

TRUMBULL PUBLIC SCHOOLS
TRUMBULL, CONNECTICUT

Curriculum Committee of the
Trumbull Board of Education

Special Meeting

Thursday, October 30, 2025
Trumbull High School Conference Room

AGENDA

- I. Call to Order/Introduction-
- II. Public Comment
- III. Approval of Minutes- September 18, 2025
- IV. New Business
 - a. Curriculum Guide Update- Middle School Math Grade 6
 - b. Curriculum Guide Update- Middle School Math Grade 7
 - c. Curriculum Guide Update- Middle School Math Grade 8
 - d. Professional Learning Update
 - e. Future Subcommittee Dates

TRUMBULL PUBLIC SCHOOLS

TRUMBULL, CONNECTICUT

Curriculum Committee of the
Trumbull Board of Education

Regular Meeting

Thursday, September 18, 2025, 8:30 a.m.
Long Hill Auditorium

MINUTES

- I. Call to Order/Introduction. The meeting was called to order at 8:36 a.m.

Members Present

M. Petitti, BOE Curriculum Committee Chair
J. McNamee, BOE member
S. Iwanicki, Ed.D. administrative designee
K. Engeldrum, Elementary Literacy Program leader
L. Hatstat, Literacy Specialist
J. Olimpieri, Literacy Specialist

Members Absent

L. Nuland, BOE Member

- II. Public Comment - No public comment was received

- III. New Business

- a. TPAUD Survey – Lori Hayes-O’Brien presented the TPAUD survey questions, highlighting the few changes and/or alterations, with details regarding those changes. Most survey questions have not changed since 2007. A discussion ensued. Ms. McNamee asked about information on a suicide hot line being incorporated into the survey. Mrs. Petitti asked about resources available to students, and how, when and to whom the critical survey data should be used. Ms. McNamee moved to approve the updated TPAUD survey questions for review by the full Board of Education. Mrs. Petitti seconded. The motion passed unanimously.
- b. Curriculum Guide Update - English Language Arts & Reading, Grade K, 1, 2, 3. K-5 ELA Program Leader Kate Engeldrum presented the guides along with Jen Olimpieri (Middlebrook) and Laura Hatstat (Tashua). Mrs. Engeldrum discussed the newly revised K-3 Literacy Curriculum Guide; She provided reasons the curriculum was edited, major points of the work, as well as the process. She also highlighted differences: old vs. new. Mrs. Petitti asks about Bookworms – how are teachers responding to new program? Ms. Olimpieri answered the teachers like it very much. Ms. Hatstat agreed and commented that it is aligned with standards, the program makes sense. Ms. McNamee remarked on how much she likes the integration of Science and Social Studies within the program, asked about the make-up of the curriculum writing committee and also the ELL population and their

access to the program. Dr. Iwanicki added the program is in line with the TPS “Vision of a Graduate”. Lengthy discussion ensued. Ms. McNamee moved to approve the guides for review by the full Board of Education. Mrs. Petitti seconded. The motion passed unanimously.

The meeting adjourned at 9:47 a.m.

TRUMBULL PUBLIC SCHOOLS

Trumbull, Connecticut

Mathematics 6

Grade 6

2025

(Last revision date: 2016)

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Mathematics 6

Grade 6

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The Trumbull Board of Education will continue to take Affirmative Action to ensure that no persons are discriminated against in its employment.

CORE VALUES AND BELIEFS

The Trumbull High School community engages in an environment conducive to learning which believes that all students will **read** and **write effectively**, therefore communicating in an articulate and coherent manner. All students will participate in activities **that present problem-solving through critical thinking**. Students will use technology as a tool applying it to decision making. We believe that by fostering self-confidence, self-directed and student-centered activities, we will promote **independent thinkers and learners**. We believe **ethical conduct** to be paramount in sustaining the welcoming school climate that we presently enjoy.

Approved 8/26/2011

INTRODUCTION & PHILOSOPHY

Grade 6 Mathematics marks a pivotal transition from the concrete arithmetic of elementary school to the more abstract and conceptual thinking required in middle school mathematics. This course is designed to build a strong foundation in number sense, ratios and proportional relationships, expressions and equations, geometry, and statistical thinking. Students begin to develop the skills and reasoning necessary for algebra and higher-level mathematics, with an emphasis on problem-solving, critical thinking, and real-world applications.

The philosophy guiding Grade 6 Mathematics emphasizes student engagement, conceptual understanding, and the development of a growth mindset toward learning math. Instruction is designed to be active and inquiry-based, encouraging students to explore multiple strategies, communicate their thinking, and collaborate with peers. Aligned with the Common Core State Standards and the Standards for Mathematical Practice, the course supports students in becoming confident and capable mathematical thinkers who can reason quantitatively and persevere through complex tasks.

By fostering a classroom culture that values curiosity, creativity, and perseverance, the Grade 6 Mathematics curriculum seeks to empower all students to see mathematics as both a powerful tool and an accessible subject. This course not only prepares students for the demands of Grade 7 mathematics and beyond but also helps them see the relevance of math in their lives and the world around them.

COURSE GOALS

Our Grades 6 math program takes a balanced instructional approach to promote the understanding of important mathematical concepts, skills, procedures, and ways of thinking and reasoning that supports the Common Core Standards for Math. This course prepares students for grade 7 math and grade 8 pre-algebra. The course will focus on the following topics:

- **Ratio and Proportional Relationships (CCSS 6.RP)** - Understanding ratio concepts and use ratio reasoning to solve problems.
- **The Number System (CCSS 6.NS)** - Apply and extend previous understandings of multiplication and division to divide fractions by fractions. Compute fluently with multi-digit numbers and find common factors and multiples. Apply and extend previous understandings of numbers to the system of rational numbers.

- **Expressions and Equations (CCSS 6.EE)** - Apply and extend previous understandings of arithmetic to algebraic expressions. Reason about and solve one-variable equations and inequalities and represent and analyze quantitative relationships between dependent and independent variables.
- **Geometry (CCSS 6.G)** - Solve real-world and mathematical problems involving area, surface area, and volume.
- **Statistics and Probability (CCSS 6.SP)** - Develop an understanding of statistical variability and summarize and describe distributions.

STANDARDS FOR MATHEMATICAL PRACTICES

The Standards of Mathematical Practice (SMP) are essential to the Mathematics 6 curriculum as they provide a foundation for developing students' mathematical thinking, reasoning, and problem-solving skills. These practices—such as making sense of problems, reasoning abstractly and quantitatively, and constructing viable arguments—encourage students to engage deeply with mathematical concepts rather than simply memorizing procedures. By integrating the SMP into instruction, educators foster a classroom environment where students learn to think critically, communicate their ideas effectively, and approach problems with confidence and perseverance. This not only supports mastery of grade-level content but also builds the habits of mind necessary for success in higher-level mathematics and real-world applications.

SMP1	Students will make sense of problems and persevere in solving them.
SMP2	Students will reason abstractly and quantitatively.
SMP3	Students will construct viable arguments and critique the reasoning of others.
SMP4	Students will model with mathematics.
SMP5	Students will use appropriate tools strategically.
SMP6	Students will attend to precision.
SMP7	Students will look for and make use of structure.
SMP8	Students will look for and express regularity in repeated reasoning.

COURSE ENDURING UNDERSTANDINGS

In Grade 6, instructional time should focus on four critical areas: (1) connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems; (2) completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers; (3) writing, interpreting, and using expressions and equations; and (4) developing understanding of statistical thinking.

Students will understand that . . .

- **Ratios and rates describe relationships between quantities**, and understanding them allows us to compare, scale, and solve problems in meaningful ways.
- **Operations with fractions and decimals follow consistent rules**, and these rules build on our understanding of whole number operations to extend to all rational numbers.
- **Expressions and equations represent mathematical situations and relationships**, and they can be used to model, analyze, and solve real-world problems.
- **Variables can be used to represent unknowns and describe patterns**, helping us generalize and solve mathematical problems efficiently.
- **Data can be collected, organized, and interpreted to answer questions and make decisions**, and different representations of data help highlight different aspects of a situation.
- **Understanding area, surface area, and volume helps us solve real-world problems involving space and measurement.**
- **Mathematics is a logical and connected system**, and recognizing patterns and structures can help make sense of new problems and concepts.

COURSE ESSENTIAL QUESTIONS

- How do ratios and rates help us describe and compare relationships between quantities in everyday situations?
- What rules govern operations with fractions and decimals, and why do these rules make sense?
- How can we use expressions and equations to represent and solve real-world problems?
- What does a variable represent, and how can it help us describe patterns and solve problems more generally?
- How can we collect, organize, and represent data to make sense of the world and support our conclusions?
- How do we measure and calculate area, surface area, and volume, and why are these ideas important in the real world?
- How can recognizing patterns and structures help us make sense of mathematics and solve new problems?

COURSE KNOWLEDGE & SKILLS

Students will know . . .

- The meaning and use of ratios, rates, and unit rates.
- How to represent ratio and rate relationships using tables, tape diagrams, double number lines, and equations.

- The structure of the number system, including whole numbers, fractions, decimals, and negative numbers.
- Rules and properties for operations with positive and negative numbers.
Vocabulary related to algebraic expressions, including term, coefficient, constant, and variable.
- The order of operations and how it applies to numerical and algebraic expressions.
- How to represent relationships using expressions, equations, and inequalities.
- Formulas for finding the area of parallelograms, triangles, and trapezoids.
- How to calculate surface area and volume of right rectangular prisms using nets and formulas.
- Definitions of statistical questions, data distributions, measures of center (mean, median), and measures of variability (range, interquartile range).
- How data displays (dot plots, histograms, box plots) help represent and interpret numerical data.

Students will be able to . . .

- Solve problems involving ratios, rates, and unit rates in real-world and mathematical contexts.
- Use ratio reasoning to convert measurement units and make comparisons.
- Add, subtract, multiply, and divide multi-digit numbers and decimals fluently using standard algorithms.
- Perform operations with fractions, including division of fractions by fractions.
- Locate and represent rational numbers (including negatives) on a number line and coordinate plane.
- Write, interpret, and evaluate algebraic expressions involving variables and exponents.
- Apply properties of operations (e.g., distributive property) to generate equivalent expressions.
- Solve one-step equations and inequalities, and represent solutions on a number line.
- Analyze and describe patterns in numerical and algebraic relationships.
- Find the area of two-dimensional figures and the surface area and volume of three-dimensional figures.
- Represent and interpret data using dot plots, histograms, and box plots.
- Summarize numerical data sets, including identifying measures of center and variability.
- Use mathematical models and strategies to solve real-world problems.
- Engage in mathematical reasoning, construct arguments, and critique the reasoning of others.
- Select and use appropriate tools (e.g., visual models, diagrams, digital tools) strategically.
- Look for patterns and structures in mathematical problems to support reasoning and problem-solving.

COURSE SYLLABUS

Course Name

Mathematics 6

Level

Regular Paced

Prerequisites

Successful completion of Grade 5 Mathematics

Core Resource: EdGems Math Course 1

General Description of the Course

In the Mathematics 6 course, instructional time is focused on five critical areas: understanding division of fractions, connecting ratios and rates to whole number operations, using expressions and equations, extending area concepts to surface area and volume, and developing statistical thinking. Students build a strong foundation in fraction division by applying their knowledge of multiplication, division, and the relationships between operations. They solve problems using these concepts and expand their understanding of numbers to include the full system of rational numbers, including negatives. They also reason about the order and absolute value of rational numbers and locate points in all four quadrants of the coordinate plane. Students use reasoning with multiplication and division to solve ratio and rate problems, analyzing equivalent ratios and interpreting visual representations to connect ratios, fractions, and whole number operations. In working with expressions and equations, students learn to write, interpret, and evaluate them in context, using variables and properties of operations to solve one-step equations and describe quantitative relationships. They analyze tables and use equations to represent equivalent ratios.

Students also deepen their understanding of geometric concepts by finding area, surface area, and volume through the decomposition of shapes, and they extend this reasoning to work with prisms and fractional dimensions. Additionally, students begin to develop statistical thinking by exploring concepts of center and variability, using measures such as mean, median, interquartile range, and mean absolute deviation. They learn to summarize and interpret data distributions by identifying features like clusters, gaps, peaks, and symmetry, while considering the context in which data were gathered.

Assured Assessments

Formative Assessments:

- o Exit Tickets, Tiered Practices, Teacher Gems activities, Focused Interim Assessment Blocks (FIABs)

Summative Assessments:

- o Common Unit Assessments
- o Trimester Performance Tasks

Supplemental Texts

- o Ready Common Core (i-Ready Teacher Toolbox)
- o Smarter Balanced Assessment Resources

UNIT 0
Grade 6 Launch
(No Calculator)

Unit Goals

At the completion of this unit, students will:

- CCSS.5.OA.A.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. This standard introduces order of operations **without exponents**, focusing on grouping symbols.
- CCSS.4.OA.B.4 Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors.
- CCSS.5.NF.B.3 Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$).
- CCSS.5.NF.A.1 Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions.
- CCSS.NF.A.2 Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators.
- CCSS.5.NBT.A.4 Use place value understanding to round decimals to any place.

Standards for Mathematical Practices

- SMP1 Students will make sense of problems and persevere in solving them.
- SMP2 Students will reason abstractly and quantitatively.
- SMP3 Students will construct viable arguments and critique the reasoning of others.
- SMP4 Students will model with mathematics.
- SMP6 Students will attend to precision.

Unit Scope and Sequence

- Order of Operations (without exponents) (Toolbox Grade 5 Lesson 19)
- Fraction Concepts (estimating, simplifying, equivalent fractions, factors and multiples vocabulary) (Toolbox Grade 4 Lessons 7, 13-14)
- Adding and Subtracting Fractions and Mixed Numbers (Toolbox Grade 5 Lessons 10-11)
- Rounding Decimals to a Given Place Value (Toolbox Grade 5 Lesson 4)

Assured Assessments

Formative Assessment: exit tickets

Summative Assessment: End of Unit Quiz

Time Allotment

Approximately 10 days

UNIT 1
Multi-Digit Operations
(NO Calculator)

Unit Resources:

EdGems Course 1

Unit Goals:

At the completion of this unit, students will:

- CCSS.6.NS.B.2 Fluently divide multi-digit numbers using the standard algorithm.
- CCSS.6.NS.B.3 Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
- CCSS.6.NS.B.4 Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor.

Standards for Mathematical Practices

- SMP1 Students will make sense of problems and persevere in solving them.
- SMP4 Students will model with mathematics.
- SMP5 Students will use appropriate tools strategically.
- SMP6 Students will attend to precision.
- SMP8 Students will look for and express regularity in repeated reasoning.

Big Ideas

Students will understand:

- Standard algorithms provide a reliable and efficient method for performing operations with multi-digit whole numbers and decimals.
- Fluency with these algorithms supports accuracy and builds confidence in solving real-world and mathematical problems.
- The greatest common factor (GCF) and least common multiple (LCM) help us solve problems involving grouping, sharing, or comparing quantities.
- Understanding these concepts is key to working with fractions, simplifying expressions, and solving word problems involving repeated patterns or combined groups.
- The distributive property allows us to rewrite expressions in different but equivalent forms, especially when factoring out common factors.
- Using this property supports mental math strategies and helps simplify problem solving in both arithmetic and algebra.

Unit Essential Questions

Teachers will ask:

- How do standard algorithms help us accurately and efficiently perform operations with whole numbers and decimals?

- Why is it important to understand and apply the greatest common factor and least common multiple when working with numbers?
- How can the distributive property be used to break apart and simplify expressions involving common factors?

Unit Vocabulary

decimal, algorithm, dividend, divisor, fraction quotient, remainder, factor greatest common factor (GCF), least common multiple (LCM), multiple

Unit Scope and Sequence

- Common Factors and Multiples (Lesson 1.6)
- Adding and Subtracting Decimals (Lesson 1.1)
- Multiplying Multi-Digit Whole Numbers Using the Standard Algorithm (review)
- Multiplying Decimals (Lessons 1.2)
- Dividing by 1-digit Numbers (Lesson 1.3)
- Dividing by Multi-Digit Numbers (Lesson 1.4)
- Dividing Decimals (Lesson 1.5)

Unit Assured Assessments

Formative Assessments: Exit Tickets, Tiered Practices, Teacher Gems activities, Multi-Digit Numbers, Factors, and Multiples FIAB

Summative Assessments: Least Common Multiple and Greatest Common Factor Quiz, End of Unit Assessment

Common Misconceptions

Teacher Moves	Misconceptions Addressed
Encourage estimation to check results.	Students may forget to use 0 as a placeholder in the quotient.
Emphasize accurate counting of repeated factors.	Students may miscount the number of factors when working with exponents.
Reinforce left-to-right processing for multiplication and division.	Students may want to evaluate multiplication before division in an expression.
Prompt students to test all factor combinations , including primes.	Students may think that smaller numbers have fewer factors.
Use a Venn diagram to visualize shared and distinct factors.	Students may struggle to select the correct factors when finding the LCM.
Insert zeros as placeholders when aligning decimals.	Students may forget to insert zeros as placeholders when adding and subtracting decimals.
Clarify that decimal places are counted to the right of the point.	Students might count decimal places to the left instead of the right when multiplying decimals.

ResourcesCore

- EdGems Math Course 1

Supplemental

- Ready Common Core

Time Allotment

- Approximately 18 days

Unit 2

Ratios and Rates

(NO Calculator)

Unit Goals

At the completion of this unit, students will:

- CCSS.6.RP.1** Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities
- CCSS.6.RP.2** Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship.
- CCSS.6.RP.3** Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

Standards for Mathematical Practice

- SMP2 Students will reason abstractly and quantitatively.
- SMP3 Students will construct viable arguments and critique the reasoning of others.
- SMP5 Students will use appropriate tools strategically.
- SMP7 Students will look for and make use of structure.
- SMP8 Students will look for and express regularity in repeated reasoning.

Big Ideas

Students will understand:

- A ratio compares two quantities by showing how many times one value contains or is contained within the other.
- Using precise ratio language helps communicate and understand relationships between quantities clearly.
- A unit rate expresses a ratio with a denominator of one and allows for easy comparison of different ratios.
- Understanding unit rates is essential for solving problems involving speed, price, density, and other rates in everyday life.
- Ratio and rate reasoning enables us to solve real-world and mathematical problems by analyzing equivalent ratios and using tools like tables, tape diagrams, and equations.
- Proportional reasoning is foundational for understanding relationships and making predictions based on those relationships.

Unit Essential Questions

Teachers will ask:

- What is a ratio, and how can we use ratio language to describe relationships between two quantities?
- How do unit rates help us understand and compare ratios in real-world contexts?
- How can ratio and rate reasoning be used to solve problems and make sense of proportional relationships?

Vocabulary:

ratio, tape diagram, equivalent ratios, ratio table, double number line, rate, unit rate, conversion, conversion factor, metric system, US customary system

Unit Scope and Sequence

- Ratios (Lesson 2.1)
- Ratio Tables and Graphs (Lesson 2.2)
- Rates and Unit Rates (Lesson 2.3)
- Comparing Rates (Lesson 2.4)
- Measurement Conversions (Lesson 2.5)

Unit Assured Assessments

Formative Assessments: Exit Tickets, Tiered Practices, Teacher Gems activities

Summative Assessments: Ratios and Rates Test (2.1 - 2.4), Measurement Conversions Quiz (2.5)

Common Misconceptions

Teacher Moves	Misconceptions Addressed
Have students label the ratio with words (e.g., cats : dogs) before inserting numbers.	Students may mix up the order of the numbers in a ratio.
Ask students to record the ratio type in words and highlight key terms in the problem.	Students may confuse a part-to-part ratio with a part-to-total ratio.
Guide students to draw equally sized rectangles in tape diagrams.	Students may not understand that each section in a tape diagram represents the same amount.
Connect simplifying ratios to simplifying fractions.	Students may forget to divide both numbers in the ratio by the same value when simplifying.
Have students label the x- and y-axes to match the table headers.	Students may struggle to graph coordinate pairs from a table of values.
Explain that ratio tables are organizational tools and emphasize equivalence , not sequence.	Students may be confused when a smaller pair of values appears to the right of a larger one in a ratio table.
Show examples of incorrect and correct methods to demonstrate that adding the same number does not maintain equivalence.	Students may incorrectly add the same value to both parts of the ratio to find equivalent ratios.
Remind students to read the question carefully.	Students may write an incorrect ratio that doesn't match what is asked.
Emphasize that order matters when writing ratios (a to b $\neq$ b to a).	Students may write ratios in the wrong order.

Explain that multiple solution strategies exist and that ratio tables are flexible templates.	Students may think there is only one correct way to fill out a ratio table.
Discuss how adding/subtracting corresponding values in equivalent ratios still yields a correct ratio.	Students may not realize they can add or subtract corresponding quantities in a ratio table to create equivalent ratios.
Reinforce that the unit rate is for one unit and model dividing to find it.	Students may not recognize that a unit rate requires dividing by the number of units.
Lead students to discover that multiplying both coordinates by the same number gives another equivalent pair (kp, kq).	Students may not realize they can generate new points by scaling both values in a ratio.

Resources

Core

- EdGems Math Course 1

Supplemental

- Ready Common Core

Time Allotment

- Approximately 17 days

UNIT 3
Percents
(NO Calculator)

Unit Goals:

At the completion of this unit, students will:

- CCSS.6.RP.A.3** Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
- c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.

Standards for Mathematical Practice

- SMP1 Students will make sense of problems and persevere in solving them.
- SMP4 Students will model with mathematics.
- SMP7 Students will look for and make use of structure.
- SMP8 Students will look for and express regularity in repeated reasoning.

Big Ideas

Students will understand:

- A percent is a ratio that compares a number to 100.
- Percents help describe proportions and make it easier to understand parts of a whole in familiar, real-world contexts (like discounts, test scores, or surveys).
- Percent problems can be solved by applying ratio and rate reasoning through equations, tables, or visual models like tape diagrams or double number lines.
- These tools help make sense of and communicate percent relationships clearly.
- In percent problems, knowing any two values (the part, the whole, or the percent) allows us to find the missing third value using multiplication, division, or proportions.
- This understanding supports problem-solving in many everyday contexts such as sales, taxes, and data analysis.

Unit Essential Questions

Teachers will ask:

- What does a percent represent, and how can we use it to describe parts of a whole?
- How can we use ratios, rates, and equations to solve percent problems in real-world situations?
- How can we find a part, a percent, or a whole when given two of the three in a percent relationship?

Vocabulary:

percent, decimal fraction, discount, markup, sales tax

Unit Scope and Sequence

- Introducing Percents (Lesson 3.1)
- Percents, Decimals and Fractions (Lesson 3.2)
- Percent of a Number (Lesson 3.3)
- Percent Applications (Lesson 3.4)

Unit Assured Assessments

Formative Assessments: Exit Tickets, Tiered Practices, Teacher Gems activities, Ratios and Proportional Relationships FIAB

Summative Assessments: End of Unit Assessment

Common Misconceptions

Teacher Moves	Misconceptions Addressed
Encourage students to label percent proportions with terms like “part” and “whole.”	Students may struggle to set up percent problems correctly since percent amounts often do not have differing units.
Have students compare different percent problems and discuss what they are solving for and what is given.	Students may not know if they are solving for the part or whole, may stop after finding the percent, or misunderstand percentages over 100%.
Use class discussions to explore how sequential percents apply to changing values.	Students may incorrectly add percentages (e.g., $20\% + 50\% = 70\%$) in multi-step percent problems.
Discuss common percent vocabulary in real-world contexts (e.g., sale, tax, markup).	Students may misunderstand or misuse vocabulary related to percent applications.
Reinforce percent equivalencies visually using a percent wheel or similar tool.	Students may not connect $X\%$, $X/100$, and $0.X$ as equivalent forms.
Use shaded visuals (like pie charts) and emphasize the need to multiply by 100 when converting decimals to percentages.	Students may incorrectly move the decimal when converting between decimals and percentages.
Review how to convert fractions to decimals first , then multiply by 100 when needed.	Students may struggle to convert fractions to percents when the denominator is not a factor of 100.
Use fraction bars and decimal conversions to explore changing values and percent increase/decrease.	Students may think $\frac{1}{2}\% = 50\%$ or that reversing a percent increase/decrease undoes the change.
Use visual models (bar graphs, tape diagrams) to clarify percent increase/decrease.	Students may ignore the % symbol and treat a percent as a whole number.
Have students examine multiple problem	Students may not realize percent problems always

types and discuss how division is used in each.	involve division.
Provide a percent translation organizer (e.g., “is” = “=”, “of” = “×”, “percent” = “÷ 100”).	Students may struggle with translating word problems into percent equations.
Use real-world examples to model percentages greater than 100%, starting with familiar amounts.	Students may not understand how a percent over 100% represents a value larger than the original.
Provide relatable examples of tiny probabilities (e.g., odds, chance).	Students may struggle to understand percentages less than 1%.
Stress when to use a percent sign and when not to (e.g., $0.45 = 45\%$, not 0.45%).	Students may mistakenly attach a percent sign to decimal representations.
Use hundreds grids to visualize percent as a ratio (shaded/total parts).	Students may not make the connection between ratios and percents.

Resources

Core

- EdGems Math Course 1

Supplemental

- Ready Common Core

Time Allotment

- Approximately 14 days

UNIT 4

Fraction Operations (NO Calculator)

Unit Goals:

At the completion of this unit, students will:

CCSS.6.NS.A.1 Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.

Standards for Mathematical Practices

- SMP2 Students will reason abstractly and quantitatively.
- SMP3 Students will construct viable arguments and critique the reasoning of others.
- SMP4 Students will model with mathematics.
- SMP6 Students will attend to precision.

Big Ideas

Students will understand:

- Dividing fractions involves determining how many groups of one fraction fit into another.
- Fraction division can be modeled visually (e.g., with tape diagrams or area models) or represented symbolically using multiplication by the reciprocal.
- Visual fraction models help make sense of complex fraction problems by showing part-whole relationships and supporting conceptual understanding.
- Modeling supports the development of strategies and helps students connect procedural steps to real-world meaning.
- Dividing fractions often requires a different strategy than dividing whole numbers, such as using the reciprocal of the divisor.
- Understanding fraction division is essential for solving real-life problems involving measurements, sharing, and scaling.

Unit Essential Questions

Teachers will ask:

- What does it mean to divide one fraction by another, and how can we represent this process with models or equations?
- How can we use visual models to understand and solve problems involving division of fractions?
- How is dividing fractions different from dividing whole numbers, and how can we apply this understanding to real-world problems?

Unit Vocabulary

reciprocal, unit fraction

Unit Scope and Sequence

- Multiplying Fractions (Lesson 4.1)
- Understanding Fraction Division (Lessons 4.2)
- Dividing Fractions (Lesson 4.3)
- Multiplying and Dividing Mixed Numbers (Lesson 4.4)

Unit Assured Assessments

Formative Assessments: Exit Tickets, Tiered Practices, Teacher Gems activities, Dividing Fractions by Fractions FIAB

Summative Assessments: Multiplying and Dividing Fractions Assessment

Common Misconceptions

Teacher Moves	Misconceptions Addressed
Use fraction tiles or area models to show how multiplying fractions results in a smaller product.	Students may think multiplying fractions always produces a larger number, or always results in a whole number.
Clarify that finding a common denominator is not needed when multiplying fractions.	Students may assume a common denominator is necessary for fraction multiplication, as with addition or subtraction.
Use area models to represent multiplication of fractions with the same denominator.	Students may incorrectly leave the denominator unchanged when multiplying (e.g., $2/3 \times 1/3 = 2/3$).
Show and compare “divide by $\frac{1}{2}$ ” vs. “divide in half” with real-life examples and models.	Students may confuse dividing by $\frac{1}{2}$ with dividing something in half.
Allow students to use one preferred model (e.g., number line or area model) and offer repeated practice.	Students may struggle with multiple models for dividing fractions and lose conceptual clarity.
Use fraction bar models to demonstrate equivalent whole number expressions.	Students may not understand how a whole number expression is equivalent to a fraction division problem.
Use paper strip models to explore how many times one quantity fits into another.	Students may use the reciprocal of the dividend instead of the divisor when dividing fractions.
Build conceptual understanding before teaching “flip and multiply.”	Students may misapply the flip-and-multiply rule: flipping the wrong fraction, both fractions, or none at all.
Return to models when students are surprised by quotients larger than the dividend.	Students may not grasp why dividing can result in a larger quotient than the dividend.

Teach students to write whole numbers as fractions and use labeled number lines to show multiplication.	Students may multiply both the numerator and denominator by the whole number when multiplying fractions by whole numbers.
Watch for patterns in student errors with mixed numbers and use manipulatives to support corrections.	Students may invert the wrong number or make other mistakes when multiplying/dividing mixed numbers.
Encourage students to show larger multiplication and division work in margins to reduce error.	Students may miscalculate when working with improper fractions from mixed number conversions due to large numerators.

Resources

Core

- EdGems Math Course 1

Supplemental

- Ready Common Core

Time Allotment

- Approximately 14 days

UNIT 5
Expressions
(NO Calculator)

Unit Goals:

At the completion of this unit, students will:

- CCSS.6.NS.B.4** Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor.
- CCSS.6.EE.A.1** Write and evaluate numerical expressions involving whole-number exponents.
- CCSS.6.EE.A.2** Write, read, and evaluate expressions in which letters stand for numbers.
- a. Write expressions that record operations with numbers and with letters standing for numbers.
 - b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity.
 - c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).
- CCSS.6.EE.A.3** Apply the properties of operations to generate equivalent expressions.
- CCSS.6.EE.A.4** Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them).
- CCSS.6.EE.B.6** Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

Big Ideas

Students will understand:

- The greatest common factor (GCF) helps us find the largest shared factor between two numbers, which is useful for simplifying expressions and solving problems involving grouping.
- The least common multiple (LCM) helps us find the smallest common multiple of two numbers, which is important in operations like adding fractions.
- The distributive property allows us to rewrite sums involving common factors to simpler equivalent expressions.
- Whole-number exponents represent repeated multiplication and help us write expressions more efficiently.
- Algebraic expressions use variables to represent numbers and can be written, read, and evaluated to model mathematical and real-world situations.
- Understanding parts of expressions (terms, coefficients, factors) is essential for interpreting and working with algebraic notation.

- Properties of operations (like distributive, associative, and commutative properties) allow us to create equivalent expressions that simplify problem solving.
- Two expressions are equivalent if they have the same value for all variable replacements, which helps us verify and justify mathematical reasoning.
- Variables can represent unknowns or any number within a specified set, enabling us to write expressions and equations to solve real-world and mathematical problems.

Unit Essential Questions

Teachers will ask:

- How can we find and use the greatest common factor and least common multiple to understand relationships between numbers and simplify expressions?
- How do we write, interpret, and evaluate numerical and algebraic expressions involving whole-number exponents and variables?
- How can properties of operations help us generate equivalent expressions, recognize when expressions are equal, and use variables to model real-world problems?

Standards for Mathematical Practices

- SMP2 Students will reason abstractly and quantitatively.
- SMP3 Students will construct viable arguments and critique the reasoning of others.
- SMP7 Students will look for and make use of structure.
- SMP8 Students will look for and express regularity in repeated reasoning.

Unit Vocabulary

algebraic expression, base, coefficient, constant, cubed, Distributive Property, equivalent expressions, evaluate, exponent, factoring, grouping symbols, like terms, numerical expressions, order of operations, power, squared, tern, variable

Unit Scope and Sequence

- Powers of Exponents (Lesson 5.1)
- Order of Operations (Lessons 5.2)
- Variables and Expressions (Lesson 5.3)
- Evaluating Expressions (Lesson 5.4)
- Equivalent Expressions (Lesson 5.5)
- The Distributive Property (Lesson 5.6)

Unit Assured Assessments

Formative Assessments: Exit Tickets, Tiered Practices, Teacher Gems activities, Algebraic Expressions FIAB

Summative Assessments: Numerical Expressions Quiz (5.1 - 5.2), Algebraic Expressions Test (5.3 - 5.6)

Common Misconceptions

Teacher Moves	Misconceptions Addressed
Remind students to double-check answers to avoid rushing errors when calculating exponents; encourage them to write each exponent in expanded form before calculating.	Students may multiply a number by its exponent (e.g., $3^2 = 3 \times 2 = 6$) instead of applying the exponent correctly ($3^2 = 9$).
Use comparison examples (e.g., 2^4 vs. 3^2) to help students focus on both base and exponent when comparing powers.	Students often compare bases only and forget to consider the exponent when comparing powers.
Clarify vocabulary by linking "squared" to area and multiplication of side length by itself.	Students confuse "squared" with taking a number to the fourth power because a square has four sides.
Model order of operations systematically with class examples and calculators to show why answers might differ if not followed.	Students do not apply order of operations rules systematically and rely on mental math, leading to discrepancies.
Encourage crossing off used numbers and rewriting problem parts to prevent "double-using" numbers across multi-step problems.	Students mistakenly reuse numbers in multiple parts of a problem, causing errors.
Explain that multiplication and division are done left to right , and clarify the meaning of parentheses beyond just "P" in PEMDAS.	Students perform calculations strictly left to right or misunderstand grouping symbols in order of operations.
Have students create expression charts to distinguish similar-looking expressions like x^3 and $3x$.	Students misread expressions, confusing exponents and coefficients (e.g., x^3 vs. $3x$).
Use concrete examples to explain variables as values, not objects, reinforcing with varied word problems.	Students confuse variables as objects rather than as numerical values they represent.
Provide graphic organizers to help translate between expressions and word phrases, supporting vocabulary acquisition.	Students struggle to translate between algebraic expressions and verbal descriptions due to weak operation vocabulary.
Distinguish clearly between labels and variables in formulas, emphasizing variables represent quantities.	Students think letters in formulas (like $A = lw$) are just labels, not variable quantities.

Reinforce the difference between negative signs and minus signs in expressions to prevent evaluation errors.	Students confuse negative signs with subtraction signs in algebraic expressions.
Discuss the equal sign as equivalence, not just an answer placeholder , encouraging students to explain their thinking.	Students see the equal sign as a prompt for an answer rather than indicating equivalence, leading to procedural errors.
Use real-world contexts to show equivalence of expressions and ask students to explain why expressions are equal.	Students find it difficult to identify when two expressions are equivalent.
Encourage students to discover and explain the Associative and Commutative Properties through examples rather than memorization.	Students confuse the Associative and Commutative Properties due to memorizing rules without understanding.
Remind students to apply the order of operations at each step , possibly creating personalized mnemonics beyond PEMDAS.	Students forget to apply order of operations when simplifying expressions, causing errors.
Revisit the Distributive Property throughout the year and use multiple practice opportunities to reinforce understanding.	Some students struggle to understand or apply the Distributive Property consistently.
Have students draw arrows from the factor outside parentheses to all inside terms to emphasize distribution to each term.	Students sometimes multiply the factor outside the parentheses by only one term inside.
Use multiplication tables to help students recognize greatest common factors as a foundation for factoring expressions.	Students who struggle with simplifying fractions and identifying factors also have trouble factoring expressions.

Resources

Core

- EdGems Math Course 1

Supplemental

- Ready Common Core

Time Allotment

- Approximately 19 days

UNIT 6
Equations
(NO Calculator)

Unit Goals:

At the completion of this unit, students will:

- CCSS.6.RP.3** Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.
- CCSS.6.EE.B.5** Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
- CCSS.6.EE.B.7** Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q and x are all nonnegative rational numbers.

Standards for Mathematical Practices

- SMP1 Students will make sense of problems and persevere in solving them.
- SMP2 Students will reason abstractly and quantitatively.
- SMP4 Students will model with mathematics.

Big Ideas

Students will understand:

- Ratios, rates, and percents are useful tools for comparing quantities and solving everyday problems such as pricing, recipes, and measurement conversions.
- Percents are a special type of ratio that compares a quantity to 100, and understanding percent relationships helps solve problems involving part, whole, and percent.
- Representing ratio relationships with tables, tape diagrams, double number lines, or equations supports reasoning and problem solving.
- Solving an equation or inequality means finding the value(s) that make the statement true.
- Substituting values into an equation or inequality helps determine whether they are solutions.
- This process is a form of logical reasoning and helps build a foundation for algebraic thinking.
- Many real-world problems can be modeled using equations involving unknown quantities.
- Solving one-step equations (e.g., $x + p = q$ or $p \times x = q$) allows us to find unknown values and interpret solutions in context.
- Equations are tools for representing relationships and making sense of everyday situations mathematically.

Unit Essential Questions

Teachers will ask:

- How can we use ratios, rates, and percents to solve real-world problems and represent relationships between quantities?
- What does it mean to solve an equation or inequality, and how can we determine which values make them true?
- How can we model real-world situations with equations and solve them to find unknown values?

Unit Vocabulary

equation, solution, inverse operations

Unit Scope and Sequence

- Equations and Solutions (Lesson 6.1)
- Solving Addition and Subtraction Equations (Lessons 6.2)
- Solving Multiplication and Division Equations (Lesson 6.3)
- Solving Percent Equations (Lesson 6.4)

Unit Assured Assessments

Formative Assessments: Exit Tickets, Tiered Practices, Teacher Gems activities

Summative Assessments: Solving Equations Assessment (6.1 -6.3), Percent Equations Quiz (6.4)

Common Misconceptions

Teacher Moves	Misconceptions Addressed
Use algebra manipulatives and equivalent equations to build understanding of equality and equivalence.	Students struggle with the concept of equality, thinking the equal sign means “do something” rather than balancing two expressions.
Model correct symbolic notation when checking solutions and attend to precision when showing work.	Students misunderstand symbols like the question mark above the equal sign, and confuse whether equations are true or not.
Clarify the difference between expressions and equations by using concrete examples.	Students believe expressions are equations and try to find an “answer” to an expression with unknown values.
Score solution pathways in addition to final answers to promote justification through inverse operations.	Students rely on mental math and do not justify their steps, leading to errors when solving equations.
Use real-world scenarios (e.g., “four fewer cookies than...”) to help students write expressions accurately.	Students misinterpret phrases like “four less than a number” as “ $4 - n$ ” instead of “ $n - 4$.”
Incorporate concrete representations (e.g., visuals or manipulatives) to help	Students have difficulty understanding the context of a problem and determining the missing value.

contextualize unknowns.	
Reinforce the importance of checking solutions by having students substitute their answer into the original equation.	Students stop after solving the equation without verifying if their solution makes the equation true.
Break word problems into steps with student participation to support procedural understanding.	Students can explain multiplication/division problems verbally but struggle with symbolic notation and inverse operations, especially with fractions.
Model fraction bar notation when dividing both sides of an equation to prepare students for future algebra.	Students fail to divide all terms on one side of the equation, which can cause errors in later math courses.
Use partner work to identify inverse operations before solving equations.	Students mix up inverse operations when solving equations with all four operations.
Have students estimate before calculating to reinforce understanding of percent–decimal conversions.	Students forget to convert percentages to decimals before using them in percent equations.
Connect percent equations to operations by identifying whether the problem represents addition, subtraction, multiplication, or division.	Students struggle to see the connection between solving equations and finding percents.
Use the Commutative Property to rewrite confusing equations , placing the variable after the known value.	Students are confused when the variable comes before the coefficient in a percent equation (e.g., $x \times 30$ instead of $30x$).

Resources

Core

- EdGems Math Course 1

Supplemental

- Ready Common Core

Time Allotment

- Approximately 14 days

UNIT 7
Rational Numbers and the Coordinate Plane
(NO Calculator)

Unit Goals:

At the completion of this unit, students will:

- CCSS.6.NS.C.5** Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
- CCSS.6.NS.C.6** Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.
- Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., $-(-3) = 3$, and that 0 is its own opposite.
 - Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
 - Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.
- CCSS.6.NS.C.7** Understand ordering and absolute value of rational numbers.
- Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram.
 - Write, interpret, and explain statements of order for rational numbers in real-world contexts.
 - Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation.
 - Distinguish comparisons of absolute value from statements about order.
- CCSS.6.NS.C.8** Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.
- CCSS.6.EE.B.5** Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
- CCSS.6.EE.B.8** Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

Standards for Mathematical Practices

- SMP1 Students will make sense of problems and persevere in solving them.
- SMP2 Students will reason abstractly and quantitatively.
- SMP3 Students will construct viable arguments and critique the reasoning of others.
- SMP7 Students will look for and make use of structure.

Big Ideas

Students will understand:

- Positive and negative numbers describe values that have opposite directions or meanings (e.g., gain/loss, above/below, credit/debit).
- Zero serves as a reference point between opposites and can have different contextual meanings depending on the situation.
- Opposite numbers lie the same distance from zero on the number line, and their positions help us compare and understand relative values.
- Rational numbers can be represented as points on the number line and in the coordinate plane, where signs indicate direction and position.
- Absolute value represents the distance from zero and is used to describe magnitude regardless of direction.
- Ordering and comparing rational numbers helps us make sense of data and real-world situations that involve elevation, temperature, or other directional quantities.
- Ordered pairs identify precise locations in the coordinate plane, with signs indicating their position in specific quadrants.
- Reflections across axes result in related points with opposite signs.
- The distance between points sharing a coordinate can be found using absolute value, which supports geometric reasoning and problem-solving.
- Solving an equation or inequality is about identifying which values make the mathematical statement true.
- Substituting values helps verify solutions, and inequalities often represent a range of possible answers.
- Graphing solutions to inequalities on a number line helps visualize and interpret constraints or conditions in context.

Unit Essential Questions

Teachers will ask:

- How can we use positive and negative numbers to represent and compare quantities with opposite values in real-world situations?
- What do the location, order, and absolute value of rational numbers tell us about their meaning and relationship on the number line or coordinate plane?
- How can we use coordinates and absolute value to describe and solve problems involving distance and position in the coordinate plane?
- How can equations and inequalities help us represent and solve real-world and mathematical problems, and how do we know which values make them true?

Unit Vocabulary

absolute value, coordinate plane, inequality, integers, negative numbers, opposites, ordered pair, origin, parallelogram, positive numbers, quadrants, quadrilateral, rational number, rectangle, reflection, rhombus, solution set, square, trapezoid, x-axis, y-axis

Unit Scope and Sequence

- Understanding Integers (Lesson 7.1)
- Comparing Rational Numbers (Lessons 7.2)
- The Coordinate Plane (Lesson 7.4)
- Quadrilaterals and the Coordinate Plane (Lesson 7.5)
- Inequalities (Lesson 7.3)

Unit Assured Assessments

Formative Assessments: Exit Tickets, Tiered Practices, Teacher Gems activities, One-Variable Expressions and Equations FIAB

Summative Assessments: Rational Numbers and the Coordinate Plane Assessment (7.1-7.2 and 7.4-7.5), Writing and Solving Inequalities Quiz (7.3)

Common Misconceptions

Teacher Moves	Misconceptions Addressed
Use a number line and finger-tracing to demonstrate that values decrease moving left.	Students believe that larger negative numbers have greater value than smaller negative numbers (e.g., $-8 > -2$).
Use rulers or number lines to show that negative numbers are the same distance from zero as their positives.	Students don't understand that negative numbers are opposites and equidistant from zero.
Reinforce absolute value as “distance from zero” and use language like: “The absolute value of ____ is ____.”	Students confuse absolute value and sign, e.g.,
Review fraction–decimal conversions to support comparison tasks.	Students struggle with comparing fractions and decimals due to lack of conversion fluency.
Model how to create additional tick marks on a number line to represent non-integer values.	Students assume number lines only represent whole numbers and don't know how to split into fractional parts.
Compare positive and negative versions of a number (e.g., $2\frac{1}{4}$ vs $-2\frac{1}{4}$) and place on the number line.	Students misplace negative mixed numbers, e.g., placing $-2\frac{1}{4}$ between -2 and -1 .
Use real-world contexts to explain inequalities with multiple solutions.	Students don't understand that inequalities can have more than one solution.
Use ads or familiar items to generate inequality scenarios and have students explain number line representations.	Students struggle with writing inequalities for real-world situations.

Present an inequality and ask students to create a matching situation to build context-awareness.	Students find it hard to write inequalities from word problems.
Use folding paper or mirrors to demonstrate reflections of ordered pairs.	Students confuse ordered pairs with their reflections, e.g., (4, 3) vs. (-4, 3).
Have students label quadrant numbers directly in quadrants I–IV and practice regularly.	Students confuse quadrant order or label quadrants incorrectly.
Show graphs with various scales and have students analyze how coordinate values change.	Students assume every graph scale counts by ones and misinterpret coordinates.
Emphasize intersections, not spaces for plotting and have students measure distances between plotted points.	Students plot points in the spaces between grid lines instead of at intersections.
Provide structured practice finding side lengths using coordinate differences (same x or same y).	Students confuse which coordinates to subtract when calculating side lengths.
Use a square to name all its properties and explore other quadrilateral identities.	Students are confused that shapes like squares can also be rectangles or rhombuses.
Create and display visual references (e.g., posters, word walls) for shape names and vocabulary.	Students forget or confuse shape names and geometric vocabulary from earlier grades.

Resources

Core

- EdGems Math Course 1

Supplemental

- Ready Common Core

Time Allotment

- Approximately 17 days

UNIT 8

Tables, Equations and Graphs (NO Calculator)

Unit Goals:

At the completion of this unit, students will:

CCSS.6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.

Standards for Mathematical Practices

- SMP4 Students will model with mathematics.
- SMP6 Students will attend to precision.
- SMP8 Students will look for and express regularity in repeated reasoning.

Big Ideas

Students will understand:

- Variables can be used to represent quantities that change in relation to one another.
- Equations describe how one variable (the dependent variable) changes based on the value of another (the independent variable).
- Tables and graphs help visualize and analyze these relationships, making patterns easier to interpret.
- In a relationship between two variables, the independent variable is the input or cause, and the dependent variable is the output or result.
- Understanding how a change in the independent variable affects the dependent variable allows us to model and predict outcomes.
- Recognizing and analyzing patterns between variables using equations, tables, and graphs allows us to make informed predictions.
- Mathematical models help us understand relationships and solve problems in real-life contexts by showing consistent patterns of change.

Unit Essential Questions

Teachers will ask:

- How can we use variables, equations, tables, and graphs to represent and analyze the relationship between two changing quantities?
- What is the difference between an independent variable and a dependent variable, and how do they relate to each other in a real-world situation?
- How can we describe patterns in data and use them to make predictions about real-world relationships?

Unit Vocabulary

continuous, dependent variable, independent variable, input-output table, linear equation, relation

Unit Scope and Sequence

- Input-Output Tables (Lesson 8.1)
- Writing Two-Variable Equations (Lessons 8.2)- supplement with Ready Common Core
- Graphing Two-Variable Equations (Lesson 8.3)

Unit Assured Assessments

Formative Assessments: Exit Tickets, Tiered Practices, Teacher Gems activities, Dependent and Independent Variables FIAB

Summative Assessments: End of Unit Assessment

Common Misconceptions

Teacher Moves	Misconceptions Addressed
Have students add an “Ordered Pair” column to the right of the output column in a table to help extract and write (x, y) correctly.	Students reverse input and output values, graphing (y, x) instead of (x, y).
Provide practice scaling graphs without plotting, focusing only on selecting appropriate intervals.	Students struggle to determine the appropriate scale when one isn’t provided.
Create sets of related tables, equations, and graphs and then mix them up for students to match.	Students don’t see the connections between equations, tables, and graphs.
Start with simple real-world statements and have students slowly build expressions with variables.	Students have difficulty interpreting word problems and writing equations.
Use real-world examples of independent and dependent variables and have students generate their own.	Students struggle to identify and differentiate independent and dependent variables.
Show tables that do not increase by one to emphasize the importance of calculating changes carefully.	Students assume all input values increase by 1 and incorrectly find rates of change.
Use graphs as prompts for verbal interpretations before introducing equations.	Students misinterpret the meaning of relationships shown in graphs.
Have students describe graphs in their own words , emphasizing how one variable changes in response to another.	Students don’t grasp that as x changes, y also changes, and may misread the graph.
Discuss why only first quadrant graphs are used , and preview that future graphs may include all four quadrants.	Students assume relationships can only exist in the first quadrant, leading to confusion when negatives are introduced later.

ResourcesCore

- EdGems Math Course 1

Supplemental

- Ready Common Core

Time Allotment

- Approximately 12 days

UNIT 9
Area and Volume
(Calculator Use allowed)

Unit Goals:

At the completion of this unit, students will:

- CCSS.6.G.A.1** Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.
- CCSS.6.G.A.2** Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = lwh$ and $V = bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.
- CCSS.6.G.A.4** Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

Standards for Mathematical Practices

- SMP5 Students will use appropriate tools strategically.
- SMP7 Students will look for and make use of structure.
- SMP8 Students will look for and express regularity in repeated reasoning.

Big Ideas

Students will understand:

- Complex polygons can be decomposed into simpler shapes like triangles and rectangles, whose areas we know how to calculate.
- Composing and decomposing shapes helps us apply area formulas flexibly and solve a variety of real-world problems involving space and measurement.
- Volume can be understood as the number of unit cubes needed to fill a three-dimensional space, including fractional units for prisms with fractional edges.
- The volume formulas $V = l \times w \times h$ and $V = b \times h$ provide efficient ways to calculate volume for right rectangular prisms.
- Understanding volume supports problem-solving in real-world contexts like packaging, storage, and construction.
- Nets unfold three-dimensional figures into two-dimensional shapes, allowing us to calculate surface area by finding the sum of areas of the faces.
- Using nets to find surface area deepens spatial reasoning and helps solve practical problems involving materials and covering surfaces.

Unit Essential Questions

Teachers will ask:

- How can we break apart complex shapes to find their area, and how does this help us solve real-world problems?

- How can we use formulas and reasoning to find the volume of right rectangular prisms, even with fractional dimensions?
- How do nets help us visualize and calculate the surface area of three-dimensional figures?

Unit Vocabulary

area, base, composite figure, cone, cubic unit, cylinder, face, net, perimeter, perpendicular, polygon, prism, pyramid, solid, sphere, surface area, unit cube, volume

Unit Scope and Sequence

- Area and Perimeter (Lesson 9.1)
- Area of Composite Figures (Lessons 9.2)
- Nets and Surface Area (Lesson 9.3)
- Volume of Rectangular Prisms (Lesson 9.4)

Unit Assured Assessments

Formative Assessments: Exit Tickets, Tiered Practices, Teacher Gems activities, Geometry IAB

Summative Assessments: Geometry Unit Assessment

Common Misconceptions

Teacher Moves	Misconceptions Addressed
Provide multiple orientations of shapes in examples and exercises to help students recognize figures regardless of rotation or position.	Students think the orientation of a figure changes its type (e.g., a square rotated 45° is called a diamond).
Use concrete materials to explore perimeter, area, volume, and surface area concepts physically.	Students confuse when to use perimeter, area, volume, or surface area and rely on memorized formulas without understanding.
Draw various triangles showing different height measurements (inside, leg, outside).	Students struggle to recognize the height of a triangle in different configurations.
Clarify the difference between perimeter and area by discussing their formulas and meaning before solving problems, especially with decimals.	Students think perimeter is length + width , or that all shapes with the same area have the same perimeter and vice versa.
Analyze student work for decimal computation errors and allow calculators if appropriate.	Errors stem from difficulty computing with decimals , not from understanding area or perimeter.
Discuss why the slanted side in a parallelogram is not the height unless it's a rectangle.	Students confuse length $\times$ width with base $\times$ height , not understanding the height's role in parallelograms.
Have students label and write areas on parts of composite figures to track their work.	Students struggle with finding areas of composite figures and may miss parts of the figure.
Use color-coding on decomposed composite figures to help students keep track of parts.	Students have difficulty organizing composite figures and tracking decomposed parts.

Encourage students to draw and label each decomposed figure separately to find missing dimensions before applying formulas.	Students make errors because they don't separate and label composite figure parts properly or calculate missing dimensions first.
Shade different faces and write areas on nets or 3-D diagrams for surface area problems.	Students find multi-step surface area problems confusing due to multiple areas to calculate and sum.
Encourage counting all faces of prisms before calculating surface area to avoid miscounting.	Students lose track of the number of prism faces , leading to incorrect surface area.
Help students break down surface area word problems to identify shapes involved and operations needed (subtracting parts, multiplying repeated shapes).	Students struggle to understand what part of the shape to calculate in surface area word problems.
Provide extra practice with fractional computations related to volume problems.	Students may know the volume concept but have weak fractional computation skills affecting answers.
Consistently ask students to identify and explain differences between surface area and volume problems.	Students often confuse surface area and volume problems when both are presented.
Use manipulatives of different solids with equal volumes to help students visualize volume equivalencies.	Students don't understand that different shapes can have equivalent volumes .

Resources

Core

- EdGems Math Course 1

Supplemental

- Ready Common Core

Time Allotment

- Approximately 14 days

UNIT 10
Statistics
(Calculator Use Allowed)

Unit Goals:

At the completion of this unit, students will:

- CCSS.6.SP.A.1** Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.
- CCSS.6.SP.A.2** Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
- CCSS.6.SP.A.3** Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
- CCSS.6.SP.B.4** Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
- CCSS.6.SP.B.5** Summarize numerical data sets in relation to their context, such as by:
- Reporting the number of observations.
 - Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
 - Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.
 - Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

Standards for Mathematical Practices

- SMP1 Students will make sense of problems and persevere in solving them.
- SMP2 Students will reason abstractly and quantitatively.
- SMP3 Students will construct viable arguments and critique the reasoning of others.
- SMP5 Students will use appropriate tools strategically.
- SMP6 Students will attend to precision.

Big Ideas

Students will understand:

- A statistical question expects variability in the data and requires data collection from a group, not just a single value.
- Data sets collected to answer statistical questions have a distribution that can be described by its center (typical value), spread (range or variability), and overall shape (such as symmetry or skewness).
- Understanding variability helps us interpret data more accurately and make informed decisions.

- The mean and median are measures of center that summarize a data set with a single number representing a “typical” value.
- Measures of variability such as the interquartile range and mean absolute deviation describe how spread out or clustered the data values are.
- Interpreting both center and variability gives a fuller picture of a data set’s characteristics and helps compare different data sets in context.
- Graphical representations such as dot plots, histograms, and box plots help display and analyze numerical data effectively.
- The shape of a distribution and presence of outliers influence which measures of center and variability are most appropriate to use.
- Choosing the right graph and summary measure depends on the data’s context, distribution, and what we want to learn or communicate.

Unit Essential Questions

Teachers will ask:

- What makes a question statistical, and how can we use data to answer it while accounting for variability?
- How do measures of center and variability help us describe and interpret a data set?
- How can we organize and display numerical data to reveal patterns, trends, and outliers in a meaningful way?

Unit Vocabulary

bias, box plot, categorical data, dot plot, first quartile, five-number summary, frequency table, histogram, interquartile range (IQR), mean, mean absolute deviation (MAD), measures of center, measures of variation, median, mode, numerical data, outlier, range, statistical question, statistics, third quartile

Unit Scope and Sequence

- Introduction to Statistics (Lesson 10.1)
- Measures of Center and Spread (Lessons 10.2)
- Dot Plots (Lesson 10.3)
- Histograms (Lesson 10.4)
- Box Plots (Lesson 10.5)
- Analyzing Statistics (Lesson 10.6)
- Mean Absolute Deviation (Lesson 10.7)

Unit Assured Assessments

Formative Assessments: Exit Tickets, Tiered Practices, Teacher Gems activities, Statistics and Probability FIAB

Summative Assessments: End of Unit Assessment

Common Misconceptions

Teacher Moves	Misconceptions Addressed
Provide repeated practice developing statistical questions and use sorting activities to distinguish between good and poor questions.	Students don't understand how to create statistical questions that allow for a variety of responses.
Use examples and non-examples to help students recognize statistical questions, and have them generate their own.	Students don't recognize patterns in statistical question structure , leading to confusion.
Show and compare datasets with different levels of variability and have students create their own examples.	Students don't understand the concept of "more" or "less" varied data .
Ask students to estimate the mean before calculating , helping them spot errors in their computation.	Students forget to divide the sum and instead divide the last number in the set.
Reinforce the difference between measures of center and variation by labeling and discussing each in context.	Students think range is a measure of center , rather than spread.
Clarify that range is a single number and connect it to interpretation of data variation.	Students describe spread as a range of values (e.g., 5–22) instead of calculating the difference.
Use word cues and visual aids to help students remember the definitions and uses of mean, median, and mode.	Students confuse mean, median, and mode , or misinterpret the meanings (e.g., mode = largest).
Discuss which data displays are appropriate for a given number of values , reinforcing dot plots for smaller data sets.	Students use dot plots with large data sets , making it hard to interpret the data.
Use graph paper and structured modeling to help students with neat, well-scaled number lines.	Students struggle with scaling and consistent tick marks when drawing number lines.
Model vertical alignment of dots and discuss visual clarity of dot plots.	Students stack dots unevenly , reducing graph readability.
Compare histograms and bar graphs side-by-side and clarify which shows numerical vs. categorical data.	Students confuse histograms and bar graphs , leading to misinterpretation of intervals.
Discuss the purpose of "empty intervals" when modeling histograms with gaps in data.	Students think empty intervals aren't allowed in histograms.
Teach a strategy to choose interval widths	Students struggle choosing appropriate

(e.g., divide the range by 8) to simplify decisions.	interval widths for histograms.
Use labeled box plot graphics and note references for each portion of the five-number summary.	Students struggle to interpret the whiskers, quartiles, and box , even if drawn correctly.
Explain that shorter sections in box plots indicate higher density and compare with bar graphs.	Students misinterpret density in box plots , thinking larger sections mean more data.
Model how to exclude the median when dividing into halves by drawing vertical lines.	Students include the median in the upper/lower halves when determining quartiles.
Ask students to define and explain measures of center in context , not just recall definitions.	Students recall definitions without understanding , e.g., don't order data to find the median.
Discuss when a value is an outlier and when it isn't , even if it seems far from others.	Students label far values as outliers , without considering data distribution.
Break multi-step problems into chunks and provide scaffolds for deeper analysis.	Students struggle applying calculations to interpret data or lack fluency in computation .
Use a three-column table for MAD: data, distance from mean, and absolute value.	Students confuse or skip steps in calculating mean absolute deviation (MAD) .
Build in additional time and repeated practice for the concept of MAD.	Students find MAD especially difficult at this level due to abstract reasoning.
Outline and visually display the four steps of MAD (mean → distance → absolute value → mean of abs. values).	Students forget the process for MAD or don't know how each step connects .

Resources

Core

- EdGems Math Course 1

Supplemental

- Ready Common Core

Time Allotment

- Approximately 20 days

CREDIT

PREREQUISITES Grade 5 Mathematics

CURRENT REFERENCES

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Wiggins, G., & McTighe, J. (2005). *Understanding by Design* (Expanded 2nd ed.). ASCD.

ASSURED STUDENT PERFORMANCE RUBRICS

[Smarter Balanced General Scoring Rubric](#)

OTHER RESOURCES

- **Desmos.** (n.d.). *Desmos Graphing Calculator and Math Activities*. Retrieved July 2025, from <https://www.desmos.com/>
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- **Smarter Balanced Assessment Consortium.** (n.d.). *Content-Related Vocabulary for Mathematics Assessments*. Retrieved July 2025, from <https://www.smarterbalanced.org/content-related-vocabulary/>
- **Tools for Teachers.** (n.d.). *Mathematics Resources and Curriculum Support*. Retrieved July 2025, from <https://toolsforteachers.org/>

TRUMBULL PUBLIC SCHOOLS

Trumbull, Connecticut

Mathematics 7

Grade 7

2025

(Last revision date: 2014)

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Mathematics 7

Grade 7

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The Trumbull Board of Education will continue to take Affirmative Action to ensure that no persons are discriminated against in its employment.

CORE VALUES AND BELIEFS

The Trumbull High School community engages in an environment conducive to learning which believes that all students will **read and write effectively**, therefore communicating in an articulate and coherent manner. All students will participate in activities **that present problem-solving through critical thinking**. Students will use technology as a tool applying it to decision making. We believe that by fostering self-confidence, self-directed and student-centered activities, we will promote **independent thinkers and learners**. We believe **ethical conduct** to be paramount in sustaining the welcoming school climate that we presently enjoy.

Approved 8/26/2011

INTRODUCTION & PHILOSOPHY

Mathematics 7 is designed to deepen students' understanding of mathematical concepts while fostering critical thinking, problem-solving skills, and a sense of curiosity about the world around them. This course is offered as a bridge between foundational arithmetic skills and the more abstract thinking required in higher-level mathematics. It provides students with opportunities to explore new topics such as algebraic reasoning, proportional relationships, and geometric thinking, while reinforcing and extending their knowledge of number operations and data analysis. At this stage, students are encouraged to move beyond procedural fluency to develop a conceptual understanding that will support their success in future mathematics courses and real-world applications.

Positioned in the middle of the broader mathematics program, Mathematics 7 builds directly on the skills students acquired in earlier grades, particularly in Mathematics 6, where they developed a strong foundation in fractions, ratios, and basic algebraic expressions. This course sets the stage for more advanced work in Mathematics 8 and Algebra I, where students will be expected to solve complex equations, interpret functions, and apply reasoning to unfamiliar problems. The curriculum emphasizes connections across mathematical domains and promotes mathematical literacy, preparing students for a range of academic pathways in STEM and beyond.

This current edition of the Mathematics 7 curriculum reflects recent revisions aimed at better aligning with updated resources to support the instruction of the Common Core State Standards and research-based strategies for effective math instruction. Emphasis has been placed on collaborative problem-solving, mathematical discourse, and differentiated instruction to meet the needs of diverse learners. Updates include greater integration of technology, more real-world application tasks, and an increased focus on conceptual understanding over rote memorization. Through these changes, the curriculum aspires to equip all students with both the skills and the mindset necessary for continued success in mathematics.

COURSE GOALS

Our Grade 7 math program takes a balanced instructional approach to promote the understanding of mathematical concepts, skills, procedures, and ways of thinking and reasoning that supports the Common Core Standards for Mathematics. This course prepares students for Grade 8 Math and Algebra 1.

Instructional time will focus on four critical areas:

- Connecting ratio and rate to whole number multiplication and division as well as using these concepts to solve problems.
- Completing an understanding of division of fractions, as well as extending the notion of number to the system of rational numbers, including negative numbers.
- Writing, interpreting and using expressions and equations.
- Developing an understanding of statistical thinking.

The following course goals derive from the 2010 Connecticut Core Standards for Mathematics:

Ratios and Proportional Relationships (CCSS.7.RP) Analyze proportional relationships and use them to solve real-world and mathematical problems.

The Number System (CCSS.7.NS) Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

Expressions and Equations (CCSS.7.EE) Use properties of operations to generate equivalent expressions.

Geometry (CCSS.7.G) Draw, construct, and describe geometrical figures and describe the relationships between them.

Statistics and Probability (CCSS.7.SP) Use random sampling to draw inferences about a population.

STANDARDS FOR MATHEMATICAL PRACTICE

The Standards of Mathematical Practice (SMP) are essential to the Mathematics 7 curriculum as they provide a foundation for developing students' mathematical thinking, reasoning, and problem-solving skills. These practices—such as making sense of problems, reasoning abstractly and quantitatively, and constructing viable arguments—encourage students to engage deeply with mathematical concepts rather than simply memorizing procedures. By integrating the SMP into instruction, educators foster a classroom environment where students learn to think critically, communicate their ideas effectively, and approach problems with confidence and perseverance. This not only supports mastery of grade-level content but also builds the habits of mind necessary for success in higher-level mathematics and real-world applications.

SMP1	Students will make sense of problems and persevere in solving them.
SMP2	Students will reason abstractly and quantitatively.
SMP3	Students will construct viable arguments and critique the reasoning of others.
SMP4	Students will model with mathematics.
SMP5	Students will use appropriate tools strategically.
SMP6	Students will attend to precision.
SMP7	Students will look for and make use of structure.
SMP8	Students will look for and express regularity in repeated reasoning.

COURSE ENDURING UNDERSTANDINGS

In 7th grade, enduring understandings center on developing a strong foundation in rational numbers, proportional relationships, and algebraic thinking, as well as applying these concepts to solve real world problems.

Students will understand that...

- **Rational Numbers:** students will understand that rational numbers (fractions, decimals, and percents) are different ways to represent the same value and can be manipulated using the properties of operations.
- **Proportional Relationships:** Students will learn to identify and analyze proportional relationships, using them to solve problems in various contexts.
- **Algebraic Thinking:** Students will begin to work with algebraic expressions and equations, understanding how to solve for unknowns and use these concepts to model real-world situations.
- **Geometry:** Students will develop an understanding of geometric figures, including area, volume, and angle measures, and how these concepts relate to real-world problems.
- **Statistics and Probability:** Students will learn to interpret and analyze data presented in various forms and use random sampling to draw inferences about populations.
- **Problem-Solving:** Students will develop their ability to make sense of problems, persevere in solving them, and understand different solution approaches.

COURSE ESSENTIAL QUESTIONS

- **How can mathematical models represent real-world situations and relationships?** *(Connects to proportional relationships, equations, geometry, statistics.)*
- **What strategies help us solve problems with numbers, variables, and unknowns?** *(Covers number operations, expressions, and equations.)*
- **How do we recognize and describe patterns and structures in mathematics?** *(Relates to proportionality, algebraic thinking, and geometry.)*
- **In what ways can we use mathematics to predict or make informed decisions?** *(Connects especially to statistics, probability, and problem-solving.)*
- **How do operations with positive and negative numbers reflect real-world contexts?** *(Focuses specifically on the number system and real-life applications.)*
- **Why is it important to attend to precision and structure when solving mathematical problems?** *(Promotes CCSS Mathematical Practice Standards, like precision and reasoning.)*
- **How can geometry help us describe and understand the physical world?** *(Ties to measurement, scale drawings, surface area, volume, angles, etc.)*

COURSE KNOWLEDGE & SKILLS

Students will know . . .

- Rational numbers can be represented with visuals (including distance models), language, and real--life contexts
- A number line model can be used to represent the unique placement of any number in relation to other numbers
- Applying number properties can simplify expressions
- Absolute value is a numbers distance from zero
- Relationships exist between positive and negative integers
- The decimal form of a rational number terminates in 0's or repeats.
- The properties used when multiplying and dividing rational numbers.
- Equivalent forms of rational numbers
- Equivalent forms of expressions
- Absolute value is a number's distance from 0.
- Angle relationships can be used to determine missing angle measures in diagrams
- A circle is a closed shape that is defined by the set of points that are the same distance from the center of the circle
- Geometric shapes can be drawn with given conditions
- Three-dimensional figures can be measured by their volume and/or surface area
- Comparing quantities can describe the relationship between them
- How graphs illustrate proportional relationships
- Proportional relationships can be used to solve ratio and percent problems
- Geometrical figures can be used to reproduce a drawing at a different scale
- Variables can be used to represent numbers in any type of mathematical problem
- The difference between an expression and an equation
- Expressions are simplified
- Equations can be solve for the variable's value
- Some equations may have more than one solution and understand inequalities.

- Properties of operations allow us to add, subtract, factor, and expand linear expressions
- Probabilities are between 0 and 1, including 0 and 1
- The formulas for relative frequency, experimental probability, and theoretical probability
- Outcomes of two or more events can be found using fundamental counting principle
- Probability of a compound event can be found using tree diagrams and fundamental counting principle
- Probability of independent events can be found by multiplying the probabilities of individual events together
- probability of two dependent events A and B is the probability of A times the probability of B after A occurs
- How to identify and appropriately utilize measures of central tendency
- The difference between a sample and its population
- The validity of different sampling methods and that bias samples lead to invalid conclusions
- Generate data sets and learn about the importance of representative samples for drawing inferences
- That data sets may be used to predict future events
- The way that data is collected, organized and displayed influences interpretation
- The results of a statistical investigation can be used to refute or support an argument
- Simulations allow you to study situations that are impractical to create in real life
- Samples can be used to make inferences about a population. Unbiased samples help make more accurate inferences
- To use mean and mean absolute deviation when comparing two populations with symmetric distribution
- To use inter quartile range and median when comparing two populations with asymmetric distribution

Students will be able to . . .

- Add and subtract rational numbers
- Represent addition and subtraction on a horizontal or vertical number line diagram
- Use words, visuals, and symbols to describe situations in which opposite quantities combine to make zero
- Represent addition of quantities with symbols, visuals, and words by showing positive or negative direction from one quantity to the other
- Show that a number and its opposite have a sum of 0 using visuals, symbols, words, and real-world contexts
- Use the term “additive inverse” to describe 2 numbers whose sum is zero
- Use commutative, distributive, associative, identity, and inverse properties to add and subtract rational numbers
- Use the term “absolute value” to describe the distance from zero on number line diagram and with symbols
- Multiply and divide rational numbers
- Understand and develop fluency of multiplication of integers through definition of integers and multiplication as repeated addition
- Develop the rules for multiplying integers and extend that understanding to all rational numbers for the purpose of fluency.
- Apply rules of signed numbers to real-world contexts

- Extend the rules of multiplication to division of integers using the inverse relationship between multiplication and division
- Apply division of integers to real-world contexts
- Apply rules of multiplication and division to all rational numbers
- Convert rational numbers to decimals using long division
- Solve real-world and mathematical problems involving the four operations with rational numbers
- Use equivalent expressions to demonstrate the relationship between quantities and determine simpler solutions to a problem
- Use facts about angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure
- Identify nets of three-dimensional figures
- Calculate area and circumference of circles
- Calculate area of composite figures
- Calculate volume and surface area of composite figures
- Calculate volume of prisms and pyramids
- Calculate surface area of prisms and pyramids
- Create two-dimensional figures using rulers, protractors, and compasses
- Analyze given conditions to construct a unique triangle, more than one triangle, or no triangle
- Compute unit rates involving rational numbers, fractions, and complex fractions
- Compute ratios of length in like or different units
- Compute ratios of area and other measurements in like or different units
- Determine whether two quantities are in a proportional relationship by using a table and or graph
- Identify the constant of proportionality (unit rate) in tables, graphs, diagrams, and verbal descriptions
- Create and solve equations to represent proportional relationships
- Use words to describe the location of a point on a graph and its relationship to the origin
- Explain what a point on a graph of a proportional relationship means in terms of the situation
- Solve multi-step ratio and percent problems
- Solve problems involving percent increase, percent decrease, and percent (margin of) error
- Solve problems involving scale drawings of geometric figures.
- Compute actual lengths and areas from a scale drawing
- Reproduce a scale drawing at a different scale
- Use Commutative, Associative, Distributive, Identity, and Inverse Properties to add and subtract linear expressions with rational coefficients
- Use Commutative, Associative, Distributive, Identity, and Inverse Properties to factor and expand linear expressions with rational coefficients
- Rewrite an expression in a different form
- Choose the form of an expression that works best to solve a problem
- Explain your reasoning for the choice of expression used to solve a problem
- Write and solve multi-step equations including all rational numbers.
- Translate words or real-life situations into variable equations
- Translate words or real-life situations into variable inequalities
- Solve one- or two-step equations with rational numbers fluently

- Solve word problems leading to one- or two-step equations with rational
- Construct simple equations and inequalities with rational numbers to solve problems
- Compare an algebraic solution to an arithmetic solution, identifying the
- sequence of the operations used in each approach
- Solve word problems leading to one- or two-step inequalities with rational numbers
- Graph the solution set of inequalities and interpret it in the context of the problem.
- Represent the probability of a chance event as a number between 0 and 1
- Use the terms “likely”, “unlikely,” to describe the probability represented by the fractions used
- Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency
- Predict the approximate relative frequency of a chance event given the probability
- Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events
- Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process
- Compare probabilities from a model to observed frequencies
- If the agreement between a model and observed frequencies is not good, explain possible sources of the discrepancy
- Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation
- Represent the probability of a compound event as the fraction of outcomes in the sample space for which the compound event occurs
- Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams
- For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event
- Design and use a simulation to generate frequencies for compound events
- Recognize and identify that different sampling techniques must be used in real life situations, because it is very difficult to survey an entire population
- Select appropriate sample sizes based on a population in real-life situations and explain why generalizations about a population from a sample are valid only if the sample is random and representative of that population
- Collect data from a sample population in order to predict information about a population
- Interpret data from a random sample to draw inferences about a population with an unknown characteristic of interest
- Generate multiple samples (or simulated samples) of the same size to determine the variation in estimates or predictions by comparing the samples
- Identify the degree of overlap between two numerical sets of data
- Visually compare two numerical data distributions with like ranges
- Measure the difference between the centers of two different data distributions and express this difference as a multiple of a measure of variability
- Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations

COURSE SYLLABUS

Course Name

Mathematics 7

Level

Regular Paced

Prerequisites

Successful completion of Grade 6 Mathematics

Core Resource: EdGems Math Course 2

General Description of the Course

Mathematics 7 is a comprehensive course that builds upon prior knowledge and prepares students for higher-level mathematics. The curriculum is aligned with the Common Core State Standards and emphasizes the development of critical thinking, problem-solving skills, and mathematical reasoning.

Students will engage in an in-depth study of ratios and proportional relationships, operations with rational numbers, expressions, equations, and inequalities. They will extend their understanding of geometry through the study of scale drawings, area, surface area, and volume of two- and three-dimensional figures. Additionally, students will explore statistics and probability, applying mathematical concepts to interpret and analyze data.

Throughout the course, students will be expected to demonstrate mastery of mathematical practices, including problem-solving, reasoning abstractly and quantitatively, constructing viable arguments, and attending to precision. Emphasis will be placed on the application of mathematics to real-world situations, the use of appropriate tools and strategies, and the communication of mathematical thinking both orally and in writing.

Successful completion of Mathematics 7 will provide students with a strong foundation for Algebra 1 and future mathematics. Students are expected to participate actively, think critically, and engage consistently in both independent and collaborative work.

Assured Assessments

Formative Assessments:

- o exit tickets, tiered practices, Teacher Gem activities, Focused Interim Assessment Blocks (FIABs)

Summative Assessments:

- o Unit Assessments
- o Trimester Performance Tasks

Supplemental Texts and Resources

- o Ready Common Core (i-Ready Teacher Toolbox)
- o Smarter Balanced Assessment Resources

UNIT 1: Proportional Relationships Part I
Ratios and Rates
(Calculator use allowed)

Unit Goals

At the completion of this unit, students will:

CCSS.7.RP.A.1 **Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks $\frac{1}{2}$ mile in each $\frac{1}{4}$ hour, compute the unit rate as the complex fraction $\frac{1}{2}$ to $\frac{1}{4}$ miles per hour, equivalently 2 miles per hour.**

CCSS.7.G.A.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

Standards for Mathematical Practices

- | | |
|------|--|
| SMP2 | Students will reason abstractly and quantitatively. |
| SMP3 | Students will construct viable arguments and critique the reasoning of others. |
| SMP4 | Students will model with mathematics. |
| SMP5 | Students will use appropriate tools strategically. |

Big Ideas

Students will understand:

- Rates, ratios, and proportional relationships express how quantities change in relationship to each other;
- Rates, ratios, and proportional relationships can be represented in multiple ways;
- Rates, ratios, and proportional relationships can be applied to problem solving situations; and
- Scale drawings can be applied to problem solving situations involving geometric figures.

Unit Essential Questions

Teachers will ask:

- How do rates, ratios, and proportional relationships apply to our world?
- When and why do I use proportional comparisons?
- How can I use scale drawings to compute actual lengths and areas?

Vocabulary:

ratio, tape diagram, equivalent ratios, rate, **unit rate**, complex fraction, reciprocal, **scale drawing**, **scale**, **scale factor**, corresponding sides

Unit Scope and Sequence

- Ratios (Lesson 1.1)
- Unit Rates (Lesson 1.2)
- Rates and Ratios with Complex Fractions (Lesson 1.3)
- Scale Drawings (Lesson 1.4)

Unit Assured Assessments**Formative Assessments:** Exit tickets, tiered practices, Teacher Gems activities**Summative Assessments:** Ratios and Rates Quiz (lesson 1.1- 1.2), Unit Assessment**Common Misconceptions:**

Teacher Moves	Misconceptions Addressed
Emphasize and model multiplicative reasoning when generating equivalent ratios	Students may confuse multiplicative and additive relationships in ratios
Use consistent language like “___ out of ___” to connect fractions to parts of a whole , not separate counts	Students may think of the numerator and denominator as separate whole numbers rather than parts of the same whole
Teach and practice ordering of terms in ratios , connecting to context (e.g., "boys to girls")	Students may mix up the order of numbers in a ratio
Use visual models or scenarios to distinguish part-to-part vs. part-to-total ratios	Students may confuse a part-to-part ratio with a part-to-total ratio
Model how to set up rates from context using unit labels and annotated numerators and denominators	Students may mix up numerator and denominator when forming a rate from a word problem
Incorporate visuals or diagrams when introducing unit rates	Some students have difficulty understanding unit rates without visual representations
Provide scaffolded division practice within the context of rates and ratios	Students lacking fluency in division may make errors calculating unit rates
Break down complex fractions and model how to convert and interpret ratio forms correctly	Students may rewrite ratios with complex fractions incorrectly or interpret them as a single value
Provide step-by-step guidance in converting ratios to unit rates	Some students have difficulty writing ratios into unit rates
Incorporate fraction division fluency-building activities into instruction	Seventh graders may have varying levels of fluency with dividing fractions
Use real-world contexts to practice converting units with scale factors	Students who haven't mastered measurement units may struggle to convert correctly
Emphasize that fractional scale factors can lead to either enlargements or reductions , depending on context	Students may think fractional scale factors always reduce the size
Consistently draw contrasts between additive and multiplicative reasoning with examples and non-examples	Students may confuse additive and multiplicative thinking

ResourcesCore

- EdGems Math Course 2

Supplemental

- Ready Common Core

Time Allotment

- Approximately 15 days

UNIT 2: Proportional Relationships Part II

Proportional Relationships

(Calculator use allowed)

Unit Goals

At the completion of this unit, students will:

- CCSS.7.RP.A.2 Recognize and represent proportional relationships between quantities.**
- Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.**
 - Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.**
 - Represent proportional relationships by equations.**
 - Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points $(0, 0)$ and $(1, r)$ where r is the unit rate.**
- CCSS.7.RP.A.3 Use proportional relationships to solve multistep ratio and percent problems.**

Standards for Mathematical Practices

- | | |
|------|--|
| SMP2 | Students will reason abstractly and quantitatively. |
| SMP3 | Students will construct viable arguments and critique the reasoning of others. |
| SMP8 | Students will look for and express regularity in repeated reasoning. |

Big Ideas

Students will understand:

- Rates, ratios, and proportional relationships express how quantities change in relationship to each other;
- Rates, ratios, and proportional relationships can be represented in multiple ways;
- Rates, ratios, and proportional relationships can be applied to problem solving situations; and
- Scale drawings can be applied to problem solving situations involving geometric figures.

Unit Essential Questions

Teachers will ask:

- How do rates, ratios, and proportional relationships apply to our world?
- When and why do I use proportional comparisons?
- How can I use scale drawings to compute actual lengths and areas?

Vocabulary:**constant of proportionality, proportion, proportional relationship, origin****Unit Scope and Sequence**

- Proportional Relationships (Lesson 2.1)
- Problem-Solving with Proportions (Lesson 2.2)
- Tables and Graphs of Proportional Relationships (Lesson 2.3)
- Proportional Relationship Equations (Lesson 2.4)

Unit Assured Assessments

Formative Assessments: Exit tickets, tiered practices, Teacher Gems activities

Summative Assessments: Proportions Mid Unit Quiz (2.1 - 2.2), Unit 2 Assessment

Common Misconceptions:

Teacher Moves	Misconceptions Addressed
Use real-world examples to help students see how two quantities vary together	Some students don't have a firm understanding of the relationship of two quantities as they vary together
Emphasize and model how proportions are equivalent fractions	Some students need more help recognizing that proportions are equivalent fractions
Teach where and how to place units consistently in different forms of proportional relationships	Students may confuse where to place units within proportional relationships that are not written as fractions
Provide targeted practice and feedback on correct ratio and proportional reasoning	Some students need help to understand correct ratio and proportional reasoning
Encourage and model reasonableness checks when solving problems	Students forget to check their answers for reasonableness
Stress the importance of including units in answers and models	Students often omit units when solving proportions
Use graphical tools and step-by-step guides for identifying unit rate from graphs	Some students have difficulty finding unit rate on a graph
Show that real-world graphs often extend beyond the origin and include many points	Students may think lines representing real-world proportional relationships stop at the origin
Reinforce that the same type of quantity belongs on the same axis when graphing	While graphing, some students may need reminders that same types of quantities need to be graphed on the same axis
Provide guided practice on identifying variables in equations	Some students confuse the variables in equations when they try to express a proportional relationship
Connect equations like $y = 4x$ to proportional	Some students struggle to recognize proportional

reasoning and highlight the constant of proportionality	equations or identify the constant of proportionality
Scaffold table creation with a focus on precision in arithmetic and pattern recognition	Students may make arithmetic errors when creating tables for proportional relationship equations

Resources

Core

- EdGems Math Course 2

Supplemental

- Ready Common Core

Time Allotment

- Approximately 14 days

UNIT 3
Percents
(Calculator Use Allowed)

Unit Goals

At the completion of this unit, students will:

CCSS.7.NS.A.2 **Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.**

d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.

CCSS.7.RP.A.3 **Use proportional relationships to solve multistep ratio and percent problems..**

Standards for Mathematical Practices

- | | |
|------|--|
| SMP1 | Students will be able to make sense of problems and persevere in solving them. |
| SMP2 | Students will reason abstractly and quantitatively. |
| SMP6 | Students will attend to precision. |
| SMP8 | Students will look for and express regularity in repeated reasoning. |

Big Ideas:

Students will know...

- Proportional relationships can be used to solve percent problems;
- Real world problems involving sales tax, tip, markups and discounts, and commission can be solved using percent; and
- Fractions, decimals, and percents can be used to represent the same ratio and will be able to determine which representation is best used for given real world situations.

Unit Essential Questions:

Teachers will ask:

- What does a percent mean?
- How can you convert between fractions, decimals, and percents? When is this helpful?
- How can percents be used to solve problems?

Vocabulary:

percent, **repeating decimals**, **terminating decimals**, **percent error**, percent of change, **percent of decrease**, **percent of increase**, commission, discount, interest, markup, principal, sales tax

Unit Scope and Sequence

- Fractions, Decimals and Percents (Lesson 3.1)
- Percent of a Number (Lesson 3.2)
- Percent of Change (Lesson 3.3)

- Percent Applications (Lesson 3.4)

Unit Assured Assessments

Formative Assessments: Exit tickets, tiered practices, Teacher Gems activities, Ratios and Proportional Relationships FIAB

Summative Assessments: Finding Percents Quiz (3.1 - 3.2), Unit Assessment

Common Misconceptions:

Teacher Moves	Misconceptions Addressed
Use place value charts and number lines to compare decimals accurately	Some students think that the longer a decimal number is, the larger it is (they don't compare decimal places)
Introduce visual models (e.g., bar models, number lines) and real-world contexts for percents over 100	Students often have a hard time understanding percentages that are greater than 100
Provide explicit instruction and guided practice for converting between decimals and percents	Students often make the common mistake of converting between decimals and percentages incorrectly
Highlight the meaning of the percent symbol ("per hundred") when increasing by a percent	Some students think increasing by "x" percent is the same as increasing by "x"; they ignore the percentage symbol
Emphasize that finding a percent of a number always involves multiplication after converting the percent	Students may not realize that finding the percent of a number involves division first, based on the definition of a percent
Teach students to use a "translation organizer" to interpret "percent of" problems	For "percent of" questions, students may find it helpful to use a "translation organizer"
Use concrete examples to contrast 5% of an item vs. 105% of an item	Students often don't understand the difference between 5% of an item and 105% of an item
Reinforce that percent values are relative quantities , not absolute amounts	Some students mistakenly treat percent values as absolute values
Use the "change over original" strategy for percent change problems	For "percent of change" questions, some students benefit from using "change over the original" to set up proportions
Use consistent language and anchor charts to clarify percent error formulas	Percent error may cause confusion over whether to divide by the actual value or the estimate
Pre-teach and reinforce real-life percent	Some students misunderstand common

vocabulary through scenarios and matching activities	percent-related vocabulary: sale, discount, tax, markup
Teach that percents cannot be simply added and instead must be applied to a base value	Some students think that percents can be simply added
Provide scaffolding for multi-step percent problems and stress using interim results to solve the final step	In multi-step percent problems, students may find a part of a whole but not use it to determine the final quantity being asked

Resources

Core

- EdGems Math Course 2

Supplemental

- Ready Common Core

Time Allotment

- Approximately 14 days

UNIT 4
Sums and Differences of Rational Numbers
(No Calculator)

Unit Goals

At the completion of this unit, students will:

- CCSS.7.NS.A.1** **Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.**
- a. Describe situations in which opposite quantities combine to make 0.**
 - b. Understand $p + q$ as the number located a distance $|q|$ from p , in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.**
 - c. Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.**
 - d. Apply properties of operations as strategies to add and subtract rational numbers.**
- CCSS.7.NS.A.3** **Solve real-world and mathematical problems involving the four operations with rational numbers.**

Standards for Mathematical Practices

- | | |
|------|---|
| SMP3 | Students will reason abstractly and quantitatively. |
| SMP4 | Students will model with mathematics. |
| SMP5 | Students will use appropriate tools strategically. |
| SMP6 | Students will attend to precision. |

Students' Big Ideas

Students will know:

- Rational numbers can be represented with visuals (including distance models), language, and real-world contexts;
- A number line model can be used to represent the unique placement of any number in relation to other numbers;
- Applying number properties can simplify expressions;
- Absolute value is a numbers distance from zero; and
- Relationships exist between positive and negative integers.

Essential Questions

Teachers will ask:

- How are rational numbers used and applied in real-life and mathematical situations?
- What is the relationship between properties of operations and types of numbers?

Vocabulary:

absolute value, additive inverses, integer, negative number, opposite, positive number, rational number, sum, difference

Unit Scope and Sequence

- Adding Integers (Lesson 4.1)
- Adding Rational Numbers (Lesson 4.2)
- Subtracting Integers (Lesson 4.3)
- Subtracting Rational Numbers (Lesson 4.4)

Unit Assured Assessments

Formative Assessments: exit tickets, tiered practices, Teacher Gems activities

Summative Assessments: Adding Rational Numbers Quiz (4.1 -4.2), Unit Assessment

Common Misconceptions:

Teacher Moves	Misconceptions Addressed
Use number lines and integer chips to show that adding two negatives results in a more negative number	Some students think that adding two negatives together will always equal a positive number
Integrate real-world contexts (e.g., temperatures, money, elevation) to support addition of negative integers	Some students have difficulty in applying a real-world context to the addition of a negative integer
Teach students to organize and annotate multi-step problems clearly	When adding more than two integers, students may struggle with organizing their work
Use visual models (e.g., number lines, fraction strips) to locate fractional values	Students may have a hard time understanding the value of a fraction on a number line
Emphasize the importance of common denominators before performing fraction addition	A common mistake that students make when adding fractions is forgetting to find a common denominator first
Provide step-by-step checklists for rational number operations to catch errors	Rational number operations have many steps where students can make computation errors
Teach clear strategies for placing negative signs in computations with fractions	Students may struggle with where to put the negative sign when computing with fractions
Use examples and counterexamples to explain rules for subtracting negative numbers	Some students think that subtracting two negatives always gives a positive number, but it depends on the values involved

Reinforce the concept that subtracting a negative is the same as adding a positive	Some students think subtracting a negative makes the value go down, when it actually increases
Clarify the difference between the subtraction symbol and a negative sign with side-by-side comparisons	Students often confuse the negative sign with the subtraction symbol
Demonstrate that fractions must be added by finding equivalent fractions , not by adding numerators and denominators	Students make the mistake of adding numerators and denominators when performing operations with rational numbers
Teach students to develop a problem-solving plan when tackling expressions involving fractions and decimals	Students may struggle with how to approach expressions with mixed rational number formats (fractions and decimals)

Resources

Core

- EdGems Math Course 2

Supplemental

- Ready Common Core

Time Allotment

- Approximately 14 days

UNIT 5
Products and Quotients of Rational Numbers
(No Calculator)

Unit Goals

At the completion of this unit, students will:

CCSS.7.NS.A.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

- a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
- b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.
- c. Apply properties of operations as strategies to multiply and divide rational numbers.
- d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.

CCSS.7.NS.A.3 Solve real-world and mathematical problems involving the four operations with rational numbers.

Standards for Mathematical Practices

SMP2	Students will reason abstractly and quantitatively.
SMP3	Students will construct viable arguments and critique the reasoning of others.
SMP4	Students will model with mathematics.
SMP5	Students will use appropriate tools strategically.

Big Ideas

Students will understand:

- For a given set of numbers there are relationships that are always true, and these are the rules that govern arithmetic and algebra;
- Numerical representations can be used to describe and compare the value of real-world quantities;
- Solving real-world problems involves using all properties of operations and all integer rules; and
- Every point on a line corresponds to a real number.

Unit Essential Questions

Teachers will ask:

- How are rational numbers used and applied in real-life and mathematical situations?
- What is the relationship between properties of operations and types of numbers?

Vocabulary:

inverse operations

Unit Scope and Sequence

- Multiplying and Dividing Integers (Lesson 5.1)
- Multiplying Rational Numbers (Lesson 5.2)
- Dividing Rational Numbers (Lesson 5.3)

Unit Assured Assessments

Formative Assessments: exit tickets, tiered practices, Teacher Gems activities, The Number System FIAB

Summative Assessments: Unit Assessment

Common Misconceptions:

Teacher Moves	Misconceptions Addressed
Explicitly differentiate between rules for addition/subtraction and those for multiplication/division of integers	When multiplying two negative numbers, students may incorrectly apply addition and subtraction rules
Use counterexamples and visual models (e.g., number lines, integer chips) to address sign misconceptions	Some students may think that the integer with the greatest absolute value dictates the sign of the product
Teach sign rules for integer division clearly, using structured practice with positive and negative combinations	Students often think that if they see a negative sign in a division problem, the answer must be negative
Provide structured mathematical contexts to help generalize integer multiplication/division rules	Students who struggle to generalize rules from real-world contexts can benefit from mathematical contexts
Emphasize that products with rational numbers may be smaller than the factors	Students may be confused that the product is not always larger than the factors with rational numbers
Teach fraction multiplication as multiplying across numerators and denominators , not relying on common denominators	Some students incorrectly leave denominators unchanged when multiplying fractions with the same denominator
Reinforce why and when to use reciprocals with visual models or conceptual language, not	Students misapply the flip-and-multiply rule due to lack of conceptual understanding

just "flip and multiply"	
Break down decimal division into clearly modeled, step-by-step procedures with estimation checks	The process of dividing decimals has multiple steps that allow for student computation errors
Provide real-world word problems with clear cues for multiplication vs. division and model how to identify them	When solving real-world problems, students may struggle to determine whether to multiply or divide

Resources

Core

- EdGems Math Course 2

Supplemental

- Ready Common Core

Time Allotment

- Approximately 12 days

UNIT 6

Expressions (No Calculator)

Unit Goals

At the completion of this unit, students will:

- CCSS.7.NS.A.3** Solve real-world and mathematical problems involving the four operations with rational numbers.
- CCSS.7.EE.A.1** Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
- CCSS.7.EE.A.2** Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.
- CCSS.7.EE.B.3** Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.

Standards for Mathematical Practices

- SMP1 Students will make sense of problems and persevere in solving them.
- SMP6 Students will attend to precision.
- SMP7 Students will look for and make use of structure.
- SMP8 Students will look for and express regularity in repeated reasoning.

Big Ideas

Students will understand:

- Expressions can be manipulated to suit a particular purpose to solve problems efficiently;
- Mathematical expressions, equations, inequalities, and graphs are used to represent and solve real-world and mathematical problems; and
- Properties, Order of Operations, and inverse operations are used to simplify expressions and solve equations efficiently.

Unit Essential Questions

Teachers will ask:

- When and how are expressions, equations, inequalities, and graphs applied to real-world situations?
- How can the Order of Operations be applied to evaluating expressions, and solving from one-step to multi-step equations?
- What are some possible real-life situations to which there may be more than one solution?

Vocabulary:

base, cubed, exponent, order of operations, power, squared, algebraic expression, **rational coefficient**, **constant**, evaluate, term, **variable**, equivalent expressions, **factoring**, like terms, **distributive property**, **linear expression**, **associative property of addition/multiplication**, **commutative property of addition/multiplication**, **numeric expression**, **additive/multiplicative identity**, **additive/multiplicative inverse**

Unit Scope and Sequence

- Order of Operations (Lesson 6.1)
- Algebraic Expressions (Lesson 6.2)
- The Distributive Property (Lesson 6.3)
- Equivalent Expressions (Lesson 6.4)

Unit Assured Assessments

Formative Assessments: exit tickets, tiered practices, Teacher Gems Activities, Equivalent Expressions FIAB

Summative Assessments: Simplifying Expressions Quiz (6.1 - 6.2), Unit Assessment

Common Misconceptions:

Teacher Moves	Misconceptions Addressed
Reinforce the Order of Operations using structured examples and mnemonic devices (e.g., PEMDAS)	Some students do not apply the Order of Operations systematically and instead rely on mental math
Encourage organized computation and reasoning—discouraging “carrying over” numbers without purpose	Students sometimes bring a number they just used into the next part of the problem without reason
Provide targeted practice where Order of Operations is applied correctly vs. incorrectly to highlight left-to-right errors	Students make errors by applying operations strictly left to right, forgetting to use the correct hierarchy
Clarify that letters in algebra can be variables or labels and their meaning depends on context	Using letters as labels can confuse students who believe variables always represent a fixed or familiar value
Explicitly teach the difference between a negative sign and a subtraction symbol in expressions	Students confuse negative signs with minus signs in variable expressions, which results in incorrect strategies
Use balance models and relational thinking to show that the equal sign represents equivalence	Some students think the equal sign just means “where the answer goes” rather than a symbol of equality
Use worked examples and error analysis to emphasize structural understanding of equations	Students may perform operations on all numbers in an equation regardless of their position, due to misinterpreting the equal sign

ResourcesCore

- EdGems Math Course 2

Supplemental

- Ready Common Core

Time Allotment

- Approximately 14 days

UNIT 7
Equations and Inequalities
(No Calculator)

Unit Goals

At the completion of this unit, students will:

- CCSS.7.EE.A.2** Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks $\frac{1}{2}$ mile in each $\frac{1}{4}$ hour, compute the unit rate as the complex fraction $\frac{1}{2}$ to $\frac{1}{4}$ miles per hour, equivalently 2 miles per hour.
- CCSS.7.EE.B.3** Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.
- CCSS.7.EE.B.4** Use variables to represent quantities in real-world or mathematical problems, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
- a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p , q , and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.
 - b. Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p , q , and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.

Standards for Mathematical Practices

- | | |
|------|---|
| SMP2 | Students will reason abstractly and quantitatively. |
| SMP4 | Students will model with mathematics. |
| SMP5 | Students will use appropriate tools strategically. |

Big Ideas

Students will understand:

- Expressions can be manipulated to suit a particular purpose to solve problems efficiently;
- Mathematical expressions, equations, inequalities, and graphs are used to represent and solve real-world and mathematical problems; and
- Properties, Order of Operations, and inverse operations are used to simplify expressions and solve equations efficiently.

Unit Essential Questions

Teachers will ask:

- When and how are expressions, equations, inequalities, and graphs applied to real-world situations?
- How can the Order of Operations be applied to evaluating expressions, and solving from one-step to multi-step equations?
- What are some possible real-life situations to which there may be more than one solution?

Vocabulary:

equation, inequality, solution, solution set

Unit Scope and Sequence

- Solving One-Step Equations (Lesson 7.1)
- Solving Two-Step Equations (Lesson 7.2)
- Simplifying and Solving Equations (Lesson 7.3)
- Linear Inequalities (Lesson 7.4)

Common Misconceptions:

Teacher Moves	Misconceptions Addressed
Reinforce integer rules within the context of solving equations and inequalities	Students may forget to apply the addition and subtraction integer rules when solving equations and inequalities
Provide structured practice with variables on both sides , especially on the right side of the equal sign	Students may struggle with solving equations when the variable is on the right side of the equals sign
Clarify the meaning of division involving variables and model why the result is a coefficient, not a fraction	Some students may think that when a variable is divided by a value, the resulting term is a fraction
Use algebra tiles or visual models to support understanding of zero-pairs in equation solving	Some students may struggle with zero-pairs when solving equations
Break down equations involving subtraction from a constant and model how to isolate the variable	Students may find equations with a term subtracted from a constant challenging
Teach a step-by-step structure for solving equations, emphasizing correct application of operations on both sides	Students may attempt to combine like terms incorrectly, multiply by the wrong value, or apply different operations on each side
Emphasize the inequality rule for multiplying/dividing by negatives with visuals and repeated exposure	Students may forget to switch the inequality sign when multiplying or dividing by a negative
Provide scaffolding and sentence frames for translating word problems into inequalities	Some students find it difficult to write an inequality from a given word problem

Unit Assured Assessments

Formative Assessments: exit tickets, tiered practices, Teacher Gem activities, Algebraic Expressions and Equations FIAB, Expressions and Equations IAB

Summative Assessments: Solving One- and Two-Step Equations Quiz (7.1 - 7.2), Unit Assessment

ResourcesCore

- EdGems Math Course 2

Supplemental

- Ready Common Core

Time Allotment

- Approximately 16 days

UNIT 8
Two-Dimensional Geometry
(Calculator Use allowed)

Unit Goals

At the completion of this unit, students will:

- CCSS.7.G.A.2 Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when conditions determine a unique triangle, more than one triangle, or no triangle.
- CCSS.7.G.A.4 Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
- CCSS.7.G.B.5 Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle figure.
- CCSS.7.G.B.6 Solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

Standards for Mathematical Practices

- SMP1 Students will make sense of problems and persevere in solving them.
- SMP3 Students will construct viable arguments and critique the reasoning of others.
- SMP4 Students will model with mathematics.
- SMP5 Students will use appropriate tools strategically.
- SMP6 Students will attend to precision.
- SMP7 Students will look for and make use of structure.

Big Ideas

Students will understand:

- Angle relationships can be used to determine missing angle measures in diagrams;
- A circle is a closed shape that is defined by the set of points that are the same distance from the center of the circle; and
- Geometric shapes can be drawn with given conditions

Unit Essential Questions

Teachers will ask:

- Why are geometry and geometric figures relevant and important?
- What are the major classifications and relationships of angles, polygons, and solids?

Vocabulary:

angle, **complementary angles**, degrees, protractor, ray, **supplementary angles**, vertex, sector, **linear pair**, **vertical angles**, **area**, **polygons**, **trapezoid**, **quadrilateral**, **parallelogram**, **square**, **rectangle**, **adjacent angles**, center, central angle, chord, **circle**, **circumference**, **diameter**, **pi** (π), **radius**, composite figure, **triangle (acute, obtuse, right, equilateral, isosceles, scalene)**, **plane**, **perpendicular**, **parallel**, **horizontal slice**, **vertical slice**

Unit Scope and Sequence

- Complementary and Supplementary Angles (Lesson 8.1)
- Vertical and Adjacent Angles (Lesson 8.2)
- Drawing Triangles with Given Conditions (Lesson 8.3)
- Area of Polygons (Lesson 8.4)
- Circumference and Pi (Lesson 8.5)
- Area of a Circle (Lesson 8.6)
- Composite Figures (Lesson 8.7)

Common Misconceptions:

Teacher Moves	Misconceptions Addressed
Use visual models to show that complementary and supplementary angles do not have to be adjacent	Many students believe complementary and supplementary angles must be adjacent
Reinforce definitions with side-by-side comparisons and visuals of complementary vs. supplementary angles	Students may confuse complementary and supplementary
Teach how to read both scales on a protractor and connect to angle orientation	Some students think degree measure is read from only one side of the protractor
Use word walls, diagrams, and repeated exposure to reinforce angle-related vocabulary	Students often confuse vocabulary words related to angles
Use diagrams and real-life examples to show that vertical angles are formed by intersecting lines , not vertical direction	Students assume vertical angle pairs only occur in an “up and down” orientation
Emphasize that adjacent angles do not have a fixed numerical relationship	Students try to force adjacent angles to equal 90° or 180°
Provide triangle construction tasks using different combinations of side lengths and angles to explore triangle viability	Students rely on a sketched triangle’s appearance and don’t evaluate the validity of given dimensions
Use exploration tasks and counterexamples to challenge false assumptions about triangles	Students may make incorrect assumptions about triangles
Reinforce that a triangle can be drawn with various combinations of side lengths and/or angle measures	Students may think all three side lengths or all three angles are needed to draw a triangle

Teach the differences between perimeter, area, volume, and surface area using context and labeled diagrams	Students confuse when to use perimeter, area, volume, or surface area
Provide guided practice identifying diagonals vs. edges or heights with labeled polygons	Students confuse diagonals with edges or heights when drawing inside polygons
Teach students to slow down and interpret real-world problems before choosing a formula	Students may rush to plug in numbers from real-world contexts without considering what is being asked
Build conceptual understanding of formulas before asking students to memorize them	Some students struggle to memorize formulas due to lack of understanding
Use physical models and visuals to clarify the difference between radius and diameter	Students often confuse radius and diameter in computations
Distinguish between exact values (in terms of π) and approximations for area and circumference of circles	Students may struggle with understanding whether the solution should be exact or an approximation
Break down composite figures into known shapes and use color-coding to minimize errors	Students make errors when breaking composite figures into known shapes
Provide structured multi-step problem-solving strategies for finding area of composite figures	Students who struggle with multi-step problems may find it difficult to find the area of composite figures

Unit Assured Assessments

Formative Assessments: exit tickets, tiered practices, Teacher Gems activities

Summative Assessments: Angle Relationships Quiz (8.1 -8.2), Triangles and Polygons Quiz (8.3 - 8.4), Area and Circumference of Circles Quiz (8.5 - 8.6), Unit Assessment

Resources

Core

- EdGems Math Course 2

Supplemental

- Ready Common Core

Time Allotment

- Approximately 20 days

UNIT 9

Three-Dimensional Geometry

(Calculator Use allowed)

Unit Goals

At the completion of this unit, students will:

- CCSS.7.G.A.3 Describe two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
- CCSS.7.G.B.6 Solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

Standards for Mathematical Practices

- SMP2 Students will reason abstractly and quantitatively.
- SMP3 Students will construct viable arguments and critique the reasoning of others.
- SMP4 Students will model with mathematics.
- SMP5 Students will use appropriate tools strategically.

Big Ideas

Students will understand:

- Three-dimensional figures can be measured by their volume and/or surface area

Unit Essential Questions

Teachers will ask:

- Why are geometry and geometric figures relevant and important?
- What are the major classifications and relationships of angles, polygons, and solids?

Vocabulary:

base, cone, cross-section, cylinder, edge, face, great circle, lateral face, prism (right-rectangular), pyramid (right-rectangular, square), solid, sphere, vertex, net, surface area, regular pyramid, slant height, volume, surface area, cube

Unit Scope and Sequence

- Three-Dimensional Figures (Lesson 9.1)
- Surface Area of Prisms (Lesson 9.2)
- Surface Area of Pyramids (Lesson 9.3)
- Volume of Prisms and Pyramids (Lesson 9.4)

Common Misconceptions:

Teacher Moves	Misconceptions Addressed
Use 3D models or nets to help students see hidden attributes and avoid double-counting	Students may not count hidden attributes or may count visible ones twice
Introduce vocabulary in chunks over time and reinforce with visual word walls and repeated use	Students may struggle with the amount of vocabulary introduced in a single lesson
Use physical models and cross-sectional animations to help students visualize slices of solids	Many students struggle with visualizing slices of solids
Model and label all steps when finding surface area of prisms , using nets and real-world examples	Understanding how to find surface area of prisms will be challenging for many students
Break down word problems involving surface area into visual components and diagrams	Some students struggle with surface area word problems
Emphasize correctly identifying and labeling all faces of a prism using nets or color-coding	Students make errors calculating surface area by miscounting or missing faces
Reinforce that area uses square units and volume uses cubic units, using anchor charts and practice	When calculating surface area, students may confuse which type of units to use
Revisit the area of a triangle formula and provide reminders to include $\frac{1}{2}$ when appropriate	Students may forget to multiply base $\times$ height by $\frac{1}{2}$ when calculating area of triangle faces
Use diagrams to differentiate between the slant height of a triangular face and the height of the entire pyramid	Students may confuse the height of a pyramid with the height of a triangular face
Emphasize the importance of including the base when calculating surface area of pyramids	Students may forget to include the base in their final surface area
Use comparison tasks and anchor charts to distinguish surface area vs. volume	Students often confuse surface area and volume problems
Provide examples showing that different shapes can have equivalent volumes to develop volume reasoning	Some students don't understand that different shapes can have equivalent volumes

Unit Assured Assessments

Formative Assessments: exit tickets, tiered practices, Teacher Gems activities, Geometric Figures FIAB, Angles, Area, and Volume FIAB

Summative Assessments: Surface Area Quiz (9.1 - 9.3), Volume Quiz (9.4)

ResourcesCore

- EdGems Math Course 2

Supplemental

- Ready Common Core

Time Allotment

- Approximately 14 days

UNIT 10
Probability and Statistics
(Calculator Use Allowed)

Unit Goals

At the completion of this unit, students will:

- CCSS.7.SP.A.1 Understand that statistics can be used to gain information about a population by examining a sample population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
- CCSS.7.SP.A.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.
- CCSS.7.SP.B.3 Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability.
- CCSS.7.SP.B.4 Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.
- CCSS.7.SP.B.5 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around $\frac{1}{2}$ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.

Standards for Mathematical Practices

- SMP1 Students will make sense of problems and persevere in solving them.
- SMP2 Students will reason abstractly and quantitatively.
- SMP3 Students will construct viable arguments and critique the reasoning of others.
- SMP4 Students will model with mathematics.
- SMP8 Students will look for and express regularity in repeated reasoning.

Big Ideas

Students will understand:

- The probability of a chance event is approximated by collecting data on the chance process that produces it, observing its long-run relative frequency, and predicting the approximate relative frequency given the probability;

- Various tools (tree diagrams, fundamental counting principle, eg) are used to find probabilities of compound events;
- Statistics and probabilities are used in everyday life including sports, forecasting weather, predicting diseases, political campaigns, etc.
- Statistics can be used to gain information about a population by examining a sample population; generalizations about a population from a sample are valid only if the sample is representative of that population; and
- Two data distributions can be compared using visual and numerical representations based upon measures of center and measures of variability to draw conclusions.

Unit Essential Questions

Teachers will ask:

- How can you determine the probability of an event?
- How can we use models to determine the probability of an event? Compound event?
- How can statistics be used to gain information about a sample population?
- How can a random sample of a large population be used to draw inferences?

Vocabulary:

event, experimental probability, **outcome**, **probability**, theoretical probability, trial, **compound event**, compound probability, dependent events, independent events, **simple event**, simulation, biased sample, **prediction**, **inference**, **tree diagram**, **frequency**, population, **random sample**, **representative sample**, sample, box plot, five-number summary, **interquartile range**, **mean**, **mean absolute deviation**, measures of center, measures of **variability (variation)**, **median**, mode, **range**, **validity**, **data sets**, **numerical data distribution**, **center**, **comparative inference**

Unit Scope and Sequence

- Probability (Lesson 10.1)
- Using Probability to Predict (10.2)
- Compound Probability (Lesson 10.3)
- Random Sampling and Inferences (Lesson 10.4)
- Measures of Center and Variability in Two Data Sets (Lesson 10.5)

Common Misconceptions:

Teacher Moves	Misconceptions Addressed
Support students in converting fractions to decimals or percents to judge closeness to 0 or 1	Students without a solid concept of fractions may struggle to determine if a probability is closer to 0 or 1
Explicitly teach and compare theoretical vs. experimental probability using familiar classroom data and vocabulary	Students may confuse theoretical and experimental probability
Use anchor activities where students list examples of certain vs. impossible events to connect to probabilities of 0 and 1	Students may struggle with understanding probability values of 0 (never) or 1 (always)
Design lessons that include multiple trials and	Some students may distrust or over-interpret

discussions of randomness and chance to address misconceptions	outcomes from direct modeling or chance activities (e.g., dice are “loaded,” spinners are unfair)
Review proportion concepts and setup before applying them to probability contexts	Students who struggled with proportions may make errors setting up probability ratios correctly
Consistently prompt students to check for reasonableness in their final answers	Students may fail to assess whether a probability outcome is logical or realistic
Emphasize the concept of prediction as an informed estimate rather than a guaranteed result	Students may misunderstand that probability results are predictions, not exact answers

Unit Assured Assessments

Formative Assessments: exit tickets, tiered practices, Teacher Gems activities

Summative Assessments: Probability and Statistics Project

Resource

Core

- EdGems Math Course 2

Supplemental

- Ready Common Core

Time Allotment

- Approximately 16 days

CREDIT

PREREQUISITES

Mathematics 6

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ASSURED STUDENT PERFORMANCE RUBRICS

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TRUMBULL PUBLIC SCHOOLS

Trumbull, Connecticut

Mathematics 8

Grade 8

2025

(Last revision date: 2019)

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Mathematics 8

Grade 8

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The Trumbull Board of Education will continue to take Affirmative Action to ensure that no persons are discriminated against in its employment.

CORE VALUES AND BELIEFS

The Trumbull High School community engages in an environment conducive to learning which believes that all students will **read and write effectively**, therefore communicating in an articulate and coherent manner. All students will participate in activities **that present problem-solving through critical thinking**. Students will use technology as a tool applying it to decision making. We believe that by fostering self-confidence, self-directed and student-centered activities, we will promote **independent thinkers and learners**. We believe **ethical conduct** to be paramount in sustaining the welcoming school climate that we presently enjoy.

Approved 8/26/2011

INTRODUCTION & PHILOSOPHY

Mathematics 8 serves as a critical capstone to middle school mathematics, consolidating and extending students' understanding as they prepare for the transition to high school-level coursework. This course is offered to ensure that all students develop a strong command of algebraic thinking, geometric reasoning, and data analysis—foundational skills that support success in Algebra I and beyond. Mathematics 8 encourages students to see mathematics as a connected, logical discipline while fostering problem-solving strategies, precision, and perseverance. Students are guided to explore mathematical ideas through inquiry, collaboration, and real-world applications.

Building on the conceptual groundwork established in Mathematics 6 and 7, this course introduces students to more formal approaches in linear equations, systems of equations, functions, the Pythagorean Theorem, and transformations on the coordinate plane. It serves as the bridge between concrete mathematical experiences and more abstract reasoning. As part of the broader mathematics program, Mathematics 8 helps to solidify students' readiness for high school algebra and geometry, while reinforcing key habits of mind such as mathematical argumentation and modeling.

In its most recent revision, the Mathematics 8 curriculum has been updated to align with current educational standards and best practices in mathematics instruction. These revisions place a stronger emphasis on depth over breadth, encouraging students to engage meaningfully with fewer topics in greater detail. New components include expanded opportunities for collaborative learning, more culturally responsive teaching materials, and increased use of digital tools to enhance conceptual understanding. These updates reflect the program's commitment to equitable access, high expectations, and the development of confident, capable mathematical thinkers.

COURSE GOALS

Our Grade 8 math program takes a balanced instructional approach to promote the understanding of mathematical concepts, skills, procedures, and ways of thinking and reasoning that supports the Common Core Standards for Mathematics. This course prepares students for high school mathematics, such as Algebra 1 and Geometry.

Instructional times should focus on three critical areas:

- Formulating and reasoning about expressions and equations, including modeling an association in bivariate data with a linear equation, and solving linear equations and systems of linear equations;
- Grasping the concept of a function and using functions to describe quantitative relationships;
- Analyzing two- and three-dimensional space and figures using distance, angles, similarity, and congruence, and understanding and applying the Pythagorean Theorem.

The following course goals derive from the 2010 Connecticut Core Standards for Mathematics:

The Number System (CCSS.8.NS) Know that there are numbers that are not rational, and approximate them by rational numbers.

Expressions and Equations (CCSS.8.EE) Work with radicals and integer exponents; understand the connections between proportional relationships, lines, and linear equations; and analyze and solve linear equations and pairs of simultaneous linear equations.

Functions (CCSS.8.F) Define, evaluate, and compare functions; and use functions to model relationships between quantities.

Geometry (CCSS.8.G) Understand congruence and similarity using physical models, transparencies, or geometry software; understand and apply the Pythagorean Theorem; and solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

Statistics and Probability (CCSS.8.SP) Investigate patterns of association between bivariate data.

Standards for Mathematical Practice

The Standards of Mathematical Practice (SMP) are essential to the Mathematics 8 curriculum as they provide a foundation for developing students' mathematical thinking, reasoning, and problem-solving skills. These practices—such as making sense of problems, reasoning abstractly and quantitatively, and constructing viable arguments—encourage students to engage deeply with mathematical concepts rather than simply memorizing procedures. By integrating the SMP into instruction, educators foster a classroom environment where students learn to think critically, communicate their ideas effectively, and approach problems with confidence and perseverance. This not only supports mastery of grade-level content but also builds the habits of mind necessary for success in higher-level mathematics and real-world applications.

SMP1	Students will make sense of problems and persevere in solving them.
SMP2	Students will reason abstractly and quantitatively.
SMP3	Students will construct viable arguments and critique the reasoning of others.
SMP4	Students will model with mathematics.
SMP5	Students will use appropriate tools strategically.
SMP6	Students will attend to precision.
SMP7	Students will look for and make use of structure.
SMP8	Students will look for and express regularity in repeated reasoning.

COURSE ENDURING UNDERSTANDINGS

In 8th grade, enduring understandings center on developing a strong foundation in algebraic relationships, representations of functions, geometric transformations, and associations shown in patterns of data. Mathematical reasoning involves making and testing conjectures, constructing arguments, and communicating ideas clearly and precisely.

Students will:

- **Algebraic relationships can be represented in multiple ways**—including equations, graphs, and tables—and each representation offers unique insights into the behavior of mathematical models.
- **Functions describe how one quantity changes in relation to another** and are essential tools for modeling real-world situations and predicting outcomes.
- **Transformations preserve or alter properties of geometric figures**, and understanding these effects helps in analyzing congruence, similarity, and symmetry.
- **The Pythagorean Theorem reveals fundamental relationships between the sides of right triangles**, and can be extended to solve problems involving distance and space in both two and three dimensions.

- **Bivariate data can show patterns of association**, and recognizing these patterns supports informed decision-making in fields such as science, economics, and social studies.
- **Mathematical reasoning involves making and testing conjectures, constructing arguments, and communicating ideas clearly and precisely.**
- **Mathematics is a connected, logical system**, and understanding these connections deepens learning and fosters the ability to transfer knowledge to new contexts.

COURSE ESSENTIAL QUESTIONS

- How can we represent and interpret algebraic relationships in different ways, and why might one form be more useful than another?
- What is a function, and how can it help us describe and predict patterns in the world around us?
- How do geometric transformations affect the properties and positioning of shapes in the coordinate plane?
- Why does the Pythagorean Theorem work, and how can we apply it to solve real-world problems involving distance and space?
- How can analyzing data from two variables help us make informed conclusions or predictions?
- What does it mean to think mathematically, and how do we construct and critique arguments in mathematics?
- How are mathematical concepts connected, and how can understanding those connections help us solve unfamiliar problems?

COURSE KNOWLEDGE & SKILLS

Students will know . . .

- Properties of Integer exponents
- Scientific Notation and its real-world applications
- The real number system, including rational and irrational numbers
- Concepts of linear equations, inequalities, and systems of equations.
- How to model relationships between quantities with variables.
- Definitions and properties of functions.
- How to distinguish between linear and nonlinear functions.
- Properties of transformations (translations, reflections, rotations, dilations).
- The Pythagorean Theorem and its converse.
- Volume formulas for cylinders, cones, and spheres.
- Concepts of bivariate data and scatter plots.
- Correlation and linear associations.

Students will be able to . . .

- Simplify expressions using the laws of exponents
- Perform operations with numbers in scientific notation
- Compare, order, and approximate irrational numbers
- Solve one-variable linear equations and inequalities.
- Analyze and solve systems of two linear equations.
- Apply algebraic reasoning to word problems and contextual scenarios.
- Represent functions using equations, tables, and graphs.
- Interpret function behavior in terms of slope and rate of change.
- Use functions to model relationships and solve real-world problems.
- Perform and describe transformations on the coordinate plane.
- Use the Pythagorean Theorem to find distances and solve problems.
- Calculate volumes of three-dimensional figures.
- Construct and interpret scatter plots.
- Describe patterns and trends in data.
- Informally fit a line to data and assess model fit.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics in real-world contexts.
- Use appropriate tools strategically (e.g., graphing calculators, manipulatives, software).
- Attend to precision and use clear mathematical language.
- Look for and express regularity in repeated reasoning.

COURSE SYLLABUS

Course Name

Mathematics 8

Level

Regular Paced

Prerequisites

Successful completion of Grade 7 Mathematics

Core Resource: EdGems Math Course 3

General Description of the Course

Mathematics 8 is a full-year course designed to deepen students' understanding of key mathematical concepts as they transition toward high school algebra. The course builds upon the foundational skills developed in earlier grades and focuses on critical areas including linear relationships, functions, rational numbers, expressions and equations, geometry, statistics, and probability. Emphasis is placed on reasoning, problem solving, and communicating mathematical thinking.

Students will explore real-world applications of mathematics through the study of proportional reasoning, transformations, and the Pythagorean Theorem. They will also begin formal work with functions and analyze linear models in multiple representations (graphs, tables, and equations). Through engaging tasks, students will develop a deeper understanding of the structure of mathematics and how to apply it in various contexts.

This course prepares students for Algebra I and higher-level mathematics by promoting both conceptual understanding and procedural fluency aligned with the Common Core State Standards for Grade 8.

Assured Assessments

Formative Assessments:

- o Exit Tickets, Tiered Practices, Teacher Gems activities, Focused Interim Assessment Blocks (FIABs)

Summative Assessments:

- o Common Unit Assessments
- o Trimester Performance Tasks

Supplemental Texts and Resources

- o Ready Common Core (i-Ready Teacher Toolbox)
- o Smarter Balanced Assessment Resources

UNIT 1
Equations
(NO Calculator)

Unit Goals

At the completion of this unit, students will:

- CCSS.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.
- CCSS.8.NS.A.2** Use 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 (e.g., π^2)
- CCSS.8.EE.A.2** Use square root and cube root symbols to represent solutions to equations in the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.
- CCSS.8.EE.C.7** Solve linear equations in one variable.
- 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).
 - b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

Standards for Mathematical Practices

- SMP1** Students will make sense of problems and persevere in solving them.
- SMP2** Students will reason abstractly and quantitatively.
- SMP3** Students will construct viable arguments and critique the reasoning of others.
- SMP5** Students will use appropriate tools strategically.
- SMP6** Students will attend to precision.
- SMP7** Students will look for and make use of structure.

Big Ideas

Students will understand:

- Every number has a decimal expansion;
- The value of any real number can be represented in relation to other real numbers such as with decimals converted to fractions and numbers written with exponents; and
- Properties of operations with whole and rational numbers also apply to all real numbers.

Unit Essential Questions

Teachers will ask:

- Why are quantities represented in multiple ways?
- How is the universal nature of properties applied to real numbers?

Vocabulary:

equation, inverse operation, solution, algebraic expression, coefficient, constant, Distributive Property, like terms, term, **cube root**, **irrational number**, **repeating decimal**, **terminating decimal**, **perfect cube**, **perfect square**, **radical**, prime factorization, **rational number**, **square root**, **pi**, real numbers

Unit Scope and Sequence

- Solving One- and Two- Step Equations (Lesson 1.1)
- Solving Multi-Step Equations (Lesson 1.2)
- Solutions to Linear Equations (Lesson 1.3)
- Square and Cube Roots (Lesson 1.4)
- Rational and Irrational Numbers (Lesson 1.5)
- Solving Equations with Exponents (Lesson 1.6)

Unit Assured Assessments

Formative Assessments: exit tickets, tiered practices, Teacher Gem activities, The Number System FIAB

Summative Assessments: Solving Equations Quiz (1.1-1.3), Roots and Irrational Numbers Quiz (1.4-1.5), Unit Assessment

Common Misconceptions:

Teacher Moves	Misconceptions Addressed
Use Algebra Tiles or hands-on manipulatives to model equations and reinforce zero pairs	Students struggling with solving equations may need hands-on experiences and review of zero pairs
Show how equations can be rewritten by rearranging terms and model flexible placement of variables	Students struggle when variables appear on the right side of the equation
Reinforce that a fraction bar represents division and provide structured practice	Students may think that when a variable is divided by a number, the term becomes a fraction
Teach that subtraction is adding the opposite , and model how to isolate variables in expressions like $10 - 2z = 24$	Students are confused by subtraction from a constant in equations

Review integer rules and prompt students to check answers by substitution after solving	Students forget integer rules when solving one-step equations
Provide a consistent strategy for keeping the variable on one side , or moving the smaller coefficient next to the larger	Students are confused about which side to place the variable or how to move terms with different coefficients
Use inverse operations as a core principle when manipulatives aren't practical (e.g., with fractions or decimals)	Students struggle with Algebra Tiles when working with fractional or decimal coefficients
Teach students to create a step-by-step list when solving multi-step equations	Students struggle to organize multi-step equation solving
Ask students to explain why $x = 0$ is still a valid solution , using substitution	Students incorrectly state that $x = 0$ has no solution
Use comparison tasks with equivalent equations to help students recognize patterns	Students miss opportunities to identify equivalent expressions during the solving process
Provide repeated exposure to equations involving the Distributive Property and negative numbers	Students often apply the Distributive Property incorrectly when negatives are involved
Explicitly contrast solving square root equations vs. quadratic equations with two solutions	Students think $\sqrt{4} = 2$, and do not expect two solutions when solving $x^2 = 4$
Review inequality symbols using whole numbers or integers before applying to irrational values	Students forget how to read or interpret inequality symbols, especially with irrational numbers
Guide students to build number lines with perfect squares and cubes for estimating irrational values	Students lack fluency with square roots and cube roots and struggle to estimate irrational numbers
Reinforce that roots, not division , are used to isolate variables with exponents (e.g., $x^2 = 49 \rightarrow x = \pm 7$)	Students divide by the exponent instead of taking a square or cube root
Clarify the difference between exponents and multiplication through whole-class work and clear notation examples	Students confuse exponents with multiplication, especially early in the lesson

Resources

Core

- EdGems Math Course 3

Supplemental

- Ready Common Core

Time Allotment

- Approximately 21 days

UNIT 2

The Pythagorean Theorem

(Calculator use allowed)

Unit Goals

At the completion of this unit, students will:

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

Standards for Mathematical Practices

- SMP4 Students will model with mathematics.
- SMP6 Students will attend to precision.
- SMP7 Students will look for and make use of structure.

Big Ideas

Students will understand:

- Right triangles have a special relationship among the side lengths which can be represented by a model and a formula;
- The Pythagorean Theorem can be used to find the missing side lengths in a coordinate plane and real-world situations;
- The Pythagorean Theorem and its converse can be proven; and
- Converse is the reverse order of a hypothesis.

Unit Essential Questions

Teachers will ask:

- Why does the Pythagorean Theorem apply only to right triangles?
- How can the Pythagorean Theorem be used for indirect measurement?

Vocabulary:

hypotenuse, legs, Pythagorean Theorem, right triangle, base, Pythagorean triples, distance formula

Unit Scope and Sequence

- The Pythagorean Theorem (Lesson 2.1)
- Applying the Pythagorean Theorem (Lesson 2.2)
- Distance on the Coordinate Plane (Lesson 2.3)

Unit Assured Assessments

Formative Assessments: exit tickets, tiered practices, Teacher Gem activities, The Pythagorean Theorem FIAB

Summative Assessments: Unit Assessment

Common Misconceptions:

Teacher Moves	Misconceptions Addressed
Discuss misconceptions explicitly in real-world contexts to reinforce correct use of the Pythagorean Theorem	Students may incorrectly add the legs or divide the sum of squares instead of taking the square root
Use diagrams with arrows and clear labeling to show that the hypotenuse is opposite the right angle	Students may find the word "opposite" confusing and cannot correctly identify the hypotenuse
Demonstrate that $a^2 + b^2 = c^2$ applies only to right triangles, and show examples of triangles that are not right but have three side lengths	Students forget the Pythagorean Theorem only applies to right triangles
Have students label diagrams in real-world problems and practice substituting correctly into the formula	Students confuse the hypotenuse with a leg or substitute values incorrectly
Provide balanced practice solving for all sides of a right triangle, not just the hypotenuse	Students find solving for the leg more difficult and may lack confidence or exposure
Offer frequent coordinate plane examples with emphasis on pairing x- and y-values correctly	Students commonly swap x- and y-values when using the distance formula
Encourage students to estimate distances visually before solving, and check if answers are reasonable	Students may make calculation errors and not recognize when answers are unreasonable
Support students in using both counting units and coordinate subtraction to find leg lengths from a graph	Some students prefer counting while others prefer subtracting coordinates; both should be validated

Resources

Core

- EdGems Math Course 3

Supplemental

- Ready Common Core

Time Allotment

- Approximately 12 days

UNIT 3
Proportional Relationships and Slope
(NO Calculator)

Unit Goals

At the completion of this unit, students will:

- CCSS.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.**
- CCSS.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 .**
- CCSS.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.**
- CCSS.F.A.2** **Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal description)**

Standards for Mathematical Practices

- | | |
|------|--|
| SMP3 | Students will construct viable arguments and critique the reasoning of others. |
| SMP4 | Students will model with mathematics. |
| SMP6 | Students will attend to precision. |
| SMP7 | Students will look for and make use of structure. |

Big Ideas

Students will understand:

- Proportional relationships have a constant ratio between quantities, known as the constant of proportionality, which can be represented using equations, tables, and graphs that pass through the origin;
- Slope describes the rate of change between two variables in a linear relationship and can be interpreted as the unit rate or constant rate of change. In proportional relationships, the slope is equal to the constant of proportionality; and
- Proportional reasoning and understanding slope help us model, interpret, and solve real-world and mathematical problems. Recognizing and comparing relationships allows for more efficient decision-making and analysis.

Unit Essential Questions

Teachers will ask:

- How can we determine if a relationship between two quantities is proportional, and how can we represent it using equations, graphs, and tables?
- What does the slope of a line tell us about a relationship, and how is it connected to proportional reasoning?
- In what ways can we use the concepts of slope and proportionality to solve real-world problems and compare relationships?

Vocabulary:

domain, function, range, vertical line test, constant of proportionality, **proportional relationship**, **linear functions**, **slope**

Unit Scope and Sequence

- Understanding Functions (Lesson 3.1)
- Proportional Relationships (Lesson 3.2)
- Calculating Slope from Graphs (Lesson 3.3)
- The Slope Formula (Lesson 3.4)

Unit Assured Assessments

Formative Assessments: exit ticket, tiered practices, Teacher Gem activities

Summative Assessments: Mid Unit Quiz, Unit Assessment

Common Misconceptions:

Teacher Moves	Misconceptions Addressed
Model how switching input and output values affects the function and graph both versions for comparison	Students may confuse input and output values, leading to the inverse of a function
Revisit vocabulary regularly through visuals, examples, and class discussions	Students may struggle with the new vocabulary introduced when learning about functions
Use visuals and kinesthetic activities , like students performing a vertical line test with their arms	Students often confuse vertical and horizontal directions, especially when identifying functions on graphs
Provide larger graph paper (e.g., >1 cm) and slower pacing when introducing proportional relationship graphing	Some students may have difficulty seeing unit rate or precision when graphing proportional relationships
Clarify that a graph may extend beyond the origin , but only specific quadrants may apply to real-world situations	Students may believe that a proportional relationship stops at the origin

Support students in analyzing one relationship at a time before comparing multiple proportional relationships	Students may be overwhelmed by comparing two relationships at once
Use real-world contexts to introduce slope, like speed, ramps, or wages	Students struggle with the abstract nature of slope and benefit from connecting it to real-life experiences
Reinforce the phrase “ rise over run ” and have students verbalize it while calculating slope	Students may incorrectly calculate slope using the reciprocal or confuse numerator and denominator
Explain the difference between ordered pair (x, y) and slope as rise/run , and explicitly model both concepts	Students confuse slope order (rise/run) with graphing coordinates (x, y), leading to misinterpretation
Have students determine the sign of the slope from the graph before calculating the ratio	Students forget to include negative signs when needed or assume slope is always positive
Connect the slope formula to the graph visually, highlighting how Δy and Δx come from the plotted points	Students struggle with the abstract slope formula without understanding the connection between the graph and formula
Encourage students to graph two points first and calculate slope from the graph before using the formula	Students may struggle with calculating slope directly from formula and benefit from a visual approach
Emphasize the difference between (x, y) and rise/run , and reinforce labeling axes clearly to avoid confusion	Students find it confusing that ordered pairs are “run then rise” while slope is “rise over run”; they may reverse them or apply concepts incorrectly

Resources

Core

- EdGems Math Course 3

Supplemental

- Ready Common Core

Time Allotment

- Approximately 14 days

UNIT 4
Functions
(Calculator Use Allowed)

Unit Goals

At the completion of this unit, students will:

- CCSS.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 .
- CCSS.8.F.A.2** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal description)
- CCSS.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.
- CCSS.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.
- CCSS.8.F.B.5** Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

Standards for Mathematical Practices

- | | |
|------|---|
| SMP1 | Students will make sense of problems and persevere in solving them. |
| SMP2 | Students will reason abstractly and quantitatively. |
| SMP3 | Students will reason abstractly and quantitatively. |
| SMP5 | Students will use appropriate tools strategically. |
| SMP7 | Students will look for and make use of structure. |

Big Ideas

Students will understand:

- The slope of a line represents the constant rate of change between two quantities;

- Similar triangles formed between any two points on a non-vertical line have the same ratio of vertical to horizontal change, explaining why slope is consistent;
- Linear relationships can be modeled with equations in the form $y = mx$ or $y = mx + b$, where m is the slope and b is the y-intercept;
- Functions can be expressed in multiple formats, and each representation provides unique insights into the relationship between variables;
- Comparing functions represented in different ways helps deepen understanding of how variables interact and change;
- Linear functions form straight lines and have a constant rate of change, while nonlinear functions do not.
- Key features of a function include its rate of change, intercepts, and whether it is increasing or decreasing;
- Linear functions have a constant rate of change and are represented by straight lines; and
- Graphs and verbal descriptions can be analyzed to determine whether a function is linear or nonlinear and to understand how one quantity changes in response to another.

Unit Essential Questions

Teachers will ask:

- How does the slope of a line help us understand and model relationships between quantities, and why is the slope the same between any two points on a straight line?
- How can we represent, compare, and interpret functions in different ways—such as through equations, tables, graphs, or descriptions—and what do these representations tell us about the relationship between variables?
- What are the key features of a function, and how can we use them to distinguish between linear and nonlinear functions and describe how one quantity changes in relation to another?

Vocabulary:

continuous, discrete, slope-intercept form, **y-intercept**, equivalent equations, **non-linear** functions, piecewise functions

Unit Scope and Sequence

- Graphing Using Slope-Intercept Form (Lesson 4.1)
- Writing Linear Equations for Graphs (Lesson 4.2)
- Writing Linear Equations from Key Information (Lesson 4.3)
- Linear Equations in Other Forms (Lesson 4.4)
- Introduction to Non-linear Functions (Lesson 4.5)
- Interpreting Graphs of Functions (Lesson 4.6)

Unit Assured Assessments

Formative Assessments: exit tickets, tiered practices, Teacher Gem activities, Proportional Relationships, Lines, and Linear Equations FIAB (can be given after 4.2), Functions FIAB

Summative Assessments: Writing Linear Equations Quiz (4.1 - 4.3), Unit Assessment

Common Misconceptions:

Teacher Moves	Misconceptions Addressed
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Teach students to locate intersections of grid lines on a graph and draw slope triangles from those points	Students struggle to draw a slope triangle if one isn't provided
Emphasize checking the scale of the graph before plotting or interpreting points	Students assume all graphs have a scale of 1
Use foldables or graphic organizers to review rise vs. run and have students verbalize slope terminology	Students confuse rise and run when calculating slope
Have students circle and label the y-intercept and slope in an equation before graphing	Students confuse the y-intercept with the x-intercept
Reinforce that the order of terms (e.g., $y = b + mx$) can vary due to the Commutative Property , and equations can be rewritten	Students are confused by equations not written in the familiar $y = mx + b$ form
Use visual examples to show that not all linear equations are proportional , even though they are related	Students incorrectly assume all linear functions are proportional relationships
Model how to plot key information from a table onto a graph before calculating slope or writing an equation	Students make procedural or arithmetic errors when writing linear equations from tables
Focus on interpreting one part of a function at a time (e.g., first slope, then y-intercept) in context	Students confuse or conflate the meanings of slope and y-intercept in real-world contexts
Use a table preview strategy to predict slope direction (positive or negative) before calculating	Students forget to check for reasonableness or sign of slope
Provide practice with tables that have non-consecutive or non-integer inputs to build pattern recognition	Students overgeneralize from tables where inputs increase by 1
Clarify that standard form equations require rearrangement to find slope and y-intercept	Students incorrectly assume the x coefficient in standard form is the slope
Remind students to distribute to all terms when simplifying expressions in point-slope form	Students incorrectly apply the Distributive Property to only one term
Review the concept of equivalent equations by connecting it to equivalent expressions and simplifying	Students think equations aren't equivalent unless they look exactly the same
Show nonlinear graphs in graphing tools (e.g., Desmos) and discuss curve shape differences vs. line segments	Students attempt to connect nonlinear function points with straight lines

Use varied tables of values and highlight how unequal x-increments affect linearity testing	Students incorrectly assess linearity when x-values don't increase consistently
Explicitly discuss increasing vs. decreasing based on y-values , not x-values	Students confuse function direction by focusing only on x-values
Use contextual analysis to explain what a negative slope means in the real world , using titles and units on graphs	Students interpret negative slope figuratively, without regard for data context
Use incorrect graph examples and analyze them through the story or situation being graphed	Students struggle to determine what to graph from a scenario and whether their graph makes sense
Require students to describe axis labels aloud before analysis	Students overlook what axes represent and misinterpret graph meaning
Point out the difference between (x, y) coordinates and slope as rise/run ; use visual comparisons	Students confuse slope order with coordinate order, leading to graphing errors
Reinforce that ordered pairs do not imply slope and that slope must be calculated with $\Delta y/\Delta x$	Students may think rise/run follows the order of (x, y), leading to calculation mistakes
Emphasize that the coefficient of x is not always the slope , especially when in standard form	Students mistakenly believe x's coefficient always equals slope

Resources

Core

- EdGems Math Course 3

Supplemental

- Ready Common Core

Time Allotment

- Approximately 19 days

UNIT 5
Systems of Equations
(Calculator use allowed)

Unit Goals

At the completion of this unit, students will:

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

Standards for Mathematical Practices

- | | |
|------|--|
| SMP2 | Students will reason abstractly and quantitatively. |
| SMP4 | Students will model with mathematics. |
| SMP5 | Students will use appropriate tools strategically. |
| SMP6 | Students will attend to precision. |
| SMP7 | Students will look for and make use of structure. |
| SMP8 | Students will look for and express regularity in repeated reasoning. |

Big Ideas

Students will understand:

- A system of equations consists of two or more equations with the same variables;
- The solution to a system is the point (or points) where the graphs of the equations intersect because this point satisfies both equations;
- Systems may have one solution, no solution, or infinitely many solutions, depending on the relationships between the equations;
- Systems of equations are a useful tool for modeling and solving real-world situations involving multiple constraints or relationships;
- Solutions can be found using graphing, substitution, elimination, or inspection, depending on the structure of the system; and
- Interpreting the solution in context is essential for understanding and communicating results effectively.

Unit Essential Questions

Teachers will ask:

- What does it mean to solve a system of equations, and how do the solutions relate to the graphs of the equations?
- How can systems of equations be used to solve real-world problems, and what strategies can we use to find and interpret their solutions?

Vocabulary:

parallel, solution (to a system of linear equations), system of linear equations, substitution method, elimination method

Unit Scope and Sequence

- Parallel, Intersecting, or the Same Line (Lesson 5.1)
- Solving Systems by Graphing (Lesson 5.2)
- Solving Systems Algebraically (Lesson 5.3- 5.4)
- Applications of Systems of Equations (Lesson 5.5)
- Converting Repeating Decimals to Fractions (Lesson 5.6)- supplemental

Unit Assured Assessments

Formative Assessments: exit tickets, tiered practices, Teacher Gem activities, Analyze and Solve Linear Equations FIAB

Summative Assessments: Introduction to Systems of Equations Quiz (5.1 - 5.2), Solving Systems Algebraically Quiz (5.3 - 5.4), Unit Assessment

Common Misconceptions:

Teacher Moves	Misconceptions Addressed
Use real-world examples to show that a system of equations cannot have two or three solutions	Students may believe systems can have multiple (non-infinite) solutions
Connect to prior knowledge about one-variable equations with infinite solutions	Students may be confused by the idea of an infinite number of solutions in a system
Graphically compare lines with the same y-intercept but different slopes to clarify when lines are parallel versus intersecting	Students may think lines with the same y-intercept are always parallel
Review converting to slope-intercept form before solving systems graphically	Students may struggle to graph systems when equations are not in $y = mx + b$ form
Use a table of values to support graphing when students struggle with visual representation	Students who struggle with graphing may benefit from numerical structure
Discuss parallel lines and overlapping lines explicitly to reinforce the idea that not all lines intersect	Students may assume all lines intersect at one point

Start substitution method with systems already solved for y to focus attention on the substitution process	Substitution can be confusing for students not fluent in solving equations
Use post-its to visually represent substitution of one expression into another	Students may confuse the concept of replacing a variable with an expression
Write a “-1” coefficient outside parentheses when substituting into a subtraction expression	Students forget to distribute the negative sign to all terms
Use number lines and models to support fluency with negative number operations	Students often make sign errors during substitution and solving
Clarify the difference between combining like terms vs. eliminating a term	Students confuse simplifying expressions with solving systems
Have students verbalize steps in substitution and elimination to distinguish the two methods	Students mix up steps from both substitution and elimination methods
Emphasize that a solution to a system is the point where the two lines intersect	Students may solve for only one variable and not realize the solution is an ordered pair
Use “let” statements to help students translate real-world contexts into algebraic equations	Students struggle to assign variables when converting word problems into systems
Require students to check solutions in both equations	Students may incorrectly validate a solution by testing it in only one equation
Use comparison activities of different system problem types to help students see patterns	Students struggle to convert applications to systems of equations

Resources

Core

- EdGems Math Course 3

Supplemental

- Ready Common Core

Time Allotment

- Approximately 20 days

UNIT 6
Angle Relationships
(Calculator Use Allowed)

Unit Goals

At the completion of this unit, students will:

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

Standards for Mathematical Practices

- | | |
|------|--|
| SMP1 | Students will make sense of problems and persevere in solving them. |
| SMP3 | Students will construct viable arguments and critique the reasoning of others. |
| SMP5 | Students will use appropriate tools strategically. |
| SMP6 | Students will attend to precision. |
| SMP7 | Students will look for and make use of structure. |

Big Ideas

Students will understand:

- Similar triangles formed between different pairs of points on the line have proportional corresponding sides, which explains why the slope remains constant;
- The sum of the interior angles of a triangle is always 180 degrees, and the measure of an exterior angle equals the sum of the two non-adjacent interior angles; and
- When parallel lines are cut by a transversal, certain angle pairs (alternate interior, corresponding, same-side interior) are congruent or supplementary.

Unit Essential Questions

Teachers will ask:

- Why is the slope between any two points on a non-vertical line constant, and how can similar triangles help explain this?
- What are the key relationships between angles in triangles and parallel lines cut by a transversal, and how do these relationships help us determine triangle similarity?

Vocabulary:

alternate exterior angles, alternate interior angles, congruent, transversal, corresponding angles, same-side interior angles, acute angle, equilateral triangle, isosceles triangle, obtuse angle, right angle, scalene triangle, straight angle, congruent figures, corresponding parts, similar figures, theorem, exterior angle, remote interior angles

Unit Scope and Sequence

- Alternate Exterior and Alternate Interior Angles (Lesson 6.1)
- Corresponding and Same-Side Interior Angles (Lesson 6.2)
- Angle Sum of a Triangle (Lesson 6.3)
- Congruent and Similar Triangles (Lesson 6.4)
- Angle Relationships (Lesson 6.5)

Unit Assured Assessments

Formative Assessments: exit tickets, tiered practices, Teacher Gem activities

Summative Assessments: Parallel Lines and Transversals Quiz (6. - 6.2), Unit Assessment

Common Misconceptions:

Teacher Moves	Misconceptions Addressed
Emphasize that complementary and supplementary angles do not need to be adjacent	Many students believe complementary and supplementary angles must be next to each other
Explicitly distinguish between complementary and supplementary with visual examples	Students confuse the two angle types
Model how to read both scales on a protractor	Students think angles are always measured from one specific side of the protractor
Reinforce angle vocabulary through visuals and reference charts	Students often confuse angle terminology
Clarify that “vertical” in vertical angles does not refer to orientation	Students assume vertical angles are only “up and down”
Explain that adjacent angles have no fixed sum unless specified	Students mistakenly assume adjacent angles must total 90° or 180°
Discuss triangle feasibility and constraints explicitly when students are sketching	Students rely too much on their drawings without considering whether the triangle is viable
Give students opportunities to work with partial triangle data and determine what additional information is needed	Students think triangles must have all three angles or sides given
Review the appropriate use of perimeter, area, surface area, and volume with concept maps	Students confuse when to use each geometric measurement
Demonstrate diagonals using tracing or color to avoid confusion with other features	Students confuse “diagonal” with “edge” or “height”

Pause before applying formulas to clarify the context and what is being asked	Students rush to apply numbers to formulas without understanding the question
Support conceptual understanding of formulas before requiring memorization	Students struggle to remember formulas they do not understand
Clarify the difference between radius and diameter using side-by-side examples	Students confuse radius and diameter in computation
Discuss the difference between exact and approximate solutions using π	Students struggle with deciding when to leave an answer in terms of π or round
Practice breaking composite figures into familiar shapes and labeling each clearly	Students make errors when decomposing figures for area
Provide checklists or plan templates for multi-step area problems	Students who struggle with multi-step processes often get lost calculating composite area

Resources

Core

- EdGems Math Course 3

Supplemental

- Ready Common Core

Time Allotment

- Approximately 17 days

UNIT 7
Transformations
(Calculator use allowed)

Unit Goals

At the completion of this unit, students will:

- CCSS.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.
- CCSS.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.**
- CCSS.8.G.A.3** **Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.**
- CCSS.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.**

Standards for Mathematical Practices

- | | |
|------|--|
| SMP1 | Students will make sense of problems and persevere in solving them. |
| SMP2 | Students will reason abstractly and quantitatively. |
| SMP3 | Students will construct viable arguments and critique the reasoning of others. |
| SMP7 | Students will look for and make use of structure. |
| SMP8 | Students will look for and express regularity in repeated reasoning. |

Big Ideas

Students will understand:

- Rotations, reflections, and translations are rigid transformations that move figures without changing their size or shape;
These transformations map lines to lines, preserve the lengths of segments and the measures of angles, and maintain parallelism between lines;
- Two figures are congruent if one can be transformed into the other using a sequence of rotations, reflections, and translations;

- Describing the sequence of transformations helps verify and communicate the congruence between figures;
- Dilations change the size of a figure but preserve its shape, resulting in similar figures;
- Similar figures can be related through a sequence of transformations including rotations, reflections, translations, and dilations; and
- Understanding and describing these transformations allow us to analyze geometric similarity using coordinates.

Unit Essential Questions

Teachers will ask:

- How do rotations, reflections, and translations transform figures, and what properties of the figures remain unchanged after these transformations?
- What does it mean for two figures to be congruent, and how can a sequence of transformations show their congruence?
- How do dilations differ from other transformations, and how can sequences of transformations demonstrate similarity between two figures?

Vocabulary:

image, pre-image, reflection, transformation, translation, angle of rotation, center of rotation, rotation, center of dilation, dilation, scale factor, composition of transformations

Unit Scope and Sequence

- Reflections (Lesson 7.1)
- Translations (Lesson 7.2)
- Rotations (Lesson 7.3)
- Dilations (Lessons 7.4)
- Composition of Transformations (Lesson 7.5)

Common Misconceptions:

Teacher Moves	Misconceptions Addressed
Ask students to imagine placing a mirror on an axis to distinguish reflections from translations	Students confuse translations and reflections
Provide multiple opportunities to explore each transformation through graphing and pattern identification	Students need practice to understand the coordinate changes that occur during each transformation
Have students label axes and verbally predict location of image before graphing	Students confuse the x- and y-axes and reflect across the wrong one
Use word associations like “horizon” for “horizontal” to differentiate from vertical	Students confuse horizontal and vertical directions
Ask students to read translation rules aloud and use directional language like “left/right,” “up/down”	Students misinterpret translation rules written in ordered pair notation

Discuss whether translations change shape or size before performing them	Students may incorrectly think translations change side lengths
Mark the center of rotation and draw lines from it to guide correct rotation	Students ignore the center of rotation and rotate from incorrect points
Use quadrant analysis to help determine coordinate sign changes after rotation	Students confuse which coordinate changes in a rotation (signs/order)
Ask students to describe transformations aloud using precise vocabulary	Students confuse transformations (e.g., rotation vs. reflection) without verbal reinforcement
Use grid paper or peg boards to model dilations and visualize enlargement/reduction	Students understand scale factor conceptually but struggle with computation
Challenge assumptions about scale factors by asking which fractional factors enlarge a figure	Students assume that all fractions lead to a reduction
Have students multiply both x and y and compare the image to the pre-image	Students apply scale factor to only one coordinate
Use rulers to help students with tracking difficulties in multi-step transformations	Students with spatial reasoning difficulties struggle to follow transformations
Encourage students to try different orders of transformations and discuss results	Students think there is only one correct order for composing transformations
Have students list each transformation in a composition and identify if any involve dilation	Students confuse whether final image is similar or congruent

Unit Assured Assessments

Formative Assessments: exit tickets, tiered practices, Teacher Gem activities, Congruence and Similarity FIAB

Summative Assessments: Rigid Transformations Quiz (7.1 - 7.3), Unit Assessment

Resources

Core

- EdGems Math Course 3

Supplemental

- Ready Common Core

Time Allotment

- Approximately 16 days

UNIT 8
Exponent Properties
(Calculator for applications only)

Unit Goals

At the completion of this unit, students will:

- CCSS.8.EE.A.1** **Know and apply the properties of integer exponents to generate equivalent numerical expressions.**
- CCSS.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.**
- CCSS.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.**

Standards for Mathematical Practices

- SMP1 Students will make sense of problems and persevere in solving them.
- SMP6 Students will attend to precision.
- SMP8 Students will look for and express regularity in repeated reasoning.

Big Ideas

Students will understand:

- Integer exponents follow specific rules (such as product of powers, power of a power, and power of a product) that help simplify and generate equivalent expressions.
- Understanding and applying these exponent properties makes it easier to work with very large or very small numbers efficiently.
- Scientific notation is a compact and effective way to represent extremely large or small numbers using powers of ten.
- Using this notation helps us estimate and compare quantities by showing how many times larger or smaller one quantity is than another.
- Scientific notation allows for efficient calculations and comparisons when dealing with extreme values in science and everyday life.
- We can perform operations (such as multiplication, division, and addition/subtraction) with numbers in scientific notation, and choosing appropriate units enhances clarity in communication and measurement.

Unit Essential Questions

Teachers will ask:

- How do the properties of exponents help us rewrite and simplify numerical expressions?
- How can we use powers of ten and scientific notation to represent and compare very large or very small numbers?

- Why is scientific notation useful, and how do we perform operations with numbers written in this form in real-world contexts?

Vocabulary:

base, cubed, exponent, power, squared, scientific notation

Unit Scope and Sequence

- Multiplication of Properties of Exponents (Lesson 8.1)
- Division Properties of Exponents (Lesson 8.2)
- Scientific Notation (Lesson 8.3)
- Applications of Scientific Notation (Lesson 8.4)

Common Misconceptions:

Teacher Moves	Misconceptions Addressed
Ask students to explain their reasoning using questions like “How did you decide to use that property?” or “Tell me your reasoning.”	Students confuse exponent rules (e.g., product vs. quotient rules) and apply them inconsistently
Have students rewrite expressions by placing like bases and coefficients side by side	Students mistakenly add coefficients when multiplying exponents with coefficients
Reinforce the Distributive Property with number talks and modeling	Students misuse or misapply the Distributive Property with exponents
Create a foldable of exponent rules for use during practice	Students confuse rules when subtracting exponents and dividing coefficients
Review how bases and exponents work together to form powers, not using division by the exponent value	Students cancel exponents incorrectly by dividing by the base number
Use a concrete “Explore” activity to show why any nonzero number to the 0 power equals 1	Students do not understand why any number to the 0 power is 1
Have students create a checklist for what constitutes a simplified expression	Students forget or misunderstand what “simplest form” means for exponential expressions
Avoid memorization of rules for scientific notation ; instead, connect to understanding of negative exponents	Students confuse the direction of movement for decimals with negative exponents
Have students rewrite multiple expressions with negative exponents and one non-zero digit to notice patterns	Students apply positive exponent patterns to numbers with negative exponents
Use multiple examples with guiding	Students believe the exponent directly gives the

questions like “Is there a relationship between the exponent and the number of zeros?”	number of zeros before or after a number
Encourage students to color-code exponents and coefficients in problems involving scientific notation	Students become overwhelmed when performing multi-step operations with scientific notation
Connect scientific notation calculations back to exponent properties to build conceptual understanding	Students with weak exponent foundations struggle with scientific notation computations

Unit Assured Assessments

Formative Assessments: exit tickets, tiered practices, Teacher Gem activities, Radicals and Integer Exponents FIAB

Summative Assessments: Exponent Properties Quiz (8.1 - 8.2), Unit Assessment

Resources

Core

- EdGems Math Course

Supplemental

- Ready Common Core

Time Allotment

- Approximately 14 days

UNIT 9

Volume

(Calculator use allowed)

Unit Goals

At the completion of this unit, students will:

CCSS.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.

Standards for Mathematical Practices

- | | |
|------|---|
| SMP1 | Students will make sense of problems and persevere in solving them. |
| SMP2 | Students will reason abstractly and quantitatively. |
| SMP7 | Students will look for and make use of structure. |

Big Ideas

Students will understand:

- Volume formulas allow us to calculate how much space is inside three-dimensional shapes.
- Understanding and using these formulas helps us solve problems involving real-world and mathematical contexts, such as capacity and storage.
- All three volume formulas are based on the idea of how space is filled within a 3D shape, but they differ based on the shape's geometry.
- The volume of a cone is one-third the volume of a cylinder with the same base and height. The volume of a sphere involves the radius cubed and a different constant multiplier.
- Volume calculations are useful for making decisions about filling, packaging, designing, or comparing objects in real-life situations.
- Accurately applying volume formulas requires identifying the correct measurements and interpreting the results in context.

Unit Essential Questions

Teachers will ask:

- How can we use volume formulas to find the amount of space inside cones, cylinders, and spheres?
- What are the similarities and differences among the volume formulas for cones, cylinders, and spheres?
- How do we apply volume formulas to solve real-world problems involving three-dimensional objects?

Vocabulary:

cylinder, volume, cone, sphere

Unit Scope and Sequence

- Volume of Cylinders (Lesson 9.1)
- Volume of Cones (Lesson 9.2)
- Volume of Spheres (Lesson 9.3)

Common Misconceptions:

Teacher Moves	Misconceptions Addressed
Have students label diagrams with terms like base, height, diameter, and radius	Students confuse formulas (e.g., using circumference instead of area) and cannot visualize or identify cylinder parts
Use graphic organizers that break down each part of the volume formulas	Students confuse radius with diameter or incorrectly square the radius
Use physical examples and guiding questions to help identify dimensions in differently oriented cylinders	Students incorrectly use the diameter as the height or misidentify height when cylinders are turned
Demonstrate a visual comparison showing that 3 cones fill a cylinder	Students believe the volume of a cone is half the volume of a cylinder rather than one-third
Discuss the components of volume formulas explicitly , especially separating the area of the base from the height	Students see volume as just a plug-in calculation and don't understand the conceptual meaning of each component
Have students label all dimensions of composite figures to identify needed measurements	Students overlook parts of composite solids, like hemispheres or shared dimensions
Break down the sphere formula and emphasize multiplying by 4, then dividing by 3	Students struggle with fractions and the multi-step nature of the sphere volume formula
Emphasize cube roots when solving for radius from a given volume of a sphere	Students incorrectly use square roots instead of cube roots when solving volume equations in reverse
Have students highlight rounding directions to ensure accuracy	Students misread or ignore rounding instructions, leading to incorrect final answers

Unit Assured Assessments

Formative Assessments: exit tickets, tiered practices, Teacher Gem activities

Summative Assessments: Volume of Cylinders, Cones, and Spheres FIAB

Resources

Core

- EdGems Math Course 3

Supplemental

- Ready Common Core

Time Allotment

- Approximately 12 days

UNIT 10

Bivariate Data

Unit Goals

At the completion of this unit, students will:

- | | |
|---------------|--|
| CCSS.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. |
| CCSS.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 points to the line. |
| CCSS.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 intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height. |
| CCSS.8.SP.A.4 | Understand the 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. For example, collect data from students in your class on whether or not they have a curfew. |

Standards for Mathematical Practices

- | | |
|------|--|
| SMP1 | Students will make sense of problems and persevere in solving them. |
| SMP2 | Students will reason abstractly and quantitatively. |
| SMP3 | Students will construct viable arguments and critique the reasoning of others. |
| SMP4 | Students will model with mathematics. |
| SMP8 | Students will look for and express regularity in repeated reasoning. |

Big Ideas

Students will understand:

- Scatter plots visually represent relationships between two quantitative variables, revealing patterns such as clustering, outliers, and types of association (positive, negative, linear, nonlinear).
- Two-way tables organize categorical data to summarize frequencies and relative frequencies, which help identify possible associations between two categorical variables.
- When data points in a scatter plot suggest a linear association, a straight line can model the relationship, showing how one variable changes in relation to another.

- The closeness of data points to the line indicates how well the line fits the data.
- The slope of a linear model represents the rate of change between the variables and describes how much the dependent variable changes for each unit increase in the independent variable.
- The intercept represents the starting value or initial condition when the independent variable is zero.
- Interpreting these values in context allows for meaningful understanding and predictions based on the model.

Unit Essential Questions

Teachers will ask:

- How can we use scatter plots and two-way tables to display and describe relationships between two variables?
- What does a linear association look like in a scatter plot, and how can we use a line to model and interpret that relationship?
- How do we interpret the slope and intercept of a linear model in the context of real-world data?

Vocabulary: association, bivariate data, categorical data, clustering, conditional frequency, line of fit, outlier, relative frequency, scatter plot, single variable data, statistical question, statistics, trend lines, two-variable data, two-way frequency table, univariate data

Unit Scope and Sequence

- Scatter Plots and Associations (Lesson 10.1)
- Lines of Fit (Lesson 10.2)
- Writing Equations for Lines of Fit (Lesson 10.3)
- Bivariate Data and Frequency Tables (Lesson 10.4)

Common Misconceptions:

Teacher Moves	Misconceptions Addressed
Provide examples of data with no association (e.g., friends vs. pizza eaten)	Students confuse scatter plots with no association, thinking all data must show a relationship
Give examples of data with non-linear but related associations	Students think non-linear graphs mean no relationship between variables
Encourage use of graph paper to help students choose appropriate scales on each axis	Students struggle to select suitable scales when plotting bivariate data
Reinforce that a line of fit shows data trends, not perfect alignment; show some points above and below the line	Students believe the line of fit must connect all points or data cannot be linear if not perfectly aligned
Have students create scatter plots from their own experiences to practice predicting future trends	Students cannot explain or interpret future trends from scatter plots or confuse dependent and independent variables

Show examples of lines of fit that do not go through the origin or first/last points	Students incorrectly believe lines of fit always pass through the origin or endpoints
Use journals/notebooks to map out steps for finding the line of fit and common errors	Students struggle finding the best equation for a line of fit and understanding slope signs or point distribution above/below the line
Discuss and give examples where correlation does not imply causation	Students mistakenly think correlation always means causation
Expose students to scatter plots with varying correlation strengths and types (tight, loose, none)	Students have limited understanding of different correlation strengths
Facilitate discussions on relative frequency meaning and calculation	Students calculate relative frequency incorrectly or confuse decimals with percentages
Provide multiple examples of two-way tables to examine totals and subtotals	Students have trouble understanding the relationship of the four numbers in two-way tables to totals and subtotals
Clarify the difference between relative frequency and conditional frequency	Students confuse relative frequency with conditional frequency; discuss vocabulary meanings and contexts

Unit Assured Assessments

Formative Assessments: exit tickets, tiered practices, Teacher Gem activities

Summative Assessments: Performance Task

Resources

Core

- EdGems Math Course 3

Supplemental

- Ready Common Core

Time Allotment

- Approximately 14 days

CREDIT

PREREQUISITES

Mathematics 7

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ASSURED STUDENT PERFORMANCE RUBRICS
[Smarter Balanced General Scoring Rubric](#)

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