PRE-ALGEBRA

Curriculum/Content Area: Mathematics	**Course Length:** 1 year
Course Title: Pre-Algebra	**Date last reviewed:** 2014/15
Prerequisites: Math 7	**Board approval date:** 8/2020
Primary Resource: REVEAL Math Course 3	

Desired Results

Course description and purpose: In this course, students will work with radicals and integer exponents; understand the connections between proportional relationships, lines, and linear equations; analyze and solve linear equations and pairs of simultaneous linear equations; define, evaluate, and compare Functions; use functions to model relationships between quantities; understand congruence and similarity using physical models, transparencies, or geometry software; and understand and apply the Pythagorean Theorem. Communication (both written and oral), connections, problem solving, reasoning abstractly and quantitatively, construction of viable arguments, and real life problems are also integral parts of each lesson.

Enduring Understandings:	**Essential Questions**:
Mathematicians make sense of problems and persevere in solving them.	a. How do we as mathematicians analyze the problem in order to choose the best strategy(ies) or resource to make sense of the problem? b. How do we as mathematicians persevere in solving problems?
Mathematicians attend to precision.	How do we as mathematicians know if we fully & accurately answered the problem and does the results make sense in the context of the problem?
Mathematicians reason abstractly and quantitatively.	How do we as mathematicians make sense of quantities and situations symbolically?
Mathematicians construct viable arguments and critique the reasoning of others.	a. How can we as mathematicians justify our answer(s)? b. How can we as mathematicians evaluate and question whether a mathematical argument is accurate?
Mathematicians model with mathematics.	a. What model(s) can we as mathematicians use to solve a problem? b. How can we as mathematicians determine an effective model to use to solve a problem?
Mathematicians use appropriate tools strategically.	What tools are available and efficient for us as mathematicians to use while solving a problem?
Mathematicians look for and make	How can we as mathematicians use and apply patterns and structures to solve problems?

use of structure	
Mathematicians look for and express regularity in repeated reasoning.	How can we as mathematicians create and apply generalizations from repeated reasoning?

Mathematical Practice Standards

The Standards for Mathematical Practice are central to the teaching and learning of mathematics. These practices describe the behaviors and habits of mind that are exhibited by students who are mathematically proficient. Mathematical understanding is the intersection of these practices and mathematics content. It is critical that the Standards for Mathematical Practice are embedded in daily mathematics instruction.

Mathematical Practice Standards		**Grade Level/Course**
Habits of Mind	MP.1 Make sense of problems and persevere in solving them	Understand the meaning of a problem and look for entry points to its conclusion. Analyze information (givens, constraints, relationships, goals. Make conjectures and plan a solution pathway. Monitor and evaluate the progress and change course as necessary Check answers to problems and ask, “Does this make sense?”
	MP.6 Attend to precision.	Communicate precisely using clear definitions. State the meaning of symbols, carefully specifying units of measure, and providing accurate labels. State the meaning of symbols, carefully specifying units of measure, and providing accurate labels. Calculate accurately and efficiently, expressing. numerical answers with a degree of precision. Provide carefully formulated explanations. Label accurately when measuring and graphing.
Reasoning & Explaining	MP.2 Reason abstractly and quantitatively.	Make sense of quantities and relationships in problem situations. Represent abstract situations symbolically and understand the meaning of quantities. Create a coherent representation of the problem at hand. Consider the units involved. Flexibility use properties of operations.
	MP.3 Construct viable arguments and critique the reasoning of others.	Use definitions and previously established causes/effects (results) in constructing arguments. Make conjectures and use counterexamples to build a logical progression of statements to explore and support ideas.

		Communicate and defend mathematical reasoning using objects, drawings, diagrams, and/or actions. Listen to or read the arguments of others. Decide if the arguments of others make sense and ask probing questions to clarify or improve the arguments.
Modeling & Using Tools	MP.4 Model with mathematics.	Apply prior knowledge to solve real world problems. Identify important quantities and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts, and/or formulas.Use assumptions and approximations to make a problem simpler. Check to see if an answer makes sense within the context of a situation and change a model when necessary.
	MP.5 Use appropriate tools strategically.	Make sound decisions about the use of specific tools (examples might include: calculator, concrete models, digital, technologies, pencil/paper, ruler, compass, protractor) Use technology tools to visualize the results of assumptions, explore consequences, and compare predictions with data. Identify relevant external math resources (digital content on a website) and use them to pose or solve problems. Use technological tools to explore and deepen understanding of concepts.
Seeing Structure & Generalizing	MP.7 Look for and make use of structure.	Look for patterns or structure, recognizing that quantities can be represented in different ways. Recognize the significance in concepts and models and use the patterns or structure for solving related problems. View complicated quantities both as single objects or compositions of several objects and use operations to make sense of problems.
	MP.8 Look for and express regularity in repeated reasoning.	Notice repeated calculations and look for general methods and shortcuts. Continually evaluate the reasonableness of intermediate results (comparing estimates), while attending to details, and make generalizations based on findings.

Priority Standard Clusters

8.EE.A Work with radicals and integer exponents.

- *8.EE.A1* Know and apply the properties of integer exponents to generate equivalent numerical expressions.
- *8.EE.A.2* Use square root and cube root symbols to represent solutions to equations of the form x2 = p and x3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.
- *8.EE.A.3* Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.
- *8.EE.A.4* Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

8.EE.B Understand the connections between proportional relationships, lines, and linear equations.

- *8.EE.B.5* Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.
- *8.EE.B.6* Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b.
- *8.EE.C.7* Solve linear equation in one variable

8.EE.C Analyze and solve linear equations and pairs of simultaneous linear equations.

- *8.EE.C.7.a* Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers).
- *8.EE.C.7.b* Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.
- *8.EE.8.C.8* Analyze and solve pairs of simultaneous linear equations.
- *8.EE.8.C.8.a* Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.
- *8.EE.C.8.b* Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection.
- *8.EE.C.8.c* Solve real-world and mathematical problems leading to two linear equations in two variables.

8.F.A Define, Evaluate, and Compare Functions.

- *8.F.A.1* Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.
- *8.F.A.2* Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
- *8.F.A.3* Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.

8.F.B Use functions to model relationships between quantities.

- *8.F.B.4* Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
- *8.F.B.5* Describe qualitatively the functional relationship between two quantities by analyzing a graph. Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

8.G.A Understand congruence and similarity using physical models, transparencies, or geometry software.

- *8.G.A.1* Verify experimentally the properties of rotations, reflections, and translations:
  a. Lines are taken to lines, and line segments to line segments of the same length.

b. Angles are taken to angles of the same measure.
c. Parallel lines are taken to parallel lines.

- *8.G.A.2* Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.
- *8.G.A.3* Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
- *8.G.A.4* Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.
- *8.G.A.5* Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.

8.G.B Understand and apply the Pythagorean Theorem.

- *8.G.B.6* Explain a proof of the Pythagorean Theorem and its converse.
- *8.G.B.7* Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
- *8.G.B.8* Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

Supporting Standard Clusters

8.SP.A Investigate patterns of association in bivariate data.

- *8.SP.A.1* Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
- *8.SP.A.2* Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.
- *8.SP.A.3* Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercepts.
- *8.SP.A.4* Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables.

8.NS.A Know that there are numbers that are not rational, and approximate them by rational numbers.

- *8.NS.A.1* Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.
- *8.NS.A.2* Use the rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram and estimate the value of expressions.

8.G.C Solve real-world and mathematical problems involving volume of a cylinder, cones and spheres.

- *8.G.C.9* Know the formula for the volume of cones, cylinders, and spheres and use then to solve real-world and mathematical problems.

Unit 1 - Exponents and Scientific Notation

Essential Questions:

- How do we as mathematicians make sense of quantities and situations symbolically?
- *Why are exponents useful when working with very large or very small numbers?*

Unit Standards

Priority Standards

8.EE.A Work with radicals and integer exponents.

- *8.EE.A1* Know and apply the properties of integer exponents to generate equivalent numerical expressions.
- *8.EE.A.3* Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.
- *8.EE.A.4* Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

Learning Targets

- I can write and evaluate expressions involving powers and exponents. (1-1) 8.EE.A.1
  - I apply the properties of integer exponents.
  - I create a representation of rules that explain the integer exponents.
  - I apply the properties of integer exponents to simplify numerical expressions.
- I can use laws of exponents to multiply and divide monomials. (1-2) 8.EE.A.1
  - I apply the properties of integer exponents.
  - I create a representation of rules that explain the integer exponents.
  - I apply the properties of integer exponents to simplify numerical expressions.
- I can use laws of exponents to find powers of monomials. (1-3) 8.EE.A.1
  - I apply the properties of integer exponents.
  - I create a representation of rules that explain the integer exponents.
  - I apply the properties of integer exponents to simplify numerical expressions.
- I can simplify expressions that have zero and negative exponents. (1-4) 8.EE.A.1
  - I apply the properties of integer exponents.
  - I create a representation of rules that explain the integer exponents.
  - I apply the properties of integer exponents to simplify numerical expressions.
- I can write numbers in scientific notation. (1-5) 8.EE.A.3, 8.EE.A.4
  - I convert a number (very small & very large) into scientific notation.
  - I research to find examples of very large (small) numbers to estimate in scientific notation.
  - I compare numbers written as an estimate in scientific notation to determine how many times larger (smaller) one number written in scientific notation is than another.
  - I perform operations using scientific notation.
  - I choose the most appropriate unit of measure when solving a problem
  - I interpret a number displayed in scientific notation on your calculator.
- I can compute with numbers in scientific notation (1-6) 8.EE.A.3, 8.EE.A.4
  - I convert a number (very small & very large) into scientific notation.
  - I research to find examples of very large (small) numbers to estimate in scientific notation.
  - I compare numbers written as an estimate in scientific notation to determine how many times larger (smaller) one number written in scientific notation is than another.
  - I perform operations using scientific notation.
  - I choose the most appropriate unit of measure when solving a problem

- I interpret a number displayed in scientific notation on your calculator.

Assessment Evidence

Performance Assessment Options & Rubrics
May include, but are not limited to the following:

- Feedback & Scoring Rubric based on Priority Standards
- Module Pre-Test
- End of Unit Assessment (3 versions)
- End of Unit Assessment (3 versions - differentiation)
- Mid-unit checks/quizzes

Other assessment options
May include, but are not limited to the following:

- Entrance or Exit Tickets/Warm Up
- ALEKS Assessment
- Pulling it together - mid quizzes
- Student work samples
- REVEAL performance tasks
- LEARN Checks
- Extension
- Dynamic Practice
- AVID Strategies
  - Quick Writes
  - KWL Chart - (What I Know, Want to know, Learned)
  - Marking Text
  - Learning Log Reflection - Daily/Weekly
  - I-Chart - Gather/Organize Information on a topic
  - Focused Note Taking
  - CSG - Collaborative Study Groups
  - Socratic Seminar
  - Philosophical Chairs
  - Think/Pair/Share
  - Talking Trios
  - World Cafe

Digital Tools & Supplementary Resources

- ALEKS (Exponents, Polynomials, and Radicals)

Unit 2 - Real Numbers

Essential Questions:

- How do we as mathematicians make sense of quantities and situations symbolically?
- *Why do we classify numbers?*

Unit Standards

Priority Standards
8.EE.A Work with radicals and integer exponents.

- *8.EE.A.2* Use square root and cube root symbols to represent solutions to equations of the form x2 =

p and x3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.

Supporting Standards

8.NS.A Know that there are numbers that are not rational, and approximate them by rational numbers.

- *8.NS.A.1* Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.
- *8.NS.A.2* Use the rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram and estimate the value of expressions.

Learning Targets

- I can convert rational numbers between decimal and fraction forms (2-1) 8.NS.A.1
  - I create a model of the real number system
  - I convert decimal expansion into equivalent fraction using an algorithm.
  - I recall common fractions
  - I use strategies other than conversions for some decimal expansions.
- I can find square and cube roots (2-2) 8.EE.A.2
  - I recognize perfect squares and perfect cubes.
  - I find positive and negative square and cube roots.
  - I solve equations containing cube and square roots.
  - I explain the relationship between square and cube roots and the sides of a square and the edges of a cube.
  - I reason that non-perfect squares and non-perfect cubes are irrational.
- I can identify and describe sets of numbers in the real number system (2-3) 8.NS.A.1
  - I identify numbers as either rational or irrational.
  - I reason abstractly to determine where to place an irrational number on the number line. Students begin to focus on the precision required of the task. It is not unreasonable to expect them to ask how precise they should be for the given exercises.
  - I create a model of the real number system
  - I express thinking in writing to clarify understanding about how to find precise approximations of irrational numbers.
- I can estimate irrational numbers (2-4) 8.NS.A.2
  - I reason abstractly to determine where to place an irrational number on the number line.
  - I look for and express regularity in the repeated reasoning used in finding approximations of irrational numbers.
  - I reason abstractly as I become more familiar with the process to find approximations of irrational numbers to streamline the algorithm.
  - I create a model of the real number system
  - I express thinking in writing to clarify understanding about how to find precise approximations of irrational numbers.
- I can compare and order numbers in the real number system (2-5) 8.NS.A.1, 8.NS.A.2
  - I recognize and use the notation for decimal expansions of irrational numbers
  - I convert decimal expansion into equivalent fraction using an algorithm.
  - I recall common fractions

- I use strategies other than conversions for some decimal expansions.
- I reason abstractly to determine where to place an irrational number on the number line.

Assessment Evidence

Performance Assessment Options & Rubrics
May include, but are not limited to the following:

- Feedback & Scoring Rubric based on Priority Standards
- Module Pre-Test
- End of Unit Assessment (3 versions)
- End of Unit Assessment (3 versions - differentiation)
- Mid-unit checks/quizzes

Other assessment options
May include, but are not limited to the following:

- Entrance or Exit Tickets/Warm Up
- ALEKS Assessment
- Pulling it together - mid quizzes
- Student work samples
- REVEAL performance tasks
- LEARN Checks
- Extension
- Dynamic Practice
- AVID Strategies
  - Quick Writes
  - KWL Chart - (What I Know, Want to know, Learned)
  - Marking Text
  - Learning Log Reflection - Daily/Weekly
  - I-Chart - Gather/Organize Information on a topic
  - Focused Note Taking
  - CSG - Collaborative Study Groups
  - Socratic Seminar
  - Philosophical Chairs
  - Think/Pair/Share
  - Talking Trios
  - World Cafe

Digital Tools & Supplementary Resources

- ALEKS (Exponents, Polynomials, and Radicals)

Unit 3 - Solve Equations with Variables on Each Side

Essential Questions:

- How do we as mathematicians make sense of quantities and situations symbolically?
- *How can equations with variables on each side be used to represent everyday situations?*

Unit Standards

Priority Standards

8.EE.C Analyze and solve linear equations and pairs of simultaneous linear equations.

- *8.EE.C.7.a* Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers).
- *8.EE.C.7.b* Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

Learning Targets

- I can solve equations with variables on each side (3-1) 8.EE.C.7.B
  - I solve multi-step one variable equations with rational coefficients (distributive & combining like terms with variables on both sides)
- I can write and solve equations with variables on each side (3-2) 8.EE.C.7.B
  - I solve multi-step one variable equations with rational coefficients (Combining like terms with variables on both sides)
- I can solve multi-step equations with variables on both sides (3-3) 8.EE.C.7.B
  - I solve multi-step one variable equations with rational coefficients (distributive & combining like terms with variables on both sides)
- I can write and solve multi-step equations with variables on each side (3-4) 8.EE.C.7.B
  - I solve multi-step one variable equations with rational coefficients (distributive & combining like terms with variables on both sides)
- I can determine the number of solutions to an equation (3-5) 8.EE.C.7.A
  - I solve one variable linear equation having one solution, infinitely many solutions, and no solution.
  - I justify the equations of no solution and infinitely many solutions.

Assessment Evidence

Performance Assessment Options & Rubrics

May include, but are not limited to the following:

- Feedback & Scoring Rubric based on Priority Standards
- Module Pre-Test
- End of Unit Assessment (3 versions)
- End of Unit Assessment (3 versions - differentiation)
- Mid-unit checks/quizzes

Other assessment options

May include, but are not limited to the following:

- Entrance or Exit Tickets/Warm Up
- ALEKS Assessment
- Pulling it together - mid quizzes
- Student work samples
- REVEAL performance tasks
- LEARN Checks
- Extension
- Dynamic Practice
- AVID Strategies
  - Quick Writes
  - KWL Chart - (What I Know, Want to know, Learned)
  - Marking Text
  - Learning Log Reflection - Daily/Weekly
  - I-Chart - Gather/Organize Information on a topic
  - Focused Note Taking
  - CSG - Collaborative Study Groups

	○ Socratic Seminar ○ Philosophical Chairs ○ Think/Pair/Share ○ Talking Trios ○ World Cafe

Digital Tools & Supplementary Resources

- ALEKS (Equations and Inequalities)

Unit 4 - Linear Relationships and Slope

Essential Questions:

- How can we as mathematicians determine an effective model to use to solve a problem?
- *How are linear relationships related to proportional relationships?*

Unit Standards

Priority Standards

8.EE.B Understand the connections between proportional relationships, lines, and linear equations.

- *8.EE.B.5* Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.
- *8.EE.B.6* Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b.

Learning Targets

- I can graph and compare proportional relationships, interpreting the unit rate as the slope of the line (4-1) 8.EE.B.5
  - I convert two different representations into a common representation and compare and interpret the unit rate/slope.
  - I compare proportional relationships with different representations (equations, tables, graphs) and interpret the unit rate/slope.
  - I write a conclusion after interpreting the proportional relationships.
- I can find the slope of a line from a graph, table and using the formula (4-2) 8.EE.B.6
  - I determine the slope of a line from a graph, table, and linear equation.
  - I understand zero slope and undefined slope.
  - I can calculate slope of a line using the rise to run ratio.
- I can relate the slope of a line to similar triangles (4-3) 8.EE.B.6
  - I use similar triangles to justify why the slope (m) is the same between any two points on a non-vertical line.
  - I determine the slope of a line from a **graph**, table, and linear equation.
- I can derive the equation y = mx from graphs, tables and verbal descriptions of proportional relationships (4-4) 8.EE.B.6
  - I discover that (b) is the y-intercept and **(m) is the slope** in a general equation (**y = mx** + b)

    - I determine the slope of a line from a **graph**, **table**, and linear equation.
- I can write linear equations to represent relationships in the form y = mx+b (4-5) 8.EE.B.6
    - I discover that (b) is the y-intercept and (m) is the slope in a general equation (y = mx + b)
    - I determine the slope of a line from a graph, table, and linear equation.
    - I explain the relationships between proportional relationships, lines, and linear equations through writing and/or orally.
- I can graph lines in slope-intercept form, vertical lines and horizontal lines (4-6)

Assessment Evidence

Performance Assessment Options & Rubrics
May include, but are not limited to the following:

- Feedback & Scoring Rubric based on Priority Standards
- Module Pre-Test
- End of Unit Assessment (3 versions)
- End of Unit Assessment (3 versions - differentiation)
- Mid-unit checks/quizzes

Other assessment options
May include, but are not limited to the following:

- Entrance or Exit Tickets/Warm Up
- ALEKS Assessment
- Pulling it together - mid quizzes
- Student work samples
- REVEAL performance tasks
- LEARN Checks
- Extension
  Dynamic Practice
- AVID Strategies
    - Quick Writes
    - KWL Chart - (What I Know, Want to know, Learned)
    - Marking Text
    - Learning Log Reflection - Daily/Weekly
    - I-Chart - Gather/Organize Information on a topic
    - Focused Note Taking
    - CSG - Collaborative Study Groups
    - Socratic Seminar
    - Philosophical Chairs
    - Think/Pair/Share
    - Talking Trios
    - World Cafe

Digital Tools & Supplementary Resources

- ALEKS (Graphing, Functions, and Sequences)

Unit 5 - Functions

Essential Questions:

- How do we as mathematicians make sense of quantities and situations symbolically?
- What model(s) can we as mathematicians use to solve a problem?
- *What does it mean for a relationship to be a function?*

Unit Standards

Priority Standards

8.F.A Define, Evaluate, and Compare Functions

- 8.F.A.1 Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.
- 8.F.A.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).
- 8.F.A.3 Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.

8.F.B Use functions to model relationships between quantities

- 8.F.B.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
- 8.F.B.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph. Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

Learning Targets

- I can identify functions from mapping diagrams, tables, and graphs. (5-1) 8.F.A.1
    - I create a graphic organizer to define a function.
    - I justify whether a mapping diagram, table or a graph models a function.
- I can create function tables and graph functions. (5-2) 8.F.A.1
    - I use a graphic organizer to define a function.
    - I justify whether a table or a graph models a function.
- I can construct functions from graphs, tables, and verbal descriptions. (5-3) 8.F.B.4
    - I identify the y-intercept of a linear function represented in a table, graph, algebraic equation, and verbal description.
    - I find the slope when the function is presented in a table, graph, algebraic equation, or verbal description.
    - I interpret the slope and y-intercept using precise mathematical vocabulary.
- I can compare functions represented in different forms. (5-4) 8.F.A.2
    - I compare and contrast the rate of change or slope for two functions represented in different ways (algebraically, graphically, numerically in tables, or verbal descriptions).
    - I compare and contrast the initial value or y-intercept for two functions represented in different ways (algebraically, graphically, numerically in tables, or verbal descriptions).
    - I justify the comparison using precise mathematical language.
- I can identify nonlinear functions using tables, graphs, and equations. (5-5) 8.F.A.3
    - I compare and contrast a linear and non-linear graph.
    - I compare and contrast a linear and non-linear table.
    - I compare and contrast a linear and non-linear equation.
    - I justify a non-linear function using precise mathematical language.
- I can analyze and sketch qualitative graphs. (5-6) 8.F.B.5
    - I sketch a graph that reflects a verbal description of the function (linear and non-linear).
    - I analyze and describe a qualitative graph (increasing, decreasing, constant rate, varied rate, linear, non-linear)

Assessment Evidence

Performance Assessment Options & Rubrics *May include, but are not limited to the following:* ● Feedback & Scoring Rubric based on Priority Standards ● Module Pre-Test ● End of Unit Assessment (3 versions) ● End of Unit Assessment (3 versions - differentiation) ● Mid-unit checks/quizzes	**Other assessment options** *May include, but are not limited to the following:* ● Entrance or Exit Tickets/Warm Up ● ALEKS Assessment ● Pulling it together - mid quizzes ● Student work samples ● REVEAL performance tasks ● LEARN Checks ● Extension ● Dynamic Practice ● AVID Strategies ○ Quick Writes ○ KWL Chart - (What I Know, Want to know, Learned) ○ Marking Text ○ Learning Log Reflection - Daily/Weekly ○ I-Chart - Gather/Organize Information on a topic ○ Focused Note Taking ○ CSG - Collaborative Study Groups ○ Socratic Seminar ○ Philosophical Chairs ○ Think/Pair/Share ○ Talking Trios ○ World Cafe
Digital Tools & Supplementary Resources	
● Desmos Activities (Function Sort, Qualitative Graphs) ● ALEKS - Functions	

Unit 6 - Systems of Linear Equations

Essential Questions:

- How do we as mathematicians analyze the problem in order to choose the best strategy(ies) or resource to make sense of the problem?
- *How can systems of equations be helpful in solving everyday problems?*

Unit Standards

Priority Standards

8.EE.C Analyze and solve linear equations and pairs of simultaneous linear equations.

- 8.EE.C.8 Analyze and solve pairs of simultaneous linear equations.
  - 8.EE.C.8.a Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy

both equations simultaneously.
    - 8.EE.C.8.b Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection.
    - 8.EE.C.8.c Solve real-world and mathematical problems leading to two linear equations in two variables.

Learning Targets

- I can solve systems of linear equations by graphing. (6-1) 8.EE.C.8.a-c
    - I explain the solution to a system of equations as one, zero, or infinite.
    - I solve a linear system of equations by graphing to estimate a solution.
    - I solve real world problems related to systems of equations.
- I can determine the number of solutions of a system of linear equations by analyzing the equations. (6-2) 8.EE.C.8.a-c
    - I explain the solution to a system of equations as one, zero, or infinite by analyzing the equations.
    - I explain the solution to a system of equations as one, zero, or infinite given two ordered pairs.
- I can solve systems of linear equations by using substitution. (6-3) 8.EE.C.8.b-c
    - I explain the solution to a system of equations as one, zero, or infinite.
    - I solve a linear system of equations using algebra (**substitution** & elimination)
    - I solve a linear system of equations using inspections (determine the number of solutions by only looking at the equations)
    - I solve real world problems related to systems of equations.
- I can solve systems of linear equations by using elimination. (6-4) 8.EE.C.8.b-c
    - I explain the solution to a system of equations as one, zero, or infinite.
    - I solve a linear system of equations using algebra (substitution & **elimination**)
    - I solve a linear system of equations using inspections (determine the number of solutions by only looking at the equations)
    - I solve real world problems related to systems of equations.
- I can write and solve systems of linear equations. (6-5) 8.EE.C.8.b-c
    - I write and solve a system of linear equations that models a real world scenario.
    - I analyze a system of linear equations to determine which method (graphing, substitution, or elimination) is most efficient in solving.
    - I solve a linear system of equations using inspections (determine the number of solutions by only looking at the equations)

Assessment Evidence

Performance Assessment Options & Rubrics
May include, but are not limited to the following:

- Feedback & Scoring Rubric based on Priority Standards
- Module Pre-Test
- End of Unit Assessment (3 versions)
- End of Unit Assessment (3 versions - differentiation)
- Mid-unit checks/quizzes

Other assessment options
May include, but are not limited to the following:

- Entrance or Exit Tickets/Warm Up
- ALEKS Assessment
- Pulling it together - mid quizzes
- Student work samples
- REVEAL performance tasks
- LEARN Checks
- Extension
- Dynamic Practice
- AVID Strategies

	○ Quick Writes ○ KWL Chart - (What I Know, Want to know, Learned) ○ Marking Text ○ Learning Log Reflection - Daily/Weekly ○ I-Chart - Gather/Organize Information on a topic ○ Focused Note Taking ○ CSG - Collaborative Study Groups ○ Socratic Seminar ○ Philosophical Chairs ○ Think/Pair/Share ○ Talking Trios ○ World Cafe

Digital Tools & Supplementary Resources

- ALEKS

Unit 7 - Triangles and the Pythagorean Theorem

Essential Questions:

- How can we as mathematicians justify our answer(s)?
- *How can angle relationships and right triangles be used to solve everyday problems?*

Unit Standards

Priority Standards

8.G.A Understand congruence and similarity using physical models, transparencies, or geometry software.

- 8.G.A.5 Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.

8.G.B Understand and apply the Pythagorean Theorem

- 8.G.B.6 Explain a proof of the Pythagorean Theorem and its converse.
- 8.G.B.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
- 8.G.B.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

Learning Targets

- I can examine relationships of angles formed by parallel lines cut by a transversal. (7-1) 8.G.A.5
  - I solve problems using angle and triangle relationships.
  - Classify angles and explore angle sums and exterior angles of triangles when parallel lines are cut by a transversal.
- I can examine relationships among the angles in a triangle. (7-2) 8.G.A.5
  - I create and defend informal arguments to justify angle relationships and triangle

relationships.
    - I use the triangle sum theorem to find missing angles.
    - I solve problems using angle and triangle relationships.
- I can solve problems using the Pythagorean Theorem. (7-3) 8.G.B.6-7
    - I model a proof of the Pythagorean Theorem.
    - I use the correct vocabulary when writing or talking about the Pythagorean Theorem.
    - I determine an unknown side length in a right triangle in two and three dimensions.
    - I determine the unknown side length in a right triangle in a real world situation.
- I can solve problems using the converse of the Pythagorean Theorem. (7-4) 8.G.B.6
    - I model a proof of the Pythagorean Theorem.
    - I apply the converse of the Pythagorean Theorem to prove that a triangle is a right triangle.
- I can find the distance between two points on the coordinate plane using the Pythagorean Theorem. (7-5) 8.G.B.8
    - Using the Pythagorean Theorem, find the distance between two points.
    - Solve real world distance problems using the Pythagorean Theorem.

Assessment Evidence

Performance Assessment Options & Rubrics
May include, but are not limited to the following:

- Feedback & Scoring Rubric based on Priority Standards
- Module Pre-Test
- End of Unit Assessment (3 versions)
- End of Unit Assessment (3 versions - differentiation)
- Mid-unit checks/quizzes

Other assessment options
May include, but are not limited to the following:

- Entrance or Exit Tickets/Warm Up
- ALEKS Assessment
- Pulling it together - mid quizzes
- Student work samples
- REVEAL performance tasks
- LEARN Checks
- Extension
- Dynamic Practice
- AVID Strategies
    - Quick Writes
    - KWL Chart - (What I Know, Want to know, Learned)
    - Marking Text
    - Learning Log Reflection - Daily/Weekly
    - I-Chart - Gather/Organize Information on a topic
    - Focused Note Taking
    - CSG - Collaborative Study Groups
    - Socratic Seminar
    - Philosophical Chairs
    - Think/Pair/Share
    - Talking Trios
    - World Cafe

Digital Tools & Supplementary Resources

- ALEKS

Unit 8 - Transformations

Essential Questions:

- What tools are available and efficient for us as mathematicians to use while solving a problem?
- How can we as mathematicians use and apply patterns and structures to solve problems?
- *What does it mean to perform a transformation on a figure?*

Unit Standards

Priority Standards

8.G.A Understand congruence and similarity using physical models, transparencies, or geometry software.

- 8.G.A.1 Verify experimentally the properties of rotations, reflections, and translations:
  - a. Lines are taken to lines, and line segments to line segments of the same length.
- 8.G.A.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.

Learning Targets

- I can translate figures and describe translations on the coordinate plane. (8-1) 8.G.A.1.A, 8.G.A.3
  - I transform figures on the coordinate plane using rotations, reflections, and **translations**, using the correct notation
  - I justify the transformations used to transform one figure into another on the coordinate plane.
  - I describe how coordinates change after dilations, **translations**, rotations, and reflections on two dimensional figures.
- I can reflect figures and describe reflections on the coordinate plane. (8-2) 8.G.A.1.A, 8.G.A.3
  - I transform figures on the coordinate plane using rotations, **reflections**, and translations, using the correct notation
  - I justify the transformations used to transform one figure into another on the coordinate plane.
  - I describe how coordinates change after dilations, translations, rotations, and **reflections** on two dimensional figures.
- I can rotate figures and describe rotations on the coordinate plane. (8-3) 8.G.A.1.A, 8.G.A.3
  - I transform figures on the coordinate plane using **rotations**, reflections, and translations, using the correct notation
  - I justify the transformations used to transform one figure into another on the coordinate plane.
  - I describe how coordinates change after dilations, translations, **rotations**, and reflections on two dimensional figures.
- I can dilate figures and describe dilations on the coordinate plane. (8-4) 8.G.A.3
  - I describe how coordinates change after **dilations**, translations, rotations, and reflections on two dimensional figures.

Assessment Evidence

Performance Assessment Options & Rubrics *May include, but are not limited to the following:*	**Other assessment options** *May include, but are not limited to the following:*

• Feedback & Scoring Rubric based on Priority Standards
• Module Pre-Test
• End of Unit Assessment (3 versions)
• End of Unit Assessment (3 versions - differentiation)
• Mid-unit checks/quizzes
	• Entrance or Exit Tickets/Warm Up
	• ALEKS Assessment
	• Pulling it together - mid quizzes
	• Student work samples
	• REVEAL performance tasks
	• LEARN Checks
	• Extension
	• Dynamic Practice
	• AVID Strategies
	  ○ Quick Writes
	  ○ KWL Chart - (What I Know, Want to know, Learned)
	  ○ Marking Text
	  ○ Learning Log Reflection - Daily/Weekly
	  ○ I-Chart - Gather/Organize Information on a topic
	  ○ Focused Note Taking
	  ○ CSG - Collaborative Study Groups
	  ○ Socratic Seminar
	  ○ Philosophical Chairs
	  ○ Think/Pair/Share
	  ○ Talking Trios
	  ○ World Cafe

Digital Tools & Supplementary Resources	
• ALEKS	

Unit 9 - Congruence and Similarity

Essential Questions:

- How can we as mathematicians justify our answer(s)?
- How can we as mathematicians determine an effective model to use to solve a problem?
- *What information is needed to determine if two figures are congruent or similar?*

Unit Standards

Priority Standards

8.G.A Understand congruence and similarity using physical models, transparencies, or geometry software.

- 8.G.A.1 Verify experimentally the properties of rotations, reflections, and translations:
  - a. Lines are taken to lines, and line segments to line segments of the same length.
  - b. Angles are taken to angles of the same measure.
  - c. Parallel lines are taken to parallel lines.
- 8.G.A.2 Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.
- 8.G.A.4 Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar

two-dimensional figures, describe a sequence that exhibits the similarity between them.
- 8.G.A.5 Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.

Learning Targets

- I can use a sequence of transformations to describe congruency between figures. (9-1) 8.G.A.1a-c, 8.G.A.2
    - I create a congruent figure by applying a series of transformations on a coordinate plane by using correct/coordinate notation.
    - I justify a series of transformations that creates a figure that is congruent to the first.
- I can write congruence statements and find missing measures for congruent figures. (9-2) 8.G.A.1.a-b
    - I use correct notation in labeling congruent figure
    - I use correct notation when writing congruence statements.
- I can use a sequence of transformations to describe similarities between figures. (9-3) 8.G.A.4
    - I represent and communicate all steps in a sequence of transformations given an image and a pre-image using similar figures.
- I can write similarity statements and find missing measures for similar figures. (9-4) 8.G.A.4, 8.G.A.5
    - I represent and communicate all steps in a sequence of transformations given an image and a pre-image using similar figures.
    - I create and defend informal arguments to justify angle relationships and triangle relationships.
    - I solve problems using angle and triangle relationships.
- I can solve problems involving similar triangles. (9-5) 8.G.A.4, 8.G.A.5
    - I represent and communicate all steps in a sequence of transformations given an image and a pre-image.
    - I create and defend informal arguments to justify angle relationships and triangle relationships.
    - I solve problems using angle and triangle relationships.

Assessment Evidence

Performance Assessment Options & Rubrics
May include, but are not limited to the following:

- Feedback & Scoring Rubric based on Priority Standards
- Module Pre-Test
- End of Unit Assessment (3 versions)
- End of Unit Assessment (3 versions - differentiation)
- Mid-unit checks/quizzes

Other assessment options
May include, but are not limited to the following:

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- ALEKS Assessment
- Pulling it together - mid quizzes
- Student work samples
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- LEARN Checks
- Extension
- Dynamic Practice
- AVID Strategies
    - Quick Writes

	○ KWL Chart - (What I Know, Want to know, Learned) ○ Marking Text ○ Learning Log Reflection - Daily/Weekly ○ I-Chart - Gather/Organize Information on a topic ○ Focused Note Taking ○ CSG - Collaborative Study Groups ○ Socratic Seminar ○ Philosophical Chairs ○ Think/Pair/Share ○ Talking Trios ○ World Cafe

Digital Tools & Supplementary Resources

- ALEKS

Unit 10 - Volume

Essential Questions:

- How can we as mathematicians use and apply patterns and structures to solve problems?
- *How can you measure a cylinder, cone, or sphere?*

Unit Standards

Additional Standards

8.G.C Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

- 8.G.C.9 Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Learning Targets

- I can find the volume of cylinders. (10-1) 8.G.C.9
  - I participate in experiments that help derive the formulas for cones, **cylinders**, and spheres.
  - I explain in writing my understanding of the volume formulas for cones, **cylinders**, and spheres.
  - I solve mathematical and real-world problems that involve finding the volumes of cones, **cylinders**, and spheres.
- I can find the volume of cones. (10-2) 8.G.C.9
  - I participate in experiments that help derive the formulas for **cones**, cylinders, and spheres.
  - I explain in writing my understanding of the volume formulas for **cones**, cylinders, and spheres.
  - I solve mathematical and real-world problems that involve finding the volumes of **cones**, cylinders, and spheres.
- I can find the volume of spheres and hemispheres. (10-3) 8.G.C.9
  - I participate in experiments that help derive the formulas for cones, cylinders, and **spheres**.

- I explain in writing my understanding of the volume formulas for cones, cylinders, and **spheres**.
- I solve mathematical and real-world problems that involve finding the volumes of cones, cylinders, and **spheres**.

- I can use volume formulas to find missing dimensions in cylinders, cones, and spheres. (10-4) 8.G.C.9
  - I explain in writing my understanding of the volume formulas for cones, cylinders, and spheres.
  - I solve mathematical and real-world problems that involve finding the volumes of cones, cylinders, and spheres.
- I can find the volume of composite solids. (10-5) 8.G.C.9
  - I explain in writing my understanding of the volume formulas for cones, cylinders, and spheres.
  - I solve mathematical and real-world problems that involve finding the volumes of cones, cylinders, and spheres.

Assessment Evidence

Performance Assessment Options & Rubrics
May include, but are not limited to the following:

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- Module Pre-Test
- End of Unit Assessment (3 versions)
- End of Unit Assessment (3 versions - differentiation)
- Mid-unit checks/quizzes

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  - KWL Chart - (What I Know, Want to know, Learned)
  - Marking Text
  - Learning Log Reflection - Daily/Weekly
  - I-Chart - Gather/Organize Information on a topic
  - Focused Note Taking
  - CSG - Collaborative Study Groups
  - Socratic Seminar
  - Philosophical Chairs
  - Think/Pair/Share
  - Talking Trios
  - World Cafe

Digital Tools & Supplementary Resources

- ALEKS

Unit 11 - Scatter Plots and Two-Way Tables

Essential Questions:

- How do we as mathematicians make sense of quantities and situations symbolically?
- *What do patterns in data mean and how are they used?*

Unit Standards

Supporting Standards

8.SP.A Investigate patterns of association in bivariate data

- 8.SP.A.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
- 8.SP.A.2 Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.
- 8.SP.A.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercepts.
- 8.SP.A.4 Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables.

Learning Targets

- I can construct and interpret Scatter Plots. (11-1) 8.SP.A.1
    - I model bivariate data in a scatter plot showing the different types of associations.
    - I describe orally and/or in writing different patterns of association when presented with scatter plots of bivariate data. Explain what the different patterns mean in specific contexts.
- I can informally draw lines that fit a set of data and use them to make conjectures. (11-2) 8.SP.A.2
    - I name examples of real world situations that can be modeled by a straight line.
    - I model real-world linear relationships on a graph.
    - I construct straight lines to fit data presented in scatter plots, informally.
    - I justify the line of fit.
    - I explain orally or in writing the meaning of the fit line and its properties in terms of the context of the graph.
- I can write the equations for lines that fit a set of data and use them to make conjectures. (11-3) 8.SP.A.3
    - I solve problems using a linear equation to model bivariate measurement data in context.
    - I fit a line to the data , interpret the slope and intercept for the context, write the linear equations, and make a prediction from the line.
- I can construct two-way tables and find and interpret their relative frequencies. (11-4) 8.SP.A.4
    - I use categorical data on two variables from the same group of people, display them in a two-way table and interpret the data for association.
- I can determine if an association exists between categories and two-way tables. (11-5) 8.SP.A.4
    - I use categorical data on two variables from the same group of people, display them in a two-way table and interpret the data for association.
    - I justify the association.

Assessment Evidence	
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Digital Tools & Supplementary Resources	
● ALEKS	