson 28</li> <li>• <i>iReady</i> grade 3, lesson 29</li> <li>• <i>iReady</i> grade 4, lesson 28</li> <li>• <i>iReady</i> grade 4, lesson 29</li> <li>• <i>iReady</i> grade 5, lesson 25</li> <li>• <i>iReady</i> grade 5, lesson 26</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 5.MD.1, 5.MD.2</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 2, 3, 4, 6, 7</p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• <i>iReady</i> grade 3, lesson 27</li> <li>• <i>iReady</i> grade 3, lesson 28</li> <li>• <i>iReady</i> grade 3, lesson 29</li> <li>• <i>iReady</i> grade 4, lesson 26</li> </ul>	<ul style="list-style-type: none"> <li>• <i>iReady</i> grade 4, lesson 28</li> <li>• <i>iReady</i> grade 4, lesson 29</li> <li>• <i>iReady</i> grade 5, lesson 25</li> <li>• <i>iReady</i> grade 5, lesson 26</li> </ul>

## SOLVING

### Graduate-Level Competency:

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M3.3-4.2</b> <b>M3.7-8.1</b> <b>M3.7-8.2</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Solve one-step equations and determine the reasonableness of their answer.</li> <li>• Solve two-step equations and determine the reasonableness of their answer.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Solve multi-step equations and determine the reasonableness of their answer.</li> <li>• Solve one-step inequalities and determine the reasonableness of their answer.</li> <li>• Solve two-step inequalities and determine the reasonableness of their answer.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li>• <i>iReady</i> grade 2, lesson 3</li> <li>• <i>iReady</i> grade 3, lesson 17</li> <li>• <i>iReady</i> grade 3, lesson 18</li> <li>• <i>iReady</i> grade 6, lesson 21</li> <li>• <i>iReady</i> grade 7, lesson 17</li> <li>• <i>iReady</i> grade 7, lesson 18</li> <li>• <i>iReady</i> grade 7, lesson 19</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 6.EE.7, 6.EE.5, 7.EE.3, 7.EE.4</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 3, 6, 7, 8</p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Solve equations with Distributive Property and determine the reasonableness of their answer.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Solve with variables on both sides and determine the reasonableness of their answer.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li>• <i>iReady</i> grade 8, lesson 10</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> <b><u>AKSS</u></b> 6.EE.7, 7.EE.3, 7.EE.4</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 3, 6, 7, 8</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>iReady</i> grade 2, lesson 3</li> <li>• <i>iReady</i> grade 3, lesson 17</li> <li>• <i>iReady</i> grade 3, lesson 18</li> <li>• <i>iReady</i> grade 6, lesson 21</li> </ul>	<ul style="list-style-type: none"> <li>• <i>iReady</i> grade 7, lesson 17</li> <li>• <i>iReady</i> grade 7, lesson 18</li> <li>• <i>iReady</i> grade 7, lesson 19</li> <li>• <i>iReady</i> grade 8, lesson 10</li> </ul>

## FORMULAS

### Graduate-Level Competency:

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M4 - Measurement:** The learner will explain reasoning when applying and modeling geometric principles.

**M6 - Geometry:** The learner will solve problems involving spatial reasoning and model geometric concepts in applied contexts.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M3.3-4.2</b>  <b>M3.7-8.1</b>  <b>M3.7-8.2</b>  <b>M4.7-8.1</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>Find the perimeter or circumference of the given shape, and determine the reasonableness of their answer.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>Find the perimeter and/or circumference of complex shapes, and determine the reasonableness of their answer.</li> <li>Find the missing measurement using perimeter or circumference, and determine the reasonableness of their answer.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li><i>iReady</i> grade 3, lesson 32</li> <li><i>iReady</i> grade 4, lesson 16</li> <li><i>iReady</i> grade 7, lesson 6</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      3.MD.10, 6.G.5,                      7.G.4</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b>                      1, 2, 3, 4, 5, 6, 7, 8</p>
<p><b>M3.3-4.2</b>  <b>M3.7-8.1</b>  <b>M3.7-8.2</b>  <b>M4.7-8.1</b>  <b>M6.7-8.1</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>Find the area of the given shape and determine the reasonableness of their answer.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>Find the area of complex shapes and determine the reasonableness of their answer.</li> <li>Find the area of the shaded region and determine the reasonableness of their answer.</li> <li>Use the Pythagorean Theorem to find the missing information and determine the reasonableness of their answer.</li> <li>Find the surface area of the given shape and determine the reasonableness of their answer.</li> <li>Find the missing measurement using area formulas and determine the reasonableness of their answer.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li><i>iReady</i> grade 3, lesson 15</li> <li><i>iReady</i> grade 3, lesson 16</li> <li><i>iReady</i> grade 3, lesson 32</li> <li><i>iReady</i> grade 4, lesson 16</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      6.G.1, 7.G.4,                      7.G.6, 8.G.6,                      8.G.7, 8.G.8</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b>                      1, 2, 3, 4, 5, 6, 7, 8</p>
	<ul style="list-style-type: none"> <li><i>iReady</i> grade 5, lesson 20</li> <li><i>iReady</i> grade 6, lesson 1</li> <li><i>iReady</i> grade 6, lesson 2</li> <li><i>iReady</i> grade 7, lesson 6</li> <li><i>iReady</i> grade 7, lesson 25</li> </ul>	

## FORMULAS (continued)

Course/ Grade Competency	Content Objectives	Standards
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Find the volume of the given shape and determine the reasonableness of their answer.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Find the volume of complex shapes and determine the reasonableness of their answer.</li> <li>Find the missing measurement using volume formulas and determine the reasonableness of their answer.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li><i>iReady</i> grade 5, lesson 1</li> <li><i>iReady</i> grade 5, lesson 2</li> <li><i>iReady</i> grade 5, lesson 3</li> <li><i>iReady</i> grade 7, lesson 26</li> <li><i>iReady</i> grade 8, lesson 28</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 5.MD.7, 6.G.2, 7.G.6</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 2, 3, 4, 5, 6, 7, 8</p>
<p><b>M3.3-4.2</b> <b>M3.7-8.2</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Use <math>D=rt</math> to find the missing value and determine the reasonableness of their answer.</li> <li>Use <math>I=prt</math> to find the missing value and determine the reasonableness of their answer.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li><i>iReady</i> grade 7, lesson 20</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 7.RP.3</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 2, 3, 4, 5, 6, 7, 8</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>Perimeter/circumference - How much fencing do you need to buy? How much space to turn your boat around?</li> <li>Area - How much paint/flooring do you need to buy?</li> <li>Volume - How much water is in the pool? How big of a container do you need for storage?</li> <li>Surface Area - How much wrapping paper do you need?</li> <li><i>iReady</i> grade 3, lesson 15</li> <li><i>iReady</i> grade 3, lesson 16</li> <li><i>iReady</i> grade 3, lesson 32</li> <li><i>iReady</i> grade 4, lesson 16</li> <li><i>iReady</i> grade 5, lesson 1</li> <li><i>iReady</i> grade 5, lesson 2</li> <li><i>iReady</i> grade 5, lesson 3</li> <li><i>iReady</i> grade 5, lesson 20</li> <li><i>iReady</i> grade 6, lesson 1</li> <li><i>iReady</i> grade 6, lesson 2</li> <li><i>iReady</i> grade 6, lesson 3</li> <li><i>iReady</i> grade 7, lesson 6</li> <li><i>iReady</i> grade 7, lesson 16</li> <li><i>iReady</i> grade 7, lesson 20</li> <li><i>iReady</i> grade 7, lesson 25</li> <li><i>iReady</i> grade 7, lesson 26</li> <li><i>iReady</i> grade 8, lesson 26</li> <li><i>iReady</i> grade 8, lesson 27</li> <li><i>iReady</i> grade 8, lesson 28</li> </ul>	

## FINANCIAL

**Graduate-Level Competency:**

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M3.7-8.2</b> <b>M5.7-8.1</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Find unit rates and rate of change, and determine the reasonableness of their answer.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li><i>iReady</i> grade 6, lesson 16</li> <li><i>iReady</i> grade 7, lesson 2</li> <li><i>iReady</i> grade 7, lesson 5</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 6.RP.2, 7.RP.1</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 2, 3, 4, 5, 6, 7</p>
	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Find percent of increase/decrease and determine the reasonableness of their answer.</li> <li>Find mark-ups and discounts and determine the reasonableness of their answer.</li> <li>Calculate final costs (including sales tax and tips) and determine the reasonableness of their answer.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li><i>iReady</i> grade 7, lesson 21</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 6.NS.5, 7.RP.3</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 2, 3, 4, 5, 6, 7</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>Best buys</li> <li>Shopping</li> <li>Restaurants</li> <li><i>iReady</i> grade 6, lesson 16</li> <li><i>iReady</i> grade 7, lesson 2</li> <li><i>iReady</i> grade 7, lesson 5</li> <li><i>iReady</i> grade 7, lesson 21</li> </ul>	

## COORDINATE PLANE

**Graduate-Level Competency:**

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<b>M5.7-8.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Correctly label the x-axis and y-axis on the coordinate plane.</li> <li>• Correctly graph ordered pairs on the coordinate plane.</li> <li>• Correctly label the quadrants.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Find the slope and determine the reasonableness of their answer.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li>• <i>iReady</i> grade 5, lesson 31</li> <li>• <i>iReady</i> grade 6, lesson 11</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 6.NS.8</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 3, 5, 6</p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• Battleship - Graph on the coordinate plane.</li> <li>• Coordinate plan – picture graphing</li> <li>• Slope – roof, steps, ramps</li> <li>• <i>iReady</i> grade 5, lesson 31</li> <li>• <i>iReady</i> grade 6, lesson 11</li> </ul>	

## STATISTICS

### Graduate-Level Competency:

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<b>M7.3-4.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Use circle graphs (pie charts).</li> <li>• Use histograms.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li>• <i>iReady</i> grade 6, lesson 30</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 6.SP.4</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 2, 3, 5, 6</p>
<b>M3.7-8.1</b> <b>M3.7-8.2</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Calculate mean, median, and mode, and determine the reasonableness of their answer.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 6.SP.3</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 2, 3, 5, 6</p>
<b>M7.7-8.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Find probability and odds, and determine the reasonableness of their answer.</li> </ul> <p>Suggested materials:</p> <ul style="list-style-type: none"> <li>• <i>iReady</i> grade 7, lesson 30</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> 6.SP.6, 6.SP.7, 7.SP.1, 7.SP.5, 7.SP.6, 7.SP.7, 7.SP.8</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> 1, 2, 3, 5, 6</p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• <i>iReady</i> grade 6, lesson 30</li> <li>• <i>iReady</i> grade 7, lesson 30</li> </ul>	

# High School Math Courses



**Grades 9 - 12**

Adopted June 7, 2022

# Math Graduation Requirements

The learner must complete a **total of three credits (six semesters) of math courses in high school** to include:

- 1 credit (two semesters) of *Algebra 1* (or one additional math credit if *Algebra 1* was completed in middle school);
- 0.5 credit (one semester) of a statistics course (either *Survey of Math in Society*, *Introduction to Statistics*, semester 2 of *Algebra 2*, or *AP Statistics*); and
- 1.5 credits (three semesters) of additional math options.

High school math credit earned in middle school would not satisfy this math graduation requirement. Instead, it would go towards general elective credit needed to graduate.

Algebra I Options	Statistics Course Options	Additional Math Options
<ul style="list-style-type: none"> <li>• Algebra I</li> <li>• Algebra 1 (Two-Year Program; students must pass 1.2 &amp; 1.3 to fulfill the Algebra 1 graduation requirement.)</li> </ul>	<ul style="list-style-type: none"> <li>• Algebra 2, semester 2</li> <li>• AP Statistics</li> <li>• Introduction to Statistics</li> <li>• Survey of Math in Society</li> </ul>	<ul style="list-style-type: none"> <li>• Accounting 1A/1B</li> <li>• Accounting 2A/2B</li> <li>• Algebra 2 or Honors</li> <li>• Algebra for Finance 1A/1B</li> <li>• AP Calculus AB</li> <li>• AP Calculus BC</li> <li>• AP Computer Science A</li> <li>• AP Computer Science Principles</li> <li>• Computer Programming</li> <li>• Geometry or Honors</li> <li>• Math for the Trades &amp; Technical Careers</li> <li>• Pre-Calculus</li> <li>• Any course listed under Statistics Course Options.</li> <li>• Any Career and Technical Education (CTE) course that is cross-credited with math credit.</li> </ul>

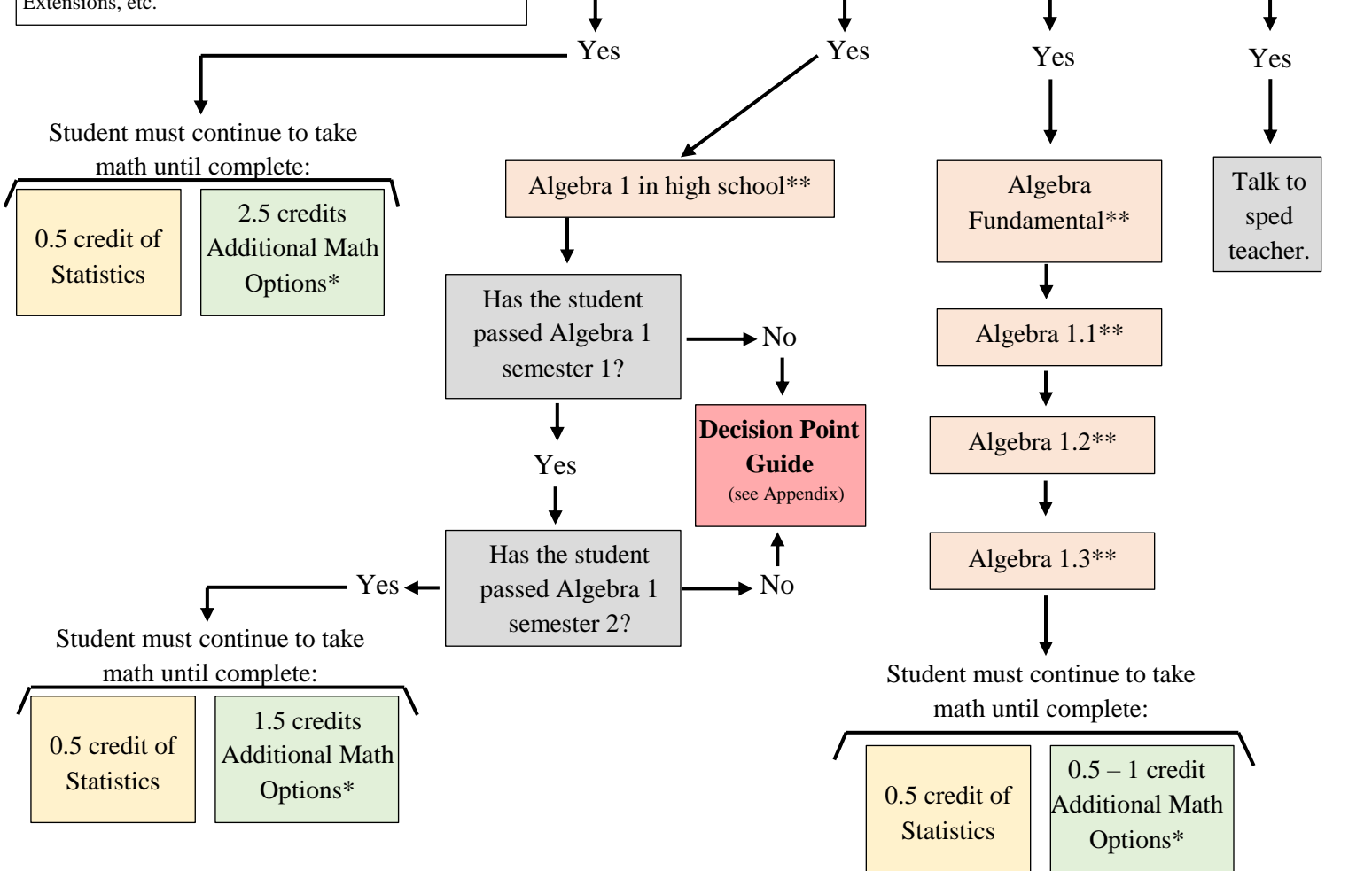
# Recommended High School Pathways

When making decisions about placement, complete the “Decision Point Guide” (see the form in the appendix).

\*Students can be concurrently enrolled in math courses as prerequisites allow.

\*\*If a student is earning a “D” or “F” at the quarter, they should receive Algebra 1 intervention through SSP, Extensions, etc.

<b>Decision Point Guide</b> (see Appendix)			
Has the student passed <i>Algebra 1</i> in middle school with at least a C?	Was Algebra 1 (one-year program) recommended?	Was Algebra 1 (two-year program) recommended?	Does the student have a Math IEP?



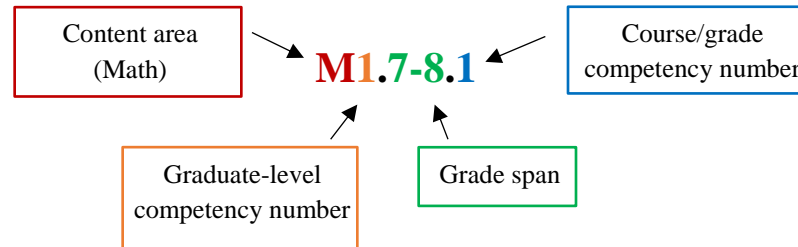
For families of students with an Individualized Education Plan (IEP), there may be additional options available through the Special Education program. Contact the Special Education Department for more information.

- Statistics Options**
- Algebra 2, semester 2
  - AP Statistics
  - Intro to Statistics
  - Survey of Math in Society

- Additional Math Options**
- Accounting 1A/1B & 2A/2B
  - Algebra 2 or Honors
  - Algebra for Finance 1A/1B
  - AP Calculus AB & BC
  - AP Computer Science A
  - AP Computer Science Principles
  - Computer Programming
  - Geometry or Honors
  - Math for the Trades & Tech Careers
  - Pre-Calculus
  - CTE cross-credited with Math

# Grades 9-12 Math Competencies

## Competency Coding



## High School Math Competency Checklist

Competencies	Algebra 1	Algebra 1 (Two Year Program)	Algebra 2 & Honors	Algebra for Finance 1A/1B	Accounting 1A	Accounting 1B	Computer Programming	Geometry & Honors	Introduction to Statistics	Accounting 2A/2B	Math for the Trades & Tech Careers	Pre-Calculus	Survey of Math in Society
<b>Symbolic Expression:</b> M1: Graduates of the FNSBSD will be able to reason abstractly and utilize symbolic expressions and mathematical models.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M1.9-12.1: The learner will write, apply, and provide a rationale for a mathematical model representing a given situation.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M1.9-12.2: The learner will interpret and use symbols to express relationships and justify reasoning when solving problems.	✓	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓

Competencies	Algebra 1	Algebra 1 (Two Year Program)	Algebra 2 & Honors	Algebra for Finance 1A/1B	Accounting 1A	Accounting 1B	Computer Programming	Geometry & Honors	Introduction to Statistics	Accounting 2A/ 2B	Math for the Trades & Tech Careers	Pre-Calculus	Survey of Math in Society
<b>Numbers and Number Systems:</b> M2: Graduates of the FNSBSD will develop an applied knowledge of numbers and number systems to solve problems.	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	
M2.9-12.1: The learner will justify how to apply properties of real number systems to variable expressions in a variety of contexts.	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	
<b>Reasoning and Strategic Thinking:</b> M3: Graduates of the FNSBSD will use evidence to support authentic application of concepts and support mathematical arguments.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M3.9-12.1: The learner will use computational strategies and algorithms and provide rationale for their use.	✓	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓
M3.9-12.2: The learner will reason quantitatively when analyzing, representing, and solving problems.	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
M3.9-12.3: The learner will compare the effectiveness or logic of two plausible arguments or models.	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓

Competencies	Algebra 1	Algebra 1 (Two Year Program)	Algebra 2 & Honors	Algebra for Finance 1A/1B	Accounting 1A	Accounting 1B	Computer Programming	Geometry & Honors	Introduction to Statistics	Accounting 2A/ 2B	Math for the Trades & Tech Careers	Pre-Calculus	Survey of Math in Society
<b>Measurement:</b> M4: Graduates of the FNSBSD will explain reasoning when applying and modeling geometric principles.			✓	✓				✓			✓	✓	✓
M4.9-12.1: The learner will provide rationale for solving measurement problems that require making conversions among various units and measurement systems, or applying the effect of a scale factor.			✓	✓				✓			✓	✓	✓
<b>Algebraic Functions, Patterns, and Relations:</b> M5: Graduates of the FNSBSD will utilize patterns, relations, and functions to compare, interpret, and analyze situations.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
M5.9-12.1: The learner will apply properties of arithmetic and algebra to simplify and manipulate symbolic expressions or models.	✓	✓	✓	✓		✓	✓	✓			✓	✓	✓
M5.9-12.2: The learner will write and apply algebraic modes to represent and answer questions about a given situation.	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
M5.9-12.3: The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Competencies	Algebra 1	Algebra 1 (Two Year Program)	Algebra 2 & Honors	Algebra for Finance 1A/1B	Accounting 1A	Accounting 1B	Computer Programming	Geometry & Honors	Introduction to Statistics	Accounting 2A/ 2B	Math for the Trades & Tech Careers	Pre-Calculus	Survey of Math in Society
M5.9-12.4: The learner will analyze relations and functions, using multiple representations.	✓	✓	✓	✓			✓					✓	✓
M5.9-12.5: The learner will identify, build, and perform operations on relations and functions and justify their reasoning.			✓	✓								✓	✓
<b>Geometry:</b> M6: Graduates of the FNSBSD will solve problems involving spatial reasoning and model geometric concepts in applied contexts.				✓				✓					
M6.9-12.1: The learner will apply geometric theorems and postulates to solve problems, create arguments, and support their reasoning.				✓				✓					
M6.9-12.2: The learner will use geometric theorems and postulates to construct and apply viable arguments.								✓					
M6.9-12.3: The learner will create and use a formal geometric construction, using appropriate tools, to illustrate geometric properties.				✓				✓					

Competencies	Algebra 1	Algebra 1 (Two Year Program)	Algebra 2 & Honors	Algebra for Finance 1A/1B	Accounting 1A	Accounting 1B	Computer Programming	Geometry & Honors	Introduction to Statistics	Accounting 2A/ 2B	Math for the Trades & Tech Careers	Pre-Calculus	Survey of Math in Society
<b>Data, Analysis, Probability, and Statistics:</b> M7: Graduates of the FNSBSD will apply statistical methods to summarize, represent, analyze, and interpret data.		✓		✓	✓	✓			✓	✓	✓	✓	✓
M7.9-12.1: The learner will formulate questions to clarify the problem at hand and formulate one (or more) questions that can be answered with data.				✓	✓	✓			✓	✓	✓		✓
M7.9-12.2: The learner will design and implement a plan to collect the appropriate data to answer the statistical question.				✓	✓	✓			✓		✓		✓
M7.9-12.3: The learner will summarize data using appropriate statistics.		✓		✓	✓	✓			✓	✓	✓	✓	✓
M7.9-12.4: The learner will select appropriate graphical and numerical methods, and use these methods to represent the data in a way that supports interpretation.		✓		✓	✓	✓			✓	✓	✓	✓	✓
M7.9-12.5: The learner will interpret descriptive statistics and linear models within the context of the data and the original question.		✓		✓		✓			✓		✓		✓
M7.9-12.6: The learner will apply probability concepts to analyze and evaluate potential decisions and strategies.				✓		✓			✓		✓	✓	

# Algebra 1

## Options

# Algebra 1

<p><b>Grade(s):</b> 9-12  <b>Length:</b> two semesters  <b>Credit:</b> 1.0 (0.5 per semester)  <b>Prerequisite:</b> none</p>	<p><b>Overview:</b>  <i>Algebra 1</i> formalizes and extends the mathematics that students learned in middle school. At the heart of <i>Algebra 1</i> is the study of functions. Throughout the study of specific functions (notably linear, exponential, and quadratic functions), students will be able to see the structures of functions, to make generalizations about all functions, and to describe the uniqueness of specific functions. Within the study of functions, students will apply properties of numbers and equality to carry out operations within different functions, all with the goal of seeing the applicability of mathematics to describe and model a wide range of natural or man-made events.</p> <p>If students have not taken and passed this course in middle school, this is the first course in their high school math pathway.</p>
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Mathematical Topics (Recommended Order)	
Semester 1	Semester 2
<ul style="list-style-type: none"> <li>• Equations and Inequalities</li> <li>• Linear Equations</li> <li>• Relations and Functions</li> <li>• Systems of Equations and Inequalities.</li> </ul>	<ul style="list-style-type: none"> <li>• Exponents and Exponential Functions</li> <li>• Polynomials and Factoring</li> <li>• Quadratic Functions</li> <li>• Solving Quadratic Equations</li> </ul>

Course/ Grade Competencies	
Semester 1	Semester 2
<ul style="list-style-type: none"> <li>• <b>M1.9-12.1:</b> The learner will write, apply, and provide a rationale for a mathematical model representing a given situation.</li> <li>• <b>M1.9-12.2:</b> The learner will interpret and use symbols to express relationships and justify reasoning when solving problems.</li> <li>• <b>M2.9-12.1:</b> The learner will justify how to apply properties of real number systems to variable expressions in a variety of contexts.</li> <li>• <b>M3.9-12.1:</b> The learner will use computational strategies and algorithms and provide rationale for their use.</li> <li>• <b>M3.9-12.2:</b> The learner will reason quantitatively when analyzing, representing, and solving problems.</li> <li>• <b>M3.9-12.3:</b> The learner will compare the effectiveness or logic of two plausible arguments or models.</li> <li>• <b>M5.9-12.1:</b> The learner will apply properties of arithmetic and algebra to simplify and manipulate symbolic expressions or models.</li> <li>• <b>M5.9-12.2:</b> The learner will write and apply algebraic modes to represent and answer questions about a given situation.</li> <li>• <b>M5.9-12.3:</b> The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.</li> <li>• <b>M5.9-12.4:</b> The learner will analyze relations and functions, using multiple representations.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>M1.9-12.1:</b> The learner will write, apply, and provide a rationale for a mathematical model representing a given situation.</li> <li>• <b>M1.9-12.2:</b> The learner will interpret and use symbols to express relationships and justify reasoning when solving problems.</li> <li>• <b>M2.9-12.1:</b> The learner will justify how to apply properties of real number systems to variable expressions in a variety of contexts.</li> <li>• <b>M3.9-12.1:</b> The learner will use computational strategies and algorithms and provide rationale for their use.</li> <li>• <b>M3.9-12.2:</b> The learner will reason quantitatively when analyzing, representing, and solving problems.</li> <li>• <b>M3.9-12.3:</b> The learner will compare the effectiveness or logic of two plausible arguments or models.</li> <li>• <b>M5.9-12.1:</b> The learner will apply properties of arithmetic and algebra to simplify and manipulate symbolic expressions or models.</li> <li>• <b>M5.9-12.2:</b> The learner will write and apply algebraic modes to represent and answer questions about a given situation.</li> <li>• <b>M5.9-12.3:</b> The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.</li> <li>• <b>M5.9-12.4:</b> The learner will analyze relations and functions, using multiple representations.</li> </ul>

## EQUATIONS & INEQUALITIES

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Simplify, then solve equations.</li> <li>• Solve equations with variables on both sides.</li> <li>• Solve any linear equation.</li> <li>• Write and solve equations to model situations.</li> <li>• Solve linear inequalities.</li> <li>• Write and solve inequalities to model situations.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Solve compound inequalities.</li> <li>• Solve absolute value equations and inequalities.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      N-Q.1, N-Q.2,                      N-Q.3, A-REI.1,                      A-REI.3, A-CED.1,                      A-CED.4</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>enVision Algebra 1</i> – topic 1</li> </ul>	

## LINEAR EQUATIONS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M3.9-12.3</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Find and interpret key characteristics (slope, x-intercept, y-intercept) of a linear situation, given a graph, ordered pairs, table, or written description.</li> <li>• Graph a linear equation written in any form.</li> <li>• Model linear situations with equations.</li> <li>• Write a linear equation given information.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Graph and find equations of parallel and perpendicular lines.</li> <li>• Recognize and utilize Point-Slope Form.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      N-Q.1, N-Q.2,                      N-Q.3, F-IF.4,                      F-IF.6, F-IF.7,                      F-IF.9</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b>                      All mathematical practices                      are present in each unit.</p>
<p><b>Suggested Activities,                      Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>enVision Algebra 1</i> – topic 2</li> </ul>	

## RELATIONS & FUNCTIONS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M3.9-12.3</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b>  <b>M5.9-12.3</b>  <b>M5.9-12.4</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Determine whether a relation is a function.</li> <li>• Determine the domain and range of a function, given a table of values, ordered pairs, mapping, or graph.</li> <li>• Determine a reasonable domain for a situation described by a linear function.</li> <li>• Sketch and interpret graphs showing key features given a description of a situation and/or function.</li> <li>• Evaluate functions written in function notation.</li> <li>• Interpret statements in function notation in terms of their context.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Use function notation to evaluate functions given a graph.</li> <li>• Compare properties of two functions each expressed in a different way (algebraically, graphically, numerically, in tables, verbal descriptions, etc.).</li> <li>• Write arithmetic sequences both recursively and with an explicit formula.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      N-Q.2, F-IF.1,                      F-IF.2, F-IF.4,                      F-IF.5, F-LE.5,                      F-IF.9, F-BF.1</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>enVision Algebra 1</i> – topic 3 (focus on 3-1).</li> </ul>	

## SYSTEMS OF EQUATIONS & INEQUALITIES

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M3.9-12.3</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Solve systems of equations by graphing.</li> <li>• Solve systems of equations using substitution.</li> <li>• Solve systems of equations using elimination.</li> <li>• Model situations with linear systems of equations.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Determine solutions to linear inequalities and systems of linear inequalities.</li> <li>• Model situations with inequalities, representing constraints with equations or inequalities and interpreting solutions as viable or non-viable.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      A-REI.5, A-REI.6,                      A-REI.10, A-REI.11,                      A-REI.12, A-CED.2,                      A-CED.3</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices                      are present in each unit.</p>
<p><b>Suggested Activities,                      Materials, and Resources:</b></p>	<p><i>enVision Algebra 1</i> – topic 4</p>	

## EXPONENTS & EXPONENTIAL FUNCTIONS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b>  <b>M5.9-12.3</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Simplify and evaluate expressions containing integer exponents.</li> <li>• Rewrite expressions involving radicals and rational exponents using the properties of exponents.</li> <li>• Solve equations with rational exponents using the properties of exponents.</li> <li>• Graph simple exponential functions (no vertical or horizontal translations).</li> <li>• Construct simple exponential functions from graphs, tables of values, or a description.</li> <li>• Distinguish between situations that can be modeled with linear functions and with exponential functions.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Write geometric sequences both recursively and with an explicit formula.</li> <li>• Simplify radical expressions.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b></p> <p>N-RN.1, N-RN.2,                      F-LE.1, F-LE.2,                      F-LE.5, A-SSE.3,                      F-IF.3, F-IF.8,                      F-IF.9, F-BF.2</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>enVision Algebra 1</i> – topic 6</li> </ul>	

## POLYNOMIALS & FACTORING

**Graduate-Level Competency:**

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M5.9-12.1</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Interpret the structure of polynomial expressions using language such as terms, factors, and coefficients.</li> <li>• Add, subtract, and multiply polynomials.</li> <li>• Factor polynomials using the greatest common factor.</li> <li>• Factor trinomials.</li> <li>• Factor a difference of squares.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      A-SSE.1, A-SSE.2,                      A-SSE.3, A-APR.1</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>enVision Algebra 1 – topic 7</i></li> </ul>	

## QUADRATIC FUNCTIONS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M3.9-12.3</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b>  <b>M5.9-12.3</b>  <b>M5.9-12.4</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Interpret key features (zeros, maximum/minimum, intercepts) of a parabola in terms of a context.</li> <li>• Graph simple quadratics written in standard form (factorable).</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Graph quadratics in vertex form.</li> <li>• Compare linear, exponential, and quadratic models.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      F-IF.4, F-IF.5,                      F-IF.7, F-IF.8,                      F-IF.9</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b>                      All mathematical practices                      are present in each unit.</p>
<p><b>Suggested Activities,                      Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>enVision Algebra 1</i> – topic 8</li> </ul>	

## SOLVING QUADRATIC EQUATIONS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b>  <b>M5.9-12.3</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Solve quadratic equations by factoring.</li> <li>• Solve quadratic equations using square roots.</li> <li>• Solve quadratic equations using the quadratic formula.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Solve quadratic equations by completing the square.</li> <li>• Write solutions as simplified exact values rather than decimal approximations.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      A-REI.4</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>enVision Algebra 1</i> – topic 9</li> </ul>	

# Algebra 1 (Two Year Program)

<p><b>Grade(s):</b> 9-12</p> <p><b>Length:</b> four semesters</p> <p><b>Credit:</b> 2.0 (0.5 per semester)</p> <ul style="list-style-type: none"><li>• 1.0 credit of math elective will be earned for successful completion of Fundamentals and 1.1.</li><li>• 1.0 credit of <i>Algebra 1</i> will be earned for successful completion of 1.2 &amp; 1.3.</li></ul> <p><b>Prerequisite:</b> none</p> <p><b>Placement recommendation:</b> Student scored below the 20<sup>th</sup> percentile on the most recent MAP test and more than one grade level below their current grade level on iReady. Complete the “Decision Point” form.</p>	<p><b>Overview:</b></p> <p><i>Algebra 1</i> formalizes and extends the mathematics that students learned in the middle school. At the heart of <i>Algebra 1</i> is the study of functions. Throughout the study of specific functions (notably linear, exponential, and quadratic functions), students will be able to see the structures of functions, to make generalizations about all functions, and to describe the uniqueness of specific functions. Within the study of functions, students will apply properties of numbers and equality to carry out operations within different functions, all with the goal of seeing the applicability of mathematics to describe and model a wide range of natural or man-made events.</p> <p>The first semester (Fundamentals) of the two-year <i>Algebra 1</i> program provides a review of middle school Algebra math standards, with individualized attention to students’ specific skill deficits. The second semester (1.1) begins instruction in <i>Algebra 1</i>. Over three semesters (1.1, 1.2, and 1.3), students receive the <i>Algebra 1</i> curriculum. Successful completion of the third and fourth semesters (<i>Algebra 1.2</i> and <i>1.3</i>) is required to fulfill the <i>Algebra 1</i> graduation requirement.</p>
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## Expectations of Two Year Program

Expectations of how the two-year *Algebra 1* program will be taught:

- This is a student-centered course that maximizes time for teacher-student interaction. Teachers will focus on student engagement and minimize lecture time.
- This course will help to build mathematical identity and agency for students. Teachers will validate student thinking and encourage positive connections with mathematics.
- Student learning and practice needs to occur in the classroom; assignments completed outside the classroom will have minimal impact on students’ grades.
- Shorter, more frequent targeted assessments will be utilized.
- It is recommended another educator be present in the classroom, as staffing allows, to assist with teacher-student interaction.

Mathematical Topics (Recommended Order)	
Semester 1 ( <i>Algebra Fundamentals</i> )	Semester 2 ( <i>Algebra 1.1</i> )
<p>Topics covered in this semester can include any from the <i>Math 8</i> curriculum, with the goal of the semester to prepare students for success in the <i>Algebra 1</i> series. Some suggested areas of focus are listed below.</p> <ul style="list-style-type: none"> <li>• Order of Operations and Integer Operations</li> <li>• Solving Equations</li> <li>• Linear Equations</li> </ul>	<ul style="list-style-type: none"> <li>• Equations and Inequalities</li> <li>• Linear Equations</li> <li>• Relations and Functions</li> </ul>
Semester 3 ( <i>Algebra 1.2</i> )	Semester 4 ( <i>Algebra 1.3</i> )
<ul style="list-style-type: none"> <li>• Systems of Equations and Inequalities</li> <li>• Exponents and Exponential Functions</li> <li>• Statistics</li> </ul>	<ul style="list-style-type: none"> <li>• Polynomials and Factoring</li> <li>• Quadratic Functions</li> <li>• Solving Quadratic Equations</li> </ul>

Course/ Grade Competencies	
Semester 1 (Algebra Fundamentals)	Semester 2 (Algebra 1.1)
<ul style="list-style-type: none"> <li>• <b>M1.9-12.1:</b> The learner will write, apply, and provide a rationale for a mathematical model representing a given situation.</li> <li>• <b>M1.9-12.2:</b> The learner will interpret and use symbols to express relationships and justify reasoning when solving problems.</li> <li>• <b>M2.9-12.1:</b> The learner will justify how to apply properties of real number systems to variable expressions in a variety of contexts.</li> <li>• <b>M3.9-12.1:</b> The learner will use computational strategies and algorithms and provide rationale for their use.</li> <li>• <b>M3.9-12.2:</b> The learner will reason quantitatively when analyzing, representing, and solving problems.</li> <li>• <b>M3.9-12.3:</b> The learner will compare the effectiveness or logic of two plausible arguments or models.</li> <li>• <b>M5.9-12.1:</b> The learner will apply properties of arithmetic and algebra to simplify and manipulate symbolic expressions or models.</li> <li>• <b>M5.9-12.2:</b> The learner will write and apply algebraic modes to represent and answer questions about a given situation.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>M1.9-12.1:</b> The learner will write, apply, and provide a rationale for a mathematical model representing a given situation.</li> <li>• <b>M1.9-12.2:</b> The learner will interpret and use symbols to express relationships and justify reasoning when solving problems.</li> <li>• <b>M2.9-12.1:</b> The learner will justify how to apply properties of real number systems to variable expressions in a variety of contexts.</li> <li>• <b>M3.9-12.1:</b> The learner will use computational strategies and algorithms and provide rationale for their use.</li> <li>• <b>M3.9-12.2:</b> The learner will reason quantitatively when analyzing, representing, and solving problems.</li> <li>• <b>M3.9-12.3:</b> The learner will compare the effectiveness or logic of two plausible arguments or models.</li> <li>• <b>M5.9-12.1:</b> The learner will apply properties of arithmetic and algebra to simplify and manipulate symbolic expressions or models.</li> <li>• <b>M5.9-12.2:</b> The learner will write and apply algebraic modes to represent and answer questions about a given situation.</li> <li>• <b>M5.9-12.3:</b> The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.</li> </ul> <p><b>M5.9-12.4:</b> The learner will analyze relations and functions, using multiple representations.</p>

Course/ Grade Competencies	
Semester 3 (Algebra 1.2)	Semester 4 (Algebra 1.3)
<ul style="list-style-type: none"> <li>● <b>M1.9-12.1:</b> The learner will write, apply, and provide a rationale for a mathematical model representing a given situation.</li> <li>● <b>M1.9-12.2:</b> The learner will interpret and use symbols to express relationships and justify reasoning when solving problems.</li> <li>● <b>M2.9-12.1:</b> The learner will justify how to apply properties of real number systems to variable expressions in a variety of contexts.</li> <li>● <b>M3.9-12.1:</b> The learner will use computational strategies and algorithms and provide rationale for their use.</li> <li>● <b>M3.9-12.2:</b> The learner will reason quantitatively when analyzing, representing, and solving problems.</li> <li>● <b>M3.9-12.3:</b> The learner will compare the effectiveness or logic of two plausible arguments or models.</li> <li>● <b>M5.9-12.1:</b> The learner will apply properties of arithmetic and algebra to simplify and manipulate symbolic expressions or models.</li> <li>● <b>M5.9-12.2:</b> The learner will write and apply algebraic modes to represent and answer questions about a given situation.</li> <li>● <b>M5.9-12.3:</b> The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.</li> <li>● <b>M7.9-12.3:</b> The learner will summarize data using appropriate statistics.</li> <li>● <b>M7.9-12.4:</b> The learner will select appropriate graphical and numerical methods, and use these methods to represent the data in a way that supports interpretation.</li> <li>● <b>M7.9-12.5:</b> The learner will interpret descriptive statistics and linear models within the context of the data and the original question.</li> </ul>	<ul style="list-style-type: none"> <li>● <b>M1.9-12.1:</b> The learner will write, apply, and provide a rationale for a mathematical model representing a given situation.</li> <li>● <b>M1.9-12.2:</b> The learner will interpret and use symbols to express relationships and justify reasoning when solving problems.</li> <li>● <b>M2.9-12.1:</b> The learner will justify how to apply properties of real number systems to variable expressions in a variety of contexts.</li> <li>● <b>M3.9-12.1:</b> The learner will use computational strategies and algorithms and provide rationale for their use.</li> <li>● <b>M3.9-12.2:</b> The learner will reason quantitatively when analyzing, representing, and solving problems.</li> <li>● <b>M3.9-12.3:</b> The learner will compare the effectiveness or logic of two plausible arguments or models.</li> <li>● <b>M5.9-12.1:</b> The learner will apply properties of arithmetic and algebra to simplify and manipulate symbolic expressions or models.</li> <li>● <b>M5.9-12.2:</b> The learner will write and apply algebraic modes to represent and answer questions about a given situation.</li> <li>● <b>M5.9-12.3:</b> The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.</li> <li>● <b>M5.9-12.4:</b> The learner will analyze relations and functions, using multiple representations.</li> </ul>

## Semester 1: *Algebra Fundamentals*

### ORDER OF OPERATIONS & INTEGERS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<b>M1.9-12.1</b> <b>M5.9-12.1</b> <b>M5.9-12.2</b>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Add, subtract, multiply and divide integer values.</li> <li>• Use order of operations to simplify numerical expressions.</li> <li>• Use order of operations to simplify algebraic expressions.</li> <li>• Model situations with algebraic expressions.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      7.NS.2, 7.NS.3,                      7.EE.1, 7.EE.3,                      7.EE.4</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<b>Suggested Activities, Materials, and Resources:</b>		

### SOLVING EQUATIONS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<b>M1.9-12.2</b> <b>M2.9-12.1</b> <b>M3.9-12.1</b> <b>M3.9-12.2</b> <b>M5.9-12.1</b>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Solve one-step equations.</li> <li>• Solve two-step equations.</li> <li>• Simplify and then solve equations with variables on one side.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      8.EE7</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<b>Suggested Activities, Materials, and Resources:</b>		

## LINEAR EQUATIONS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M3.9-12.3</b>  <b>M5.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Find and interpret the slope of a linear situation given a graph, ordered pairs, table, or written description.</li> <li>• Use a table of values to graph a linear equation written in slope-intercept form.</li> <li>• Use slope and y-intercept to graph a linear equation written in slope-intercept form.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      8.F.4, 8.F.5</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>		

## Semester 2: Algebra 1.1

### EQUATIONS & INEQUALITIES

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Simplify, then solve equations (include literal equations).</li> <li>• Solve equations with variables on both sides.</li> <li>• Write and solve equations to model situations.</li> <li>• Solve linear inequalities.</li> <li>• Write and solve inequalities to model situations.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Solve compound inequalities.</li> <li>• Solve absolute value equations and inequalities.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      N-Q.1, N-Q.2,                      N-Q.3, A-REI.1,                      A-REI.3, A-CED.1,                      A-CED.4</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b>                      All mathematical practices                      are present in each unit.</p>
<p><b>Suggested Activities,                      Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>enVision Algebra 1</i> – topic 1</li> </ul>	

## LINEAR EQUATIONS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M3.9-12.3</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Find and interpret key characteristics (slope, x-intercept, and y-intercept) of a linear situation, given a graph, ordered pairs, table, or written description.</li> <li>• Graph a linear equation written in any form.</li> <li>• Model linear situations with equations.</li> <li>• Write a linear equation given information.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Graph and find equations of parallel and perpendicular lines.</li> <li>• Recognize and utilize Point-Slope Form.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      N-Q.1, N-Q.2,                      N-Q.3, F-IF.4,                      F-IF.6, F-IF.7,                      F-IF.9</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>enVision Algebra 1 – topic 2</i></li> </ul>	

## RELATIONS & FUNCTIONS

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M3.9-12.3</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b>  <b>M5.9-12.3</b>  <b>M5.9-12.4</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Determine whether a relation is a function.</li> <li>• Determine the domain and range of a function, given a table of values, ordered pairs, mapping, or graph.</li> <li>• Determine a reasonable domain for a situation described by a linear function.</li> <li>• Sketch and interpret graphs showing key features given a description of a situation and/or function.</li> <li>• Evaluate functions written in function notation.</li> <li>• Interpret statements in function notation in terms of their context.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Use function notation to evaluate functions given a graph.</li> <li>• Compare properties of two functions each expressed in a different way (algebraically, graphically, numerically, in tables, verbal descriptions, etc.).</li> <li>• Write arithmetic sequences both recursively and with an explicit formula.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      N-Q.2, F-IF.1,                      F-IF.2, F-IF.4,                      F-IF.5, F-LE.5,                      F-IF.9, F-BF.1</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>enVision Algebra 1</i> – topic 3 (focus on 3-1)</li> </ul>	

## Semester 3: Algebra 1.2

### SYSTEMS OF EQUATIONS & INEQUALITIES

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M3.9-12.3</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Solve systems of equations by graphing.</li> <li>• Solve systems of equations using substitution.</li> <li>• Solve systems of equations using elimination.</li> <li>• Model situations with linear systems of equations.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Determine solutions to linear inequalities and systems of linear inequalities.</li> <li>• Model situations with inequalities, representing constraints with equations or inequalities and interpreting solutions as viable or non-viable.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      A-REI.5, A-REI.6,                      A-REI.10, A-REI.11,                      A-REI.12, A-CED.2,                      A-CED.3</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>enVision Algebra 1</i> – topic 4</li> </ul>	

## EXPONENTS & EXPONENTIAL FUNCTIONS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b>  <b>M5.9-12.3</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Rewrite expressions involving radicals and rational exponents using the properties of exponents.</li> <li>• Solve equations with rational exponents using the properties of exponents.</li> <li>• Graph simple exponential functions (no vertical or horizontal translations).</li> <li>• Construct simple exponential functions from graphs, tables of values, or a description.</li> <li>• Distinguish between situations that can be modeled with linear functions and with exponential functions.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Write geometric sequences both recursively and with an explicit formula.</li> <li>• Simplify radical expressions.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b></p> <p>N-RN.1, N-RN.2,                      F-LE.1, F-LE.2,                      F-LE.5, A-SSE.3,                      F-IF.3, F-IF.8,                      F-IF.9, F-BF.2</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>enVision Algebra 1</i> – topic 6</li> </ul>	

## STATISTICS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M7.9-12.3</b>  <b>M7.9-12.4</b>  <b>M7.9-12.5</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Represent data on a dot plot, box plot, or histogram.</li> <li>• Use statistics to describe the center and spread of a data set.</li> <li>• Interpret the effect of outliers on a data set.</li> <li>• Represent data on a scatter plot and describe how the two variables are related.</li> <li>• Create linear models from scatter plots (linear regression).</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Use technology to compute and then interpret the correlation coefficient.</li> <li>• Distinguish between correlation and causation.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      S-ID.1, S-ID.2,                      S-ID.3, S-ID.6,                      S-ID.7, S-ID.8,                      S-ID.9</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b>                      All mathematical practices                      are present in each unit.</p>
<p><b>Suggested Activities,                      Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>enVision Algebra 1</i> – topic 11</li> </ul>	

## Semester 4: Algebra 1.3

### POLYNOMIALS & FACTORING

**Graduate-Level Competency:**

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M5.9-12.1</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Interpret the structure of polynomial expressions using language such as terms, factors, and coefficients.</li> <li>• Add, subtract, and multiply polynomials.</li> <li>• Factor polynomials using the greatest common factor.</li> <li>• Factor trinomials.</li> <li>• Factor a difference of squares.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      A-SSE.1, A-SSE.2,                      A-SSE.3, A-APR.1</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b>                      All mathematical practices                      are present in each unit.</p>
<p><b>Suggested Activities,                      Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>enVision Algebra 1</i> – topic 7</li> </ul>	

## QUADRATIC FUNCTIONS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M3.9-12.3</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b>  <b>M5.9-12.3</b>  <b>M5.9-12.4</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Interpret key features (zeros, maximum/minimum, intercepts) of a parabola in terms of a context.</li> <li>• Graph simple quadratics written in standard form (factorable).</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Graph quadratics in vertex form.</li> <li>• Compare linear, exponential, and quadratic models.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      F-IF.4, F-IF.5,                      F-IF.7, F-IF.8                      F-IF.9  <b><u>Mathematical Practices</u></b>                      All mathematical practices                      are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>enVision Algebra 1</i> – topic 8</li> </ul>	

## SOLVING QUADRATIC EQUATIONS

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b>  <b>M5.9-12.3</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Solve quadratic equations by factoring.</li> <li>• Solve quadratic equations using square roots.</li> <li>• Solve quadratic equations using the quadratic formula.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Solve quadratic equations by completing the square.</li> <li>• Write solutions as simplified exact values rather than decimal approximations.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      A-REI.4</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>enVision Algebra 1</i> – topic 9</li> </ul>	

**Statistics**

**Course Options**

# Advanced Placement Statistics

**Grade(s):** 9-12  
**Length:** two semesters  
**Credit:** 1.0 (0.5 per semester)  
**Prerequisite:** *Algebra 2*

## Overview:

This yearlong course is designed for learners capable of college level work, follows the description put forward by the College Board, and prepares them to take the Advanced Placement exam.

*AP Statistics* introduces students to the major concepts and tools for collecting, analyzing, and drawing conclusions from data. There are four themes evident in the content, skills, and assessment for this course: exploring data, sampling and experimentation, probability and simulation, and statistical inference. Students use technology, investigations, problem solving, and writing as they build conceptual understanding.

*AP Statistics* is equivalent to a one-semester, introductory, non-calculus-based college course in statistics.

Please visit the College Board-AP Central website for more information (<http://apcentral.collegeboard.com>).

# Algebra 2, Semester 2

**Grade(s):** 9-12  
**Length:** one semester  
**Credit:** 0.5  
**Prerequisite:**  
*Algebra 2, semester 1*

**Overview:**

*Algebra 2* continues students' study of functions including polynomial, exponential, rational, and radical functions. They build and interpret functions that model a relationship between two quantities by analyzing key features of the graphs and equations. Students make sense of periodic behavior as they study trigonometric functions and build fluency with values of sine, cosine, and tangent at various angle measures. Equation solving strategies expand to include higher degree polynomials and quadratics over the complex number system and exponential equations using the properties of logarithms. Transformations are included in all units pertaining to functions. (Concurrent enrollment in geometry is an option.)

***Algebra 2 Honors:***

Students will master all of the topics from *Algebra 2* listed above, with a variety of additional topics to include an in-depth study of asymptotic behaviors associated with radical and rational functions.

**Semester 2 of Algebra 2 fulfills the statistics graduation requirement** (semester one is a prerequisite). Concurrent enrollment in *Geometry* is an option.

The curriculum for this course is under “additional math options.”

# Introduction to Statistics

<b>Grade(s):</b> 9-12 <b>Length:</b> one semester <b>Credit:</b> 0.5 <b>Prerequisite:</b> <i>Algebra I</i> or teacher recommendation	<b>Overview:</b> <i>Introduction to Statistics</i> is a semester-long course that provides an introduction to the topics of statistics and data analysis. Topics include data analysis, probability, simulations, inferential statistics, and techniques of sampling. Students use exploratory methods to identify patterns and make decisions. Emphasis is placed on applications and the use of statistics to solve real-life problems.
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Mathematical Topics (Recommended Order)
<ul style="list-style-type: none"> <li>• Analyzing One-Variable Data</li> <li>• Analyzing Two-Variable Data</li> <li>• Collecting Data</li> <li>• Probability and Distributions</li> </ul>

Course/ Grade Competencies
<ul style="list-style-type: none"> <li>• <b>M1.9-12.1:</b> The learner will write, apply, and provide a rationale for a mathematical model representing a given situation.</li> <li>• <b>M1.9-12.2:</b> The learner will interpret and use symbols to express relationships and justify reasoning when solving problems.</li> <li>• <b>M3.9-12.1:</b> The learner will use computational strategies and algorithms and provide rationale for their use.</li> <li>• <b>M3.9-12.2:</b> The learner will reason quantitatively when analyzing, representing, and solving problems.</li> <li>• <b>M3.9-12.3:</b> The learner will compare the effectiveness or logic of two plausible arguments or models.</li> <li>• <b>M5.9-12.3:</b> The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.</li> <li>• <b>M7.9-12.1:</b> The learner will formulate questions to clarify the problem at hand and formulate one (or more) questions that can be answered with data.</li> <li>• <b>M7.9-12.2:</b> The learner will design and implement a plan to collect the appropriate data to answer the statistical question.</li> <li>• <b>M7.9-12.3:</b> The learner will summarize data using appropriate statistics.</li> <li>• <b>M7.9-12.4:</b> The learner will select appropriate graphical and numerical methods, and use these methods to represent the data in a way that supports interpretation.</li> <li>• <b>M7.9-12.5:</b> The learner will interpret descriptive statistics and linear models within the context of the data and the original question.</li> <li>• <b>M7.9-12.6:</b> The learner will apply probability concepts to analyze and evaluate potential decisions and strategies.</li> </ul>

## ANALYZING ONE-VARIABLE DATA

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M3.9-12.3</b>  <b>M7.9-12.3</b>  <b>M7.9-12.4</b>  <b>M7.9-12.5</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• In a data set, identify the individuals and variables (categorical vs. quantitative) and summarize the distribution with a frequency or relative frequency table.</li> <li>• Create bar charts from categorical data, and interpret and compare bar charts and pie charts.</li> <li>• Make, interpret, and compare dot plots of quantitative data.</li> <li>• Make, interpret, and compare stem plots of quantitative data.</li> <li>• Make, interpret, and compare histograms of quantitative data.</li> <li>• Find the mean and median of a distribution of quantitative data, and identify the more appropriate measure of center in a given situation.</li> <li>• Calculate (using technology) and interpret the following measures of spread: range, interquartile range, and standard deviation.</li> <li>• Use the 1.5 x interquartile range rule to identify outliers in a data set.</li> <li>• Make, interpret, and compare boxplots of quantitative data.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Find and interpret a percentile from a distribution of quantitative data.</li> <li>• Find and interpret standardized scores (z-scores).</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      S-ID.1, S-ID.2,                      S-ID.3, S-ID.4</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>		

## ANALYZING TWO-VARIABLE DATA

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M3.9-12.3</b>  <b>M5.9-12.3</b>  <b>M7.9-12.3</b>  <b>M7.9-12.4</b>  <b>M7.9-12.5</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Display relationships between two categorical variables.</li> <li>• Make a scatter plot of and describe the relationship between two quantitative variables.</li> <li>• Estimate and interpret the correlation between two quantitative variables displayed in a scatterplot.</li> <li>• Distinguish between correlation and causation.</li> <li>• Calculate the correlation between two quantitative variables, apply properties of the correlation, and describe how outliers influence the correlation.</li> <li>• Determine and assess the viability of a linear regression model.</li> <li>• Use regression lines to make predictions.</li> <li>• Interpret the slope and y-intercept of a regression line.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Calculate and interpret residuals.</li> <li>• Use residuals to determine if the relationship between two quantitative variables is best modeled by quadratic or exponential functions.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      S-ID.5, S-ID.6,                      S-ID.7, S-ID.8,                      S-ID.9</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>		

## COLLECTING DATA

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M3.9-12.3</b>  <b>M7.9-12.1</b>  <b>M7.9-12.2</b>  <b>M7.9-12.3</b>  <b>M7.9-12.4</b>  <b>M7.9-12.5</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Identify good statistical questions, and identify the population and sample in a statistical study.</li> <li>• Distinguish between an observational study and an experiment.</li> <li>• Define and describe convenience, voluntary response, and random sampling.</li> <li>• Describe how sampling method affects bias.</li> <li>• Describe how to obtain a simple random sample.</li> <li>• Explain the concepts of sampling variability and how to reduce it.</li> <li>• Use simulations to test a claim about a population proportion.</li> <li>• Find the margin of error for a sample proportion and sample mean using simulation.</li> <li>• Explain how under-coverage, nonresponse, and other aspects of a sample survey can lead to bias.</li> <li>• Explain confounding and the placebo effect.</li> <li>• Explain the purpose of comparison and blinding in an experiment.</li> <li>• Describe how to randomly assign treatments and explain the purpose.</li> <li>• Identify other sources of variability in an experiment.</li> <li>• Outline an experiment that uses a completely randomized design.</li> <li>• Determine if it is appropriate to make an inference about cause and effect.</li> <li>• Evaluate if a study has been carried out ethically.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      S-IC.1, S-IC.2,                      S-IC.3, S-IC.4,                      S-IC.5, S-IC.6</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>		

## PROBABILITY & DISTRIBUTIONS

**Graduate-Level Competency:**

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M3.9-12.3</b>  <b>M7.9-12.5</b>  <b>M7.9-12.6</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Interpret probability as a long-run relative frequency and use simulation to model chance behavior.</li> <li>• Use probability models, the complement rule, and the addition rule for mutually exclusive events to find probabilities.</li> <li>• Use two-way tables and Venn diagrams to find probabilities.</li> <li>• Use two-way tables to find and interpret conditional probabilities.</li> <li>• Use the general multiplication rule to calculate probabilities of independent events.</li> <li>• Compute the number of permutations of <math>n</math> individuals taken <math>r</math> at a time.</li> <li>• Compute the number of combinations of <math>n</math> individuals taken <math>r</math> at a time.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Use the conditional probability formula to calculate probabilities and determine independence.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b></p> <p>S-CP.1, S-CP.2,                      S-CP.3, S-CP.4,                      S-CP.5, S-CP.6,                      S-CP.7, S-CP.8,                      S-CP.9</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>		

# Survey of Math in Society

<p><b>Grade(s):</b> 9-12  <b>Length:</b> one semester  <b>Credit:</b> 0.5  <b>Prerequisite:</b> <i>Algebra I</i> or teacher recommendation</p>	<p><b>Overview:</b>  <i>Survey of Math in Society</i> serves students by preparing them for the math on which our society operates. Students will learn the vocabulary behind managing their money and how to estimate the hypothetical future values of their accounts, taking risk into account. They will learn the fundamentals of statistics and probability so they can understand how data is summarized and interpreted. Lastly, students will learn to teach computers to calculate and parse using an object-oriented language (Python recommended). This course is intended to be project/activity driven, rather than test-driven.</p>
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<b>Mathematical Topics</b> (Recommended Order)
<ul style="list-style-type: none"> <li>• Basic Finance</li> <li>• Statistics: Summarizing Data</li> <li>• Statistics: Experiments and Probability</li> <li>• Computer Science</li> </ul>

<b>Course/ Grade Competencies</b>
<ul style="list-style-type: none"> <li>• <b>M1.9-12.1:</b> The learner will write, apply, and provide a rationale for a mathematical model representing a given situation.</li> <li>• <b>M1.9-12.2:</b> The learner will interpret and use symbols to express relationships and justify reasoning when solving problems.</li> <li>• <b>M3.9-12.1:</b> The learner will use computational strategies and algorithms and provide rationale for their use.</li> <li>• <b>M3.9-12.2:</b> The learner will reason quantitatively when analyzing, representing, and solving problems.</li> <li>• <b>M3.9-12.3:</b> The learner will compare the effectiveness or logic of two plausible arguments or models.</li> <li>• <b>M4.9-12.1:</b> The learner will provide rationale for solving measurement problems that require making conversions among various units and measurement systems, or applying the effect of a scale factor.</li> <li>• <b>M5.9-12.1:</b> The learner will apply properties of arithmetic and algebra to simplify and manipulate symbolic expressions or models.</li> <li>• <b>M5.9-12.2:</b> The learner will write and apply algebraic modes to represent and answer questions about a given situation.</li> <li>• <b>M5.9-12.3:</b> The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.</li> <li>• <b>M5.9-12.4:</b> The learner will analyze relations and functions, using multiple representations.</li> <li>• <b>M5.9-12.5:</b> The learner will identify, build, and perform operations on relations and functions and justify their reasoning.</li> <li>• <b>M7.9-12.1:</b> The learner will formulate questions to clarify the problem at hand and formulate one (or more) questions that can be answered with data.</li> <li>• <b>M7.9-12.2:</b> The learner will design and implement a plan to collect the appropriate data to answer the statistical question.</li> <li>• <b>M7.9-12.3:</b> The learner will summarize data using appropriate statistics.</li> <li>• <b>M7.9-12.4:</b> The learner will select appropriate graphical and numerical methods, and use these methods to represent the data in a way that supports interpretation.</li> <li>• <b>M7.9-12.5:</b> The learner will interpret descriptive statistics and linear models within the context of the data and the original question.</li> </ul>

## PERSONAL FINANCE (4 weeks)

### Graduate-Level Competency:

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b>  <b>M5.9-12.3</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Perform basic calculations with tax tables and incomes.</li> <li>• Compare levels of withholding.</li> <li>• Calculate potential earnings in different account types from banks and credit unions.</li> <li>• Compare different types of securities and mutual funds.</li> <li>• Compare pre- and post-tax accounts.</li> <li>• Evaluate the risks associated with taking on debt and building credit.</li> <li>• Using technology, create an amortization table of a hypothetical home purchase and compare it to renting for the same amount of time.</li> <li>• State the purpose of insurance.</li> <li>• Compare health insurance plans using the following vocabulary: premium, deductible, out-of-pocket maximum, copay, coinsurance.</li> <li>• Calculate cost of different medical situations under different plans.</li> <li>• Compare auto insurance plans using the following vocabulary: premium, liability, uninsured, underinsured, collision, and comprehensive.</li> <li>• Calculate cost of different hypothetical automotive accidents on different insurance packages.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Calculate hypothetical future values of pre- and post-tax accounts</li> <li>• Compare other investing options (such as minerals, real estate, and cryptocurrency), and assess the benefits and drawbacks of each.</li> <li>• Compare banks versus credit unions.</li> <li>• Set financial goals for themselves to plan for retirement.</li> <li>• Compare other forms of insurance: home, life, renters, etc.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b></p> <p style="text-align: center;">F-BF.1, F-LE.1,                      F-LE.2, F-LE.3,                      F-LE.5, A-CED.1,                      A-CED.2, A-REI.3</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• This unit is first so students can invest hypothetical money in any way they choose and calculate the value of this at the end of the semester.</li> </ul>	

## STATISTICS: SUMMARIZING DATA (5 weeks)

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M4 - Measurement:** The learner will explain reasoning when applying and modeling geometric principles.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M3.9-12.3</b>  <b>M4.9-12.1</b>  <b>M7.9-12.1</b>  <b>M7.9-12.3</b>  <b>M7.9-12.4</b>  <b>M7.9-12.5</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• In a data set, identify the individuals and variables (categorical vs. quantitative), and summarize the distribution with a frequency or relative frequency table.</li> <li>• Create bar charts from categorical data, and interpret and compare bar charts and pie charts.</li> <li>• Make, interpret, and compare dot plots of quantitative data.</li> <li>• Make, interpret, and compare histograms of quantitative data.</li> <li>• Find the mean and median of a distribution of quantitative data, and identify the more appropriate measure of center in a given situation.</li> <li>• Calculate (using technology) and interpret the following measures of spread: range, interquartile range, and standard deviation.</li> <li>• Use the 1.5 x interquartile range rule to identify outliers in a data set.</li> <li>• Make, interpret, and compare boxplots of quantitative data.</li> <li>• Make a scatter plot of and describe the relationship between two quantitative variables.</li> <li>• Make a line of best fit using technology.</li> <li>• Distinguish between correlation and causation.</li> <li>• Use regression lines to make predictions.</li> <li>• Interpret the slope and y-intercept of a regression line.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Find and interpret a percentile from a distribution of quantitative data.</li> <li>• Estimate and interpret the correlation between two quantitative variables displayed in a scatterplot.</li> <li>• Calculate and interpret sample variance.</li> <li>• Make predictions using non-linear models.</li> <li>• Calculate and interpret a z-score from an approximately normal population.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      S-ID.1, S-ID.2,                      S-ID.3, S-ID.6,                      S-ID.7, S-ID.8,                      S-ID.9</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>		

## DATA COLLECTION (4 weeks)

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.3</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M3.9-12.3</b>  <b>M7.9-12.2</b>  <b>M7.9-12.3</b>  <b>M7.9-12.4</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Identify good statistical questions, and identify the population and sample in a statistical study.</li> <li>• Distinguish between an observational study and an experiment.</li> <li>• Define and describe convenience, voluntary response, and random sampling.</li> <li>• Describe how sampling method affects bias.</li> <li>• Explain the concepts of sampling variability and how to reduce it.</li> <li>• Describe how to obtain a simple random sample.</li> <li>• Use simulations to test a claim about a population proportion.</li> <li>• Explain how under-coverage, nonresponse, measurement, and other aspects of a sample survey can lead to bias.</li> <li>• Explain confounding and the placebo effect.</li> <li>• Explain the purpose of comparison and blinding in an experiment.</li> <li>• Describe how to randomly assign treatments and explain the purpose.</li> <li>• Identify other sources of variability in an experiment.</li> <li>• Outline an experiment that uses a completely randomized design.</li> <li>• Determine if it is appropriate to make an inference about cause and effect.</li> <li>• Evaluate if a study has been carried out ethically.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Find the margin of error for a sample proportion and sample mean using simulation.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      S-IC.1, S-IC.2,                      S-IC.3, S-IC.4,                      S-IC.5, S-IC.6</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Student propose a research question, create a method for collecting data randomly, and present their findings.</li> </ul>	

## COMPUTER SCIENCE (4 weeks)

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M4 - Measurement:** The learner will explain reasoning when applying and modeling geometric principles.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M3.9-12.3</b>  <b>M4.9-12.1</b>  <b>M5.9-12.1</b>  <b>M5.9-12.3</b>  <b>M5.9-12.4</b>  <b>M5.9-12.5</b>  <b>M7.9-12.1</b>  <b>M7.9-12.2</b>  <b>M7.9-12.3</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Identify a general history of computers, how to recognize their components, the functions of those components, and a basic understanding of how they operate.</li> <li>• Differentiate between an editor and compiler.</li> <li>• Identify and troubleshoot different error types in computer programming: Syntax, Logic, and Semantic.</li> <li>• Learn basic reserved words in the selected language for the class.</li> <li>• Write programs using different data types: string, int, float, Booleans.</li> <li>• Write programs with the following math operators: addition, subtraction, multiplication, division, modulus, and exponentiation.</li> <li>• Write programs that take user input to print a variety of responses.</li> <li>• Write programs with the following string operators: concatenation.</li> <li>• Utilize comments to annotate their programs, create drafts, and debug.</li> <li>• Write programs using the following logical operators: and, or.</li> <li>• Create functions without parameters.</li> <li>• Write programs that contain basic conditional statements.</li> <li>• Write programs and evaluate logic statements that contain the following comparison operators: =, !=, &lt;, &gt;, &lt;=, &gt;=.</li> <li>• Write programs that iterate using “for” and “while” loops.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Create functions with parameters.</li> <li>• Write programs that contain chained/ nested conditional statements.</li> <li>• Write programs with the following math operators: Floor, Ceiling.</li> <li>• Logical Operators: xor and not.</li> <li>• Utilize dictionaries to display information to the user.</li> <li>• Write programs to parse a list/ array and extract specific elements of that list/ array.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      F-IF.2, F-BF.1,                      F-LE.1, F-LE.2,                      F-LE.5, A-CED.1,                      A-CED.2, A-REI.3</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>		

# **Additional Math Options**

# Accounting 1A/1B

<p><b>Grade(s):</b> 9-12  <b>Length:</b> two semesters  <b>Credit:</b> 1 (0.5 per semester)  <b>Prerequisite:</b> none</p>	<p><b>Overview:</b>  <i>Accounting 1A/1B</i> provides an introduction to the objectives, principles, assumptions, and concepts of financial accounting, which is a specialized branch of accounting that keeps track of a company’s financial transactions. Using standardized guidelines, the transactions are recorded, summarized, and presented in a financial report or financial statement, such as an income statement or balance sheet.</p> <p>This course focuses on procedures and practices from the accounting cycle through financial statement presentation, with an emphasis on recognizing, valuing, reporting, and disclosing assets, liabilities, and equity. Students will acquire the capability for developing a sound financial basis for accounting. This course presumes no previous accounting knowledge.</p>
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Mathematical Topics (Recommended Order)	
Semester 1 ( <i>Accounting 1A</i> )	Semester 2 ( <i>Accounting 1B</i> )
<ul style="list-style-type: none"> <li>• Starting a Proprietorship: Changes that Affect the Accounting Equation</li> <li>• Analyzing Transactions into Debit and Credit Parts</li> <li>• Journalizing Transactions</li> <li>• Posting to a General Ledger</li> <li>• Cash Control Systems</li> <li>• Work Sheet and Adjusting Entries for a Service Business</li> <li>• Financial Statements for Proprietorship</li> <li>• Recording Closing Entries and Preparing a Post-Closing Trial Balance for A Service Business</li> </ul>	<ul style="list-style-type: none"> <li>• Accounting for Purchases and Cash Payments</li> <li>• Accounting for Sales and Cash Receipts</li> <li>• Accounting for Transactions Using a General Journal</li> <li>• Preparing Payroll Records</li> <li>• Accounting for Payroll and Payroll Taxes</li> <li>• Accounting for Uncollectible Accounts Receivable</li> <li>• Preparing Adjusting Entries and a Trial Balance</li> <li>• Financial Statements and Closing Entries for a Corporation</li> <li>• Financial Statement Analysis</li> </ul>

## Course/ Grade Competencies

Semester 1	Semester 2
<ul style="list-style-type: none"> <li>• <b>M1.9-12.1:</b> The learner will write, apply, and provide a rationale for a mathematical model representing a given situation.</li> <li>• <b>M2.9-12.1:</b> The learner will justify how to apply properties of real number systems to variable expressions in a variety of contexts.</li> <li>• <b>M3.9-12.2:</b> The learner will reason quantitatively when analyzing, representing, and solving problems.</li> <li>• <b>M3.9-12.3:</b> The learner will compare the effectiveness or logic of two plausible arguments or models.</li> <li>• <b>M5.9-12.2:</b> The learner will write and apply algebraic modes to represent and answer questions about a given situation.</li> <li>• <b>M5.9-12.3:</b> The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.</li> <li>• <b>M7.9-12.1:</b> The learner will formulate questions to clarify the problem at hand and formulate one (or more) questions that can be answered with data.</li> <li>• <b>M7.9-12.2:</b> The learner will design and implement a plan to collect the appropriate data to answer the statistical question.</li> <li>• <b>M7.9-12.3:</b> The learner will summarize data using appropriate statistics.</li> <li>• <b>M7.9-12.4:</b> The learner will select appropriate graphical and numerical methods, and use these methods to represent the data in a way that supports interpretation.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>M1.9-12.1:</b> The learner will write, apply, and provide a rationale for a mathematical model representing a given situation.</li> <li>• <b>M1.9-12.2:</b> The learner will interpret and use symbols to express relationships and justify reasoning when solving problems.</li> <li>• <b>M2.9-12.1:</b> The learner will justify how to apply properties of real number systems to variable expressions in a variety of contexts.</li> <li>• <b>M3.9-12.1:</b> The learner will use computational strategies and algorithms and provide rationale for their use.</li> <li>• <b>M3.9-12.2:</b> The learner will reason quantitatively when analyzing, representing, and solving problems.</li> <li>• <b>M3.9-12.3:</b> The learner will compare the effectiveness or logic of two plausible arguments or models.</li> <li>• <b>M5.9-12.1:</b> The learner will apply properties of arithmetic and algebra to simplify and manipulate symbolic expressions or models.</li> <li>• <b>M5.9-12.2:</b> The learner will write and apply algebraic modes to represent and answer questions about a given situation.</li> <li>• <b>M5.9-12.3:</b> The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.</li> <li>• <b>M7.9-12.1:</b> The learner will formulate questions to clarify the problem at hand and formulate one (or more) questions that can be answered with data.</li> <li>• <b>M7.9-12.2:</b> The learner will design and implement a plan to collect the appropriate data to answer the statistical question.</li> <li>• <b>M7.9-12.3:</b> The learner will summarize data using appropriate statistics.</li> <li>• <b>M7.9-12.4:</b> The learner will select appropriate graphical and numerical methods, and use these methods to represent the data in a way that supports interpretation.</li> <li>• <b>M7.9-12.6:</b> The learner will apply probability concepts to analyze and evaluate potential decisions and strategies.</li> </ul>

## STARTING A PROPRIETORSHIP: CHANGES THAT AFFECT THE ACCOUNTING EQUATION

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b> <b>M7.9-12.3</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Understand accounting standards and rules.</li> <li>• Use basic accounting equations.</li> <li>• Determine the effects of business transactions.</li> <li>• Learn about receiving cash.</li> <li>• Learn about paying cash.</li> <li>• Learn about purchasing on account.</li> <li>• Learn about paying on account.</li> <li>• Learn about receiving cash from sales.</li> <li>• Learn about sales on account.</li> <li>• Learn about receiving cash on account.</li> <li>• Learn about paying cash to the owner for personal use.</li> <li>• Understand the summary of changes in owner’s equity.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Practice oral communication.</li> <li>• Practice written communication.</li> <li>• Learn about the role of accounting.</li> <li>• Understand ethics in business.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.3. A-CED.1, A-CED.4.</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Accounting in the real world: TerraCycle</li> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):             <ul style="list-style-type: none"> <li>○ Working papers 1-1, 1-2, and 1-3</li> <li>○ Application problems 1-1, 1-2, and 1-3</li> </ul> </li> <li>• Analyzing Nike’s financial statements</li> </ul>	

## ANALYZING TRANSACTIONS INTO DEBIT & CREDIT PARTS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b> <b>M5.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Use T accounts.</li> <li>• Analyze how transactions affect accounts.</li> <li>• Analyze how transactions affect the owner’s equity accounts.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.3. A-CED.1, A-CED.4.</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Accounting in the real world: SportClips</li> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):             <ul style="list-style-type: none"> <li>○ Working papers 2-1, 2-2, and 2-3</li> <li>○ Application problems 2-1, 2-2, and 2-3</li> </ul> </li> <li>• Auditing for errors</li> </ul>	

## JOURNALIZING TRANSACTIONS

**Graduate-Level Competency:**

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M2.9-12.1</b> <b>M7.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Understand double-entry accounting.</li> <li>• Learn about source documents.</li> <li>• Prepare journal entries.</li> <li>• Learn about receipts.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Learn about chronological records.</li> <li>• Practicing using calculator tapes.</li> <li>• Start a new General Journal page.</li> <li>• Correct errors in journal entries.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.3. A-CED.1, A-CED.4.</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Accounting in the real world: Target</li> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):             <ul style="list-style-type: none"> <li>○ Working papers 3-1, 3-2, 3-3, and 3-4</li> <li>○ Application problems 3-1, 3-2, 3-3, and 3-4</li> </ul> </li> <li>• 21<sup>st</sup> Century Skills</li> </ul>	

## POSTING TO A GENERAL LEDGER

**Graduate-Level Competency:**

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

Course/ Grade Competency	Content Objectives	Standards
<b>M3.9-12.2</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Prepare a chart of accounts.</li> <li>• Post from a General Journal to a General Ledger.</li> <li>• Prove cash</li> <li>• Create a journal entry to record a correcting entry.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Create a memorandum for correcting entries.</li> <li>• Assign account numbers.</li> <li>• Open an account in a General Ledger.</li> <li>• Understand the relationship of a T account to an Account Form.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.3. A-CED.1, A-CED.4.</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• Accounting in the real world: Tidal</li> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):             <ul style="list-style-type: none"> <li>○ Working papers 4-1, 4-2, and 4-3</li> <li>○ Application problems 4-1, 4-2, and 4-3</li> <li>○ Source documents problem 4-S</li> </ul> </li> <li>• Auditing for errors</li> </ul>	

## CASH CONTROL SYSTEMS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

Course/ Grade Competency	Content Objectives	Standards
<b>M1.9-12.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Practice bank statement reconciliation.</li> <li>• Complete check stubs and checks.</li> <li>• Understand and interpret bank statements.</li> <li>• Deposit cash.</li> <li>• Learn about petty cash.</li> <li>• Establish a petty cash fund.</li> <li>• Replenish petty cash.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• How businesses use cash.</li> <li>• Learn about restrictive endorsement.</li> <li>• Learn about special endorsement.</li> <li>• Learn about blank endorsement.</li> <li>• Record a voided check.</li> <li>• Practice oral communication of accounting information.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.3. A-CED.1, A-CED.4.</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• Accounting in the real world: Starbucks</li> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):             <ul style="list-style-type: none"> <li>○ Working papers 5-1, 5-2, 5-3, and 5-4</li> <li>○ Application problem 5-1, 5-2, 5-3, and 5-4</li> <li>○ Reinforcement activity 1, part A</li> </ul> </li> </ul>	

## WORK SHEET & ADJUSTING ENTRIES FOR A SERVICE BUSINESS

**Graduate-Level Competency:**

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M5.9-12.3</b> <b>M7.9-12.3</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Create a work sheet.</li> <li>• Prepare a trial balance on a work sheet.</li> <li>• Plan adjustments on a work sheet.</li> <li>• Record net income.</li> <li>• Calculate and record a net loss.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Prove the adjustments column of a work sheet.</li> <li>• Partial ledger accounts after posting adjusting entries.</li> <li>• Prevent errors.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.3. A-CED.1, A-CED.4.</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Accounting in the real world: AICPA</li> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):             <ul style="list-style-type: none"> <li>○ Working papers 6-1, 6-2, 6-3, and 6-4</li> <li>○ Application problems 6-1, 6-2, 6-3, and 6-4</li> </ul> </li> <li>• Analyzing Nike’s financial statements</li> </ul>	

## FINANCIAL STATEMENTS FOR A PROPRIETORSHIP

**Graduate-Level Competency:**

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M3.9-12.2</b> <b>M3.9-12.3</b> <b>M7.9-12.4</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Prepare an income statement.</li> <li>• Report financial information.</li> <li>• Analyze an income statement.</li> <li>• Calculate net income ratio.</li> <li>• Calculate total expense ratio.</li> <li>• Learn about acceptable financial ratios.</li> <li>• Prepare a statement of owner’s equity.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Prepare the heading of an income statement.</li> <li>• Prepare the heading of a balance sheet.</li> <li>• Prepare the body of a statement of owner’s equity.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.3. A-CED.1, A-CED.4.</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Accounting in the real world: Winmark Corporation</li> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):             <ul style="list-style-type: none"> <li>○ Working papers 7-1 and 7-2</li> <li>○ Application problems 7-1 and 7-2</li> </ul> </li> </ul>	

## RECORDING CLOSING ENTRIES & PREPARING A POST-CLOSING TRIAL BALANCE FOR A SERVICE BUSINESS

**Graduate-Level Competency:**

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M7.9-12.1</b> <b>M7.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Record closing entries.</li> <li>• Prepare a post-closing trial balance.</li> <li>• Make a closing entry to record net income or loss.</li> <li>• Make a closing entry for the owner’s drawing accounting.</li> <li>• Make a closing entry for an income statement account.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Learn about the accounting cycle for a service business.</li> <li>• Prepare a post-closing trial balance.</li> <li>• Learn about the need for the income summary account.</li> <li>• Learn about the need for closing temporary accounts.</li> <li>• Learn about the need for permanent and temporary accounts.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.3. A-CED.1, A-CED.4.</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Accounting in the real world: Radio Flyer</li> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):             <ul style="list-style-type: none"> <li>○ Working papers 8-1 and 8-2</li> <li>○ Application problems 8-1 and 8-2</li> <li>○ Reinforcement activity 1, part B</li> </ul> </li> </ul>	

## ACCOUNTING FOR PURCHASES & CASH PAYMENTS

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b>  <b>M5.9-12.3</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Prepare subsidiary ledgers.</li> <li>• Learn about controlling accounts.</li> <li>• Learn about how to form a corporation.</li> <li>• Practice the perpetual inventory method.</li> <li>• Practice the periodic inventory method.</li> <li>• Learn about the cost of goods sold.</li> <li>• Prepare purchases journal.</li> <li>• Prepare cash payments journal.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Prove the accounts payable ledger.</li> <li>• Total, prove, and rule a cash payments journal.</li> <li>• Total and rule a purchases journal.</li> <li>• Replenish a petty cash fund.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      A-SSE.1, A-SSE.3.                      A-CED.1, A-CED.4.</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Accounting in the real world: Staples</li> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):                             <ul style="list-style-type: none"> <li>○ Working papers 9-1, 9-2, 9-3, 9-4, and 9-5</li> <li>○ Application problem 9-1, 9-2, 9-3, 9-4, and 9-5</li> <li>○ Using source document 9-S</li> </ul> </li> </ul>	

## ACCOUNTING FOR SALES & CASH RECEIPTS

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.2</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M3.9-12.3</b>  <b>M7.9-12.2</b>  <b>M7.9-12.3</b>  <b>M7.9-12.4</b>  <b>M7.9-12.6</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Learn about sales tax.</li> <li>• Prepare a sales invoice.</li> <li>• Process sales transactions.</li> <li>• Process cash and credit card sales.</li> <li>• Process credit cards.</li> <li>• Process sales transactions.</li> <li>• Prove cash at the end of a month.</li> <li>• Calculate cash receipts on an account with a sales discount.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Prove the Accounts Receivable Ledger.</li> <li>• Total, prove, and rule a Cash Receipts Journal.</li> <li>• Total, prove, and rule Sales Journal.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      A-SSE.1, A-SSE.3.                      A-CED.1, A-CED.4.</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Accounting in the real world: Federal Trade Commission</li> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):                             <ul style="list-style-type: none"> <li>○ Working papers 10-1, 10-2, 10-3, and 10-4</li> <li>○ Application problems 10-1, 10-2, 10-3, and 10-4</li> <li>○ Using source document 10-S</li> </ul> </li> </ul>	

## ACCOUNTING FOR TRANSACTIONS USING A GENERAL JOURNAL

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b> <b>M7.9-12.3</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Journalize sales returns and allowances.</li> <li>• Learn about accounting for the declaration and payment of a dividend.</li> <li>• Journalize purchase returns and allowances.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Declare a dividend.</li> <li>• Pay declared dividends.</li> <li>• Prepare memorandum for buying supplies on account.</li> <li>• Correct errors in subsidiary ledger accounts.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b></p> <p style="text-align: center;">A-SSE.1, A-SSE.3. A-CED.1, A-CED.4.</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Accounting in the real world: Square, Inc.</li> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):             <ul style="list-style-type: none"> <li>○ Working papers 11-1, 11-2, and 11-3</li> <li>○ Application problems 11-1, 11-2, and 11-3</li> </ul> </li> <li>• Auditing for errors</li> </ul>	

## PREPARING PAYROLL RECORDS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b> <b>M3.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Calculate employee earning.</li> <li>• Determine payroll tax withholding.</li> <li>• Prepare payroll records.</li> <li>• Prepare payroll checks.</li> <li>• Understand and interpret a payroll bank statement.</li> <li>• Learn about payroll taxes.</li> <li>• Calculate employee hours worked.</li> <li>• Prepare employee earning records.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Prepare electronic funds transfer.</li> <li>• Learn about voluntary deductions from earnings.</li> <li>• Learn about time clock systems.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.3. A-CED.1, A-CED.4.</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Accounting in the real world: Deloitte University</li> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):             <ul style="list-style-type: none"> <li>○ Working papers 12-1, 12-2, 12-3, and 12-4</li> <li>○ Application problems 12-1, 12-2, 12-3, and 12-4</li> <li>○ Source document 12-S</li> </ul> </li> </ul>	

## ACCOUNTING FOR PAYROLL & PAYROLL TAXES

### Graduate-Level Competency:

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M2.9-12.1</b>  <b>M3.9-12.2</b>  <b>M7.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Record payroll.</li> <li>• Analyze payment of payroll.</li> <li>• Record employer payroll taxes.</li> <li>• Learn about employer payroll taxes.</li> <li>• Learn about state unemployment tax.</li> <li>• Learn about Federal unemployment tax.</li> <li>• Learn about employer Social Security and Medicare taxes.</li> <li>• Calculate unemployment taxes.</li> <li>• Prepare employer’s quarterly federal tax return.</li> <li>• Prepare employer’s annual reporting of payroll taxes.</li> <li>• Learn how to make Federal tax deposits.</li> <li>• Learn about paying the Liability for Federal Unemployment Tax.</li> <li>• Learn about paying the Liability for Employee Income Tax, Social Security Tax, and Medicare Tax.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Prepare different forms containing payroll information.</li> <li>• Journalize payment of a payroll.</li> <li>• Journalize employer payroll taxes.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b></p> <p>A-SSE.1, A-SSE.3.                      A-CED.1, A-CED.4.                      CC.9-12.A.REI.1                      CC.9-12.A.REI.1                      CC.9-12.A.CED.1                      CC.9-12.A.CED.1                      CC.9-12.A.CED.1</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Accounting in the real world: GoPro</li> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):                             <ul style="list-style-type: none"> <li>○ Working papers 13-1, 13-2, 13-3, and 13-4</li> <li>○ Application problems 13-1, 13-2, 13-3, and 13-4</li> <li>○ Reinforcement activity 2, part A</li> </ul> </li> </ul>	

## ACCOUNTING FOR UNCOLLECTIBLE ACCOUNTS RECEIVABLE

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

Course/ Grade Competency	Content Objectives	Standards
<b>M1.9-12.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Learn about methods of estimating uncollectable accounts receivable.</li> <li>• Adjust entry for allowance for uncollectible accounts.</li> <li>• Estimate uncollectible accounts expense.</li> <li>• Reopen an account previously written off.</li> <li>• Prepare promissory notes.</li> <li>• Learn about maturity dates of promissory notes.</li> <li>• Calculate interest on promissory notes.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Journalize the writing-off of an uncollectible accounts receivable.</li> <li>• Accept a note receivable from a customer.</li> <li>• Understand promissory notes.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.3. A-CED.1, A-CED.4.</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):</li> <li>• Accounting in the real world: United Parcel Service               <ul style="list-style-type: none"> <li>○ Working papers 14-1, 14-2, and 14-3</li> <li>○ Application problems 14-1, 14-2, and 14-3</li> </ul> </li> </ul>	

## PREPARING ADJUSTING ENTRIES & A TRIAL BALANCE

**Graduate-Level Competency:**

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M5.9-12.3</b> <b>M7.9-12.3</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Calculate Federal income tax.</li> <li>• Calculate the depreciation of plan assets.</li> <li>• Plan adjusting entries.</li> <li>• Adjust merchandise inventory and interest receivables.</li> <li>• Adjust accumulated depreciation.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Journalize the adjusting entry for Federal income tax payable.</li> <li>• Journalize the adjusting entry for accumulated depreciation.</li> <li>• Journalize the adjusting entry for interest receivable.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.3. A-CED.1, A-CED.4.</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Accounting in the real world: Dollar General</li> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):             <ul style="list-style-type: none"> <li>○ Working papers 15-1, 15-2, 15-3, and 15-4</li> <li>○ Application problems 15-1, 15-2, 15.3 and 15.4</li> </ul> </li> <li>• Auditing for errors</li> </ul>	

## FINANCIAL STATEMENTS & CLOSING ENTRIES FOR A CORPORATION

### Graduate-Level Competency:

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M3.9-12.2</b> <b>M3.9-12.3</b> <b>M7.9-12.4</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Prepare an income statement.</li> <li>• Prepare a statement of stockholder’s equity.</li> <li>• Prepare a balance sheet.</li> <li>• Record closing entries for income statement accounts.</li> <li>• Prepare a post-closing trial balance.</li> <li>• Complete closing entries for a corporation recorded in a journal.</li> <li>• Understand supporting schedules for a balance sheet.</li> <li>• Prepare closing entries for dividends.</li> <li>• Prepare closing entries to record net income.</li> <li>• Prepare closing entries for accounts with credit balances.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Prepare post-closing trial balance.</li> <li>• Complete a balance sheet.</li> <li>• Learn about the income summary account.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b></p> <p style="text-align: center;">A-SSE.1, A-SSE.3. A-CED.1, A-CED.4.</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Accounting in the real world: Toshiba</li> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):             <ul style="list-style-type: none"> <li>○ Working papers 16-1, 16-2, 16-3, 16-4, and 16-5</li> <li>○ Application problems 16-1, 16-2, 16-3, 16-4, and 16-5</li> </ul> </li> </ul>	

## FINANCIAL STATEMENT ANALYSIS

**Graduate-Level Competency:**

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M7.9-12.1</b> <b>M7.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Calculate vertical analysis ratios.</li> <li>• Use vertical analysis ratios to analyze gross profit.</li> <li>• Understand the vertical analysis of a balance sheet.</li> <li>• Calculate the horizontal analysis.</li> <li>• Analyze financial statements using financial ratios.</li> <li>• Calculate liquidity ratios.</li> <li>• Calculate market ratios.</li> <li>• Calculate earnings per share.</li> <li>• Correct an unfavorable debt ratio.</li> <li>• Correct an unfavorable operating expense ratio.</li> <li>• Correct an unfavorable gross margin.</li> <li>• Manage an unfavorable gross margin.</li> <li>• Calculate vertical analysis ratios on a balance sheet.</li> <li>• Calculate price-earnings ratio.</li> <li>• Learn about dividend yields.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Analyze trends with vertical analysis.</li> <li>• Learn about quick ratios.</li> <li>• Learn about the current ratio.</li> <li>• Learn about working capital.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.3. A-CED.1, A-CED.4.</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Accounting in the real world: Scottrade</li> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):             <ul style="list-style-type: none"> <li>○ Working papers 17-1, 17-2, 17-3, and 17-4</li> <li>○ Application problems 17-1, 17-2, 17-3, and 17-4</li> <li>○ Reinforcement activity 2, part B</li> </ul> </li> <li>• Analyzing Nike’s financial statements</li> </ul>	

# Accounting 2A/2B

<p><b>Grade(s):</b> 10-12  <b>Length:</b> two semesters  <b>Credit:</b> 1 (0.5 per semester)  <b>Prerequisite:</b> <i>Accounting 1A/1B</i> or teacher recommendation</p>	<p><b>Overview:</b>  <i>Accounting 2A/2B</i> introduces students to the concepts and applications of managerial accounting. Students focus on analysis and recording of various manufacturing costs, cost-volume-profit analysis, preparation of financial statements for a manufacturer, creation of static and flexible budgets and reports, evaluation of capital investments, and various costing systems.</p>
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Mathematical Topics (Recommended Order)	
Semester 1 <i>(Managerial Accounting 2A)</i>	Semester 2 <i>(Managerial Accounting 2B)</i>
<ul style="list-style-type: none"> <li>• Acquiring Capital for Growth and Development</li> <li>• Accounting for Plant Assets, Depreciation, and Intangible Assets</li> <li>• Accounting for Inventory</li> <li>• Accounting for Accruals, Deferrals, and Reversing Entries</li> <li>• End-of-Fiscal-Period Work for a Corporation</li> </ul>	<ul style="list-style-type: none"> <li>• Forming a Partnership</li> <li>• Distribution of Net Income and Owner's Equity Statements</li> <li>• Dissolving a Partnership</li> <li>• Recording International Sales</li> <li>• Recording Internet Sales</li> </ul>

Course/ Grade Competencies	
Semester 1	Semester 2
<ul style="list-style-type: none"> <li>• <b>M1.9-12.1:</b> The learner will write, apply, and provide a rationale for a mathematical model representing a given situation.</li> <li>• <b>M2.9-12.1:</b> The learner will justify how to apply properties of real number systems to variable expressions in a variety of contexts.</li> <li>• <b>M3.9-12.3:</b> The learner will compare the effectiveness or logic of two plausible arguments or models.</li> <li>• <b>M5.9-12.2:</b> The learner will write and apply algebraic modes to represent and answer questions about a given situation.</li> <li>• <b>M5.9-12.3:</b> The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.</li> <li>• <b>M7.9-12.1:</b> The learner will formulate questions to clarify the problem at hand and formulate one (or more) questions that can be answered with data.</li> <li>• <b>M7.9-12.3:</b> The learner will summarize data using appropriate statistics.</li> <li>• <b>M7.9-12.4:</b> The learner will select appropriate graphical and numerical methods, and use these methods to represent the data in a way that supports interpretation.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>M1.9-12.1:</b> The learner will write, apply, and provide a rationale for a mathematical model representing a given situation.</li> <li>• <b>M1.9-12.2:</b> The learner will interpret and use symbols to express relationships and justify reasoning when solving problems.</li> <li>• <b>M3.9-12.1:</b> The learner will use computational strategies and algorithms and provide rationale for their use.</li> <li>• <b>M3.9-12.3:</b> The learner will compare the effectiveness or logic of two plausible arguments or models.</li> <li>• <b>M5.9-12.1:</b> The learner will apply properties of arithmetic and algebra to simplify and manipulate symbolic expressions or models.</li> <li>• <b>M5.9-12.2:</b> The learner will write and apply algebraic modes to represent and answer questions about a given situation.</li> <li>• <b>M5.9-12.3:</b> The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.</li> <li>• <b>M5.9-12.4:</b> The learner will analyze relations and functions, using multiple representations.</li> <li>• <b>M7.9-12.1:</b> The learner will formulate questions to clarify the problem at hand and formulate one (or more) questions that can be answered with data.</li> <li>• <b>M7.9-12.2:</b> The learner will design and implement a plan to collect the appropriate data to answer the statistical question.</li> <li>• <b>M7.9-12.3:</b> The learner will summarize data using appropriate statistics.</li> <li>• <b>M7.9-12.4:</b> The learner will select appropriate graphical and numerical methods, and use these methods to represent the data in a way that supports interpretation.</li> </ul>

## ACQUIRING CAPITAL FOR GROWTH & DEVELOPMENT

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M2.9-12.1</b>  <b>M5.9-12.2</b>  <b>M5.9-12.3</b>  <b>M7.9-12.1</b></p>	<p><b>Short-Term Debt Financing:</b>  <u><b>Must be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Short-Term Debt Financing</li> <li>• Long-Term Debt Financing</li> <li>• Capital Stock</li> <li>• Acquiring Additional Stock</li> </ul> <p><u><b>Can be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Signing a Promissory Note for an Extension of Time</li> <li>• Selecting Financing Methods</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-SSE.3.                      A-CED.1, A-CED.4.</p> <p style="text-align: center;"><u><b>Mathematical Practices</b></u>                      CC.9-12.A.REI.1                      CC.9-12.A.REI.1                      CC.9-12.A.CED.1                      CC.9-12.A.CED.1                      CC.9-12.A.CED.1</p>
	<p><b>Long-Term Debt Financing:</b>  <u><b>Must be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Applying for a Business Loan</li> <li>• Issuing Bonds</li> <li>• Paying Interest on Bonds</li> </ul> <p><u><b>Can be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Signing a Long-Term Note Payable</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-SSE.3.                      A-CED.1, A-CED.4.</p> <p style="text-align: center;"><u><b>Mathematical Practices</b></u>                      CC.9-12.N.Q.1</p>
<p><b>M1.9-12.1</b>  <b>M2.9-12.1</b>  <b>M5.9-12.2</b>  <b>M7.9-12.1</b></p>	<p><b>Capital Stock:</b>  <u><b>Must be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Issuing Capital Stock</li> <li>• Issuing Stock in Excess of Par Value</li> <li>• Issuing Preferred Stock at Par Value</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-SSE.3.                      A-CED.1, A-CED.4.</p> <p style="text-align: center;"><u><b>Mathematical Practices</b></u>                      CC.9-12.A.REI.1</p>

## ACQUIRING CAPITAL FOR GROWTH & DEVELOPMENT (continued)

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M2.9-12.1</b>  <b>M5.9-12.2</b>  <b>M7.9-12.1</b>  <b>M7.9-12.3</b></p>	<p><b>Acquiring Additional Capital:</b>  <u><b>Must be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Making Financial Decisions</li> <li>• Financial Leverage</li> </ul> <p><u><b>Can be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Selecting Financial Methods</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-SSE.3.                      A-CED.1, A-CED.4.</p> <p style="text-align: center;"><u><b>Mathematical Practices</b></u>                      All mathematical practices                      are present in each unit.</p>
<p><b>Suggested Activities,                      Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Accounting in the real world: Ford Motor Company</li> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):                             <ul style="list-style-type: none"> <li>○ Working papers 18-1, 18-2, 18-3, and 18-4</li> <li>○ Application problems 18-1, 18-2, 18-3, and 18-4</li> </ul> </li> <li>• 21<sup>st</sup> Century Skills: Financial, Economic, Business, and Entrepreneurial Literacy</li> </ul>	

## ACCOUNTING FOR PLANT ASSETS, DEPRECIATION, & INTANGIBLE ASSETS

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M2.9-12.1</b>  <b>M3.9-12.3</b>  <b>M5.9-12.2</b>  <b>M5.9-12.3</b>  <b>M7.9-12.1</b>  <b>M7.9-12.4</b></p>	<p><b>Buying Plant Assets &amp; Paying Property Taxes:</b>  <u><b>Must be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Plant Assets</li> <li>• Recording the Buying of a Plant Asset</li> <li>• Calculating and Paying Property Tax</li> </ul> <p><u><b>Can be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Recording the Buying of a group of Assets</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-SSE.3.                      A-CED.1, A-CED.4.</p> <p><u><b>Mathematical Practices</b></u>                      All mathematical practices are present in each unit.</p>
<p><b>M2.9-12.1</b>  <b>M3.9-12.3</b>  <b>M5.9-12.2</b>  <b>M7.9-12.1</b></p>	<p><b>Calculating Depreciation Expense:</b>  <u><b>Must be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Calculating Straight-Line Depreciation</li> <li>• Calculating Accumulated Depreciation</li> <li>• Calculating Book Value</li> </ul> <p><u><b>Can be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Calculating depreciation expense for part of a year.</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-SSE.3.                      A-CED.1, A-CED.4.</p> <p><u><b>Mathematical Practices</b></u>                      All mathematical practices are present in each unit.</p>
<p><b>M1.9-12.1</b>  <b>M2.9-12.1</b>  <b>M5.9-12.2</b></p>	<p><b>Journalizing Depreciation Expense:</b>  <u><b>Must be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Preparing Plant Asset Records</li> <li>• Journalizing Annual Depreciation Expense</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-SSE.3.                      A-CED.1, A-CED.4.</p> <p><u><b>Mathematical Practices</b></u>                      All mathematical practices are present in each unit.</p>

## ACCOUNTING FOR PLANT ASSETS, DEPRECIATION, & INTANGIBLE ASSETS (continued)

Course/ Grade Competency	Content Objectives	Standards
<p>M2.9-12.1 M3.9-12.3 M5.9-12.2 M7.9-12.1</p>	<p><b>Disposing of Plant Assets:</b> <b>Must be Covered:</b> The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Selling a Plant Asset for Book Value</li> <li>• Recording Depreciation Expense on Disposal of an Asset</li> <li>• Selling a Plant Asset for more than Book Value</li> <li>• Selling a Plant Asset for less than Book Value</li> </ul>	<p style="text-align: center;"><b>AKSS</b> A-SSE.1, A-SSE.3. A-CED.1, A-CED.4.</p> <p><b>Mathematical Practices</b> All mathematical practices are present in each unit.</p>
<p>M1.9-12.1 M2.9-12.1 M3.9-12.3 M5.9-12.2 M7.9-12.1</p>	<p><b>Declining-Balance Method of Appreciation:</b> <b>Must be Covered:</b> The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Calculating Depreciation Using the Double-Declining-Balance Method</li> <li>• Calculating Depreciation Expense in the Final Year</li> </ul> <p><b>Can be Covered:</b> The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Accelerated Depreciation Methods</li> <li>• Comparing Two Methods of Depreciation</li> </ul>	<p style="text-align: center;"><b>AKSS</b> A-SSE.1, A-SSE.3. A-CED.1, A-CED.4.</p> <p><b>Mathematical Practices</b> All mathematical practices are present in each unit.</p>
<p><b>Buying Intangible Assets &amp; Calculating Amortization Expense:</b> <b>Must be Covered:</b></p>	<p>The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Recording the Buying of an Intangible Asset</li> <li>• Calculating and Recording Amortization Expense</li> </ul>	<p style="text-align: center;"><b>AKSS</b> A-SSE.1, A-SSE.3. A-CED.1, A-CED.4.</p> <p><b>Mathematical Practices</b> All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Accounting in the real world: Costco Wholesale</li> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):             <ul style="list-style-type: none"> <li>○ Working papers 19-1, 19-2, 19-3, 19-4, 19-5, and 19-6</li> <li>○ Application problems 19-1, 19-2, 19-3, 19-4, and 19-6</li> </ul> </li> <li>• 21<sup>st</sup> Century Skills: Financial, Economic, Business, and Entrepreneurial Literacy</li> </ul>	

## ACCOUNTING FOR INVENTORY

### Graduate-Level Competency:

- M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.
- M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.
- M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.
- M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.
- M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M2.9-12.1</b>  <b>M3.9-12.3</b>  <b>M5.9-12.2</b>  <b>M7.9-12.1</b>  <b>M7.9-12.3</b></p>	<p><b>Determining the Quantity of Merchandise Inventory:</b>  <u><b>Must be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• The Most Efficient Quantity of Inventory</li> <li>• Inventory Record</li> <li>• Stock Record</li> <li>• Perpetual Inventory Using a Computer</li> </ul> <p><u><b>Can be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Why Merchandise Inventory is Important</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-SSE.3.                      A-CED.1, A-CED.4.</p> <p style="text-align: center;"><u><b>Mathematical Practices</b></u>                      All mathematical practices are present in each unit.</p>
<p><b>M1.9-12.1</b>  <b>M2.9-12.1</b>  <b>M3.9-12.3</b>  <b>M5.9-12.2</b>  <b>M7.9-12.1</b></p>	<p><b>Determining the Cost of Merchandise Inventory:</b>  <u><b>Must be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• First-In, First-Out Inventory Costing Method</li> <li>• Last-In, First-Out Inventory Costing Method</li> <li>• Weighted-Average Inventory Costing Method</li> <li>• Calculating the Cost of Merchandise Sold</li> <li>• Inventory Costing Method and Actual Flow of Inventory</li> </ul> <p><u><b>Can be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Comparison of Inventory Methods</li> <li>• Lower of Cost or Market Inventory Costing Method</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-SSE.3.                      A-CED.1, A-CED.4.</p> <p style="text-align: center;"><u><b>Mathematical Practices</b></u>                      All mathematical practices are present in each unit.</p>

## ACCOUNTING FOR INVENTORY (continued)

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M2.9-12.1</b>  <b>M3.9-12.3</b>  <b>M5.9-12.2</b>  <b>M7.9-12.1</b>  <b>M7.9-12.3</b>  <b>M7.9-12.4</b></p>	<p><b>Eliminating Inventory:</b>  <u><b>Must be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Gross Profit Method of Estimating Inventory</li> <li>• Estimating Inventory for Other Months</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-SSE.3.                      A-CED.1, A-CED.4.</p> <p><u><b>Mathematical Practices</b></u>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Accounting in the real world: IKEA</li> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):                             <ul style="list-style-type: none"> <li>○ Working papers 20-1, 20-2, and 20-3</li> <li>○ Application problems 20-1, 20-2, and 20-3</li> <li>○ Reinforcement activity 3, part A</li> </ul> </li> </ul>	

## ACCOUNTING FOR ACCRUALS, DEFERRALS, & REVERSING ENTRIES

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M2.9-12.1</b>  <b>M3.9-12.3</b>  <b>M5.9-12.2</b>  <b>M7.9-12.1</b>  <b>M7.9-12.3</b></p>	<p><b>Accruals:</b>  <u><b>Must be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Collecting a Note Receivable with Accrued Interest</li> <li>• Reversing Entry for Accrued Interest Income</li> <li>• Reversing Entry for Accrued Interest Expense</li> <li>• Paying an Installment Note Payable with Accrued Interest</li> </ul> <p><u><b>Can be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Analyzing Deferrals</li> <li>• Effect of Not Using Reversing Entries</li> <li>• Analyzing an Adjustment for Accrued Interest Expense</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-SSE.3.                      A-CED.1, A-CED.4.</p> <p style="text-align: center;"><u><b>Mathematical Practices</b></u>                      All mathematical practices are present in each unit.</p>
<p><b>M2.9-12.1</b>  <b>M3.9-12.3</b>  <b>M7.9-12.1</b></p>	<p><b>Deferrals:</b>  <u><b>Must be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Recording Revenue Received in Advance</li> <li>• Recording Adjusting Entry for Deferred Revenue Earned</li> <li>• Recording an Expense Paid in Advance</li> <li>• Recording Adjusting Entry for Deferred Expenses Incurred</li> </ul> <p><u><b>Can be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Analyzing Deferrals</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-SSE.3.                      A-CED.1, A-CED.4.</p> <p style="text-align: center;"><u><b>Mathematical Practices</b></u>                      All mathematical practices are present in each unit.</p>

## ACCOUNTING FOR ACCRUALS, DEFERRALS, & REVERSING ENTRIES (continued)

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M2.9-12.1</b>  <b>M3.9-12.3</b>  <b>M5.9-12.2</b>  <b>M7.9-12.1</b>  <b>M7.9-12.3</b></p>	<p><b>Preparing Adjusting Entries:</b>  <u><b>Must be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Uncollectible Accounts Adjustment</li> <li>• Merchandise Inventory Adjustment</li> <li>• Supplies-Store Adjustment</li> <li>• Prepaid Insurance Adjustment</li> <li>• Calculating Federal Income Tax</li> </ul> <p><u><b>Can be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• End-Of-Fiscal-Period Work</li> <li>• Unadjusted Trial Balance</li> <li>• Adjusted Trial Balance</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-SSE.3.                      A-CED.1, A-CED.4.</p> <p><u><b>Mathematical Practices</b></u>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Accounting in the real world: Anytime Fitness</li> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):                             <ul style="list-style-type: none"> <li>○ Working papers 21-1 and 21-2</li> <li>○ Application problems 21-1 and 21-2</li> </ul> </li> </ul>	

## END-OF-FISCAL-PERIOD WORK FOR A CORPORATION

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M2.9-12.1</b>  <b>M3.9-12.3</b>  <b>M5.9-12.2</b>  <b>M7.9-12.1</b>  <b>M7.9-12.3</b>  <b>M7.9-12.4</b></p>	<p><b>Preparing an Income Statement, Statement of Stockholders Equity, &amp; Balance Sheet:</b>  <u><b>Must be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Income Statement</li> <li>• Statement of Stockholders’ Equity</li> <li>• Balance Sheet</li> </ul> <p><u><b>Can be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Additional Items on an Income Statement</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-SSE.3.                      A-CED.1, A-CED.4.</p> <p style="text-align: center;"><u><b>Mathematical Practices</b></u>                      All mathematical practices are present in each unit.</p>
<p><b>M1.9-12.1</b>  <b>M2.9-12.1</b>  <b>M3.9-12.3</b>  <b>M5.9-12.2</b>  <b>M7.9-12.1</b>  <b>M7.9-12.3</b>  <b>M7.9-12.4</b></p>	<p><b>Preparing a Statement of Cash Flows:</b>  <u><b>Must be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Statement of Cash Flows</li> <li>• Cash Flows from Operating, Investing, and Financing Activities</li> <li>• Investing Activities Section of a Statement of Cash flows</li> <li>• Financing Activities Section of a Statement of Cash flows</li> <li>• Operating Activities Section of a Statement of Cash Flows</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-SSE.3.                      A-CED.1, A-CED.4.</p> <p style="text-align: center;"><u><b>Mathematical Practices</b></u>                      All mathematical practices are present in each unit.</p>
<p><b>M1.9-12.1</b>  <b>M2.9-12.1</b>  <b>M7.9-12.1</b></p>	<p><b>Preparing Closing &amp; Reversing Entries:</b>  <u><b>Must be Covered:</b></u>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Closing Entry for Accounts with Credit Balance</li> <li>• Closing Entry for Accounts with Debit Balance</li> <li>• Closing Entry to Record Net income</li> <li>• Closing Entry for Dividends</li> <li>• Reversing Entries</li> <li>• Accounting Cycle for a Merchandising Business Organized as a Corporation</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-SSE.3.                      A-CED.1, A-CED.4.</p> <p style="text-align: center;"><u><b>Mathematical Practices</b></u>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Accounting in the real world: JP Morgan Chase and Co.</li> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):                             <ul style="list-style-type: none"> <li>○ Working papers 22-1, 22-2, 22-3, and 22-4</li> <li>○ Application problems 22-1, 22-2, 22-3, and 22-4</li> <li>○ Reinforcement activity 3, part B</li> </ul> </li> </ul>	

## FORMING A PARTNERSHIP

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M5.9-12.3</b>  <b>M7.9-12.1</b>  <b>M7.9-12.4</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Initial investments by owners</li> <li>• Withdrawal of cash by partners</li> <li>• Withdrawal of supplies by partners</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Partnership agreements</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      A-SSE.1, A-SSE.3.                      A-CED.1, A-CED.4.</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Accounting in the real world: Jimmy John’s</li> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):                             <ul style="list-style-type: none"> <li>○ Working paper 23-1</li> <li>○ Application problem 23-1</li> </ul> </li> </ul>	

## DISTRIBUTION OF NET INCOME & OWNERS' EQUITY STATEMENTS

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.2</b>  <b>M5.9-12.3</b>  <b>M5.9-12.4</b>  <b>M7.9-12.1</b>  <b>M7.9-12.2</b>  <b>M7.9-12.3</b>  <b>M7.9-12.4</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Distribution of Net Income Statement</li> <li>• Distribution of Net Income Statement with unequal distribution</li> <li>• Partner’s Capital and Drawing Accounts</li> <li>• Owners’ Equity Statement</li> <li>• Balance Sheet for a Partnership</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Owner’s Equity Statement with an additional investment and a net loss.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      A-SSE.1, A-SSE.3.                      A-CED.1, A-CED.4.</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Accounting in the real world: Jimmy John’s</li> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):                             <ul style="list-style-type: none"> <li>○ Working paper 23-2</li> <li>○ Application problem 23-2</li> </ul> </li> </ul>	

## DISSOLVING A PARTNERSHIP

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.2</b>  <b>M3.9-12.1</b>  <b>M3.9-12.3</b>  <b>M5.9-12.3</b>  <b>M5.9-12.4</b>  <b>M7.9-12.1</b>  <b>M7.9-12.2</b>  <b>M7.9-12.3</b>  <b>M7.9-12.4</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Account Balances Before Realization</li> <li>• Calculating Gain on Realization</li> <li>• Recording a Gain on Realization</li> <li>• Calculating Loss on Realization</li> <li>• Recording a Loss on Realization</li> <li>• Liquidating Liabilities</li> <li>• Distributing Remaining Cash to Partners</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      A-SSE.1, A-SSE.3.                      A-CED.1, A-CED.4.</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):                             <ul style="list-style-type: none"> <li>○ Working paper 23-3</li> <li>○ Application problem 23-3</li> </ul> </li> </ul>	

## RECORDING INTERNATIONAL SALES

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.2</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b>  <b>M5.9-12.3</b>  <b>M5.9-12.4</b>  <b>M7.9-12.1</b>  <b>M7.9-12.2</b>  <b>M7.9-12.3</b>  <b>M7.9-12.4</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• International Sales</li> <li>• International Sales Compared with Domestic Sales</li> <li>• Processing an International Sale</li> <li>• Collecting Payment for an International Sale</li> <li>• Journalizing an International Sale</li> <li>• Journalizing Time Drafts</li> <li>• Journalizing Cash Receipts from Time Drafts</li> <li>• Trade Acceptances</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      A-SSE.1, A-SSE.3.                      A-CED.1, A-CED.4.</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Accounting in the real world: Lyft</li> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):                             <ul style="list-style-type: none"> <li>○ Working paper 24-1</li> <li>○ Application problem 24-1</li> </ul> </li> </ul>	

## RECORDING INTERNET SALES

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.2</b>  <b>M5.9-12.3</b>  <b>M5.9-12.4</b>  <b>M7.9-12.1</b>  <b>M7.9-12.2</b>  <b>M7.9-12.3</b>  <b>M7.9-12.4</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will learn about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Internet sales</li> <li>• Journalizing an internet sale</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      A-SSE.1, A-SSE.3.                      A-CED.1, A-CED.4.</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>Century 21 Accounting - General Journal</i> (Cengage, 2019):                             <ul style="list-style-type: none"> <li>○ Working paper 24-2</li> <li>○ Application problem 24-2</li> </ul> </li> </ul>	

# Advanced Placement Calculus AB

**Grade(s):** 9-12  
**Length:** two semesters  
**Credit:** 1.0 (0.5 per semester)  
**Prerequisite:** *Pre-Calculus* or teacher recommendation

## Overview:

This yearlong course is designed for learners capable of college level work, follows the description put forward by the College Board, and prepares them to take the Advanced Placement exam.

Both *AP Calculus AB* and *AP Calculus BC* focus on students' understanding of calculus concepts and provide experience with methods and applications. Through the use of big ideas of calculus (e.g., modeling change, approximation and limits, and analysis of functions), each course becomes a cohesive whole, rather than a collection of unrelated topics. Both courses require students to use definitions and theorems to build arguments and justify conclusions.

The courses feature a multi representational approach to calculus, with concepts, results, and problems expressed graphically, numerically, analytically, and verbally. Exploring connections among these representations builds understanding of how calculus applied limits to develop important ideas, definitions, formulas, and theorems. A sustained emphasis on clear communication of methods, reasoning, justifications, and conclusions is essential. Teachers and students should regularly use technology to reinforce relationships among functions, to confirm written work, to implement experimentation, and to assist in interpreting results.

*AP Calculus AB* is designed to be the equivalent of a first semester college calculus course devoted to topics in differential and integral calculus.

Please visit the College Board-AP Central website for more information (<http://apcentral.collegeboard.com>).

# Advanced Placement Calculus BC

**Grade(s):** 9-12

**Length:** two semesters

**Credit:** 1.0 (0.5 per semester)

**Prerequisite:** *AP Calculus AB* or equivalent

## Overview:

This yearlong course is designed for learners capable of college level work, follows the description put forward by the College Board, and prepares them to take the Advanced Placement exam.

Both *AP Calculus AB* and *AP Calculus BC* focus on students' understanding of calculus concepts and provide experience with methods and applications. Through the use of big ideas of calculus (e.g., modeling change, approximation and limits, and analysis of functions), each course becomes a cohesive whole, rather than a collection of unrelated topics. Both courses require students to use definitions and theorems to build arguments and justify conclusions.

The courses feature a multi representational approach to calculus, with concepts, results, and problems expressed graphically, numerically, analytically, and verbally. Exploring connections among these representations builds understanding of how calculus applied limits to develop important ideas, definitions, formulas, and theorems. A sustained emphasis on clear communication of methods, reasoning, justifications, and conclusions is essential. Teachers and students should regularly use technology to reinforce relationships among functions, to confirm written work, to implement experimentation, and to assist in interpreting results.

*AP Calculus BC* is designed to be the equivalent of both first and second semester college calculus courses. This course applies the content and skills learned in *AP Calculus AB* to parametrically defined curves, polar curves, and vector-valued functions; develops additional integration techniques and applications; and introduces the topics of sequences and series.

Please visit the College Board-AP Central website for more information (<http://apcentral.collegeboard.com>).

# Advanced Placement Computer Science A

**Grade(s):** 9-12  
**Length:** two semesters  
**Credit:** 1.0 (0.5 per semester)  
**Prerequisite:** *Computer Programming, Algebra 2*, or teacher recommendation

**Overview:**

This yearlong course is designed for learners capable of college level work, follows the description put forward by the College Board, and prepares them to take the Advanced Placement exam.

*AP Computer Science A* introduces students to computer science through programming. Fundamental topics in this course include the design of solutions to problems, the use of data structures to organize large sets of data, the development and implementation of algorithms to process data and discover new information, the analysis of potential solutions, and the ethical and social implications of computing systems. The course emphasizes object-oriented programming and design using the Java programming language.

*AP Computer Science A* is equivalent to a first-semester, college-level course in computer science.

Please visit the College Board-AP Central website for more information (<http://apcentral.collegeboard.com>).

# Advanced Placement Computer Science Principles

**Grade(s):** 9-12  
**Length:** two semesters  
**Credit:** 1.0 (0.5 per semester)  
**Prerequisite:** *Algebra 1*

**Overview:**

This yearlong course is designed for learners capable of college level work, follows the description put forward by the College Board, and prepares them to take the Advanced Placement exam.

*AP Computer Science Principles* is an introductory college-level computing course that introduces students to the breadth of the field of computer science. Students learn to design and evaluate solutions, and to apply computer science to solve problems through the development of algorithms and programs. They incorporate abstraction into programs and use data to discover new knowledge. Students also explain how computing innovations and computing systems (including the internet) work, explore their potential impacts, and contribute to a computing culture that is collaborative and ethical.

Please visit the College Board-AP Central website for more information (<http://apcentral.collegeboard.com>).

# Algebra 2 & Honors

<p><b>Grade(s):</b> 9-12  <b>Length:</b> two semesters  <b>Credit:</b> 1 (0.5 per semester)  <b>Prerequisite:</b> <i>Algebra 1</i></p>	<p><b>Overview:</b>  <i>Algebra 2</i> continues students' study of functions including polynomial, exponential, rational, and radical functions. They build and interpret functions that model a relationship between two quantities by analyzing key features of the graphs and equations. Students make sense of periodic behavior as they study trigonometric functions and build fluency with values of sine, cosine, and tangent at various angle measures. Equation solving strategies expand to include higher degree polynomials and quadratics over the complex number system and exponential equations using the properties of logarithms. Transformations are included in all units pertaining to functions.</p> <p><b>Semester 2 of Algebra 2 fulfills the statistics graduation requirement</b> (semester one is a prerequisite). Concurrent enrollment in <i>Geometry</i> is an option.</p> <p><b><i>Algebra 2 Honors:</i></b>          Students will master all of the topics from <i>Algebra 2</i> listed above, with a variety of additional topics to include an in-depth study of asymptotic behaviors associated with radical and rational functions. These additional topics (content objectives) are documented within each unit in <b>RED</b>.</p>
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Mathematical Topics (Recommended Order)	
Semester 1	Semester 2
<ul style="list-style-type: none"> <li>• Linear Functions and Systems</li> <li>• Quadratic Functions</li> <li>• Polynomials</li> <li>• Radical Functions</li> </ul>	<ul style="list-style-type: none"> <li>• Inferences and Conclusions from Data</li> <li>• Rational Functions</li> <li>• Exponential and Logarithmic Functions</li> <li>• Applications of Trigonometric Functions</li> <li>• <b>Conic Sections</b></li> </ul>

Course/ Grade Competencies	
Semester 1	Semester 2
<ul style="list-style-type: none"> <li>• <b>M1.9-12.1:</b> The learner will write, apply, and provide a rationale for a mathematical model representing a given situation.</li> <li>• <b>M1.9-12.2:</b> The learner will interpret and use symbols to express relationships and justify reasoning when solving problems.</li> <li>• <b>M2.9-12.1:</b> The learner will justify how to apply properties of real number systems to variable expressions in a variety of contexts.</li> <li>• <b>M3.9-12.1:</b> The learner will use computational strategies and algorithms and provide rationale for their use.</li> <li>• <b>M3.9-12.2:</b> The learner will reason quantitatively when analyzing, representing, and solving problems.</li> <li>• <b>M5.9-12.1:</b> The learner will apply properties of arithmetic and algebra to simplify and manipulate symbolic expressions or models.</li> <li>• <b>M5.9-12.3:</b> The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.</li> <li>• <b>M5.9-12.4:</b> The learner will analyze relations and functions, using multiple representations.</li> <li>• <b>M5.9-12.5:</b> The learner will identify, build, and perform operations on relations and functions and justify their reasoning.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>M1.9-12.2:</b> The learner will interpret and use symbols to express relationships and justify reasoning when solving problems.</li> <li>• <b>M4.9-12.1:</b> The learner will provide rationale for solving measurement problems that require making conversions among various units and measurement systems, or applying the effect of a scale factor.</li> <li>• <b>M5.9-12.1:</b> The learner will apply properties of arithmetic and algebra to simplify and manipulate symbolic expressions or models.</li> <li>• <b>M5.9-12.2:</b> The learner will write and apply algebraic modes to represent and answer questions about a given situation.</li> <li>• <b>M5.9-12.3:</b> The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.</li> <li>• <b>M5.9-12.4:</b> The learner will analyze relations and functions, using multiple representations.</li> <li>• <b>M5.9-12.5:</b> The learner will identify, build, and perform operations on relations and functions and justify their reasoning.</li> <li>• <b>M7.9-12.1:</b> The learner will formulate questions to clarify the problem at hand and formulate one (or more) questions that can be answered with data.</li> <li>• <b>M7.9-12.2:</b> The learner will design and implement a plan to collect the appropriate data to answer the statistical question.</li> <li>• <b>M7.9-12.3:</b> The learner will summarize data using appropriate statistics.</li> <li>• <b>M7.9-12.4:</b> The learner will select appropriate graphical and numerical methods, and use these methods to represent the data in a way that supports interpretation.</li> <li>• <b>M7.9-12.6:</b> The learner will apply probability concepts to analyze and evaluate potential decisions and strategies.</li> </ul>

## LINEAR FUNCTIONS & SYSTEMS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b> <b>M1.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Solve any linear equation.</li> <li>• Solve any linear inequality.</li> <li>• Solve compound inequalities.</li> <li>• Solve absolute value equations and inequalities.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> N-Q.1, N-Q.2, N-Q.3, A-REI.1, A-REI.3, A-CED.1, A-CED.4</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>M3.9-12.1</b> <b>M3.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Solve systems of linear equations:                             <ul style="list-style-type: none"> <li>○ Graphically</li> <li>○ Algebraically.</li> </ul> </li> <li>• Solve systems of linear inequalities.</li> <li>• Solve systems in three variables.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-REI.5, A-REI.6, A-REI.10, A-REI.11, A-REI.12, A-CED.2, A-CED.3</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>enVision Algebra 2</i> textbook: topic 1, lessons 1-3 and 5-6</li> </ul>	

## QUADRATIC FUNCTIONS

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.2</b> <b>M5.9-12.1</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Solve quadratic equations (to include equations with complex solutions) by:               <ul style="list-style-type: none"> <li>○ Inspection</li> <li>○ Square roots</li> <li>○ Factoring</li> <li>○ Completing the square</li> <li>○ Quadratic formula</li> </ul> </li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-REI.4e, A-REI.4f, N-CN.7</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>M5.9-12.3</b> <b>M5.9-12.4</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Solve a system consisting of a linear and quadratic equation by graphing.</li> <li>• Solve a system consisting of a linear and quadratic equation algebraically.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-REI.7</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>M2.9-12.1</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Perform arithmetic operations with complex numbers.               <ul style="list-style-type: none"> <li>○ Add, subtract and multiply.</li> </ul> </li> <li>• Find conjugates of complex numbers.</li> <li>• Use conjugates of complex numbers to divide complex numbers.</li> <li>• Extend polynomial identities to complex numbers.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> N-CN.1, N-CN.2, N-CN.3, N-N.8</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>enVision Algebra 2</i> textbook: topic 2, lessons 1-7</li> <li>• <i>Illustrative Mathematics Algebra 2</i>: unit 3, lessons 10-19 (<a href="https://im.kendallhunt.com/HS/students/3/index.html">https://im.kendallhunt.com/HS/students/3/index.html</a>)</li> </ul>	

## POLYNOMIALS

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<b>M5.9-12.4</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Interpret key features of graphs and tables:                             <ul style="list-style-type: none"> <li>○ Extreme values</li> <li>○ Symmetry</li> <li>○ Vertex</li> <li>○ Zeros</li> <li>○ End behavior.</li> </ul> </li> <li>• Sketch graphs showing key features.</li> <li>• Factor an expression to find zeros.</li> <li>• Complete the square for a quadratic expression to find the vertex and axis of symmetry.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> F-IF.4, F-IF.7a, F-IF.7c, F-IF.8</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<b>M5.9-12.5</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Transform functions:                             <ul style="list-style-type: none"> <li>○ Horizontal/vertical shifts</li> <li>○ Horizontal/vertical compression.</li> </ul> </li> <li>• Recognize even/odd functions from their graphs or equations.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> F-BF.3</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<b>M5.9-12.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Add, subtract, and multiply polynomials.</li> <li>• Apply long and synthetic division to divide polynomials.</li> <li>• <b>Know and apply the Binomial Theorem.</b></li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-APR.1, <b>A-APR.5</b></p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<b>M1.9-12.2</b> <b>M5.9-12.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Use Rational Root Theorem to solve polynomials.</li> <li>• Identify the roots of a polynomial.</li> <li>• Write the equation of a polynomial of least degree with given roots.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-APR.3</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• <i>enVision Algebra 2</i> textbook: topic 3, lessons 1-7</li> <li>• <i>Illustrative Mathematics Algebra 2</i>: unit 2, lessons 1-15 and unit 5, lessons 1-7 (<a href="https://im.kendallhunt.com/HS/students/3/index.html">https://im.kendallhunt.com/HS/students/3/index.html</a>)</li> </ul>	

## RADICAL FUNCTIONS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<b>M5.9-12.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Rewrite radical expressions using rational exponents.</li> <li>• Simplify radical expressions.</li> <li>• Evaluate radical expressions.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> N.RN.1, N.RN.2</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<b>M1.9-12.2</b> <b>M5.9-12.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Solve radical equations and inequalities.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-REI.2, A-CED.3</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• <i>enVision Algebra 2</i> textbook: topic 5, lessons 1-4</li> <li>• <i>Illustrative Mathematics Algebra 2</i>: unit 3, lessons 1-9 (<a href="https://im.kendallhunt.com/HS/students/3/index.html">https://im.kendallhunt.com/HS/students/3/index.html</a>)</li> </ul>	

## INFERENCE & CONCLUSIONS FROM DATA

### Graduate-Level Competency:

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<b>M7.9-12.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Understand and evaluate random processes underlying statistical experiments.                             <ul style="list-style-type: none"> <li>○ Identify a sampling method that provides a random sample from a population.</li> <li>○ Determine if a specified model (theoretical and empirical) is consistent with results from simulation.</li> </ul> </li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> S-IC.1, S-IC.2</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<b>M7.9-12.2</b> <b>M7.9-12.4</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Make inferences and justify conclusions from sample surveys, experiments, and observational studies.                             <ul style="list-style-type: none"> <li>○ Identify the purpose of and differences between experiments, sample surveys, and observational studies.</li> <li>○ Use multiple samples to make an inference about a population.</li> <li>○ Use graphs and simulation to determine if differences between parameters is significant.</li> <li>○ Evaluate reports based on data.</li> </ul> </li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> S-IC.3, S-IC.4, S-IC.5, S-IC.6</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<b>M7.9-12.3</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Summarize, represent, and interpret data on a single count or measurement variable.                             <ul style="list-style-type: none"> <li>○ Find measures of center and spread.</li> <li>○ Compare data sets using statistical measures that are appropriate.</li> <li>○ Fit a normal distribution to data.</li> </ul> </li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> S-ID.4</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<b>M7.9-12.6</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Use probability to evaluate outcomes of decisions.                             <ul style="list-style-type: none"> <li>○ Use probabilities to make fair decisions.</li> <li>○ Analyze decisions and strategies using probability concepts.</li> </ul> </li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> S-MD.6, S-MD.7</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• <i>enVision Algebra 2</i> textbook: topic 11, lessons 1-6 and <b>topic 12, lesson 6</b></li> <li>• <i>Illustrative Mathematics Algebra 2</i>: unit 7, lessons 1-16 (<a href="https://im.kendallhunt.com/HS/students/3/index.html">https://im.kendallhunt.com/HS/students/3/index.html</a>)</li> </ul>	

## RATIONAL FUNCTIONS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<b>M5.9-12.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Simplify rational expressions.</li> <li>• Multiply and divide rational expressions.</li> <li>• Add and subtract rational expressions.</li> <li>• Simplify complex fractions.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-APR.6, A-APR.7</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<b>M1.9-12.2</b> <b>M5.9-12.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Solve rational equations and inequalities.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-REI.2, A-CED.3</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<b>M5.9-12.5</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Graph rational functions:               <ul style="list-style-type: none"> <li>○ Piecewise</li> <li>○ Absolute value</li> <li>○ Step functions</li> <li>○ <b>Any rational function and identify key features: asymptotes/ holes.</b></li> </ul> </li> <li>• Transform rational and radical functions.               <ul style="list-style-type: none"> <li>○ Horizontal/vertical shifts.</li> <li>○ Horizontal/vertical compression.</li> </ul> </li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> F-IF.7a, <b>F-IF.7c</b>, F.BF.3</p> <p><b><u>Mathematical Practices</u></b></p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• <i>enVision Algebra 2</i> textbook: topic 4, lessons 1-5 and topic 5, lessons 5-6</li> <li>• <i>Illustrative Mathematics Algebra 2</i>: unit 2, lessons 16-24 (<a href="https://im.kendallhunt.com/HS/students/3/index.html">https://im.kendallhunt.com/HS/students/3/index.html</a>)</li> </ul>	

## EXPONENTIAL & LOGARITHMIC FUNCTIONS

### Graduate-Level Competency:

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<b>M5.9-12.4</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Distinguish between situations that are linear, quadratic, or exponential.</li> <li>• Graph exponential growth and decay.</li> <li>• Write exponential functions from:                             <ul style="list-style-type: none"> <li>○ A graph</li> <li>○ A table</li> <li>○ A description.</li> </ul> </li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> F-LE.1a, F-LE.1b, F-LE.1c, F-LE.2, F-LE.3, F-IF.7</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<b>M5.9-12.5</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Graph and recognize inverse relations and functions.</li> <li>• Find inverses of functions.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> F-IF.7, F-BF.3</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<b>M5.9-12.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Write logarithmic functions.</li> <li>• Graph logarithmic functions.</li> <li>• Evaluate logarithmic functions.</li> <li>• Simplify logarithmic functions.</li> <li>• Translate between logarithms in any base.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> F-LE.2, F-LE.4, F-BF.3</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<b>M5.9-12.1</b> <b>M5.9-12.2</b> <b>M5.9-12.3</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Write equivalent forms for exponential and logarithmic functions.</li> <li>• Solve exponential and logarithmic equations and inequalities.</li> <li>• Model data using exponential and logarithmic functions.</li> <li>• Use exponential and logarithmic functions to analyze and predict.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-CED.1, A-CED.3, A-REI.11</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• <i>enVision Algebra 2</i> textbook: topic 6, lessons 1-6</li> <li>• <i>Illustrative Mathematics Algebra 2</i>: unit 4, lessons 1-18 (<a href="https://im.kendallhunt.com/HS/students/3/index.html">https://im.kendallhunt.com/HS/students/3/index.html</a>)</li> </ul>	

## APPLICATIONS OF TRIGONOMETRIC FUNCTIONS

### Graduate-Level Competency:

**M4 - Measurement:** The learner will explain reasoning when applying and modeling geometric principles.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M4.9-12.1</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Convert between radians, degrees, and degree/minute/second.</li> <li>• Extend the domain of trig functions using the unit circle.</li> <li>• Evaluate all six trig functions for exact values.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      N-Q.3, F-TF.2,                      F-TF.3</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>M5.9-12.1</b>  <b>M5.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Use inverse trigonometric functions to solve trigonometric equations.</li> <li>• Prove and apply trigonometric functions - Pythagorean Identity.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>•</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      F-TF.7, F-TF.8</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>enVision Algebra 2</i> textbook: topic 7, lessons 1-3 and topic 8, lessons 1 and 3</li> <li>• <i>Illustrative Mathematics Algebra 2</i>: unit 6, lessons 1-19 (<a href="https://im.kendallhunt.com/HS/students/3/index.html">https://im.kendallhunt.com/HS/students/3/index.html</a>)</li> </ul>	

## CONIC SECTIONS

(This is an optional unit for Algebra 2, if time allows.)

**Graduate-Level Competency:**

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M5.9-12.1</b> <b>M5.9-12.4</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• <b>Graph conic sections:</b> <ul style="list-style-type: none"> <li>○ Circles</li> <li>○ Parabolas</li> <li>○ Ellipses</li> <li>○ Hyperbolas</li> </ul> </li> <li>• <b>Transform conic sections:</b> <ul style="list-style-type: none"> <li>○ Horizontal/vertical shifts</li> <li>○ Horizontal/vertical compression</li> </ul> </li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> F.BF.3</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>M5.9-12.1</b> <b>M5.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• <b>Write equations of conic sections:</b> <ul style="list-style-type: none"> <li>○ Circles</li> <li>○ Parabolas</li> <li>○ Ellipses</li> <li>○ Hyperbolas</li> </ul> </li> <li>• <b>Derive the equations of ellipses and hyperbolas given foci and directrices.</b></li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> G-GPE.1, G-GPE.2, F-IF.8, G-GPE.3</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>enVision Algebra 2</i> textbook: topic 9, lessons 1-4</li> </ul>	

# Algebra for Finance 1A/1B

<p><b>Grade(s):</b> 9-12  <b>Length:</b> one or two semesters  <b>Credit:</b> 0.5 per semester  <b>Prerequisite:</b> <i>Algebra 1.</i></p>	<p><b>Overview:</b>  <i>Algebra for Finance 1A/1B</i> applies computational skills to real world consumer situations. The content includes: algebra, linear equations and inequalities, graphing, exponential growth, present and future value of money, interest (simple/compound), credit cards (credit scores, finance charges, deferred payments, etc.), mortgages (fees, points, expenses, interest, fixed/adjustable interest rates, balloon payments, etc.), personal budgets, cash management strategies, net worth calculations, debt payoff, tax forms with tax tables, insurance (options, fees, expenses, etc.), retirement plans (savings, IRA's, ROTH, annuities, etc.), and stocks (gains, losses, selling, preferred/common stock, bonds).</p> <p>Students can take <i>Algebra for Finance 1B</i> without taking <i>Algebra for Finance 1A</i>.</p>
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<b>Mathematical Topics</b> (Recommended Order)	
<b>Semester 1</b> ( <i>Algebra for Finance 1A</i> )	<b>Semester 2</b> ( <i>Algebra for Finance 1B</i> )
<ul style="list-style-type: none"> <li>• Discretionary Expenses</li> <li>• Banking Services</li> <li>• Consumer Credit</li> <li>• Automobile Ownership</li> <li>• Employment Basics</li> <li>• Income Taxes</li> </ul>	<ul style="list-style-type: none"> <li>• Independent Living</li> <li>• The Stock Market</li> <li>• Modeling a Business</li> <li>• Planning for Retirement</li> <li>• Prepare a Budget</li> </ul>

## Course/ Grade Competencies

Semester 1	Semester 2
<ul style="list-style-type: none"> <li>• <b>M1.9-12.1:</b> The learner will write, apply, and provide a rationale for a mathematical model representing a given situation.</li> <li>• <b>M1.9-12.2:</b> The learner will interpret and use symbols to express relationships and justify reasoning when solving problems.</li> <li>• <b>M2.9-12.1:</b> The learner will justify how to apply properties of real number systems to variable expressions in a variety of contexts.</li> <li>• <b>M3.9-12.1:</b> The learner will use computational strategies and algorithms and provide rationale for their use.</li> <li>• <b>M3.9-12.2:</b> The learner will reason quantitatively when analyzing, representing, and solving problems.</li> <li>• <b>M3.9-12.3:</b> The learner will compare the effectiveness or logic of two plausible arguments or models.</li> <li>• <b>M4.9-12.1:</b> The learner will provide rationale for solving measurement problems that require making conversions among various units and measurement systems, or applying the effect of a scale factor.</li> <li>• <b>M5.9-12.1:</b> The learner will apply properties of arithmetic and algebra to simplify and manipulate symbolic expressions or models.</li> <li>• <b>M5.9-12.2:</b> The learner will write and apply algebraic modes to represent and answer questions about a given situation.</li> <li>• <b>M5.9-12.3:</b> The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.</li> <li>• <b>M5.9-12.4:</b> The learner will analyze relations and functions, using multiple representations.</li> <li>• <b>M6.9-12.1:</b> The learner will apply geometric theorems and postulates to solve problems, create arguments, and support their reasoning.</li> <li>• <b>M7.9-12.1:</b> The learner will formulate questions to clarify the problem at hand and formulate one (or more) questions that can be answered with data.</li> <li>• <b>M7.9-12.3:</b> The learner will summarize data using appropriate statistics.</li> <li>• <b>M7.9-12.4:</b> The learner will select appropriate graphical and numerical methods, and use these methods to represent the data in a way that supports interpretation.</li> <li>• <b>M7.9-12.5:</b> The learner will interpret descriptive statistics and linear models within the context of the data and the original question.</li> <li>• <b>M7.9-12.6:</b> The learner will apply probability concepts to analyze and evaluate potential decisions and strategies.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>M1.9-12.1:</b> The learner will write, apply, and provide a rationale for a mathematical model representing a given situation.</li> <li>• <b>M1.9-12.2:</b> The learner will interpret and use symbols to express relationships and justify reasoning when solving problems.</li> <li>• <b>M2.9-12.1:</b> The learner will justify how to apply properties of real number systems to variable expressions in a variety of contexts.</li> <li>• <b>M3.9-12.1:</b> The learner will use computational strategies and algorithms and provide rationale for their use.</li> <li>• <b>M3.9-12.2:</b> The learner will reason quantitatively when analyzing, representing, and solving problems.</li> <li>• <b>M3.9-12.3:</b> The learner will compare the effectiveness or logic of two plausible arguments or models.</li> <li>• <b>M5.9-12.1:</b> The learner will apply properties of arithmetic and algebra to simplify and manipulate symbolic expressions or models.</li> <li>• <b>M5.9-12.2:</b> The learner will write and apply algebraic modes to represent and answer questions about a given situation.</li> <li>• <b>M5.9-12.3:</b> The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.</li> <li>• <b>M5.9-12.4:</b> The learner will analyze relations and functions, using multiple representations.</li> <li>• <b>M5.9-12.5:</b> The learner will identify, build, and perform operations on relations and functions and justify their reasoning.</li> <li>• <b>M6.9-12.3:</b> The learner will create and use a formal geometric construction, using appropriate tools, to illustrate geometric properties.</li> <li>• <b>M7.9-12.1:</b> The learner will formulate questions to clarify the problem at hand and formulate one (or more) questions that can be answered with data.</li> <li>• <b>M7.9-12.2:</b> The learner will design and implement a plan to collect the appropriate data to answer the statistical question.</li> <li>• <b>M7.9-12.3:</b> The learner will summarize data using appropriate statistics.</li> <li>• <b>M7.9-12.4:</b> The learner will select appropriate graphical and numerical methods, and use these methods to represent the data in a way that supports interpretation.</li> <li>• <b>M7.9-12.5:</b> The learner will interpret descriptive statistics and linear models within the context of the data and the original question.</li> <li>• <b>M7.9-12.6:</b> The learner will apply probability concepts to analyze and evaluate potential decisions and strategies.</li> </ul>

## DISCRETIONARY EXPENSES

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M4 - Measurement:** The learner will explain reasoning when applying and modeling geometric principles.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M2.9-12.1</b>  <b>M7.9-12.1</b>  <b>M7.9-12.3</b>  <b>M7.9-12.4</b></p>	<p><b>Discretionary &amp; Essential Expenses:</b>  <u><b>Must be Covered:</b></u>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Identify the difference between essential and discretionary expenses.</li> <li>• Determine the mean, median, and mode of a data set.</li> <li>• Use sigma notation to represent and determine the mean of a data set.</li> <li>• Create and interpret a frequency distribution table.</li> </ul> <p><u><b>Can be Covered:</b></u>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Determine the mean, median, and mode of a data set presented in a frequency distribution table.</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-CED.1.                      A-CED.2, A-CED.4.                      A-REI.1, F-IF.5.                      F-LE.2, F-LE.1</p> <p><u><b>Mathematical Practices</b></u>                      Make sense of problems and persevere in solving them.                      Reason abstractly and quantitatively.                      Use appropriate tools strategically.</p>
<p><b>M1.9-12.1</b>  <b>M2.9-12.1</b>  <b>M5.9-12.4</b></p>	<p><b>Travel Expenses:</b>  <u><b>Must be Covered:</b></u>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Determine and interpret cumulative frequency.</li> <li>• Determine and interpret relative frequency.</li> <li>• Determine and interpret relative cumulative frequency.</li> <li>• Determine and interpret percentiles.</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-CED.2.                      A-CED.3, A-CED.4</p> <p><u><b>Mathematical Practices</b></u>                      Reason abstractly and quantitatively</p>
<p><b>M1.9-12.1</b>  <b>M2.9-12.1</b>  <b>M5.9-12.4</b></p>	<p><b>Vacation Expenses:</b>  <u><b>Must be Covered:</b></u>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Measure dispersion using standard deviation units.</li> <li>• Compute z-scores.</li> <li>• Find percentages using the normal curve.</li> <li>• Compute raw scores using z-scores.</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-CED.2.                      A-CED.4</p> <p><u><b>Mathematical Practices</b></u>                      Use appropriate tools strategically.</p>

## DISCRETIONARY EXPENSES (continued)

Course/ Grade Competency	Content Objectives	Standards
<p><b>M4.9-12.1</b>  <b>M7.9-12.3</b>  <b>M7.9-12.4</b>  <b>M7.9-12.6</b></p>	<p><b>Personal Expenses:</b>  <u><b>Must be Covered:</b></u>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Graph bivariate data.</li> <li>• Interpret patterns and trends based on data.</li> <li>• Construct a scatter plot.</li> <li>• Fit a linear regression equation to a scatter plot.</li> <li>• Determine the linear regression equation.</li> <li>• Find and interpret the correlation coefficient.</li> <li>• Make predictions based on lines of best fit.</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-CED.1.                      A-CED.4, A-REI.1.                      A-REI.10, F-IF.5.                      F-IF.6, F-IF.7.                      F-LE.2, F-LE.1</p> <p><u><b>Mathematical Practices</b></u>                      Reason abstractly and quantitatively                      Use appropriate tools strategically.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Students plan their #1 bucket list vacation.</li> <li>• Guest speaker from a travel agency.</li> </ul>	

## BANKING SERVICES

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M4 - Measurement:** The learner will explain reasoning when applying and modeling geometric principles.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b></p>	<p><b>Checking Accounts:</b>  <u>Must be Covered:</u>                      The learner will:</p> <ul style="list-style-type: none"> <li>Explain how checking accounts work.</li> <li>Complete a check register.</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-CED.4</p> <p><u><b>Mathematical Practices</b></u>                      Make sense of problems and persevere in solving them. Attend to precision.</p>
<p><b>M1.9-12.2</b>  <b>M5.9-12.1</b></p>	<p><b>Reconcile a Bank Statement:</b>  <u>Must be Covered:</u>                      The learner will:</p> <ul style="list-style-type: none"> <li>Reconcile a checking account with a bank statement.</li> </ul> <p><u>Can be Covered:</u>                      The learner will:</p> <ul style="list-style-type: none"> <li>Reconcile a checking account with a bank statement using a spreadsheet.</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-CED.4.</p> <p><u><b>Mathematical Practices</b></u>                      Make sense of problems and persevere in solving them. Attend to precision.</p>
<p><b>M1.9-12.1</b></p>	<p><b>Savings Account:</b>  <u>Must be Covered:</u>                      The learner will:</p> <ul style="list-style-type: none"> <li>Define the basic vocabulary of savings accounts.</li> <li>Compute simple interest using the simple interest formula.</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-SSE.4.                      A-CED.1, A-CED.2.                      A-REI.1.</p> <p><u><b>Mathematical Practices</b></u>                      Make sense of problems and persevere in solving them. Attend to precision.</p>
<p><b>M1.9-12.2</b>  <b>M2.9-12.1</b></p>	<p><b>Explore Compound Interest:</b>  <u>Must be Covered:</u>                      The learner will:</p> <ul style="list-style-type: none"> <li>Explain the concept of getting interest on your interest.</li> <li>Compute compound interest using a table.</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-SSE.4.                      A-CED.2, F-LE.2</p> <p><u><b>Mathematical Practices</b></u>                      Attend to precision.</p>

## BANKING SERVICES (continued)

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b> <b>M2.9-12.1</b></p>	<p><b>Compound Interest Formula:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Understand the derivation of the compound interest formula.</li> </ul> <p>Make computations using the compound interest formula.</p>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.4, A-CED.2</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Attend to precision.</p>
<p><b>M1.9-12.1</b> <b>M1.9-12.2</b> <b>M2.9-12.1</b></p>	<p><b>Continuous Compounding:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Compute interest on an account that is continuously compounded.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1., A-SSE.4. A-CED.2</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Attend to precision.</p>
<p><b>M1.9-12.1</b> <b>M1.9-12.2</b> <b>M2.9-12.1</b> <b>M5.9-12.1</b></p>	<p><b>Future Value of Investments:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Calculate the future value of a periodic investment.</li> <li>Graph the future value function.</li> <li>Interpret the graph of the future value function.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.4. A-CED.2, F-IF.5. F-IF.7, F-LE.2. F-LE.1</p> <p><b><u>Mathematical Practices</u></b> Reason abstractly and Quantitatively. Attend to precision.</p>
<p><b>M1.9-12.2</b> <b>M2.9-12.1</b> <b>M5.9-12.1</b></p>	<p><b>Present Value of Investment:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Calculate the present value of a single deposit investment.</li> <li>Calculate the present value of a periodic deposit investment.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.4. A-CED.2.</p> <p><b><u>Mathematical Practices</u></b> Attend to precision.</p>
<p><b>M3.9-12.1</b> <b>M3.9-12.3</b></p>	<p><b>The Term of a Single Deposit Amount:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Construct exponential and logarithmic models of a situation.</li> <li>Evaluate logarithms.</li> <li>Express exponential models as logarithms.</li> <li>Demonstrate use of the change-of-base formula.</li> <li>Evaluate common and natural logarithms.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-CED.4. F-LE.2, F-LE.4. F-LE.1</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Use appropriate tools strategically.</p>

## BANKING SERVICES (continued)

Course/ Grade Competency	Content Objectives	Standards
<p><b>M3.9-12.1</b>  <b>M3.9-12.3</b>  <b>M4.9-12.1</b></p>	<p><b>The Term of a Systematic Account:</b>  <u><b>Must be Covered:</b></u>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Demonstrate use of the Change-of-Base Formula.</li> <li>• Explain and apply the One-to-One Property.</li> <li>• Explain and apply the Power Property.</li> <li>• Determine the term of systematic savings.</li> <li>• Determine the term of systematic withdrawal.</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-CED.3.                      A-CED.4.</p> <p style="text-align: center;"><u><b>Mathematical Practices</b></u>                      Use appropriate tools strategically.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Guest speaker – banker or investment manager</li> <li>• Simulated bank reconciliation</li> </ul>	

## CONSUMER CREDIT

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M4 - Measurement:** The learner will explain reasoning when applying and modeling geometric principles.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.2</b> <b>M2.9-12.1</b></p>	<p><b>Introduction to Consumer Credit:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Define basic credit terms.</li> <li>• Identify types of lending institutions.</li> <li>• Compute finance charges for installment purchases.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.4. A-CED.1, A-REI.1</p> <p><b><u>Mathematical Practices</u></b> Use appropriate tools strategically.</p>
<p><b>M1.9-12.2</b> <b>M3.9-12.2</b> <b>M5.9-12.3</b></p>	<p><b>Loans:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Read monthly payments from a table.</li> <li>• Compute monthly payments using a formula.</li> <li>• Compute finance charges on loans.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.4. A-CED.2</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Attend to precision. Use appropriate tools strategically.</p>
<p><b>M3.9-12.3</b> <b>M5.9-12.3</b></p>	<p><b>Student Loans:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Explain the options available for student loans.</li> <li>• Calculate the interest due in various student loan situations.</li> <li>• Apply the simplified daily interest formula.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Learn about interest capitalization.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.4. A-CED.1, A-REI.1</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Reason abstractly and quantitatively</p>

## CONSUMER CREDIT (continued)

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.2</b>  <b>M7.9-12.1</b>  <b>M7.9-12.4</b></p>	<p><b>Loan Calculations and Regression:</b>  <b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Determine the interest on a loan given the principle, time, and annual percentage rate (APR).</li> <li>• Use the logarithmic loan length formula to determine the term of a loan.</li> <li>• Use regression to determine the curve of best fit using data from a loan table.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      A-SSE.1, A-SSE.4.                      A-CED.2, A-CED.3.                      A-CED.4, F-LE.2.                      F-LE.1, F-LE.4</p> <p><b><u>Mathematical Practices</u></b>                      Make sense of problems and persevere in solving them. Reason abstractly and quantitatively                      Use appropriate tools strategically.</p>
<p><b>M1.9-12.2</b>  <b>M3.9-12.1</b></p>	<p><b>Credit Cards:</b>  <b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Define the basic vocabulary of credit cards.</li> <li>• Compute an average daily balance.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      A-SSE.1, A-SSE.4.                      A-CED.1., A-CED.2.                      A-REI.1, F-IF.6</p> <p><b><u>Mathematical Practices</u></b>                      Use appropriate tools strategically.</p>
<p><b>M1.9-12.2</b>  <b>M3.9-12.1</b></p>	<p><b>Credit Card Statement:</b>  <b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Identify and use the various entries in a credit card statement.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      A-REI.1.</p> <p><b><u>Mathematical Practices</u></b>                      Attend to precision.</p>
<p><b>M1.9-12.2</b>  <b>M3.9-12.1</b>  <b>M4.9-12.1</b></p>	<p><b>Average Daily Balance:</b>  <b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Calculate the average daily balance using the credit calendar.</li> <li>• Calculate the finance charge using the credit calendar.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Learn about negative amortization.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      A-SSE.1, A-CED.1.                      A-CED.2, A-REI.1.</p> <p><b><u>Mathematical Practices</u></b>                      Attend to precision.                      Use appropriate tools strategically.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Compare credit card rates and benefits.</li> </ul>	

## AUTOMOBILE OWNERSHIP

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M4 - Measurement:** The learner will explain reasoning when applying and modeling geometric principles.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M6 - Geometry:** The learner will solve problems involving spatial reasoning and model geometric concepts in applied contexts.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b> <b>M2.9-12.1</b></p>	<p><b>Automobile Ads:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Compute the cost of classified ads for used cars.</li> <li>• Compute the cost of sales tax on automobiles.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-CED.1. A-CED.2, A-REI.1.</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> Attend to precision.</p>
<p><b>M7.9-12.3</b> <b>M7.9-12.4</b> <b>M7.9-12.5</b></p>	<p><b>Automobile Transactions:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Compute quartiles and interquartile range.</li> <li>• Create a frequency distribution from a set of data.</li> <li>• Use box-and-whisker plots and stem-and-leaf plots to display information.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Use a modified box plot.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.4. A-CED.2, A-CED.4. F-IF.4, F-IF.5. F-LE.2.</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> Use appropriate tools strategically.</p>
<p><b>M2.9-12.1</b> <b>M7.9-12.5</b></p>	<p><b>Automobile Insurance:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Identify different types of auto insurance coverage.</li> <li>• Compute insurance costs.</li> <li>• Compute payments on insurance claims.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Learn about emergency road service insurance.</li> <li>• Learn about car rental insurance.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-CED.1. A-CED.2, A-CED.3. A-CED.4, A-REI.1. F-IF.4.</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Attend to precision.</p>

## AUTOMOBILE OWNERSHIP (continued)

Course/ Grade Competency	Content Objectives	Standards
<p>M7.9-12.3 M7.9-12.4 M7.9-12.5 M7.9-12.6</p>	<p><b>Probability – The Basis of Insurance:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Explain how to interpret two-way tables.</li> <li>• Compute conditional probabilities based on two-way tables.</li> <li>• Determine if two events are independent.</li> <li>• Interpret Venn diagrams.</li> <li>• Create Venn diagrams</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-CED.2. A-CED.4, F-IF.4. F-LE.2</p> <p><b><u>Mathematical Practices</u></b> Reason abstractly and Quantitatively. Use appropriate tools strategically.</p>
<p>M1.9-12.2</p>	<p><b>Linear Automobile Depreciation:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Write, interpret, and graph a straight line depreciation equation.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-CED.1, A-REI.1. A-REI.3, A-REI.10. F-IF.6, F-LE.2</p> <p><b><u>Mathematical Practices</u></b> Attend to precision.</p>
<p>M1.9-12.1 M1.9-12.2 M2.9-12.1 M3.9-12.1 M3.9-12.3</p>	<p><b>Historical and Exponential Depreciation:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Write, interpret, and graph and exponential depreciation equation.</li> <li>• Manipulate the exponential depreciation equation in order to determine time, original price, and depreciated value.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Learn about geometric sequences.</li> <li>• Learn about geometric progression.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.4, A-CED.2. A-CED.3, A-CED.4. F-IF.4, F-IF.7. F-LE.2, F-LE.1.</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Reason abstractly and quantitatively. Use appropriate tools strategically.</p>
<p>M4.9-12.1</p>	<p><b>Driving Data:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Write, interpret, and use the distance formula.</li> <li>• Use the formula for the relationship between distance, fuel economy, and gas usage.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Will learn about the currency exchange rate.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-CED.2. A-CED.3, A-CED.4. F-IF.4, F-IF.6.</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them.</p>

## AUTOMOBILE OWNERSHIP (continued)

Course/ Grade Competency	Content Objectives	Standards
<p><b>M4.9-12.1</b> <b>M5.9-12.2</b></p>	<p><b>Driving Safety Data:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Calculate reaction time and distance in the English Standard System.</li> <li>• Calculate and use the braking distance in both the English Standard and metric systems.</li> <li>• Calculate and use the total stopping distance in both the English Standard and metric systems.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-CED.1. A-CED.2, A-CED.4. A-REI.1, F-IF.4.</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Attend to precision. Use appropriate tools strategically.</p>
<p><b>M4.9-12.1</b> <b>M6.9-12.1</b></p>	<p><b>Accident Investigation Data:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Determine the minimum skid speed using the skid mark formula.</li> <li>• Determine the minimum skid speed using the yaw mark formula.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-CED.1. A-CED.2, A-CED.4. A-REI.1, F-IF.4.</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Attend to precision. Use appropriate tools strategically.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Guest speaker – insurance agent</li> <li>• Driver safety – Ask Cherokee Riders to talk with students about passing their driving tests.</li> </ul>	

## EMPLOYMENT BASICS

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**M4 - Measurement:** The learner will explain reasoning when applying and modeling geometric principles.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b> <b>M2.9-12.1</b></p>	<p><b>Looking for Employment:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Compute periodic salary based on annual contract salary.</li> <li>• Interpret abbreviations in classified ads.</li> <li>• Express classified ad prices as piecewise functions.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-CED.1. A-REI.1.</p> <p><b><u>Mathematical Practices</u></b> Use appropriate tools strategically.</p>
<p><b>M1.9-12.2</b></p>	<p><b>Pay Periods and Hourly Rates:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Compute weekly, semimonthly, and biweekly earnings given annual salary.</li> <li>• Compute hourly pay and overtime pay given hourly rate.</li> <li>• Compute annual salaries based on annual percentage increases.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.4. A-CED.1, A-CED.2. A-CED.4, A-REI.1. F-IF.4, F-IF.6.</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Attend to precision.</p>
<p><b>M3.9-12.1</b> <b>M4.9-12.1</b></p>	<p><b>Commissions, Royalties, and Piecework Pay:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Compute pay based on percent commission.</li> <li>• Compute piecework pay.</li> <li>• Explain advantages and disadvantages of pay based on production.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.4, A-CED.1. A-CED.2, A-CED.4. A-REI.1, F-IF.4.</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Attend to precision.</p>

## EMPLOYMENT BASICS (continued)

Course/ Grade Competency	Content Objectives	Standards
<p><b>M5.9-12.2</b> <b>M5.9-12.3</b></p>	<p><b>Employee Benefits:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Explain and calculate the value of certain employee benefits.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will: Learn about childcare leave</p>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.4, A-CED.1. A-CED.2, A-CED.4. A-REI.1, F-IF.4.</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them.</p>
<p><b>M5.9-12.3</b></p>	<p><b>Social Security and Medicare:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Compute paycheck deductions for Social Security.</li> <li>• Compute paycheck deductions for Medicare.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.4, A-CED.1. A-REI.1.</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Attend to precision.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Guest speaker – temp agency hiring manager</li> <li>• Invite car dealership to talk about commission</li> </ul>	

## INCOME TAXES

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<b>M1.9-12.1</b> <b>M2.9-12.1</b>	<b>Tax Tables, Worksheets, and Schedules:</b> <u>Must be Covered:</u> The learner will: <ul style="list-style-type: none"> <li>Express tax schedules algebraically.</li> <li>Compute federal income taxes using a tax table and tax schedules.</li> </ul>	<u>AKSS</u> A-SSE.1, A-SSE.4, A-CED.1, A-CED.2. A-REI.1.  <u>Mathematical Practices</u> Attend to precision. Use appropriate tools strategically.
<b>M3.9-12.3</b>	<b>Modeling Tax Schedules:</b> <u>Must be Covered:</u> The learner will: <ul style="list-style-type: none"> <li>Construct income tax graphs using compound equations.</li> </ul>	<u>AKSS</u> F-LE.1.  <u>Mathematical Practices</u> Use appropriate tools strategically.
<b>M1.9-12.1</b> <b>M5.9-12.3</b>	<b>Income Statements:</b> <u>Must be Covered:</u> The learner will: <ul style="list-style-type: none"> <li>Interpret and use the information on a pay stub, W-2 form, and 1099 form.</li> </ul>	<u>AKSS</u> A-SSE.1, A-CED.4.  <u>Mathematical Practices</u> Attend to precision.
	<b>Forms 1040EZ and 1040A:</b> <u>Must be Covered:</u> The learner will: <ul style="list-style-type: none"> <li>Complete Form 1040EZ.</li> <li>Complete Form 1040A.</li> </ul>	<u>AKSS</u> A-SSE.1, A-CED.4.  <u>Mathematical Practices</u> Make sense of problems and persevere in solving them. Attend to precision.
	<b>Form 1040 and Schedules A and B:</b> <u>Must be Covered:</u> The learner will: <ul style="list-style-type: none"> <li>File Form 1040 with itemized deductions.</li> <li>Explain the difference between a tax credit and a tax deduction.</li> </ul>	<u>AKSS</u> A-REI.1.  <u>Mathematical Practices</u> Make sense of problems and persevere in solving them. Attend to precision.
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>Ask H&amp;R Block to talk about tax season</li> <li>TurboTax: Using TurboTax to Teach Tax Basics (<a href="https://www.intuit.com/partners/education-program/products/turbotax/">https://www.intuit.com/partners/education-program/products/turbotax/</a>)</li> </ul>	

## INDEPENDENT LIVING

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M6 - Geometry:** The learner will solve problems involving spatial reasoning and model geometric concepts in applied contexts.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M7.9-12.1</b>  <b>M7.9-12.2</b>  <b>M7.9-12.3</b>  <b>M7.9-12.4</b>  <b>M7.9-12.5</b>  <b>M7.9-12.6</b></p>	<p><b>Finding a Place to Live:</b>  <u>Must be Covered:</u>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Calculate the affordability of a monthly rent.</li> <li>• Determine the relationship between square footage and monthly rent.</li> <li>• Determine lease signing costs.</li> <li>• Calculate moving expenses.</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-SSE.4.                      A-CED.1, A-CED.2.                      A-CED.3, A-CED.4.                      A-REI.1, F-IF.4.</p> <p><u><b>Mathematical Practices</b></u>                      Make sense of problems and persevere in solving them. Attend to precision.</p>
<p><b>M6.9-12.3</b></p>	<p><b>Reading a Floorplan:</b>  <u>Must be Covered:</u>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Compute the perimeter and the area of a polygon.</li> <li>• Compute areas of irregular regions.</li> <li>• Compute volumes of rectangular solids.</li> </ul> <p><u>Can be Covered:</u>                      The learner will:</p> <ul style="list-style-type: none"> <li>• The Monte Carlo method.</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-CED.1, A-CED.2.                      A-CED.4, A-REI.1.                      F-IF.4, G-GMD.3.                      G-MG.2.</p> <p><u><b>Mathematical Practices</b></u>                      Attend to precision. Use appropriate tools strategically.</p>
<p><b>M3.9-12.1</b>  <b>M3.9-12.2</b></p>	<p><b>Mortgage Application Process:</b>  <u>Must be Covered:</u>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Compute the monthly cost of paying for a house.</li> <li>• Explain the research that is necessary before you purchase a home.</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-SSE.1, A-SSE.4.                      A-CED.1, A-CED.2.                      A-CED.3, A-REI.1.</p> <p><u><b>Mathematical Practices</b></u>                      Make sense of problems and persevere in solving them. Attend to precision.</p>

## INDEPENDENT LIVING (continued)

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b> <b>M3.9-12.3</b></p>	<p><b>Purchasing a Home:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Estimate closing costs.</li> <li>• Create an amortization table for a fixed-rate mortgage.</li> <li>• Create an amortization table for a fixed-rate mortgage with extra payments.</li> </ul> <p>Investigate the amortization table for an adjustable-rate mortgage.</p>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.4. A-CED.1, A-CED.2. A-CED.3, A-CED.4. A-REI.1.</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Use appropriate tools strategically.</p>
<p><b>M3.9-12.2</b></p>	<p><b>Mortgage Points:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Calculate discount points for a mortgage.</li> <li>• Determine the breakeven time for discount points.</li> <li>• Calculate negative points.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.4. A-CED.1, A-CED.2. A-CED.3, A-CED.4. A-REI.1, F-IF.5.</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Attend to precision.</p>
<p><b>M3.9-12.3</b></p>	<p><b>Rentals, Condominiums, and Cooperatives:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Compute the costs of purchasing a cooperative or a condominium.</li> <li>• Explain the advantages and disadvantages of purchasing different types of homes.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Learn about landminium.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.4. A-CED.1, A-CED.2. A-CED.3, A-CED.4. A-REI.1.</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Attend to precision.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Use Zillow (<a href="https://www.zillow.com/">https://www.zillow.com/</a>) to compare rent rates on places in Fairbanks and other areas.</li> <li>• Guest speaker: banker about mortgage points</li> <li>• Guest speaker: State Farm about renter’s insurance</li> </ul>	

## THE STOCK MARKET

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b> <b>M3.9-12.3</b></p>	<p><b>Business Organization:</b> <b>Must be Covered:</b> The learner will:</p> <ul style="list-style-type: none"> <li>• State the basic vocabulary of business organizations.</li> <li>• Compute financial responsibility of business ownership based on ratios and percents.</li> </ul>	<p><b>AKSS</b> A-SSE.1, A-SSE.4. A-CED.2, A-CED.3. A-CED.4.</p> <p><b>Mathematical Practices</b> Make sense of problems and persevere in solving them.</p>
<p><b>M1.9-12.2</b> <b>M2.9-12.1</b></p>	<p><b>Stock Market Data:</b> <b>Must be Covered:</b> The learner will:</p> <ul style="list-style-type: none"> <li>• Use stock data to follow the daily progress of a corporate stock.</li> <li>• Write spreadsheet formulas.</li> </ul> <p><b>Can be Covered:</b> The learner will:</p> <ul style="list-style-type: none"> <li>• Learn about after-hours trading.</li> </ul>	<p><b>AKSS</b> A-SSE.1, A-CED.2. A-CED.3, A-CED.4.</p> <p><b>Mathematical Practices</b> Reason abstractly and quantitatively. Use appropriate tools strategically.</p>
<p><b>M2.9-12.1</b> <b>M5.9-12.5</b></p>	<p><b>Stock Market Data Charts:</b> <b>Must be Covered:</b> The learner will:</p> <ul style="list-style-type: none"> <li>• Interpret a stock bar chart.</li> <li>• Create a stock bar chart.</li> <li>• Interpret a stock candlestick chart.</li> <li>• Create a stock candlestick chart.</li> </ul>	<p><b>AKSS</b> A-SSE.1, A-REI.10. F-IF.5, F-IF.7.</p> <p><b>Mathematical Practices</b> Construct viable arguments and critique the reasoning of others. Reason abstractly and quantitatively Use appropriate tools strategically.</p>

## THE STOCK MARKET (continued)

Course/ Grade Competency	Content Objectives	Standards
<p><b>M2.9-12.1</b> <b>M7.9-12.3</b></p>	<p><b>Trends in Stock Closing Prices:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Explain how data is smoothed.</li> <li>• Calculate simple moving averages using the arithmetic average formula.</li> <li>• Calculate simple moving averages using the subtraction and addition method.</li> <li>• Graph simple moving averages using a spreadsheet.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Learn about regression analysis.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.4. A-CED.1, A-CED.2. A-REI.1, A-REI.10. F-IF.5, F-IF.6. F-IF.7, F-LE.2.</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Reason abstractly and quantitatively. Use appropriate tools strategically.</p>
<p><b>M3.9-12.2</b></p>	<p><b>Stock Market Ticker:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Explain stock market ticker information.</li> <li>• Determine the total value of a trade from ticker information.</li> <li>• Determine trade volume from ticker information.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-CED.1. A-REI.1.</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> Use appropriate tools strategically.</p>
<p><b>M1.9-12.2</b> <b>M2.9-12.1</b></p>	<p><b>Stock Transactions:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Define the basic vocabulary of buying and selling shares of stock.</li> <li>• Compute gains and losses from stock trades.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Learn about odd lot.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.4, A-CED.1. A-CED.2, A-REI.1.</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> Reason abstractly and Quantitatively. Use appropriate tools strategically.</p>
<p><b>M1-9-12.1</b></p>	<p><b>Stock Transaction Fees:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Compute the fees involved in buying and selling stocks.</li> <li>• Define the basic vocabulary of stock trading.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-CED.1, A-CED.3. A-REI.1.</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> Attend to precision.</p>

## THE STOCK MARKET (continued)

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b> <b>M3.9-12.2</b></p>	<p><b>Stock Splits:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Calculate the post-split outstanding shares and share price for a traditional split.</li> <li>• Calculate the post-split outstanding shares and share prices for a reverse split.</li> <li>• Calculate the fractional value amount that a shareholder receives after a split.</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Learn about penny stocks.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b></p> <p style="text-align: center;">A-SSE.1. A-SSE.4. A-CED.1. A-CED.2. A-CED.3. A-REI.1.</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> Attend to precision. Use appropriate tools strategically.</p>
<p><b>M3.9-12.2</b></p>	<p><b>Dividend Income:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Understand the concept of shareowners splitting the profit of the corporation they own.</li> <li>• Compute dividend income.</li> <li>• Compute the yield for a given stock.</li> <li>• Compute the interest earned on corporate bonds.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b></p> <p style="text-align: center;">A-SSE.1. A-SSE.4. A-CED.1. A-CED.2. A-REI.1.</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Play the stock market game against other schools in Alaska and worldwide (<a href="https://www.stockmarketgame.org">https://www.stockmarketgame.org</a>).</li> </ul>	

## MODELING A BUSINESS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M5.9-12.5</b> <b>M7.9-12.6</b></p>	<p><b>Inventions:</b> <b>Must be Covered:</b> The learner will:</p> <ul style="list-style-type: none"> <li>• Describe how to choose sample subjects without bias.</li> <li>• Use a random number table.</li> <li>• Explain methods used to reduce bias in experiments.</li> <li>• Create diagrams for experimental designs.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-CED.2, F-IF.5, F-IF.7, F-LE.2.</p> <p><b><u>Mathematical Practices</u></b> Look for and make use of structure. Reason abstractly and quantitatively. Use appropriate tools strategically.</p>
<p><b>M5.9-12.1</b> <b>M7.9-12.3</b></p>	<p><b>Market Research:</b> <b>Must be Covered:</b> The learner will:</p> <ul style="list-style-type: none"> <li>• Compute combinations.</li> <li>• Compute unbiased estimators.</li> <li>• Determine if a statistic is biased or unbiased.</li> <li>• Critique sampling techniques.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-CED.2, A-CED.3, A-CED.4.</p> <p><b><u>Mathematical Practices</u></b> Look for and express regularity in repeated reasoning. Reason abstractly and quantitatively. Use appropriate tools strategically.</p>
<p><b>M3.9-12.2</b></p>	<p><b>Supply and Demand:</b> <b>Must be Covered:</b> The learner will:</p> <ul style="list-style-type: none"> <li>• Describe the slopes of the supply and demand curves.</li> <li>• Find points of equilibrium.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.4, A-CED.1, A-CED.2, A-CED.3, A-CED.4, A-REI.1, A-REI.3, A-REI.11, F-IF.4, F-IF.7, F-IF.5, F-LE.2.</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Attend to precision. Use appropriate tools strategically.</p>

## MODELING A BUSINESS (continued)

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b> <b>M2.9-12.1</b></p>	<p><b>Fixed and Variable Expenses:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Explain the difference between fixed and variable expenses.</li> </ul> <p>Create an expense equation based on fixed and variable expenses.</p>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.4, A-CED.1. A-CED.2, A-CED.3. A-CED.4, A-REI.1. A-REI.3, F-IF.4.</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Attend to precision. Use appropriate tools strategically.</p>
<p><b>M5.9-12.4</b></p>	<p><b>Graphs of Expense and Revenue Functions:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Write, graph, and interpret the expense function.</li> <li>• Write, graph, and interpret the revenue function.</li> <li>• Identify the points of intersection of the expense and revenue functions.</li> <li>• Identify breakeven points, and explain them in the context of the problem.</li> <li>• Factor a quadratic using the method of completing the square.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.4. A-CED.1, A-CED.2. A-CED.3, A-CED.4. A-REI.1, A-REI.3. A-REI.11, F-IF.4. F-IF.7, F-LE.2, F-LE.1.</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Attend to precision. Use appropriate tools strategically.</p>
<p><b>M5.9-12.1</b> <b>M5.9-12.2</b> <b>M5.9-12.3</b> <b>M5.9-12.4</b> <b>M5.9-12.5</b></p>	<p><b>Breakeven Analysis:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Determine the breakeven prices and amounts using technology or algebra.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.4. A-CED.1, A-CED.2. A-CED.3, A-CED.4. A-REI.1, A-REI.11. F-IF.4, F-LE.2.</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Attend to precision. Use appropriate tools strategically.</p>

## MODELING A BUSINESS (continued)

Course/ Grade Competency	Content Objectives	Standards
<p><b>M3.9-12.1</b> <b>M3.9-12.3</b></p>	<p><b>The Profit Equation:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Determine a profit equation given the expense and revenue equations.</li> <li>• Determine the maximum profit and the price at which that maximum is attained.</li> <li>• Determine complex roots of a quadratic equation.</li> </ul>	<p><b><u>AKSS</u></b> A-SSE.1, A-SSE.4. A-CED.2, A-CED.3. A-CED.4, A-REI.11. F-IF.4, F-LE.2, F-LE.1.</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Attend to precision. Use appropriate tools strategically.</p>
<p><b>M1.9-12.1</b> <b>M1.9-12.2</b> <b>M2.9-12.1</b> <b>M3.9-12.1</b> <b>M3.9-12.3</b></p>	<p><b>Mathematically Modeling a Business:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Recognize the transitive property of dependence as it is used in a business model.</li> <li>• Use multiple sources of information, functions, and methodologies to model a new business.</li> </ul>	<p><b><u>AKSS</u></b> A-SSE.1, A-CED.3. A-CED.4.</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Use appropriate tools strategically.</p>
<p><b>M3.9-12.1</b> <b>M3.9-12.3</b> <b>M7.9-12.5</b></p>	<p><b>Optimal Outcomes:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Use linear programming.</li> <li>• Write an objective function.</li> <li>• Construct a feasible region given constraints.</li> <li>• Maximize an objective profit function.</li> <li>• Minimize an objective expense function.</li> </ul>	<p><b><u>AKSS</u></b> A-SSE.4, A-CED.1. A-CED.2, A-CED.3. A-CED.4, A-REI.1. A-REI.3, A-REI.11. F-IF.5, F-LE.2.</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Use appropriate tools strategically.</p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• Guest speaker: Pagoda restaurant or Santa Claus House</li> </ul>	

## PLANNING FOR RETIREMENT

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b> <b>M1.9-12.2</b></p>	<p><b>Retirement Income from Savings:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Calculate the future values of retirement investments that are both single deposit and periodic.</li> <li>• Compare the tax savings by making contributions to pre-tax retirement savings accounts.</li> <li>• Calculate an employer’s matching contribution to a retirement account.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.4. A-CED.2, A-CED.3. A-CED.4, F-IF.4.</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Use appropriate tools strategically.</p>
<p><b>M1.9-12.2</b></p>	<p><b>Social Security Benefits:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Understand the benefits paid by Social Security.</li> <li>• Understand how benefits are computed.</li> <li>• Compute federal income tax on benefits that are paid under Social Security.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-SSE.4. A-CED.2, A-CED.4.</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Attend to precision. Use appropriate tools strategically.</p>
<p><b>M1.9-12.1</b> <b>M1.9-12.2</b></p>	<p><b>Pensions:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Calculate pension benefits using various formulas.</li> <li>• Calculate pension benefits during and after vesting periods.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-CED.2. A-CED.3, A-CED.4. F-IF.4.</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Attend to precision. Use appropriate tools strategically.</p>
<p><b>M1.9-12.2</b></p>	<p><b>Life Insurance:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Compute the cost of different types of life insurance.</li> <li>• State the advantages and disadvantages of different types of life insurance.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.1, A-CED.1. A-CED.4, A-REI.1.</p> <p><b><u>Mathematical Practices</u></b> Use appropriate tools strategically.</p>

## PLANNING FOR RETIREMENT

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M7.9-12.1</b>  <b>M7.9-12.2</b>  <b>M7.9-12.3</b></p>	<p><b>Investment Diversification:</b>  <u><b>Must be Covered:</b></u>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Compare different types of investments that were covered throughout the previous nine units.</li> </ul>	<p style="text-align: center;"><u><b>AKSS</b></u>                      A-CED.4.</p> <p><u><b>Mathematical Practices</b></u>                      Make sense of problems and persevere in solving them.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<p>Bring in a speaker from the local funeral home to talk about the cost of a western civilization funeral, and bring in someone to talk about the cost for an Alaska Native wake.</p>	

## PREPARE A BUDGET

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.2</b> <b>M2.9-12.1</b></p>	<p><b>Utility Expenses:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Compute the cost of electricity, gas, oil, and water for the home.</li> <li>• Compute the cost of using specific appliances for specific lengths of time.</li> <li>• Compute the time it takes an energy-saving appliance to pay for itself.</li> </ul>	<p><b><u>AKSS</u></b> A-SSE.1, A-SSE.4. A-CED.1, A-CED.2. A-CED.3, A-CED.4. A-REI.1, A-REI.3.</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Attend to precision.</p>
<p><b>M1.9-12.2</b></p>	<p><b>Electronic Utilities:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Compute the cost of cell phone calls, text messaging, Internet service, and cable television.</li> <li>• Compare different plans for these services.</li> <li>• Set up, graph, and interpret an average cost function.</li> </ul>	<p><b><u>AKSS</u></b> A-SSE.1, A-SSE.4. A-CED.1, A-CED.2. A-CED.3, A-CED.4. A-REI.1, A-REI.3. A-REI.10, F-IF.4. F-IF.6, F-IF.7, F-LE.2. F-LE.1.</p> <p><b><u>Mathematical Practices</u></b> Make sense of problems and persevere in solving them. Attend to precision. Use appropriate tools strategically.</p>
<p><b>M1.9-12.2</b> <b>M2.9-12.1</b> <b>M5.9-12.4</b></p>	<p><b>Charting a Budget:</b> <b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Create and use a budget check-off chart.</li> <li>• Visualize and interpret a budget using a circle graph, a bar graph, a line graph, and a budget line graph.</li> </ul>	<p><b><u>AKSS</u></b> A-SSE.1, A-CED.4. A-REI.3, A-REI.10. F-IF.4, F-IF.5, F-IF.7. F-LE.2.</p> <p><b><u>Mathematical Practices</u></b> Use appropriate tools strategically.</p>

## PREPARE A BUDGET (continued)

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.2</b>  <b>M3.9-12.3</b>  <b>M3.9-12.2</b>  <b>M5.9-12.4</b></p>	<p><b>Cash Flow and Budgeting:</b>  <u><b>Must be Covered:</b></u>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Develop and interpret a cash flow chart.</li> <li>• Develop and interpret a frequency budget plan.</li> <li>• Develop and interpret a yearlong expense budget plan.</li> </ul>	<p><u><b>AKSS</b></u>                      A-SSE.1, A-CED.1.                      A-CED.4, A-REI.1.                      F-IF.4, F-LE.2.</p> <p><u><b>Mathematical Practices</b></u>                      Make sense of problems and persevere in solving them. Reason abstractly and quantitatively. Use appropriate tools strategically.</p>
<p><b>M1.9-12.2</b>  <b>M3.9-12.3</b>  <b>M3.9-12.2</b>  <b>M5.9-12.4</b>  <b>M5.9-12.5</b></p>	<p><b>Budget Matrices:</b>  <u><b>Must be Covered:</b></u>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Determine the dimension of a matrix.</li> <li>• Add, subtract, and multiply matrices.</li> <li>• Multiply a matrix by a scalar.</li> </ul>	<p><u><b>AKSS</b></u>                      A-SSE.1, A-CED.2.                      A-CED.3, A-CED.4.                      F-IF.4, F-LE.2.</p> <p><u><b>Mathematical Practices</b></u>                      Reason abstractly and Quantitatively. Attend to precision. Use appropriate tools strategically.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Next Gen Personal Finance (NGPF) budgeting activities: <a href="https://www.ngpf.org/curriculum/budgeting/activities">https://www.ngpf.org/curriculum/budgeting/activities</a></li> <li>• MoneyInstructor.com budgeting planning and budgeting lessons: <a href="https://www.moneyinstructor.com/budgeting.asp">https://www.moneyinstructor.com/budgeting.asp</a></li> </ul>	

# Computer Programming

<p><b>Grade(s):</b> 9-12  <b>Length:</b> two semesters  <b>Credit:</b> 1 (0.5 per semester)  <b>Prerequisite:</b> <i>Algebra 1</i>, concurrent enrollment in <i>Algebra 1</i>, or teacher recommendation</p>	<p><b>Overview:</b>  <i>Computer Programming</i> is a course designed to introduce basic programming concepts. Students will master concepts including integer arithmetic, basic sorts and searches, and use of data structures. Concepts of object-oriented programming and algorithm design within the syntax of a higher-level language will be introduced.</p>
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Mathematical Topics (Recommended Order)	
Semester 1	Semester 2
<ul style="list-style-type: none"> <li>• Overview of Computing</li> <li>• Data and Expressions</li> <li>• Using Classes and Objects</li> <li>• Conditionals and Loops</li> </ul>	<ul style="list-style-type: none"> <li>• Writing Classes</li> <li>• Building on Conditional and Loops</li> <li>• Object Oriented Design</li> <li>• Arrays</li> </ul>

Course/ Grade Competencies	
Semester 1	Semester 2
<ul style="list-style-type: none"> <li>• <b>M1.9-12.1:</b> The learner will write, apply, and provide a rationale for a mathematical model representing a given situation.</li> <li>• <b>M1.9-12.2:</b> The learner will interpret and use symbols to express relationships and justify reasoning when solving problems.</li> <li>• <b>M2.9-12.1:</b> The learner will justify how to apply properties of real number systems to variable expressions in a variety of contexts.</li> <li>• <b>M3.9-12.1:</b> The learner will use computational strategies and algorithms and provide rationale for their use.</li> <li>• <b>M3.9-12.2:</b> The learner will reason quantitatively when analyzing, representing, and solving problems.</li> <li>• <b>M3.9-12.3:</b> The learner will compare the effectiveness or logic of two plausible arguments or models.</li> <li>• <b>M5.9-12.1:</b> The learner will apply properties of arithmetic and algebra to simplify and manipulate symbolic expressions or models.</li> <li>• <b>M5.9-12.2:</b> The learner will write and apply algebraic modes to represent and answer questions about a given situation.</li> <li>• <b>M5.9-12.3:</b> The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.</li> <li>• <b>M5.9-12.4:</b> The learner will analyze relations and functions, using multiple representations.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>M1.9-12.1:</b> The learner will write, apply, and provide a rationale for a mathematical model representing a given situation.</li> <li>• <b>M1.9-12.2:</b> The learner will interpret and use symbols to express relationships and justify reasoning when solving problems.</li> <li>• <b>M2.9-12.1:</b> The learner will justify how to apply properties of real number systems to variable expressions in a variety of contexts.</li> <li>• <b>M3.9-12.1:</b> The learner will use computational strategies and algorithms and provide rationale for their use.</li> <li>• <b>M3.9-12.2:</b> The learner will reason quantitatively when analyzing, representing, and solving problems.</li> <li>• <b>M3.9-12.3:</b> The learner will compare the effectiveness or logic of two plausible arguments or models.</li> <li>• <b>M5.9-12.1:</b> The learner will apply properties of arithmetic and algebra to simplify and manipulate symbolic expressions or models.</li> <li>• <b>M5.9-12.2:</b> The learner will write and apply algebraic modes to represent and answer questions about a given situation.</li> <li>• <b>M5.9-12.3:</b> The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.</li> <li>• <b>M5.9-12.4:</b> The learner will analyze relations and functions, using multiple representations.</li> </ul>

## OVERVIEW OF COMPUTING

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M6 - Geometry:** The learner will solve problems involving spatial reasoning and model geometric concepts in applied contexts.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M5.9-12.1</b>  <b>M6.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Computer Processing</li> <li>• Hardware Components</li> <li>• Programming Language</li> <li>• Program Development</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b></p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>		

## DATA & EXPRESSIONS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M3.9-12.3</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Character Strings</li> <li>• Variables and assignment</li> <li>• Primitive data types</li> <li>• Expressions</li> <li>• Data conversion</li> <li>• Interactive programs</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b></p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>		

## USING CLASSES & OBJECTS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M3.9-12.3</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b>  <b>M5.9-12.3</b>  <b>M5.9-12.4</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Creating objects</li> <li>• The String Class</li> <li>• Packages</li> <li>• Enumerated types</li> <li>• Wrapper classes</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b></p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>		

## CONDITIONALS & LOOPS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M3.9-12.3</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Boolean expressions</li> <li>• The if statement</li> <li>• Comparing data</li> <li>• The while statement</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b></p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>		

## WRITING CLASSES

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<b>M1.9-12.1</b> <b>M1.9-12.2</b> <b>M2.9-12.1</b> <b>M3.9-12.1</b> <b>M3.9-12.2</b> <b>M5.9-12.1</b> <b>M5.9-12.2</b> <b>M5.9-12.3</b>	<p><b><u>Must be Covered:</u></b>                      The learner will about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Classes &amp; objects revisited</li> <li>• Anatomy of a class</li> <li>• Encapsulation</li> <li>• Anatomy of a method</li> <li>• Constructors</li> </ul>	<p><b><u>AKSS</u></b></p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<b>Suggested Activities, Materials, and Resources:</b>		

## BUILDING ON CONDITIONAL & LOOPS

**Graduate-Level Competency:**

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<b>M2.9-12.1</b> <b>M3.9-12.1</b> <b>M3.9-12.2</b> <b>M5.9-12.1</b>	<p><b><u>Must be Covered:</u></b>                      The learner will about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• The switch statement</li> <li>• The Conditional Operator</li> <li>• The do statement</li> <li>• The for statement</li> </ul>	<p><b><u>AKSS</u></b></p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<b>Suggested Activities, Materials, and Resources:</b>		

## OBJECT ORIENTED DESIGN

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M3.9-12.3</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b>  <b>M5.9-12.3</b>  <b>M5.9-12.4</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Identifying classes and objects</li> <li>• Static class members</li> <li>• Class relationships</li> <li>• Interfaces</li> <li>• Enumerated types revisited</li> <li>• Method design</li> <li>• Method overloading</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b></p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>		

## ARRAYS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b>  <b>M5.9-12.3</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will about and understand the following topics:</p> <ul style="list-style-type: none"> <li>• Array elements</li> <li>• Declaring &amp; using arrays</li> <li>• Arrays of objects</li> <li>• Command-line arguments</li> <li>• Two-dimensional arrays</li> </ul>	<p><b><u>AKSS</u></b></p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>		

# Geometry & Honors

<p><b>Grade(s):</b> 9-12  <b>Length:</b> two semesters  <b>Credit:</b> 1 (0.5 per semester)  <b>Prerequisite:</b> <i>Algebra 1</i> or teacher recommendation</p>	<p><b>Overview:</b>  The fundamental purpose of the course in Geometry is to formalize and extend students’ geometric experiences using more precise definitions and developing careful proofs. In Geometry, students take the basic distance and angle-preserving properties of rigid motions and similarity transformations as axiomatic, establish triangle congruence, and similarity criteria, then use them to prove a wide variety of theorems and solve problems involving, for example, triangles, other polygons, and circles.</p> <p>Students study geometric measurement and solve problems involving length, area and volume, learning more sophisticated arguments for the circumference, area, and volume formulas that they learned in earlier grades. They use similarity of right triangles with given angle measures to define sine, cosine, and tangent in terms of side ratios. They prove theorems and solve problems about circles, segments, angles, and arcs.</p> <p>Throughout the course, students use coordinates to connect geometry with algebra, and engage in mathematical modeling using geometric principles.</p> <p><b>Geometry Honors:</b>  Students will master all of the topics from <i>Geometry</i> listed above, with a variety of additional topics. These additional topics (content objectives) are documented within each unit in <b>RED</b> under the “can be covered” section.</p>
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Mathematical Topics (Recommended Order)	
Semester 1	Semester 2
<ul style="list-style-type: none"> <li>• Constructions</li> <li>• Rigid Transformations</li> <li>• Congruence</li> <li>• Similarity</li> </ul>	<ul style="list-style-type: none"> <li>• Right Triangle Trigonometry</li> <li>• Solid Geometry</li> <li>• Coordinate Geometry</li> <li>• Circles</li> </ul>

Course/ Grade Competencies	
Semester 1	Semester 2
<ul style="list-style-type: none"> <li>• <b>M1.9-12.1:</b> The learner will write, apply, and provide a rationale for a mathematical model representing a given situation.</li> <li>• <b>M1.9-12.2:</b> The learner will interpret and use symbols to express relationships and justify reasoning when solving problems.</li> <li>• <b>M2.9-12.1:</b> The learner will justify how to apply properties of real number systems to variable expressions in a variety of contexts.</li> <li>• <b>M3.9-12.3:</b> The learner will compare the effectiveness or logic of two plausible arguments or models.</li> <li>• <b>M5.9-12.1:</b> The learner will apply properties of arithmetic and algebra to simplify and manipulate symbolic expressions or models.</li> <li>• <b>M5.9-12.2:</b> The learner will write and apply algebraic modes to represent and answer questions about a given situation.</li> <li>• <b>M5.9-12.3:</b> The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.</li> <li>• <b>M6.9-12.1:</b> The learner will apply geometric theorems and postulates to solve problems, create arguments, and support their reasoning.</li> <li>• <b>M6.9-12.2:</b> The learner will use geometric theorems and postulates to construct and apply viable arguments.</li> <li>• <b>M6.9-12.3:</b> The learner will create and use a formal geometric construction, using appropriate tools, to illustrate geometric properties.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>M1.9-12.1:</b> The learner will write, apply, and provide a rationale for a mathematical model representing a given situation.</li> <li>• <b>M1.9-12.2:</b> The learner will interpret and use symbols to express relationships and justify reasoning when solving problems.</li> <li>• <b>M2.9-12.1:</b> The learner will justify how to apply properties of real number systems to variable expressions in a variety of contexts.</li> <li>• <b>M3.9-12.1:</b> The learner will use computational strategies and algorithms and provide rationale for their use.</li> <li>• <b>M3.9-12.2:</b> The learner will reason quantitatively when analyzing, representing, and solving problems.</li> <li>• <b>M3.9-12.3:</b> The learner will compare the effectiveness or logic of two plausible arguments or models.</li> <li>• <b>M4.9-12.1:</b> The learner will provide rationale for solving measurement problems that require making conversions among various units and measurement systems, or applying the effect of a scale factor.</li> <li>• <b>M5.9-12.1:</b> The learner will apply properties of arithmetic and algebra to simplify and manipulate symbolic expressions or models.</li> <li>• <b>M5.9-12.2:</b> The learner will write and apply algebraic modes to represent and answer questions about a given situation.</li> <li>• <b>M5.9-12.3:</b> The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.</li> <li>• <b>M6.9-12.1:</b> The learner will apply geometric theorems and postulates to solve problems, create arguments, and support their reasoning.</li> <li>• <b>M6.9-12.2:</b> The learner will use geometric theorems and postulates to construct and apply viable arguments.</li> <li>• <b>M6.9-12.3:</b> The learner will create and use a formal geometric construction, using appropriate tools, to illustrate geometric properties.</li> </ul>

## CONSTRUCTIONS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M6 - Geometry:** The learner will solve problems involving spatial reasoning and model geometric concepts in applied contexts.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M3.9-12.3</b>  <b>M6.9-12.1</b>  <b>M6.9-12.2</b>  <b>M6.9-12.3</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>Know and be able to use precise definitions of geometric terms.</li> <li>Make formal geometric constructions.</li> <li>Construct an equilateral triangle, a square, an angle bisector, and a perpendicular bisector.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>Construct a regular polygon.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      G-CO.1, G-CO.12,                      G-CO.13</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<b>Suggested Activities, Materials, and Resources:</b>		

## RIGID TRANSFORMATIONS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M6 - Geometry:** The learner will solve problems involving spatial reasoning and model geometric concepts in applied contexts.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M3.9-12.3</b>  <b>M6.9-12.1</b>  <b>M6.9-12.2</b>  <b>M6.9-12.3</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>Develop and apply precise definitions for translations, reflections, and rotations.</li> <li>Describe rigid motions that take one figure onto another.</li> <li>Prove angles of a triangle add up to 180 degrees.</li> <li>Construct and apply a sequence of rigid motions.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      G-CO.2, G-CO.3,                      G-CO.4, G-CO.5</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<b>Suggested Activities, Materials, and Resources:</b>		

## CONGRUENCE

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M6 - Geometry:** The learner will solve problems involving spatial reasoning and model geometric concepts in applied contexts.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M3.9-12.3</b>  <b>M6.9-12.1</b>  <b>M6.9-12.2</b>  <b>M6.9-12.3</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Specify sequences of rigid motion that will carry a figure onto another.</li> <li>• Understand that there can be more than one sequence of rigid motion that carries a figure onto another figure.</li> <li>• Use the definition of congruence in terms of rigid motion to decide if two figures are congruent.</li> <li>• Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.</li> <li>• Be able to explain how the criteria for triangle congruence (ASA, SAS, SSS) follow from the definition of congruence in terms of rigid motion.</li> <li>• Prove theorems about triangles, lines, angles, and parallelograms.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Prove congruence for quadrilaterals.</li> <li>• Develop an understanding of AAS triangle congruence.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      G-CO.6, G-CO.7,                      G-CO.8, G-SRT.4</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>		

## SIMILARITY

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M6 - Geometry:** The learner will solve problems involving spatial reasoning and model geometric concepts in applied contexts.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.3</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b>  <b>M5.9-12.3</b>  <b>M6.9-12.1</b>  <b>M6.9-12.2</b>  <b>M6.9-12.3</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Understand dilations, using center and scale factor to describe them.</li> <li>• Use the definition of similarity to decide if two figures are similar.</li> <li>• Use the properties of similarity to understand the Angle Similarity Theorem.</li> <li>• Prove why triangles are similar.</li> <li>• Prove why all circles are similar.</li> <li>• Find unknown side lengths of similar triangles.</li> <li>• Apply similarity to quadrilaterals.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Understand Side Side Side and Side Angle Side Triangle Similarity Theorem.</li> <li>• Prove the Law of Sines and Cosines and use them to solve problems.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      G-SRT.1, G-SRT.2,                      G-SRT.3, G-SRT.4,                      G-SRT.5, G-C.1</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>		

## RIGHT TRIANGLE TRIGONOMETRY

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M4 - Measurement:** The learner will explain reasoning when applying and modeling geometric principles.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M6 - Geometry:** The learner will solve problems involving spatial reasoning and model geometric concepts in applied contexts.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M3.9-12.3</b>  <b>M4.9-12.1</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b>  <b>M5.9-12.3</b>  <b>M6.9-12.1</b>  <b>M6.9-12.2</b>  <b>M6.9-12.3</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Using similarity, show that side ratios in right triangles are properties of angles.</li> <li>• Define the trigonometric ratios (sin, cos, tan) for acute angles.</li> <li>• Explain and use the relationship between sine and cosine of complementary angles.</li> <li>• Use trigonometric ratios to solve a variety of modeling problems.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Understand relationships in special right triangles (30-60-90 &amp; 45-45-90 triangles).</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      G-SRT.6, G-SRT.7,                      G-SRT.8</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<b>Suggested Activities, Materials, and Resources:</b>		

## SOLID GEOMETRY

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M4 - Measurement:** The learner will explain reasoning when applying and modeling geometric principles.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M6 - Geometry:** The learner will solve problems involving spatial reasoning and model geometric concepts in applied contexts.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M3.9-12.3</b>  <b>M4.9-12.1</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b>  <b>M5.9-12.3</b>  <b>M6.9-12.1</b>  <b>M6.9-12.2</b>  <b>M6.9-12.3</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Identify the shapes of two-dimensional cross-sections of three-dimensional objects and 3D objects from rotation of 2D shapes.</li> <li>• Understand the effects of dilation on area and volume.</li> <li>• Derive volume formulas using dissections and Cavalieri’s Principle.</li> <li>• Apply volume formulas to solve problems involving surface area to volume ratios and density.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• <b>Informally prove the formula for the volume of a sphere using Cavalieri’s principle.</b></li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      G-GMD.1, G-GMD.3,                      G-GMD.4</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>		

## COORDINATE GEOMETRY

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M4 - Measurement:** The learner will explain reasoning when applying and modeling geometric principles.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M6 - Geometry:** The learner will solve problems involving spatial reasoning and model geometric concepts in applied contexts.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M3.9-12.3</b>  <b>M4.9-12.1</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b>  <b>M5.9-12.3</b>  <b>M6.9-12.1</b>  <b>M6.9-12.2</b>  <b>M6.9-12.3</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Describe functions as transformations using coordinate transformation notation.</li> <li>• Describe transformations in the coordinate plane.</li> <li>• Derive equations for circles using definition of a circle.</li> <li>• Derive equations for parabolas using focus and directrix.</li> <li>• Understand the relationship between an equation and the graph, especially for linear and quadratic equations.</li> <li>• Understand slopes of parallel and perpendicular lines in a coordinate plane.</li> <li>• Use coordinates to make conjectures and prove geometric theorems algebraically.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• <b>Derive the formula for an ellipse and hyperbolas.</b></li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      G-GPE.1, G-GPE.2,                      G-GPE.4, G-GPE.5</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b>                      All mathematical practices                      are present in each unit.</p>
<p><b>Suggested Activities,                      Materials, and Resources:</b></p>		

## CIRCLES

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M4 - Measurement:** The learner will explain reasoning when applying and modeling geometric principles.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

**M6 - Geometry:** The learner will solve problems involving spatial reasoning and model geometric concepts in applied contexts.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.3</b>  <b>M4.9-12.1</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b>  <b>M5.9-12.3</b>  <b>M6.9-12.1</b>  <b>M6.9-12.2</b>  <b>M6.9-12.3</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Use the Pythagorean Theorem to derive an equation for a circle given center and radius.</li> <li>• Use similarity to derive the length of the arc of the circle.</li> <li>• Derive a formula for the area of sector.</li> <li>• Describe the relationship between central and inscribed angles and their arcs.</li> <li>• Describe relationships and ratios of lengths of intersecting chords.</li> <li>• Use relationships about inscribed angles to solve problems about inscribed polygons.</li> <li>• Solve problems involving properties of circles.</li> <li>• Prove properties of angles of inscribed polygons.</li> <li>• Proves that a radius and a tangent to a circle at the same point are perpendicular.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• <b>Prove that an inscribed angle that subtends a diameter is a right angle.</b></li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      G-C.2, G-C.3,                      G-C.5, G-GPE.1</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>		

# Math for the Trades & Technical Careers

<p><b>Grade(s):</b> 9-12  <b>Length:</b> two semesters  <b>Credit:</b> 1 (0.5 per semester)  <b>Prerequisite:</b> none</p>	<p><b>Overview:</b>  <i>Math for Trades &amp; Technical Careers</i> emphasizes the advanced and applied algebraic topics needed for success in industry-based occupations. The course is designed to introduce students to the mathematics used in various trades and apprenticeship programs through a focus on the practical application of mathematics.</p> <p>Students are expected to master skills without the use of a calculator, in addition to working with applied problems using manipulatives, calculators, spreadsheets, application software, and specialized technologies. There will be a review of the real number system, fractions, measuring tools, unit conversions, ratios, proportions, percent, plane and solid geometry, systems of equations, trigonometry, and vectors.</p> <p>All concepts are applied to industry situations with the goal and focus of preparing for industry entrance exams.</p>
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Mathematical Topics (Recommended Order)	
Semester 1	Semester 2
<ul style="list-style-type: none"> <li>• Numeration</li> <li>• Measurement</li> <li>• Geometry and Unit Analysis</li> <li>• Formulas and Equations</li> </ul>	<ul style="list-style-type: none"> <li>• Ratios and Slope</li> <li>• Apply and Interpret Functions</li> <li>• Vectors</li> </ul>

Course/ Grade Competencies	
Semester 1	Semester 2
<ul style="list-style-type: none"> <li>• <b>M1.9-12.1:</b> The learner will write, apply, and provide a rationale for a mathematical model representing a given situation.</li> <li>• <b>M1.9-12.2:</b> The learner will interpret and use symbols to express relationships and justify reasoning when solving problems.</li> <li>• <b>M2.9-12.1:</b> The learner will justify how to apply properties of real number systems to variable expressions in a variety of contexts.</li> <li>• <b>M3.9-12.1:</b> The learner will use computational strategies and algorithms and provide rationale for their use.</li> <li>• <b>M3.9-12.2:</b> The learner will reason quantitatively when analyzing, representing, and solving problems.</li> <li>• <b>M3.9-12.3:</b> The learner will compare the effectiveness or logic of two plausible arguments or models.</li> <li>• <b>M4.9-12.1:</b> The learner will provide rationale for solving measurement problems that require making conversions among various units and measurement systems, or applying the effect of a scale factor.</li> <li>• <b>M5.9-12.1:</b> The learner will apply properties of arithmetic and algebra to simplify and manipulate symbolic expressions or models.</li> <li>• <b>M5.9-12.2:</b> The learner will write and apply algebraic modes to represent and answer questions about a given situation.</li> <li>• <b>M5.9-12.3:</b> The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>M2.9-12.1:</b> The learner will justify how to apply properties of real number systems to variable expressions in a variety of contexts.</li> <li>• <b>M4.9-12.1:</b> The learner will provide rationale for solving measurement problems that require making conversions among various units and measurement systems, or applying the effect of a scale factor.</li> <li>• <b>M5.9-12.1:</b> The learner will apply properties of arithmetic and algebra to simplify and manipulate symbolic expressions or models.</li> <li>• <b>M5.9-12.3:</b> The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.</li> <li>• <b>M7.9-12.1:</b> The learner will formulate questions to clarify the problem at hand and formulate one (or more) questions that can be answered with data.</li> <li>• <b>M7.9-12.2:</b> The learner will design and implement a plan to collect the appropriate data to answer the statistical question.</li> <li>• <b>M7.9-12.3:</b> The learner will summarize data using appropriate statistics.</li> <li>• <b>M7.9-12.4:</b> The learner will select appropriate graphical and numerical methods, and use these methods to represent the data in a way that supports interpretation.</li> <li>• <b>M7.9-12.5:</b> The learner will interpret descriptive statistics and linear models within the context of the data and the original question.</li> <li>• <b>M7.9-12.6:</b> The learner will apply probability concepts to analyze and evaluate potential decisions and strategies.</li> </ul>

## NUMERATION

**Graduate-Level Competency:**

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M4 - Measurement:** The learner will explain reasoning when applying and modeling geometric principles.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M2.9-12.1</b> <b>M4.9-12.1</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Apply rational numbers to common trade situations.</li> <li>• Express rational numbers as common fractions and mixed fractions.</li> <li>• Evaluate operations with rational numbers in applied situations.</li> <li>• Convert between ratios, decimals, and percents</li> </ul> <p><b><u>Can be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Learn about and understand binary, octal, and hexadecimal numbers.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b></p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Make a daily goal to practice Work Keys questions so students interested in the trade unions may score well on the math portion of this test.</li> </ul>	

## MEASUREMENT

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M4 - Measurement:** The learner will explain reasoning when applying and modeling geometric principles.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b> <b>M1.9-12.2</b> <b>M4.9-12.1</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Reason quantitatively and use units to solve problems.</li> <li>• Use metric and U.S. systems of measurement.</li> <li>• Use precision when necessary and estimate when necessary.</li> <li>• Use industry related scales.</li> <li>• Use measuring tapes (regular/landscaper’s), speed squares, carpenter’s squares, vernier caliper, micrometers</li> <li>• Differentiate the terms “level”, “square”, “plum”</li> <li>• Measure in one, two, and three dimensions</li> <li>• Measure angles in degrees using industry-appropriate tools</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> N-Q.1, N-Q.2, N-Q.3</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>		

## GEOMETRY & UNIT ANALYSIS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M4 - Measurement:** The learner will explain reasoning when applying and modeling geometric principles.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M4.9-12.1</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Determine area &amp; perimeter of rectangular, triangular, and circular floor layouts.</li> <li>• Determine volume of right rectangular prisms to find common trade volumes.</li> <li>• Use dimensional analysis to convert units in one, two, and three dimensions.</li> <li>• Use dimensional analysis to convert rates involving one, two, and three dimensions.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      N-Q.1, N-Q.2,                      N-Q.3</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>		

## FORMULAS & EQUATIONS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Create and solve equations that describe numbers or relationships.</li> <li>• Simplify, then solve equations.</li> <li>• Solve equations with variables on both sides.</li> <li>• Solve any linear equation.</li> <li>• Write and solve equations to model situations.</li> <li>• Apply the Pythagorean theorem and the converse of the Pythagorean theorem.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b></p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Use the converse of the Pythagorean theorem to create a 20 by 30 rectangle with tape on the floor.</li> </ul>	

## RATIO & SLOPE

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Create unit rates to perform quick calculations in applied problems.</li> <li>• Use proportions to perform any one-step unit conversion.</li> <li>• Use proportions to read/ create scale drawings.</li> <li>• Graph lines in slope-intercept form.</li> <li>• Find the slope of physical objects</li> <li>• Cite industry standards slopes for roofs, plumbing, and stairs.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      S-CP.3, S-CP.2,                      S-CP.1, S-ID.4,                      S-ID.3, S-ID.2</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Hang an ABS pipe at industry standard minimum slope.</li> </ul>	

## APPLY & INTERPRET FUNCTIONS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b>  <b>M1.9-12.2</b>  <b>M2.9-12.1</b>  <b>M3.9-12.1</b>  <b>M3.9-12.2</b>  <b>M3.9-12.3</b>  <b>M5.9-12.1</b>  <b>M5.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Understand similarity in terms of similarity transformations.</li> <li>• Define trigonometric ratios and solve problems involving right triangles.</li> <li>• Extend the domain of trigonometric functions using the unit circle.</li> <li>• Apply the law of sines &amp; law of cosines to find angles in a truss.</li> </ul> <p><b><u>Can be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Use identities from the unit circle to perform quick calculations.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      G-SRT.2, G-SRT.6,                      G-SRT.7, G-SRT.8,                      F-TF.1, F-TF.2,                      F-TF.3, G-GMD.1,                      G-GMD.2, G-GMD.3,                      G-MG.2, G-MG.3,                      G-GPE.7</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b>                      All mathematical practices                      are present in each unit.</p>
<p><b>Suggested Activities,                      Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• Make clinometers to find heights of tall objects outside or in school.</li> </ul>	

## VECTORS

**Graduate-Level Competency:**

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M5.9-12.1</b> <b>M5.9-12.3</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Represent and model with vector quantities.</li> <li>• Calculate exponents, roots, and rational exponents.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> N-VM.1, N-VM.2, N-VM.4, N-VM.5</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>		

# Pre-Calculus

<p><b>Grade(s):</b> 10-12  <b>Length:</b> two semesters  <b>Credit:</b> 1 (0.5 per semester)  <b>Prerequisite:</b> <i>Geometry</i> and <i>Algebra 2</i> or teacher recommendation</p>	<p><b>Overview:</b>  <i>Pre-Calculus</i> is the preparation for Calculus. The course approaches topics from a function point of view, where appropriate, and is designed to strengthen and enhance conceptual understanding and mathematical reasoning used when modeling and solving mathematical and real-world problems. Students will be provided with a rigorous algebraic study of rational, polynomial, exponential and logarithmic functions, radians, degrees, DMS, graphing trigonometric functions, trigonometric identities, and other coordinate systems.</p>
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Mathematical Topics (Recommended Order)	
Semester 1	Semester 2
<ul style="list-style-type: none"> <li>• Functions</li> <li>• Polynomials</li> <li>• Rational Functions</li> <li>• Exponential and Logarithmic Relationships</li> <li>• Sequences and Series</li> </ul>	<ul style="list-style-type: none"> <li>• Unit Circle and Right/ Non-Right Triangle Trigonometry</li> <li>• Graphs of Trigonometric Functions</li> <li>• Trigonometric Identities</li> <li>• Other Coordinate Systems</li> </ul> <p>Other topics, if time allows:</p> <ul style="list-style-type: none"> <li>• Conditional Probability</li> </ul>

Course/ Grade Competencies	
Semester 1	Semester 2
<ul style="list-style-type: none"> <li>• <b>M1.9-12.2:</b> The learner will interpret and use symbols to express relationships and justify reasoning when solving problems.</li> <li>• <b>M3.9-12.1:</b> The learner will use computational strategies and algorithms and provide rationale for their use.</li> <li>• <b>M3.9-12.2:</b> The learner will reason quantitatively when analyzing, representing, and solving problems.M5.9-12.1</li> <li>• <b>M5.9-12.3:</b> The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.</li> <li>• <b>M5.9-12.4:</b> The learner will analyze relations and functions, using multiple representations.</li> <li>• <b>M5.9-12.5:</b> The learner will identify, build, and perform operations on relations and functions and justify their reasoning.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>M1.9-12.1:</b> The learner will write, apply, and provide a rationale for a mathematical model representing a given situation.</li> <li>• <b>M1.9-12.2:</b> The learner will interpret and use symbols to express relationships and justify reasoning when solving problems.</li> <li>• <b>M2.9-12.1:</b> The learner will justify how to apply properties of real number systems to variable expressions in a variety of contexts.</li> <li>• <b>M3.9-12.1:</b> The learner will use computational strategies and algorithms and provide rationale for their use.</li> <li>• <b>M3.9-12.2:</b> The learner will reason quantitatively when analyzing, representing, and solving problems.</li> <li>• <b>M4.9-12.1:</b> The learner will provide rationale for solving measurement problems that require making conversions among various units and measurement systems, or applying the effect of a scale factor.</li> <li>• <b>M5.9-12.1:</b> The learner will apply properties of arithmetic and algebra to simplify and manipulate symbolic expressions or models.</li> <li>• <b>M5.9-12.2:</b> The learner will write and apply algebraic modes to represent and answer questions about a given situation.</li> <li>• <b>M5.9-12.3:</b> The learner will interpret, analyze, and use relations and functions applied in a variety of contexts, including real-world phenomena.</li> <li>• <b>M5.9-12.4:</b> The learner will analyze relations and functions, using multiple representations.</li> <li>• <b>M5.9-12.5:</b> The learner will identify, build, and perform operations on relations and functions and justify their reasoning.</li> <li>• <b>M7.9-12.3:</b> The learner will summarize data using appropriate statistics.</li> <li>• <b>M7.9-12.4:</b> The learner will select appropriate graphical and numerical methods, and use these methods to represent the data in a way that supports interpretation.</li> <li>• <b>M7.9-12.6:</b> The learner will apply probability concepts to analyze and evaluate potential decisions and strategies.</li> </ul>

## FUNCTIONS

**Graduate-Level Competency:**

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M5.9-12.1</b> <b>M5.9-12.5</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Perform operations with functions:               <ul style="list-style-type: none"> <li>○ Add</li> <li>○ Subtract</li> <li>○ Composition.</li> </ul> </li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> F-BF.1</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>M5.9-12.3</b> <b>M5.9-12.4</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Find inverses of functions:               <ul style="list-style-type: none"> <li>○ To include domain restriction when needed.</li> </ul> </li> <li>• Verify inverses through composition.</li> <li>• Use a graph or table to find values of an inverse.</li> <li>• Use the inverse relationship between exponentials and logarithms to solve problems.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> F-BF.4a, F-BF.4b, F-BF.4c, F.BF.4d, F-BF.5</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>Precalculus: Mathematics for Calculus</i> (Cengage, 7<sup>th</sup> edition, 2016) – chapter 2</li> </ul>	

## POLYNOMIALS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

Course/ Grade Competency	Content Objectives	Standards
<b>M3.9-12.1</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Use long and/or synthetic division to factor polynomials of degree three or higher.</li> <li>• Use algebraic methods to find all real and imaginary zeros of polynomials degree three or higher.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-APR.1, N-CN.9</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<b>M1.9-12.2</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Graph polynomials of degree three or higher and identify key features:               <ul style="list-style-type: none"> <li>○ Intercepts, increasing/decreasing intervals, positive/negative intervals, end behavior, relative max/min.</li> </ul> </li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> F-IF.4</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• <i>Precalculus: Mathematics for Calculus</i> (Cengage, 7<sup>th</sup> edition, 2016) – chapter 3</li> </ul>	

## RATIONAL FUNCTIONS

### Graduate-Level Competency:

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<b>M5.9-12.4</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Graph functions and show key features:               <ul style="list-style-type: none"> <li>○ Linear</li> <li>○ Quadratic</li> <li>○ Square and cube root</li> <li>○ Piecewise to include step and absolute value</li> <li>○ Polynomial functions</li> <li>○ Rational functions</li> <li>○ Exponential functions</li> <li>○ Logarithmic functions.</li> </ul> </li> <li>• Find domain and range of a function.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> F-IF.7a, F-IF.7b, F-IF.7c, F-IF.7d, F-IF.7e, F-IF.5</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• <i>Precalculus: Mathematics for Calculus</i> (Cengage, 7<sup>th</sup> edition, 2016) – chapter 3</li> </ul>	

## EXPONENTIAL & LOGARITHMIC RELATIONSHIPS

### Graduate-Level Competency:

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

Course/ Grade Competency	Content Objectives	Standards
<b>M3.9-12.1</b> <b>M3.9-12.2</b>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Use properties of logarithms to simplify and expand logarithms.</li> <li>• Use a variety of algebraic methods to solve logarithmic and exponential equations; include restrictions in the solutions.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> F-IF.5</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• <i>Precalculus: Mathematics for Calculus</i> (Cengage, 7<sup>th</sup> edition, 2016) – chapter 4</li> </ul>	

## SEQUENCES & SERIES

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M5.9-12.1</b> <b>M5.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Write arithmetic sequences recursively.</li> <li>• Write arithmetic sequences explicitly.</li> <li>• Write geometric sequences recursively.</li> <li>• Write geometric sequences explicitly.</li> <li>• Model situation with sequences.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> F.BF.2</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>M1.9-12.1</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Use summation notation to write finite and infinite series</li> <li>• Use summation notation to evaluate finite and infinite series</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> A-SSE.4</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>Precalculus: Mathematics for Calculus</i> (Cengage, 7<sup>th</sup> edition, 2016) – chapter 12</li> </ul>	

## UNIT CIRCLE & RIGHT/ NON-RIGHT TRIANGLE TRIGONOMETRY

### Graduate-Level Competency:

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

**M4 - Measurement:** The learner will explain reasoning when applying and modeling geometric principles.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<b>M3.9-12.2</b> <b>M4.9-12.1</b>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Solve right triangles using Pythagorean Theorem and trigonometry ratios.</li> <li>• Solve non-right triangles using Law of Sines and/or Law of Cosines (to include ambiguous case).</li> <li>• Convert between radians, degrees, and degree/minute/second.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      G-SRT.8, G-SRT.11,                      F-TF.1, N-Q.3</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<b>M5.9-12.1</b> <b>M5.9-12.2</b>	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Extend the domain of trig functions using the unit circle.</li> <li>• Evaluate all six trig functions for exact values.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      F-TF.2, F-TF.3</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
	<p><b><u>Must be Covered:</u></b>                      The learner will:</p> <ul style="list-style-type: none"> <li>• Use inverse trig functions to solve trigonometric equations.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b>                      F-TF.7</p> <p><b><u>Mathematical Practices</u></b>                      All mathematical practices are present in each unit.</p>
<b>Suggested Activities, Materials, and Resources:</b>	<ul style="list-style-type: none"> <li>• <i>Precalculus: Mathematics for Calculus</i> (Cengage, 7<sup>th</sup> edition, 2016) – chapter 5, lesson 1-2 and chapter 6</li> </ul>	

## GRAPHS OF TRIGONOMETRIC FUNCTIONS

**Graduate-Level Competency:**

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M1.9-12.1</b> <b>M5.9-12.3</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Graph the six trigonometric functions and their transformations.</li> <li>Graph the inverses of trigonometric functions.</li> <li>Model periodic phenomena with trigonometric functions.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> F.BF.3, F-TF.6, F-TF.5</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li><i>Precalculus: Mathematics for Calculus</i> (Cengage, 7<sup>th</sup> edition, 2016) – chapter 5, lessons 3-6</li> </ul>	

## TRIGONOMETRIC IDENTITIES

**Graduate-Level Competency:**

**M3 – Reasoning and Strategic Thinking:** The learner will use evidence to support authentic application of concepts and support mathematical arguments.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M3.9-12.2</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Prove and apply the three Pythagorean Identities .</li> <li>Prove and apply the addition and subtraction formulas.</li> <li>Prove and apply the double and half-angle identities.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> F-TF.8, F-TF.9</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>M3.9-12.1</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>Use identities to solve trigonometric equations.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> F-TF.9</p> <p><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li><i>Precalculus: Mathematics for Calculus</i> (Cengage, 7<sup>th</sup> edition, 2016) – chapter 7</li> </ul>	

## OTHER COORDINATE SYSTEMS

### Graduate-Level Competency:

**M1 – Symbolic Expression:** The learner will be able to reason abstractly and utilize symbolic expressions and mathematical models.

**M2 – Numbers and Number Systems:** The learner will develop an applied knowledge of numbers and number systems to solve problems.

**M5 – Algebraic Functions, Patterns and Relations:** The learner will utilize patterns, relations, and functions to compare, interpret, and analyze situations.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M5.9-12.1</b> <b>M5.9-12.5</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Recognize vector quantities have both magnitude and direction.</li> <li>• Represent vectors with directed line segments.</li> <li>• Use appropriate symbols for vectors and their magnitudes .</li> <li>• Find the components of a vector.</li> <li>• Solve problems that can be represented by vectors.</li> <li>• Add and subtract vectors.</li> <li>• Multiply a vector by a scalar.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> N-VM.1, N-VM.2, N-VM.3, N-VM.4a, N-VM.4b, N-VM.4c, N-VM.5a, N-VM.5b</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>M5.9-12.4</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Graph parametric functions with and without technology.</li> <li>• Graph ordered pairs in polar.</li> <li>• Graph polar functions.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> N-CN.4</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>M1.9-12/2</b> <b>M2.9-12.1</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Represent complex numbers on the complex plane.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> N-CN.4</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>Precalculus: Mathematics for Calculus</i> (Cengage, 7<sup>th</sup> edition, 2016) – chapter 8 and chapter 9</li> </ul>	

## CONDITIONAL PROBABILITY (Optional, if time allows.)

**Graduate-Level Competency:**

**M7 – Data, Analysis, Probability, and Statistics:** The learner will apply statistical methods to summarize, represent, analyze, and interpret data.

Course/ Grade Competency	Content Objectives	Standards
<p><b>M7.9-12.3</b> <b>M7.9-12.4</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Understand independence and conditional probability and use them to interpret data.               <ul style="list-style-type: none"> <li>○ Construct and interpret two way frequency tables.</li> </ul> </li> <li>• Use the rules of probability to compute probabilities of compound events in a uniform probability model.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> S.CP.1, S.CP.2, S.CP.3, S.CP.4, S.CP.5, S.CP.6, S.CP.7</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>M7.9-12.6</b></p>	<p><b><u>Must be Covered:</u></b> The learner will:</p> <ul style="list-style-type: none"> <li>• Use probability to evaluate outcomes of decisions.               <ul style="list-style-type: none"> <li>○ Making fair decisions.</li> </ul> </li> <li>• Analyzing decisions and strategies using probability concepts.</li> </ul>	<p style="text-align: center;"><b><u>AKSS</u></b> S.MD.6, S.MD.7</p> <p style="text-align: center;"><b><u>Mathematical Practices</u></b> All mathematical practices are present in each unit.</p>
<p><b>Suggested Activities, Materials, and Resources:</b></p>	<ul style="list-style-type: none"> <li>• <i>Precalculus: Mathematics for Calculus</i> (Cengage, 7<sup>th</sup> edition, 2016) – chapter 14</li> </ul>	



Fairbanks North Star Borough School District

The Fairbanks North Star Borough School District is an equal employment and educational opportunity institution, as well as a tobacco and nicotine-free learning and work environment.

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Fairbanks North Star Borough School District

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