



G-E-T Middle School Curriculum

Align, Explore, Empower

Scope and Sequence

Math - Grade 7

Unit 1 - Ratios and Proportional Relationships

5 Weeks

In this unit, students will build upon sixth grade reasoning of ratios and rates to formally define proportional relationships and the constant of proportionality. Students explore multiple representations of proportional relationships by looking at tables, graphs, equations, and verbal descriptions. Students extend their understanding about ratios and proportional relationships to compute unit rates for ratios and rates specified by rational numbers. The module concludes with students applying proportional reasoning to identify scale factor and create a scale drawing.

Standards for Ratios and Proportional Relationships - 7th Grade Math

- CCSS.MATH.CONTENT.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.
- CCSS.MATH.CONTENT.7.RP.A.2.A
 - 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.
- CCSS.MATH.CONTENT.7.RP.A.2.B
 - Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
- CCSS.MATH.CONTENT.7.RP.A.2.C
 - Represent proportional relationships by equations.
- CCSS.MATH.CONTENT.7.RP.A.2.D
 - 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.MATH.CONTENT.7.EE.B.4.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.
- CCSS.MATH.CONTENT.7.RP.A.3
 - Use proportional relationships to solve multistep ratio and percent problems.
- CCSS.MATH.CONTENT.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.

The students will:

- examine situations carefully to determine if they are describing a proportional relationship.
- learn that the unit rate of a collection of equivalent ratios is called the *constant of proportionality* and can be used to represent proportional relationships with equations of the form $y = kx$, where k is the constant of proportionality.
- relate the equation of a proportional relationship to ratio tables and to graphs and interpret the points on the

graph within the context of the situation.

- extend their reasoning about ratios and proportional relationships to compute unit rates for ratios and rates specified by rational numbers, such as a speed of $\frac{1}{2}$ mile per $\frac{1}{4}$ hour.
- apply their understanding of unit rates for ratios and rates involving fractions to solve multistep ratio word problems.
- bring the sum of their experience with proportional relationships to the context of scale drawings. Given a scale drawing, students rely on their background in working with side lengths and areas of polygons as they identify the scale factor as the constant of proportionality, calculate the actual lengths and areas of objects in the drawing, and create their own scale drawings of a two-dimensional view of a room or building.

Unit 2 - Rational Numbers

5 Weeks

In this unit, students will build on conceptual understanding of integers through the use of the number line, absolute value, and opposites and extended their understanding to include the ordering and comparing of rational numbers. This module uses the Integer Game: a card game that creates a conceptual understanding of integer operations and serves as a powerful mental model students can rely on during the module. Students build on their understanding of rational numbers to add, subtract, multiply, and divide signed numbers. Previous work in computing the sums, differences, products, and quotients of fractions serves as a significant foundation.

Standards for Rational Numbers - 7th Grade Math

- CCSS.MATH.CONTENT.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.
- CCSS.MATH.CONTENT.7.NS.A.1.A
 - Describe situations in which opposite quantities combine to make 0.
- CCSS.MATH.CONTENT.7.NS.A.1.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.
- CCSS.MATH.CONTENT.7.NS.A.1.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.
- CCSS.MATH.CONTENT.7.NS.A.1.D
 - Apply properties of operations as strategies to add and subtract rational numbers.
- CCSS.MATH.CONTENT.7.NS.A.2.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.
- CCSS.MATH.CONTENT.7.NS.A.2.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.
- CCSS.MATH.CONTENT.7.NS.A.2.C
 - Apply properties of operations as strategies to multiply and divide rational numbers.

- CCSS.MATH.CONTENT.7.NS.A.2.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.MATH.CONTENT.7.NS.A.3
 - Solve real-world and mathematical problems involving the four operations with rational numbers.
- CCSS.MATH.CONTENT.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.MATH.CONTENT.7.EE.B.4.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.

The students will:

- model the addition and subtraction of integers using a number line.
- demonstrate that an integer added to its opposite equals zero, representing the additive inverse.
- develop rules for adding and subtracting integers, and recognize that subtracting a number is the same as adding its opposite .
- extend integer rules to include the rational numbers and use properties of operations to perform rational number calculations without the use of a calculator.
- develop the rules for multiplying and dividing signed numbers.
- use the properties of operations and their previous understanding of multiplication as repeated addition to represent the multiplication of a negative number as repeated subtraction.
- Learn signed number rules for division are consistent with those for multiplication, provided a divisor is not zero.
- represent the division of two integers as a fraction, extending product and quotient rules to all rational numbers.
- realize that any rational number in fractional form can be represented as a decimal that either terminates in 0s or repeats.
- recognize that the context of a situation often determines the most appropriate form of a rational number, and they use long division, place value, and equivalent fractions to fluently convert between these fraction and decimal forms.
- multiply and divide rational numbers using the properties of operations.
- problem-solve with rational numbers.
- perform operations with rational numbers, incorporating them into algebraic expressions and equations.
- represent and evaluate expressions in multiple forms, demonstrating how quantities are related.
- translate word problems into algebraic equations and become proficient at solving equations of the form $px + q = r$ and $p(x + q) = r$, where p , q , and r , are specific rational numbers.
- identify the operations, inverse operations, and order of steps, comparing these to an arithmetic solution.

(A listing of the standards that mastery level is expected for 80% or more of the students is listed here.)

In this unit, students will consolidate and expand upon their understanding of equivalent expressions as they apply the properties of operations to write expressions in both standard form and in factored form. They use linear equations to solve unknown angle problems and other problems presented within context to understand that solving algebraic equations is all about the numbers. Students use the number line to understand the properties of inequality and recognize when to preserve the inequality and when to reverse the inequality when solving problems leading to inequalities. They interpret solutions within the context of problems. Students extend their sixth-grade study of geometric figures and the relationships between them as they apply their work with expressions and equations to solve problems involving area of a circle and composite area in the plane, as well as volume and surface area of right prisms.

Standards for Expressions and Equations - 7th Grade Math

- CCSS.MATH.CONTENT.7.EE.A.1
 - Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
- CCSS.MATH.CONTENT.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.MATH.CONTENT.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.MATH.CONTENT.7.EE.B.4
 - Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
- CCSS.MATH.CONTENT.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.
- CCSS.MATH.CONTENT.7.NS.A.2
 - Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
- CCSS.MATH.CONTENT.7.G.B.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.MATH.CONTENT.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.

The students will:

- generate equivalent expressions using the fact that addition and multiplication can be done in any order with any grouping and will extend this understanding to subtraction (adding the inverse) and division (multiplying by the multiplicative inverse).
- extend the properties of operations with numbers (learned in earlier grades) and recognize how the same properties hold true for letters that represent numbers.
- utilize an area model as a tool for students to rewrite products as sums and sums as products and can provide a visual representation leading students to recognize the repeated use of the distributive property in factoring and expanding linear expressions.
- examine situations where more than one form of an expression may be used to represent the same context, and they see how looking at each form can bring a new perspective to the problem.
- recognize and use the identity properties and the existence of inverses to efficiently write equivalent expressions in standard form.
- use linear equations and inequalities to solve problems.
- solve problems involving consecutive numbers, total cost, age comparisons, distance/rate/time, area and

perimeter, and missing angle measures.

- recognize that a value exists, and it is simply their job to discover what that value is.
- recognize that pi has a distinct value and can be approximated by $\frac{22}{7}$ or 3.14 to give students an intuitive sense of the relationship that exists.
- derive the formula for area of a circle by dividing a circle of radius r into pieces of pi and rearranging the pieces so that they are lined up, alternating direction, and form a shape that resembles a rectangle.
- Understand the definitions for diameter, circumference, pi, and circular region or disk will be developed during this topic.
- solve real-life and mathematical problems involving area of two-dimensional shapes and surface area and volume of prisms, e.g., rectangular, triangular, focusing on problems that involve fractional values for length.

(A listing of the standards that mastery level is expected for 80% or more of the students is listed here.)

Unit 4 - Percent and Proportional Relationships

5 weeks

In this unit, students will deepen their understanding of ratios and proportional relationships from unit 1 by solving a variety of percent problems. They convert between fractions, decimals, and percents to further develop a conceptual understanding of percent and use algebraic expressions and equations to solve multi-step percent problems. An initial focus on relating 100% to “the whole” serves as a foundation for students. Students begin the module by solving problems without using a calculator to develop an understanding of the reasoning underlying the calculations. Material in early lessons is designed to reinforce students’ understanding by having them use mental math and basic computational skills. To develop a conceptual understanding, students use visual models and equations, building on their earlier work with these. As the lessons and topics progress and students solve multi-step percent problems algebraically with numbers that are not as compatible, teachers may let students use calculators so that their computational work does not become a distraction.

Standards for Percent and Proportional Relationships- 7th Grade Math

- CCSS.MATH.CONTENT.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.
- CCSS.MATH.CONTENT.7.RP.A.2
 - Recognize and represent proportional relationships between quantities.
- CCSS.MATH.CONTENT.7.RP.A.2.B
 - Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
- CCSS.MATH.CONTENT.7.RP.A.2.C
 - Represent proportional relationships by equations.
- CCSS.MATH.CONTENT.7.RP.A.3
 - Use proportional relationships to solve multistep ratio and percent problems.
- CCSS.MATH.CONTENT.7.NS.A.1.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.
- CCSS.MATH.CONTENT.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.MATH.CONTENT.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.

The students will:

- represent percents as decimals and fractions and extend their understanding from Grade 6 to include percents greater than 100%, such as 225%, and percents less than 1%, such as 1/2% or 0.5%.
- use complex fractions to represent non-whole number percents.
- write equations to solve multi-step percent problems and relate their conceptual understanding to the representation: *Quantity = Percent × Whole*.
- solve percent increase and decrease problems with and without equations.
- use visual models, such as a double number line diagram, to justify their answers.
- recognize that when the percent is a factor of 100, they can use mental math and proportional reasoning to find the amount of other percents.
- create algebraic representations and apply their understanding of percent to interpret and solve multi-step word problems related to markups or markdowns, simple interest, sales tax, commissions, fees, and percent error.
- apply their understanding of proportional relationships in order to create an equations, graphs, or tables to model a tax or commission rate that is represented as a percent.
- solve problems related to changing percents and use their understanding of percent and proportional relationships.
- apply their understanding of absolute value to solve percent error problems.
- solve problems in which the scale factor is represented by a percent.
- construct scale drawings, find scale lengths and areas given the actual quantities and the scale factor (and vice-versa); with the scale factor represented as a percent.
- apply their understanding of percent to solve word problems.

(A listing of the standards that mastery level is expected for 80% or more of the students is listed here.)

Unit 5 - Statistics and Probability

5 Weeks

In this unit, students will begin their study of probability, learning how to interpret probabilities and how to compute probabilities in simple settings. They also learn how to estimate probabilities empirically. Probability provides a foundation for the inferential reasoning developed in the second half of this unit. Additionally, students build on their knowledge of data distributions that they studied in Grade 6, compare data distributions of two or more populations, and are introduced to the idea of drawing informal inferences based on data from random samples.

Standards for Statistics and Probability - 7th Grade Math

- CCSS.MATH.CONTENT.7.SP.A.1
 - Understand that statistics can be used to gain information about a population by examining a sample of the 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.MATH.CONTENT.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.MATH.CONTENT.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.MATH.CONTENT.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.MATH.CONTENT.7.SP.C.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 1/2 indicates an event that is neither unlikely or likely, and a probability near 1 indicates a likely event.
- CCSS.MATH.CONTENT.7.SP.C.6
 - Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.
- CCSS.MATH.CONTENT.7.SP.C.7
 - Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.

The students will:

- learn to interpret the probability of an event as the proportion of the time that the event will occur when a chance experiment is repeated many times.
- learn to compute or estimate probabilities using a variety of methods, including collecting data, using tree diagrams, and using simulations.
- compare probabilities from simulations to computed probabilities that are based on theoretical models.
- calculate probabilities of compound events using lists, tables, tree diagrams, and simulations.
- use probabilities to make decisions and to determine whether or not a given probability model is plausible.
- draw informal inferences about a population.
- investigate sampling from a population.
- estimate a population mean using numerical data from a random sample.
- learn how to estimate a population proportion using categorical data from a random sample.
- compare two populations with similar variability.
- consider sampling variability when deciding if there is evidence that the means or the proportions of two populations are actually different.

(A listing of the standards that mastery level is expected for 80% or more of the students is listed here.)

Unit 6 - Geometry

5 Weeks

In this unit, students will delve further into several geometry topics they have been developing over the years. Grade 7 presents some of these topics, (e.g., angles, area, surface area, and volume) in the most challenging form students have experienced yet. Unit 6 assumes students understand the basics. The goal is to build a fluency in these difficult problems. The remaining topics, (i.e., working on constructing triangles and taking slices (or cross-sections) of three-dimensional figures) are new to students.

Standards for Geometry - 7th Grade Math

- CCSS.MATH.CONTENT.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.
- CCSS.MATH.CONTENT.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 the conditions determine a unique triangle, more than one triangle, or no triangle.
- CCSS.MATH.CONTENT.7.G.A.3
 - Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
- CCSS.MATH.CONTENT.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.

The students will:

- solve for unknown angles.
- use a synthesis of angle relationships and algebra.
- identify several layers of angle relationships and to fit them with an appropriate equation to solve.
- work extensively with a ruler, compass, and protractor to construct geometric shapes, mainly triangles.
- use the tools to build triangles, provided given conditions, such side length and the measurement of the included angle.
- explore how changes in arrangement and measurement affect a triangle, culminating in a list of conditions that determine a unique triangle.
- noticing the conditions that determine a unique triangle, more than one triangle, or no triangle.
- explore and identify the two-dimensional figures that result from taking slices of right rectangular prisms and right rectangular pyramids parallel to the base, parallel to a lateral face, and slices that are not parallel to the base nor lateral face, but are skewed slices.
- test the volume formula $V = bh$, where b represents the area of the base, on a set of three-dimensional figures that extends beyond right rectangular prisms to right prisms in general.
- apply the practice of composing and decomposing two-dimensional shapes into shapes they could work with to determine volume.

(A listing of the standards that mastery level is expected for 80% or more of the students is listed here.)

Unit 1 - Math Practices All Year Long

In this unit, students will learn that

Standards for (Course Title Goes Here)

The students will:

(A listing of the standards that mastery level is expected for 80% or more of the students is listed here.)

Unit 2 - (Title of Unit Goes Here)

(Length of Unit Goes Here)

In this unit, students will

Standards for (Course Title Goes Here)

The students will:

(A listing of the standards that mastery level is expected for 80% or more of the students is listed here.)

Unit 1 - (Title of Unit Goes Here)

(Length of Unit Goes Here)

In this unit, students will learn that

Standards for (Course Title Goes Here)

The students will:

(A listing of the standards that mastery level is expected for 80% or more of the students is listed here.)

Unit 2 - (Title of Unit Goes Here)

(Length of Unit Goes Here)

In this unit, students will

Standards for (Course Title Goes Here)

The students will:

(A listing of the standards that mastery level is expected for 80% or more of the students is listed here.)

Unit 1 - (Title of Unit Goes Here) (Length of Unit Goes Here)

In this unit, students will learn that

Standards for (Course Title Goes Here)

The students will:

(A listing of the standards that mastery level is expected for 80% or more of the students is listed here.)

Unit 2 - (Title of Unit Goes Here) (Length of Unit Goes Here)

In this unit, students will

Standards for (Course Title Goes Here)

The students will:

(A listing of the standards that mastery level is expected for 80% or more of the students is listed here.)

