

Unit 1: Signed Numbers

Unit Overview: Students will build an additive understanding of signed numbers, identifying the additive inverse, identity, and absolute value, and representing signed numbers as movements along the number line. They will explore ways to calculate rational number additions and subtractions. Students will apply properties of operations to add and subtract rational numbers. They will focus on multiplying and dividing positive and negative integers and use properties of operations to prove why these rules hold true for all rational numbers. (Focus on MP.1, MP.6, MP.7)

Concept 1: Investigate Signed Numbers

Concept Overview: Students construct an additive understanding of signed numbers, identifying the additive inverse, identity, and absolute value, and representing signed numbers as movements along the number line. They recognize properties of signed numbers in real-world and mathematical contexts and use signed numbers to model changes in real-world quantities.

Unit 1, Concept 1 Standards

- 7.NS.A.1
- 7.NS.A.1a
- 7.NS.A.1b
- 7.NS.A.1c

Concept 2: Add and Subtract Signed Numbers

Concept Overview: Students explore techniques to calculate rational number additions and subtractions. They apply properties of operations to add and subtract rational numbers. Students use their understanding of addition and subtraction of rational numbers to solve real-world and mathematical problems.

Unit 1, Concept 2 Standards

- 7.NS.A.1
- 7.NS.A.1a
- 7.NS.A.1b
- 7.NS.A.1c
- 7.NS.A.1d
- 7.NS.A.3

Concept 3: Multiply and Divide Signed Numbers

Concept Overview: Students learn how to multiply and divide positive and negative integers and use properties of operations to prove why these rules hold true for all rational numbers. They apply properties of operations to solve real-world problems involving all four operations with rational numbers.

Unit 1, Concept 3 Standards

- 7.NS.A.2
- 7.NS.A.2b
- 7.NS.A.2a
- 7.NS.A.2c
- 7.NS.A.3

Unit 2: The Rational Number System

Unit Overview: Students will explore the rules for division of signed numbers and discover that the quotient of two integers, where the denominator is non-zero, is always a rational number. They will use the standard algorithm for division and the number line to explore decimal expansion as an infinite process and recognize that all rational numbers have decimal expansions that either terminate or repeat. Students will perform the operations of multiplication and division on various forms of rational numbers and explore the meaning of rational number multiplication and division in context. (Focus on MP.1, MP.6, MP.7)

Concept 1: Investigate Rational Numbers

Concept Overview: Students formally understand the rational number system. They explore the rules for division of signed numbers and discover that the quotient of two integers, where the denominator is non-zero, is always a rational number. Students use the standard algorithm for division and the number line to explore decimal expansion as an infinite process and recognize that all rational numbers have decimal expansions that either terminate or repeat. They use their understanding of relationships within the rational number system to solve number problems.

Unit 2, Concept 1 Standards

- 7.NS.A.2b
- 7.NS.A.2d
- 7.NS.A.3

Concept 2: Multiply and Divide Rationals

Concept Overview: Students perform the operations of multiplication and division on various forms of rational numbers and explore the meaning of rational number multiplication and division in context. They also apply understandings of rational number arithmetic to solve problems in real-world situations.

Unit 2, Concept 2 Standards

- 7.NS.A.2
- 7.NS.A.1
- 7.NS.A.3

Unit 3: Ratios and Proportions

Unit Overview: Students will investigate ratios and unit rates in which the quantities being compared are expressed as fractions rather than whole numbers. They will extend their work with ratios, rates, and unit rates to solve multistep rate problems. Students will use their prior knowledge of ratios and rates as they begin to explore proportional relationships. They will develop methods to determine whether ratios are proportional and discover that proportional ratios have the same unit rate. Students will extend their reasoning about ratios as they begin to explore proportional relationships. They will examine situations carefully to determine whether they describe a proportional relationship, and they will identify the constant of proportionality (unit rate) for these relationships. Students will also write equations to model proportional relationships and graph proportional relationships, interpreting the meaning of key points on the graphs. (Focus on MP.4, MP.6, MP.8)

Concept 1: Investigate Ratios and Rates

Concept Overview: Students explore ratios and unit rates in which the quantities being compared are expressed as fractions rather than whole numbers. Students apply their understanding of multiplication and division of rational numbers as they work with these types of rates. They extend their work with ratios, rates, and unit rates to solve multistep rate problems.

Unit 3, Concept 1 Standards

- 7.RP.A.1
- 7.RP.A.3

Concept 2: Understand Proportions

Concept Overview: Students apply their prior knowledge of ratios and rates as they begin to explore proportional relationships. They develop methods to determine whether ratios are proportional and discover that proportional ratios have the same unit rate. Students also write proportions to model real-world situations and solve proportions by using ratio reasoning.

Unit 3, Concept 2 Standards

- 7.RP.A.2
- 7.RP.A.2a
- 7.RP.A.2b

Concept 3: Represent Proportions

Concept Overview: Students extend their reasoning about ratios as they begin to explore proportional relationships. They examine situations carefully to determine whether they describe a proportional relationship, and they identify the constant of proportionality (unit rate) for these relationships. Students also write equations to model proportional relationships and graph proportional relationships, interpreting the meaning of key points on the graphs.

Unit 3, Concept 3 Standards

- 7.RP.A.2
- 7.RP.A.2a
- 7.RP.A.2b
- 7.RP.A.2c
- 7.RP.A.2d

Unit 4: Proportional Reasoning and Scale

Unit Overview: Students will identify proportional relationships involving expressions and extend their understanding of proportion to solve multistep ratio and percent problems. They will learn to create and solve problems involving scale drawings and scale models. Students will determine the scale used in a model or drawing and build models to scale. They will find missing dimensions, both scale and actual, using proportional reasoning strategies involving equivalent ratios or unit rates. (Focus on MP.4, MP.7, MP.8)

Concept 1: Solve Problems Using Proportions

Concept Overview: Students create and apply proportions using multiple methods. Students identify proportional relationships involving expressions and extend their understanding of proportion to solve multistep ratio and percent problems.

Unit 4, Concept 1 Standards

- 7.RP.A.2
- 7.RP.A.3

Concept 2: Design Scale Models

Concept Overview: Students learn to create and solve problems involving scale drawings and scale models. Students determine the scale used in a model or drawing and build models to scale. They find missing dimensions, both scale and actual, using proportional reasoning strategies involving equivalent ratios or unit rates. Students apply proportional reasoning to solve multistep problems involving determined scale and changes in scale.

Unit 4, Concept 2 Standards

- 7.G.A.1
- 7.RP.A.3

Unit 5: Equivalent Expressions

Unit Overview: Students will use variables to represent unknown values in multistep expressions and use the expressions to represent real-world situations. They will apply properties of operations to simplify expressions that include numbers in whole number, fraction, and decimal forms, including expressions that contain negative values. Students will solve multistep real-world and mathematical problems involving rational quantities by utilizing mathematical reasoning, algebraic thinking, and the properties of operations. They will learn to generate equivalent expressions by operating on linear expressions with rational coefficients. Students will apply their understanding of operations with rational numbers to solve multistep problems in both real-world and mathematical contexts, and they will convert between forms of the expressions produced by the application of properties of equality. (Focus on MP.2, MP.4, MP.7)

Concept 1: Interpret Algebraic Expressions

Concept Overview: Students learn that they can use variables to represent unknown values in multistep expressions and use the expressions to represent real-world situations. They apply properties of operations to simplify expressions that include numbers in whole number, fraction, and decimal forms, including expressions that contain negative values, and use these expressions to model real-world and mathematical problems.

Unit 5, Concept 1 Standards

- 7.EE.B.3
- 7.EE.B.4

Concept 2: Analyze Algebraic Expressions

Concept Overview: Students solve multistep real-world and mathematical problems involving rational quantities by utilizing mathematical reasoning, algebraic thinking, and the properties of operations.

Unit 5, Concept 2 Standards

- 7.EE.B.3

Concept 3: Combine Algebraic Expressions

Concept Overview: Students focus on generating equivalent expressions by operating on linear expressions with rational coefficients. They use these equivalent forms to better

Unit 5, Concept 3 Standards

- 7.EE.A.1
- 7.EE.A.2
- 7.EE.B.3

understand a problem and the relationship between the quantities. They apply their understanding of operations with rational numbers to solve multistep problems, in both real-world and mathematical contexts, and they convert between forms of the expressions produced by the application of properties of equality. In addition, they assess the reasonableness of their solutions using strategies like estimation.

Unit 6: Equations and Inequalities

Unit Overview: Students will write and solve one-variable equations with multiple steps using positive and negative rational values. They will identify and create equivalent multistep expressions and develop an algebraic approach to formally solving one-variable linear equations. Students will develop formal algebraic methods to solve inequalities with one variable and two operations using rational numbers. They will graph the solution set of an inequality on a number line and interpret the meaning of the solution set in context. Students will solve multistep inequalities with both positive and negative coefficients, understanding how negative coefficients affect the relationship between the two expressions. (Focus on MP.1, MP.4, MP.7)

Concept 1: Solve Algebraic Equations

Concept Overview: Students learn how to write and solve one-variable equations with multiple steps using positive and negative rational values. They build on their understanding of the properties of operations to identify and create equivalent multistep expressions and develop an algebraic approach to formally solving one-variable linear equations. Students interpret the meaning of the solution to an equation in context.

Unit 6, Concept 1 Standards

- 7.EE.A.2
- 7.EE.A.1
- 7.EE.B.3
- 7.EE.B.4
- 7.EE.B.4a

Concept 2: Solve Algebraic Inequalities

Concept Overview: Students develop formal algebraic methods to solve inequalities with one variable and two operations using rational numbers. Students graph the solution set of an inequality on a number line and interpret the meaning of the solution set in context. They solve multistep inequalities with both positive and negative coefficients, understanding how negative coefficients affect the relationship between the two expressions.

Unit 6, Concept 2 Standards

- 7.EE.A.1
- 7.EE.A.2
- 7.EE.B.4
- 7.EE.B.4b
- 7.EE.B.3

Unit 7: Populations and Samples

Unit Overview: Students will use data from a sample to generalize about a population. They will identify representative samples and explore how nonrepresentative samples introduce bias. Students will analyze sampling techniques and identify why random samples tend to be representative. They will

also learn to gather or simulate data to measure the characteristics in the sample and generalize the results to describe that same characteristic within a larger population. Students will compare two data distributions of similar variabilities by visually assessing the degree to which the data sets overlap. They will relate the difference between the centers of the two data sets to the measure of variability to describe the degree to which the two data sets differ. Students will use sample data from two populations to make inferences about how the populations are similar or different and describe how variability in sampling affects the validity of their inferences. (Focus on MP.3, MP.4, MP.6)

Concept 1: Explore Populations and Samples

Concept Overview: Students learn to use data from a sample to generalize about a population. They identify representative samples and explore how nonrepresentative samples introduce bias. Students analyze sampling techniques and identify why random samples tend to be representative. They also learn to gather or simulate data to measure the characteristics in the sample and generalize the results to describe that same characteristic within a larger population.

Unit 7, Concept 1 Standards

- 7.SP.A.1
- 7.SP.A.2

Concept 2: Compare Populations and Samples

Concept Overview: Students work on comparing two data distributions of similar variabilities by visually assessing the degree to which the data sets overlap. They also relate the difference between the centers of the two data sets to the measure of variability to describe the degree to which the two data sets differ. Students use sample data from two populations to make inferences about how the populations are similar or different and describe how variability in sampling affects the validity of their inferences.

Unit 7, Concept 2 Standards

- 7.SP.B.3
- 7.SP.B.4

Unit 8: Probability of Random Events

Unit Overview: Students will explore the meaning of probability in terms of a sample space of possible events. Students will learn that probability is the ratio of favorable outcomes to possible outcomes and learn to represent the probability as a value between 0 and 1. Students will discover experimental probability as a measure of the long-run relative frequency of an outcome or event. They will develop probability models based on theory or experimentation and analyze the relationship between these two models. Students will learn to generate equivalent expressions by operating on linear expressions with rational coefficients. They will apply their understanding of operations with rational numbers to solve multistep problems, in both real-world and mathematical contexts, and convert between forms of the expressions produced by the application of properties of equality. (Focus on MP.3, MP.4, MP.6)

Concept 1: Predict Probabilities

Concept Overview: Students explore the meaning of probability in terms of a sample space of possible events. Students learn that probability is the ratio of favorable outcomes to possible outcomes and learn to represent the probability as a value between 0 and 1. They also learn to interpret a probability in terms of the likelihood of an event occurring.

Unit 8, Concept 1 Standards

- 7.SP.C.5

Concept 2: Observe Probabilities

Concept Overview: Students investigate experimental probability as a measure of the long-run relative frequency of an outcome or event. They develop probability models based on theory or experimentation and analyze the relationship between these two models.

Unit 8, Concept 2 Standards

- 7.SP.C.6
- 7.SP.C.7
- 7.SP.C.7a
- 7.SP.C.7b

Concept 3: Model Probabilities

Concept Overview: Students learn to generate equivalent expressions by operating on linear expressions with rational coefficients. They use these equivalent forms to better understand a problem and the relationship between the quantities. They apply their understanding of operations with rational numbers to solve multistep problems, in both real-world and mathematical contexts, and convert between forms of the expressions produced by the application of properties of equality. In addition, students assess the reasonableness of their solutions using strategies like estimation.

Unit 8, Concept 3 Standards

- 7.SP.C.6
- 7.SP.C.7
- 7.SP.C.7a
- 7.SP.C.7b

Unit 9: Probability of Multiple Events

Unit Overview: Students will find the probability of a compound event and identify the sample space for a compound event using lists, tables, and tree diagrams. They will identify favorable outcomes within that space. Students will also develop and use simulations to determine the probability of compound events based on generated frequencies. They will design and utilize simulations to find frequencies and determine experimental probability. (Focus on MP.4, MP.5, MP.8)

Concept 1: Explore Compound Probabilities

Concept Overview: Students apply their understanding of simple probability to find the probability of a compound event. Students identify the sample space for a compound event using lists, tables, and tree diagrams, and they identify favorable outcomes within that space. They also develop and use simulations to determine the probability of compound

Unit 9, Concept 1 Standards

- 7.SP.C.8
- 7.SP.C.8a
- 7.SP.C.8b
- 7.SP.C.8c

events based on generated frequencies.

Concept 2: Determine Compound Probabilities

Concept Overview: Students learn to represent a sample space and find the probabilities for compound events in a variety of ways. They use organized lists, tables, and tree diagrams to define the sample space and to determine the probabilities of certain outcomes. They further design and utilize simulations to find frequencies and determine experimental probability.

Unit 9, Concept 2 Standards

- 7.SP.C.8
- 7.SP.C.8a
- 7.SP.C.8b
- 7.SP.C.8c

Unit 10: Angles, Triangles, and Polygons

Unit Overview: Students will identify complementary, supplementary, vertical, and adjacent angles. They will use relationships between angles to set up and solve equations involving angle measures. Students will explore how to construct a triangle given certain geometric conditions. They will also discover the conditions necessary for three side lengths to make a triangle (the triangle inequality theorem). They will solve real-world and mathematical problems that involve finding the area of complex polygons by decomposing them into polygons with known areas. (Focus on MP.1, MP.6, MP.7)

Concept 1: Understand Angle Relationships

Concept Overview: Students learn to identify complementary, supplementary, vertical, and adjacent angles. They use relationships between angles to set up and solve equations involving angle measures.

Unit 10, Concept 1 Standards

- 7.G.B.5

Concept 2: Construct Triangles and Polygons

Concept Overview: Students explore how to construct a triangle given certain geometric conditions. They determine if the conditions describe one unique triangle, more than one triangle, or no triangle. Students also explore the conditions necessary for three side lengths to make a triangle (the triangle inequality theorem).

Unit 10, Concept 2 Standards

- 7.G.A.2

Concept 3: Find Areas of Complex Polygons

Concept Overview: Students solve real-world and mathematical problems that involve finding the area of complex polygons by decomposing them into polygons with known areas.

Unit 10, Concept 3 Standards

- 7.G.B.6

Unit 11: Circles

Unit Overview: Students will find the area and circumference of a circle. They will study the relationship between area and circumference using their knowledge of the properties of circles. (Focus on MP.4, MP.6, MP.7)

Concept 1: Investigate Circles

Concept Overview: Students learn to find the area and circumference of a circle and build upon their understandings of the properties of circles by observing the relationship between area and circumference.

Unit 11, Concept 1 Standards

- 7.G.B.4

Unit 12: Solid Figures

Unit Overview: Students will describe three-dimensional figures by their bases, the number of sides, and the shape of their sides. They will establish the shape of the base and use it to calculate surface area and volume of three-dimensional figures. (Focus on MP.1, MP.2, MP.4)

Concept 1: Explore Three-Dimensional Shapes

Concept Overview: Students learn how to describe three-dimensional figures by their bases, the number of sides, and the shape of their sides. They also learn to describe the cross section of three-dimensional figures. Students determine the shape of the base and use it to calculate surface area and volume of three-dimensional figures.

Unit 12, Concept 1 Standards

- 7.G.A.3
- 7.G.B.6