Big Ideas Math: Red

Parent Newsletter

Chapter 1: Integers

Key Terms

Integers are the set of whole numbers and their opposites.

The ***absolute value*** of an integer is the distance between the number and 0 on a number line.

Two numbers that are the same distance from 0, but on opposite sides of 0, are called ***opposites.***

The sum of an integer and its ***additive inverse,*** or opposite, is 0.

Students will...

Define the absolute value of a number.

Find absolute values of numbers.

Add integers.

Show that the sum of a number and its opposite is 0.

Subtract integers.

Multiply integers.

Divide integers.

Solve real-life problems.

Standards

Common Core:

7.NS.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.

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

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

Key Ideas

Additive Inverse Property

- The sum of an integer and its additive inverse, or opposite, is 0.
- $a + (-a) = 0$

Multiplying Integers with the Same Sign

- The product of two integers with the same sign is positive.

Multiplying Integers with Different Signs

- The product of two integers with different signs is negative.

Dividing Integers with the Same Sign

- The quotient of two integers with the same sign is positive.

Adding Integers with the Same Sign

- Add the absolute values of the integers.
- Then use the common sign.

Adding Integers with Different Signs

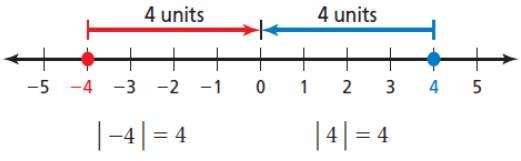
- Subtract the lesser absolute value from the greater absolute value.
- Then use the sign of the integer with the greater absolute value.

Dividing Integers with Different Signs

- The quotient of two integers with different signs is negative.

Absolute Value

- The absolute value of an integer is the distance between the number and 0 on a number line.
- The absolute value of a number a is written as $|a|$.



$|-4| = 4$ $|4| = 4$

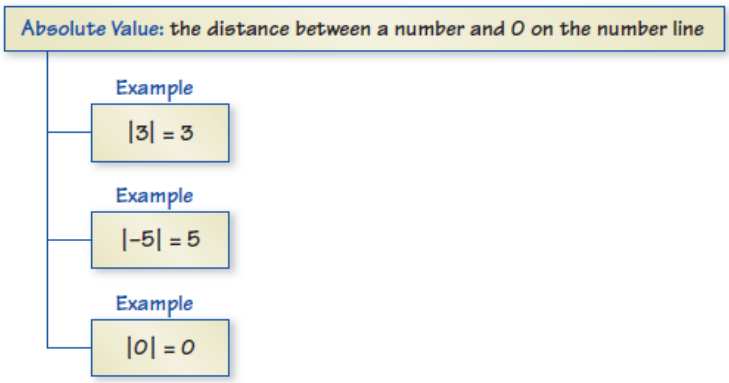
Games

- Choose Wisely
- Top This
- Right on Target
- 5 is Alive
- 6 Sticks
- 7 Not 11
- 8 is Great
- 9 is Fine
- Can 3=2?
- More Fours

These are available online in the *Game Closet* at www.bigideasmath.com.

Reference Tools

An **Idea and Examples Chart** can be used to organize information about a concept. Fill in the top rectangle with a term and its definition or description. Fill in the rectangles that follow with examples to illustrate the term. Each sample answer shows 3 examples, but your student can show more or fewer examples. Idea and examples charts are useful for concepts that can be illustrated with more than one type of example.



Essential Questions

How can you use integers to represent the velocity and the speed of an object?

Is the sum of two integers *positive*, *negative*, or *zero*? How can you tell?

How are adding integers and subtracting integers related?

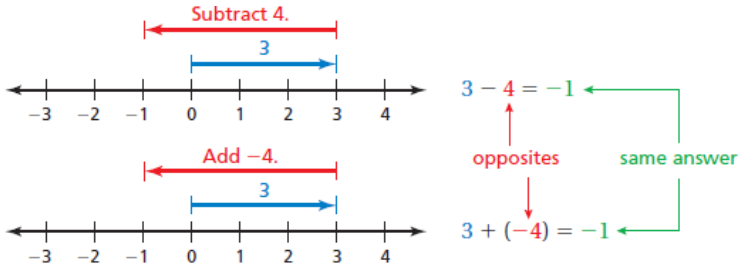
Is the product of two integers *positive*, *negative*, or *zero*? How can you tell?

Is the quotient of two integers *positive*, *negative*, or *zero*? How can you tell?

Key Ideas

Subtracting Integers

- To subtract an integer, add its opposite.



Quick Review

- A number line can be used to compare and order integers.
  - Numbers to the left are less than numbers to the right.
  - Numbers to the right are greater than numbers to the left.
- Division by 0 is undefined.
- The absolute value of a number is always a positive number or zero.
- When both factors have the same sign, the product is positive.
- When the factors have different signs, the product is negative.

What's the Point?

The ability to understand and work with integers is very useful in real life for events like measuring rainfall. Have your student collect rain water from the next few storms and measure the amount of collected water in whole centimeters. Record this data and have them plot the data on a number line. Which storm produced the most rain? What is the difference between the lightest rainfall and the heaviest rainfall?

The STEM Videos available online show ways to use mathematics in real-life situations. The Chapter 1: Freezing Solid STEM Video is available online at www.bigideasmath.com.

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Chapter 2: Rational Numbers

Standards

Common Core:

7.NS.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.

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

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

Students will...

Understand that a rational number is an integer divided by an integer.

Convert rational numbers to decimals.

Add rational numbers.

Subtract rational numbers.

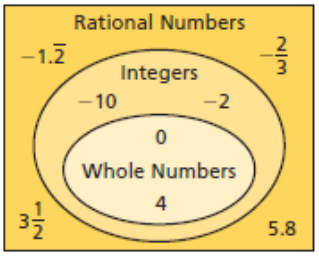
Multiply and divide rational numbers.

Solve real-life problems.

Key Ideas

Rational Numbers

A rational number is a number that can be written as $\frac{a}{b}$ where a and b are integers and $b \neq 0$.



Adding Rational Numbers

- To add rational numbers, use the same rules for signs as you used for integers.
- For example:

$$-\frac{1}{3}+\frac{1}{6}=\frac{-2}{6}+\frac{1}{6}=\frac{-2+1}{6}=\frac{-1}{6}=-\frac{1}{6}$$

Subtracting Rational Numbers

- To subtract rational numbers, use the same rules for signs as you used for integers.
- For example:

$$\frac{2}{5}-\left(-\frac{1}{5}\right)=\frac{2}{5}+\frac{1}{5}=\frac{2+1}{5}=\frac{3}{5}$$

Multiplying and Dividing Rational Numbers

- To multiply or divide rational numbers, use the same rules for signs as you used for integers.
- For example:

$$-\frac{2}{7}\cdot\frac{1}{3}=\frac{-2\cdot 1}{7\cdot 3}=\frac{-2}{21}=-\frac{2}{21}$$

$$-\frac{1}{2}\div\frac{4}{9}=\frac{-1}{2}\cdot\frac{9}{4}=\frac{-1\cdot 9}{2\cdot 4}=\frac{-9}{8}=-\frac{9}{8}$$

Key Terms

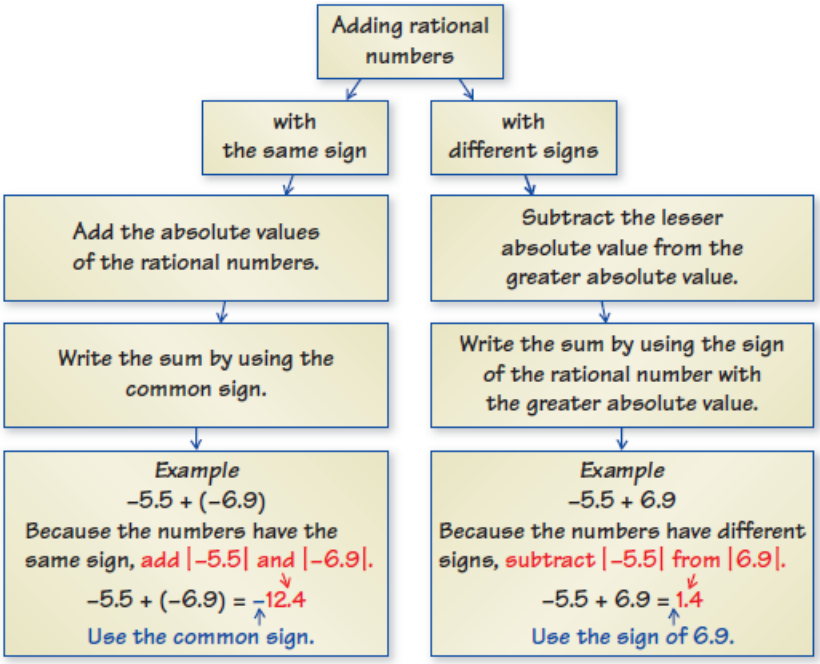
A ***rational number*** is a number that can be written as the ratio of two integers.

A ***terminating decimal*** is a decimal that ends.

A ***repeating decimal*** is a decimal that has a pattern that repeats.

Reference Tools

A **Process Diagram** can be used to show the steps involved in a procedure. Process diagrams are particularly useful for illustrating procedures with two or more steps, and they can have one or more branches. As shown, process diagrams can consist of a single flowchart-type diagram, with example(s) included in the last box to illustrate the steps that precede it. Or, the diagram can have two parallel flowcharts, in which the procedure is stepped out in one chart and an example illustrating each step is shown in the other chart.



Essential Questions

How can you use a number line to order rational numbers?

How can you use what you know about adding integers to add rational numbers?

How can you use what you know about subtracting integers to subtract rational numbers?

Why is the product of two negative rational numbers positive?

Quick Review

- Because you can divide any integer by any nonzero integer, you can use long division to write fractions and mixed numbers as decimals. These decimals are also rational numbers and will either *terminate* or *repeat*.
- Every quotient of integers (with a non-zero divisor) is a rational number.
- The distance between any two numbers on a number line is the absolute value of the difference of the numbers.
- When multiplying or dividing fractions, mixed numbers must be written as improper fractions.

What's the Point?

The ability to work with rational numbers is very useful in real life for events like balancing a checkbook. Have your student help you balance your checkbook or check your online bank statement. What is the beginning balance and the end balance? How much was spent in total? Stress to them the importance of checking bank statements because errors can be made.

The STEM Videos available online show ways to use mathematics in real-life situations. The Chapter 2: Carpenter or Joiner STEM Video is available online at www.bigideasmath.com.

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Chapter 3: Expressions and Equations

Key Terms

Like terms are terms that have the same variables raised to the same exponents.

An algebraic expression is in ***simplest form*** when it has no like terms and no parentheses.

A ***linear expression*** is an algebraic expression in which the exponent of the variable is 1.

When ***factoring an expression***, you write the expression as a product of factors.

Two equations are ***equivalent equations*** if they have the same solutions.

Students will...

Apply properties of operations to simplify algebraic expressions.

Apply properties of operations to add and subtract linear expressions.

Factor linear expressions.

Write simple equations.

Solve equations using addition or subtraction.

Solve equations using multiplication or division.

Solve two-step equations.

Solve real-life problems.

Standards

Common Core:

7.EE.1: Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

7.EE.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.

7.EE.4a: 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.

Key Ideas

Addition Property of Equality

- Adding the same number to each side of an equation produces an equivalent equation.
- If $a = b$, then $a + c = b + c$.

Subtraction Property of Equality

- Subtracting the same number from each side of an equation produces an equivalent equation.
- If $a = b$, then $a - c = b - c$.

Multiplication Property of Equality

- Multiplying each side of an equation by the same number produces an equivalent equation.
- If $a = b$, then $a \cdot c = b \cdot c$.

Division Property of Equality

- Dividing each side of an equation by the same number produces an equivalent equation.
- If $a = b$, then $a \div c = b \div c$, $c \neq 0$.

Games

- Let's Race
- Tic-Tac-Toe

These are available online in the *Game Closet* at www.bigideasmath.com.

Reference Tools

A **Four Square** can be used to organize information about a topic. Write the topic in the "bubble" in the middle of the four square. Then write concepts related to the topic in the four squares surrounding the bubble. Any concept related to the topic can be used. Encourage your student to include concepts that will help them learn the topic. Place four squares on note cards to use as a quick study reference.

Like Terms

Definition
Terms that have the same variables raised to the same exponents

Examples
2 and −3, 3x and −7x, x^2 and $6x^2$

Words
To *combine* like terms that have variables, use the Distributive Property to add or subtract the coefficients.

Non-Examples
y and 4, 3x and −4y, $6x^2$ and 2x

Quick Review

- Parts of an algebraic expression are called *terms*.
- Any letter can be used as a variable.
- To identify terms and like terms in an expression, first write the expression as a sum of its terms.
- The same variables must be raised to the same exponents for terms to be *like terms*.
- To *combine* like terms that have variables, use the Distributive Property to add or subtract the coefficients.
- To subtract a variable term, add the term with the opposite coefficient.
- You can use a vertical or a horizontal method to add linear expressions.
- To subtract one linear expression from another, add the opposite of each term in the expression.
- You can use the Distributive Property to factor out any rational number from an expression.
- Variables can be on either side of the equation.

Essential Questions

How can you simplify an algebraic expression?

How can you use algebra tiles to add or subtract algebraic expressions?

How can you use algebra tiles to solve addition or subtraction equations?

How can you use multiplication or division to solve equations?

How can you use algebra tiles to solve a two-step equation?

What's the Point?

The ability to use expressions and equations is very useful in real life for events like budgeting for a trip to the movies. Have your student figure out how many people they can take to the movies with a certain amount if money. What if everyone gets popcorn?

The STEM Videos available online show ways to use mathematics in real-life situations. The Chapter 3: Rock Climbing STEM Video is available online at www.bigideasmath.com.

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Chapter 4: Inequalities

Key Terms

An ***inequality*** is a mathematical sentence that compares expressions. It contains the symbols $<$, $>$, $\leq$, or $\geq$.

A ***solution of an inequality*** is a value that makes the inequality true.

The set of all solutions of an inequality is called the ***solution set***.

The ***graph of an inequality*** shows all the solutions of the inequality on a number line.

Students will...

Write and graph inequalities.

Use substitution to check whether a number is a solution of an inequality.

Solve inequalities using addition or subtraction.

Solve inequalities using multiplication or division.

Solve multi-step inequalities.

Solve real-life problems.

Standards

Common Core:
7.EE.4b: 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.

Key Ideas

Addition Property of Inequality

- When you add the same number to each side of an inequality, the inequality remains true.
- If $a < b$, then $a + c < b + c$.
- If $a > b$, then $a + c > b + c$.

Subtraction Property of Inequality

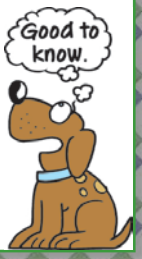
- When you subtract the same number from each side of an inequality, the inequality remains true.
- If $a < b$, then $a - c < b - c$.
- If $a > b$, then $a - c > b - c$.

Multiplication and Division Properties of Inequality (Case 1)

- When you multiply or divide each side of an inequality by the same *positive* number, the inequality remains true.
- If $a < b$ and c is positive, then $a \cdot c < b \cdot c$ and $\frac{a}{c} < \frac{b}{c}$.
- If $a > b$ and c is positive, then $a \cdot c > b \cdot c$ and $\frac{a}{c} > \frac{b}{c}$.

Multiplication and Division Properties of Inequality (Case 2)

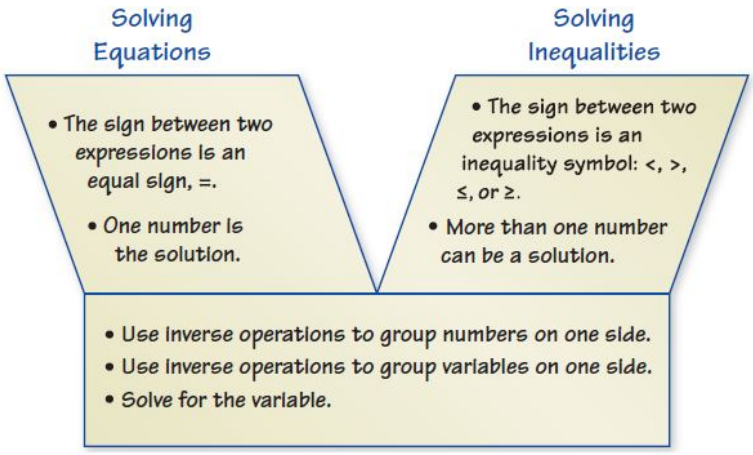
- When you multiply or divide each side of an inequality by the same *negative* number, the direction of the inequality symbol must be reversed for the inequality to remain true.
- If $a < b$ and c is negative, then $a \cdot c > b \cdot c$ and $\frac{a}{c} > \frac{b}{c}$.
- If $a > b$ and c is negative, then $a \cdot c < b \cdot c$ and $\frac{a}{c} < \frac{b}{c}$.



These properties are also true for $\leq$ and $\geq$.

Reference Tools

A **Y Chart** can be used to compare two topics. List differences between the two topics in the branches of the Y and similarities in the base of the Y. A Y chart serves as a good tool for assessing knowledge of a pair of topics that have subtle but important differences.



Quick Review

Inequality Symbols				
Symbol	<	>	≤	≥
Key Phrases	• is less than • is fewer than	• is greater than • is more than	• is less than or equal to • is at most • is no more than	• is greater than or equal to • is at least • is no less than

- When you multiply or divide by a negative quantity, reverse the direction of the inequality symbol.
- You solve two-step inequalities in much the same way as you solve two-step equations. You only need to remember to change the direction of the inequality symbol if you multiply or divide by a negative quantity.

Essential Questions

How can you use a number line to represent solutions of an inequality?

How can you use addition or subtraction to solve an inequality?

How can you use multiplication or division to solve an inequality?

How can you use an inequality to describe the dimensions of a figure?

What's the Point?

The ability to write and solve inequalities is very useful in real life for events like making a household budget. Ask your student how they plan on spending their money next month. Then have them make a budget to show at least how much money they will need to earn to cover all the costs.

The STEM Videos available online show ways to use mathematics in real-life situations. The Chapter 4: Space Cadets STEM Video is available online at www.bigideasmath.com.

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Chapter 5: Ratios and Proportions

Standards

Common Core:

7.RP.1: Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.

7.RP.2: Recognize and represent proportional relationships between quantities.

7.RP.3: Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.

Key Terms

A ***ratio*** is a comparison of two quantities using division.

A ***rate*** is a ratio of two quantities with different units.

A rate with a denominator of 1 is called a ***unit rate***.

A ***complex fraction*** has at least one fraction in the numerator, denominator, or both.

Slope is the rate of change between any two points on a line.

Two quantities x and y show ***direct variation*** when $y = kx$, where k is a number and $k \neq 0$.

The number k in the direct variation equation is called the ***constant of proportionality***.

Students will...

Find ratios, rates, and unit rates.

Find ratios and rates involving ratios of fractions.

Use equivalent ratios to determine whether two ratios form a proportion.

Use the Cross Products Property to determine whether two ratios form a proportion.

Use graphs to determine whether two ratios form a proportion.

Interpret graphs of proportional relationships.

Write proportions.

Solve proportions using mental math.

Solve proportions using multiplication or the Cross Products Property.

Use a point on a graph to write and solve proportions.

Find the slopes of lines.

Interpret the slopes of lines as rates.

Identify direct variation from graphs or equations.

Use direct variation models to solve problems.

Key Ideas

Proportions

- A proportion is an equation stating that two ratios are equivalent.
- Two quantities that form a proportion are proportional.

Cross Products

- In the proportion $\frac{a}{b} = \frac{c}{d}$, the products $a \cdot d$ and $b \cdot c$ are called **cross products**.

Cross Products Property

- The cross products of a proportion are equal.
- $\frac{a}{b} = \frac{c}{d}$
  $ad = bc$, where $b, d \neq 0$

Direct Variation

The graph of $y = kx$ is a line with a slope of k that passes through the origin. So, two quantities that show direct variation are in a proportional relationship.

Solving Proportions

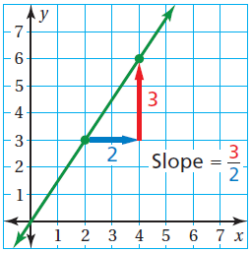
Method 1: Use mental math.

Method 2: Use the Multiplication Property of Equality.

Method 3: Use the Cross Products Property.

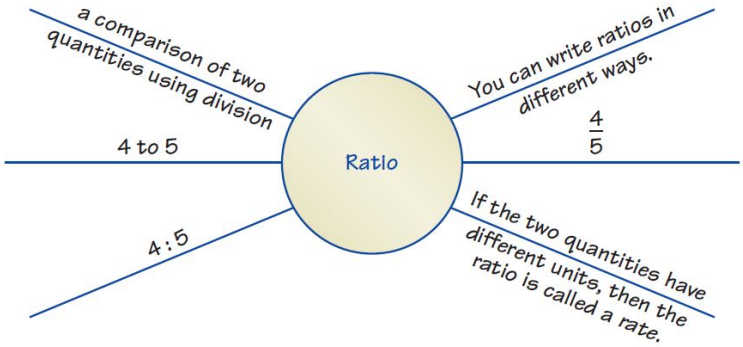
Slope

- The slope is a measure of the *steepness* of a line.
- To find the slope of a line, find the ratio of the change in y (vertical change) to the change in x (horizontal change).



$$\text{Slope} = \frac{\text{change in } y}{\text{change in } x}$$

Reference Tools



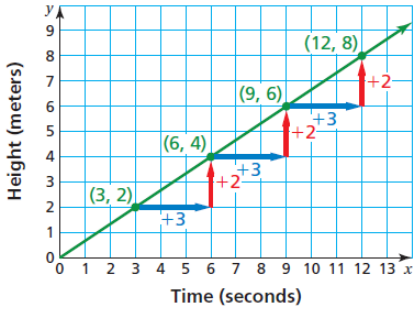
An **Information Wheel** can be used to organize information about a concept. Write the concept in the middle of the "wheel." Then write information related to the concept on the "spokes" of the wheel. Related information can include, but is not limited to: vocabulary words or terms, definitions, formulas, procedures, examples, and visuals. This type of organizer serves as a good summary tool because any information related to a concept can be included.

Quick Review

- You can graph the values from a ratio table.

Time, x (seconds)	Height, y (meters)
3	2
6	4
9	6
12	8

+3, +3, +3 (time); +2, +2, +2 (height)



- The graph of every proportional relationship is a line through the origin.
- When two quantities *vary directly*, the ratio of one quantity to another is a *constant*.

- One way to write a proportion is to use a table.

	Last Month	This Month
Purchase	2 ringtones	3 ringtones
Total Cost	6 dollars	x dollars

Use columns:

$\frac{2 \text{ ringtones}}{6 \text{ dollars}} = \frac{3 \text{ ringtones}}{x \text{ dollars}}$ — Numerators have the same units. / Denominators have the same units.

Use rows:

$\frac{2 \text{ ringtones}}{3 \text{ ringtones}} = \frac{6 \text{ dollars}}{x \text{ dollars}}$ — The units are the same on each side of the proportion.

Essential Questions

How do rates help you describe real-life problems?

How can proportions help you decide when things are "fair"?

How can you write a proportion that solves a problem in real life?

How can you use ratio tables and cross products to solve proportions?

How can you compare two rates graphically?

How can you use a graph to show the relationship between two quantities that vary directly? How can you use an equation?

What's the Point?

The ability to write and solve ratios and proportions is very useful in real life for events like converting between measures. If you are driving in Canada, speed is measured in km/h. Ask your student what the speed limit is in miles per hour if a sign says "Speed Limit 110 km/h."

The STEM Videos available online show ways to use mathematics in real-life situations. The Chapter 5: Painting a Large Room STEM Video is available online at www.bigideasmath.com.

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Chapter 6: Percents

Standards

Common Core:

7.EE.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.

7.RP.3: Use proportional relationships to solve multistep ratio and percent problems.

Key Terms

A ***percent of change*** is the percent that a quantity changes from the original amount.

When the original amount increases, the percent of change is called a ***percent of increase***.

When the original amount decreases, the percent of change is called a ***percent of decrease***.

A ***percent error*** is the percent that an estimated quantity differs from the actual amount.

A ***discount*** is a decrease in the original price of an item.

The increase from what the store pays to the selling price is called a ***markup***.

Interest is money paid or earned for the use of money.

The ***principal*** is the amount of money borrowed or deposited.

Simple interest is money paid or earned only on the principal.

Students will...

Write percents as decimals.

Write decimals as percents.

Compare and order fractions, decimals, and percents.

Use the percent proportion to find parts, wholes, and percents.

Use the percent equation to find parts, wholes, and percents.

Find percents of increase.

Find percents of decrease.

Use percent of discounts to find prices of items.

Use percent of markups to find selling prices of items.

Use the simple interest formula to find interest earned or paid, annual interest rates, and amounts paid on loans.

Solve real-life problems.

Key Ideas

Writing Percents as Decimals

- Remove the percent symbol. Then divide by 100, or just move the decimal point two places to the left.

Writing Decimals as Percents

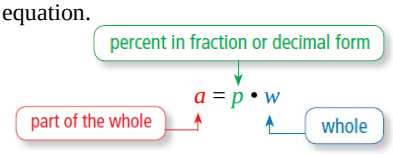
- Multiply by 100, or just move the decimal point two places to the right. Then add a percent symbol.

The Percent Proportion

You can represent "a is p percent of w" with the proportion $\frac{a}{w} = \frac{p}{100}$ where a is part of the whole w, and p%, or $\frac{p}{100}$, is the percent.

The Percent Equation

To represent "a is p percent of w," use an equation.



Percent Error

$$\text{Percent error} = \frac{\text{amount of error}}{\text{actual amount}}$$

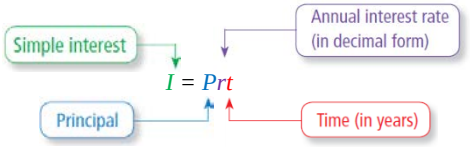
Percents of Increase and Decrease

$$\text{Percent of increase} = \frac{\text{new amount} - \text{original amount}}{\text{original amount}}$$

$$\text{Percent of decrease} = \frac{\text{original amount} - \text{new amount}}{\text{original amount}}$$

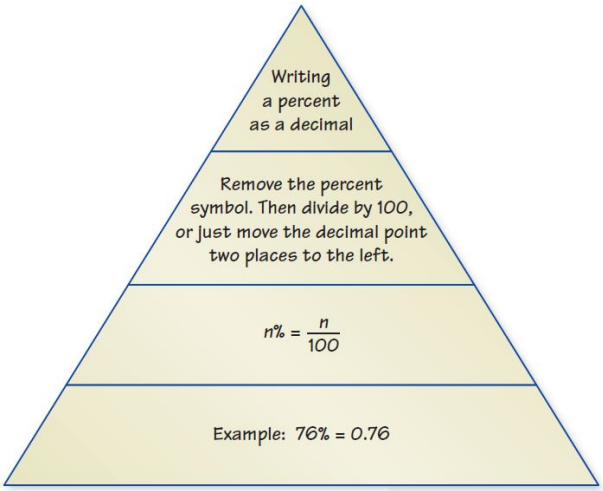
Simple Interest

Simple interest is money paid or earned only on the principal.



Reference Tools

A **Summary Triangle** can be used to explain a concept. Typically, the summary triangle is divided into 3 or 4 parts. In the top part, write the concept being explained. In the middle part(s), write any procedure, explanation, description, definition, theorem, and/or formula(s). In the bottom part, write an example to illustrate the concept. They can be placed on note cards to use as a quick study reference.



Games

- I Have…Who Has…?
- Order Matters

These are available online in the *Game Closet* at www.bigideasmath.com.

Essential Questions

How does the decimal point move when you rewrite a percent as a decimal and when you rewrite a decimal as a percent?

How can you order numbers that are written as fractions, decimals, and percents?

How can you use models to estimate percent questions?

How can you use an equivalent form of the percent proportion to solve a percent problem?

What is a percent of decrease? What is a percent of increase?

How can you find discounts and selling prices?

How can you find the amount of simple interest earned on a savings account? How can you find the amount of interest owed on a loan?

Quick Review

Percent/Decimal Review

- 25% is 25 per one hundred or 0.25.
- 250% is 250 per one hundred or 2.5.
- 0.25% is 25 hundredths per one hundred or 0.0025.
- 0.025% is 25 thousandths per one hundred or 0.00025.

- When comparing and ordering fractions, decimals, and percents, write the numbers as all fractions, all decimals, or all percents.

- Percent bar models help estimate answers, while ratio tables can be used to find the exact answers.

- The percent error compares the amount of error to the actual amount.

- For the Simple Interest formula, the interest rate is written as a decimal. Time is written in terms of years. When time is given in months, remember to express it as a fraction of a year or as a decimal.

What's the Point?

The ability to use percents is very useful in real life when taking out a loan on a car. Ask your student to research car loans through different banks or dealerships. How much interest would they pay over the life of a specific loan? Does this seem like a good choice? Why or Why not?

The STEM Videos available online show ways to use mathematics in real-life situations. The Chapter 6: Tornado! STEM Video is available online at www.bigideasmath.com.

Big Ideas Math: Red

Parent Newsletter

Chapter 7: Constructions and Scale Drawings

Standards

Common Core:

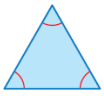
7.G.1: Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

7.G.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.

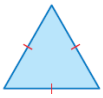
7.G.5: Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

Key Ideas

Classifying Triangles Using Angles

acute triangle	*obtuse* triangle	*right* triangle	*equiangular* triangle
			
all acute angles	1 obtuse angle	1 right angle	3 congruent angles

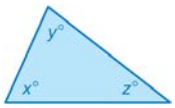
Classifying Triangles Using Sides

scalene triangle	*isosceles* triangle	*equilateral* triangle
		
no congruent sides	at least 2 congruent sides	3 congruent sides

Sum of the Angle Measures of a Triangle

The sum of the angle measures of a triangle is 180°.

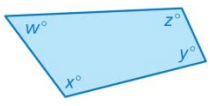
$x + y + z = 180$



Sum of the Angle Measures of a Quadrilateral

The sum of the angle measures of a quadrilateral is 360°.

$w + x + y + z = 360$



Scale

The measurements in scale drawings and models are proportional to the measurements of the actual object.

Key Terms

Two angles are ***adjacent angles*** when they share a common side and have the same vertex.

Two angles are ***vertical angles*** when they are opposite angles formed by the intersection of two lines.

Congruent angles have the same measure.

Two angles are ***complementary angles*** when the sum of their measures is 90°.

Two angles are ***supplementary angles*** when the sum of their measures is 180°.

Congruent sides have the same length.

A ***scale drawing*** is a proportional, two-dimensional drawing of an object.

A ***scale model*** is a proportional, three-dimensional model of an object.

The ***scale*** gives the ratio that compares the measurements of the drawing or model with the actual measurements.

A scale without units is called a ***scale factor***.

Students will...

Identify adjacent and vertical angles.

Find angle measures using adjacent and vertical angles.

Classify pairs of angles as complementary, supplementary, or neither.

Find angle measures using complementary and supplementary angles.

Construct triangles with given angle measures.

Construct triangles with given side lengths.

Understand that the sum of the angle measures of any triangle is 180°.

Find missing angle measures in triangles.

Understand that the sum of the angle measures of any quadrilateral is 360°.

Find missing angle measures in quadrilaterals.

Construct quadrilaterals.

Use scale drawings to find actual distances.

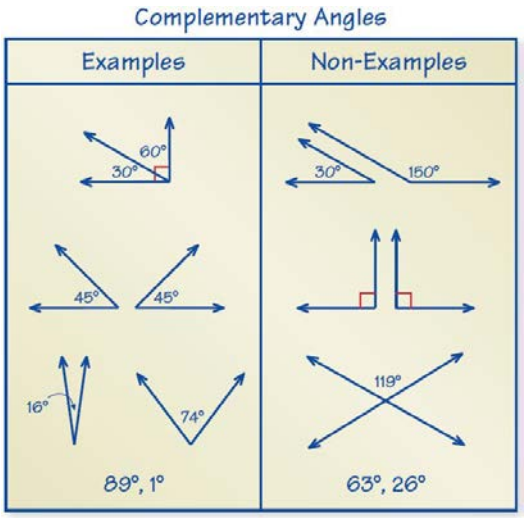
Find scale factors.

Use scale drawings to find actual perimeters And areas.

Recreate scale drawings at a different scale.

Reference Tools

An **Example and Non-Example Chart** can be used to list examples and non-examples of a vocabulary word or term. Write examples of the word or term in the left column and non-examples in the right column. This type of organizer serves as a good tool for assessing knowledge of pairs of topics that have subtle but important differences, such as complementary and supplementary angles.



Games

- It's All About the Details
- Six in a Row
- Picture This

These are available online in the *Game Closet* at www.bigideasmath.com.

Essential Questions

What can you conclude about the angles formed by two intersecting lines?

How can you classify two angles as complementary or supplementary?

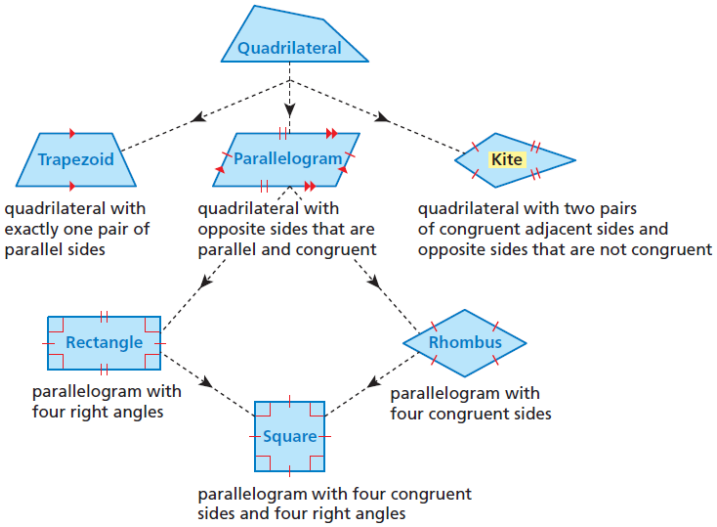
How can you construct triangles?

How can you classify quadrilaterals?

How can you enlarge or reduce a drawing proportionally?

Quick Review

A quadrilateral is a polygon with four sides. The diagram shows properties of different types of quadrilaterals and how they are related. When identifying a quadrilateral, use the name that is most specific.



- When two lines intersect, two pairs of vertical angles are formed. Vertical angles are congruent.
- Adjacent sides share a common vertex.
- The measurements in scale drawings and models are proportional to the measurements of the actual object.

An angle can be classified by its measure.

- A right angle is 90°
- An acute angle is less than 90°
- An obtuse angle is between 90° and 180°
- A straight angle is 180°.

What's the Point?

The ability to use scale drawings is very useful in real life when making building plans or in architectural design. Ask your student to make a scale drawing of their ideal bedroom. How would they have to change the dimensions of their real bedroom to create the ideal bedroom?

The STEM Videos available online show ways to use mathematics in real-life situations.
The Chapter 7: Trick Shots in Film STEM Video is available online at www.bigideasmath.com.

Big Ideas Math: Red

Parent Newsletter

Chapter 8: Circles and Area

Standards

Common Core:

7.G.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.

7.G.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.

Key Terms

A ***circle*** is the set of all points in a plane that are the same distance from a point called the ***center***.

The distance around a circle is called the ***circumference***.

The ratio $\frac{\text{circumference}}{\text{diameter}}$ is the same for *every* circle and is represented by the Greek letter π, called ***pi***.

A ***semicircle*** is one-half of a circle.

A ***composite figure*** is made up of triangles, squares, rectangles, semicircles, and other two-dimensional figures.

Students will...

Describe a circle in terms of radius and diameter.

Understand the concept of pi.

Find circumferences of circles and perimeters of semicircles.

Find perimeters of composite figures.

Find areas of circles and semicircles.

Find areas of composite figures by separating them into familiar figures.

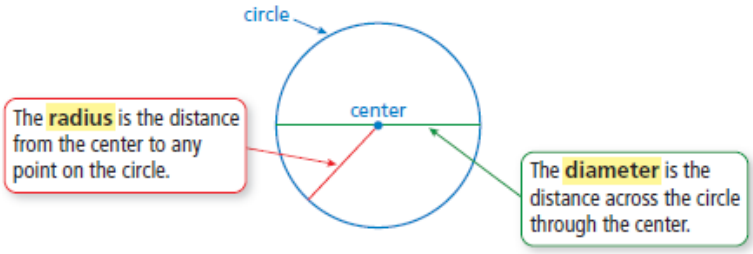
Solve real-life problems.

Key Ideas

Radius and Diameter

The diameter d of a circle is twice the radius r. The radius r of a circle is one-half the diameter d.

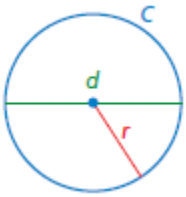
Diameter: $d = 2r$ **Radius:** $r = \frac{d}{2}$



Circumference of a Circle

The circumference C of a circle is equal to π times the diameter d or π times twice the radius r.

$C = \pi d$ or $C = 2\pi r$



Area of a Circle

The area A of a circle is the product of π and the square of the radius.

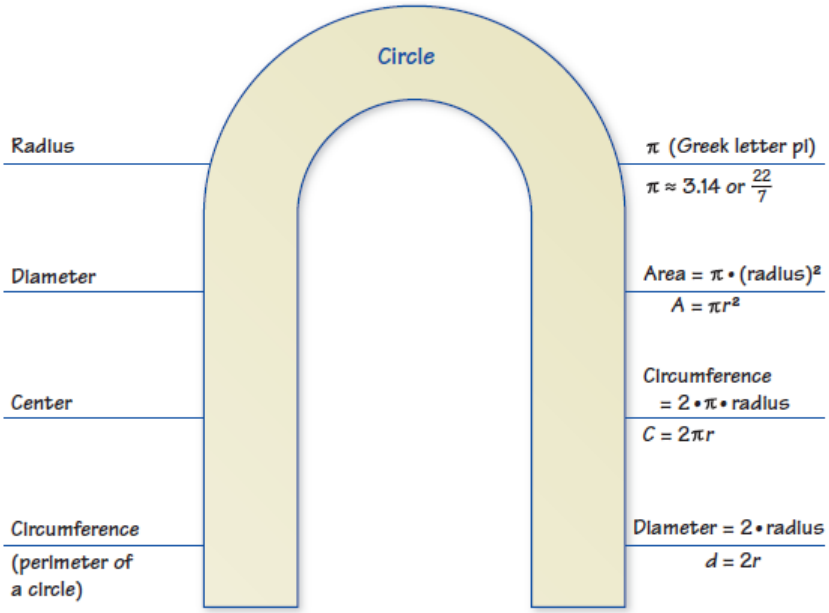
$A = \pi r^2$

Composite Figures

- A composite figure is made up of triangles, squares, rectangles, semicircles, and other two-dimensional figures.
- To find the perimeter of a composite figure, find the distance around the figure.
- To find the area of a composite figure, separate it into figures with areas you know how to find. Then find the sum of the areas of those figures.

Reference Tools

A **Word Magnet** can be used to organize information associated with a vocabulary word or term. As shown, write the word or term inside the magnet. Write associated information on the blank lines that "radiate" from the magnet. Associated information can include, but is not limited to: other vocabulary words or terms, definitions, formulas, procedures, examples, and visuals. This type of organizer serves as a good summary tool because any information related to a topic can be included.



Essential Questions

How can you find the circumference of a circle?

How can you find the perimeter of a composite figure?

How can you find the area of a circle?

How can you find the area of a composite figure?

Quick Review

- Pi (π) is a constant whose value is approximately 3.14 or $\frac{22}{7}$.
- Area includes everything inside the figure.
- The radius is half the diameter.
- The symbol ≈ means *approximately equal to*.
- To find the perimeter of a composite figure, find the distance around the figure.

Games

- Math Card War
- Pick your Polygon

These are available online in the *Game Closet* at www.bigideasmath.com.

What's the Point?

The ability to use properties of circles and area is very useful in real life for events like putting up a pool. Have your student measure their yard. What size of a circular swimming pool would fit best? How many square feet would be needed to add a deck?

The STEM Videos available online show ways to use mathematics in real-life situations. The Chapter 8: Track and Field STEM Video is available online at www.bigideasmath.com.

Big Ideas Math: Red

Parent Newsletter

Chapter 9: Surface Area and Volume

Students will...

Use two-dimensional nets to represent three-dimensional solids.

Find surface areas of rectangular and triangular prisms.

Find surface areas of regular pyramids.

Find surface areas of cylinders.

Find volumes of prisms.

Find volumes of pyramids.

Describe the intersections of planes and solids.

Solve real-life problems.

Key Terms

The ***lateral surface area*** of a prism is the sum of the areas of the lateral faces.

A ***regular pyramid*** is a pyramid whose base is a regular polygon.

The height of each lateral face of a pyramid is the ***slant height*** of the pyramid.

A two-dimensional shape formed by the intersection of a plane and a solid is called a ***cross section***.

Standards

Common Core:

7.G.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.

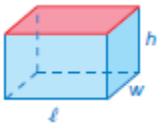
7.G.4: Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

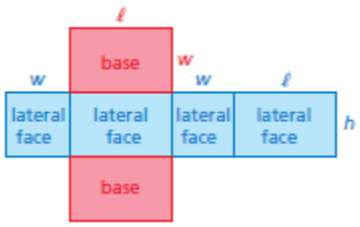
7.G.6: Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

Key Ideas

Surface Area of a Rectangular Prism

The surface area S of a rectangular prism is the sum of the areas of the bases and the lateral faces.





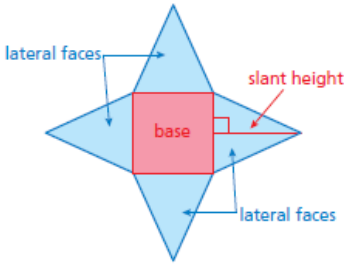
$$S = 2\ell w + 2\ell h + 2wh$$

Areas of bases | Areas of lateral faces

Surface Area of a Pyramid

The surface area S of a pyramid is the sum of the areas of the base and the lateral faces.

S = area of base + areas of lateral faces



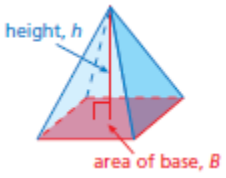
Surface Area of a Prism

The surface area S of any prism is the sum of the areas of the bases and the lateral faces.

S = areas of bases + areas of lateral faces

Volume of a Pyramid

The volume V of a pyramid is one-third the product of the area of the base and the height of the pyramid.



$$V = \frac{1}{3}Bh$$

Area of base | Height of pyramid

Essential Questions

How can you find the surface area of a prism?

How can you find the surface area of a pyramid?

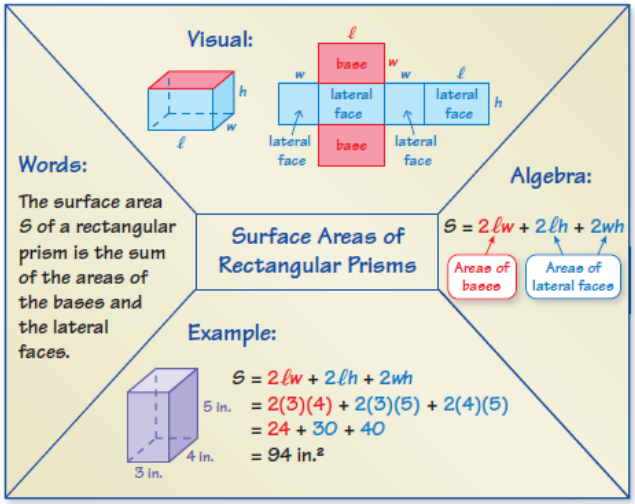
How can you find the surface area of a cylinder?

How can you find the volume of a prism?

How can you find the volume of a pyramid?

Reference Tools

An **Information Frame** can be used to help organize and remember concepts. Write the topic in the middle rectangle. Then write related concepts in the spaces around the rectangle. Related concepts can include *Words*, *Numbers*, *Algebra*, *Example*, *Definition*, *Non-Example*, *Visual*, *Procedure*, *Details*, and *Vocabulary*. Your student can place their information frames on note cards to use as a quick study reference.



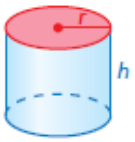
Quick Review

- Area is always measured in square units.
- The area A of a triangle with base b and height h is $A = \frac{1}{2}bh$.
- When all the edges of a rectangular prism have the same length s, the rectangular prism is a cube. The formula for the surface area of a cube is $S = 6s^2$.
- Even though many well-known pyramids have square bases, the base of a pyramid can be any polygon.
- In a regular polygon, all the sides are congruent and all the angles are congruent.
- Volume is measured in cubic units.
- The *height* of a pyramid is the perpendicular distance from the base to the vertex.

Key Ideas

Surface Area of a Cylinder

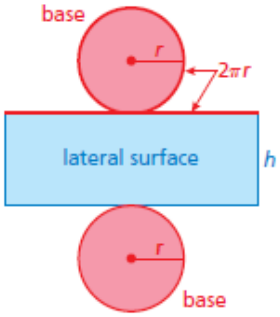
The surface area S of a cylinder is the sum of the areas of the bases and the lateral surface.



$S = 2\pi r^2 + 2\pi rh$

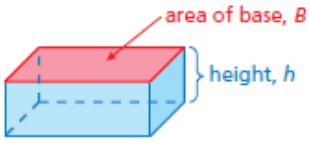
Areas of bases

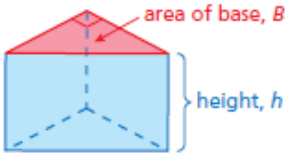
Area of lateral surface



Volume of a Prism

The volume V of a prism is the product of the area of the base and the height of the prism.





$V = Bh$

Area of base

Height of prism

What's the Point?

The ability to calculate surface area and volume is very useful in real life for events like packaging a product. Have your student measure a cereal box and calculate the surface area and volume of the box. Could the box be a different size with a smaller surface area and still hold the same amount of cereal? Why do you think the company made the box the size it is?

The STEM Videos available online show ways to use mathematics in real-life situations. The Chapter 8: Paper Measurements STEM Video is available online at www.bigideasmath.com.

Big Ideas Math: Red

Parent Newsletter

Chapter 10: Probability and Statistics

Students will...

Identify and count the outcomes of experiments.

Understand the concept of probability and the relationship between probability and likelihood.

Find probabilities of events.

Find relative frequencies.

Use experimental probabilities to make predictions.

Use theoretical probabilities to find quantities.

Compare experimental and theoretical probabilities.

Use tree diagrams, tables, or a formula to find the number of possible outcomes.

Find probabilities of compound events.

Identify independent and dependent events.

Use formulas to find probabilities of independent and dependent events.

Use simulations to find experimental probabilities.

Determine when samples are representative of populations.

Use data from random samples to make predictions about populations.

Use multiple samples to make predictions about populations.

Use measures of center and variation to compare populations.

Use random samples to compare populations.

Essential Questions

In an experiment, how can you determine the number of possible results?

How can you describe the likelihood of an event?

How can you use relative frequencies to find probabilities?

How can you find the number of possible outcomes of one or more events?

What is the difference between dependent and independent events?

How can you determine whether a sample accurately represents a population?

How can you compare data sets that represent two populations?

Key Terms

The ***relative frequency*** of an event is the fraction or percent of the time that the event occurs in an experiment.

The set of all possible outcomes of one or more events is called the ***sample space***.

A ***compound event*** consists of two or more events.

Events are ***independent events*** if the occurrence of one event *does not* affect the likelihood that the other event(s) will occur.

Events are ***dependent events*** if the occurrence of one event *does* affect the likelihood that the other event(s) will occur.

A ***simulation*** is an experiment that is designed to reproduce the conditions of a situation or process.

A ***population*** is an entire group of people or objects.

A ***sample*** is a part of the population.

An ***unbiased sample*** is representative of a population because it is selected at random and is large enough to provide accurate data..

A ***biased sample*** is not representative of a population because one or more parts of the population are favored over others..

Standards

Common Core:

7.SP.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.

7.SP.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.

7.SP.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.

7.SP.4: Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.

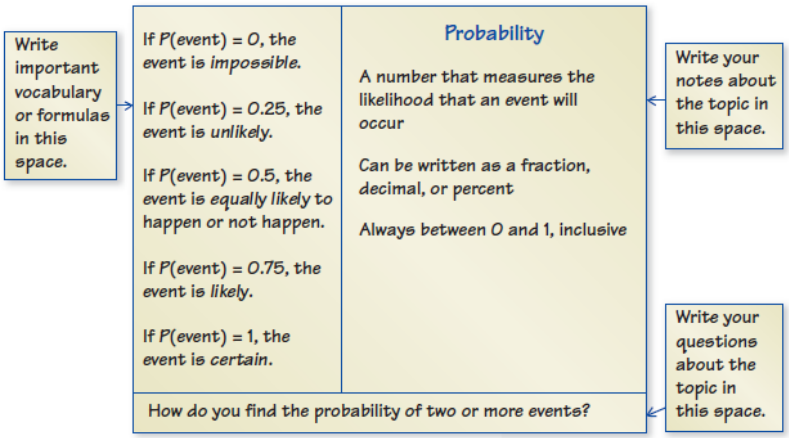
7.SP.5: Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.

7.SP.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.

7.SP.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.

7.SP.8: Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

Reference Tools



A **Notetaking Organizer** can be used to write notes, vocabulary, and questions about a topic. In the space on the left, write important vocabulary or formulas. In the space on the right, write notes about the topic. In the space at the bottom, write questions about the topic.

Quick Review

- When an experiment is performed *at random* or *randomly*, all of the possible outcomes are equally likely.
- Probabilities can be written as fractions, decimals, or percents.
- You can use tables and tree diagrams to find the sample space of two or more events.
- You can use a sample to make an *inference*, or conclusion, about a population.
- You use the mean and the mean absolute deviation (MAD) to describe symmetric distributions of data.
- You use the median and the interquartile range (IQR) to describe skewed distributions of data.
- You can use random samples to make comparisons about two populations.

Key Ideas

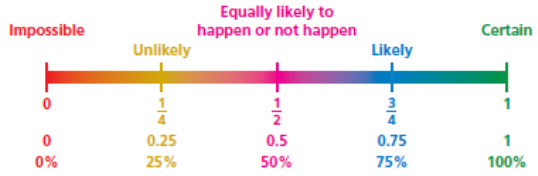
Outcomes and Events

An **experiment** is an investigation or a procedure that has varying results. The possible results of an experiment are called **outcomes**. A collection of one or more outcomes is an **event**. The outcomes of a specific event are called **favorable outcomes**.

For example, randomly selecting a marble from a group of marbles is an experiment. Each marble in the group is an outcome. Selecting a green marble from the group is an event.

Probability

The **probability** of an event is a number that measures the likelihood that the event will occur. Probabilities are between 0 and 1, including 0 and 1. The diagram relates likelihoods (above the diagram) and probabilities (below the diagram).



Probability of Independent Events

The probability of two or more independent events is the product of the probabilities of the events.

$$P(A \text{ and } B) = P(A) \cdot P(B)$$
$$P(A \text{ and } B \text{ and } C) = P(A) \cdot P(B) \cdot P(C)$$

Finding the Probability of an Event

When all possible outcomes are equally likely, the probability of an event is the ratio of the number of favorable outcomes to the number of possible outcomes. The probability of an event is written as $P(\text{event})$.

$$P(\text{event}) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$$

Experimental Probability

Probability that is based on repeated trials of an experiment is called **experimental probability**.

$$P(\text{event}) = \frac{\text{number of times the event occurs}}{\text{total number of trials}}$$

Theoretical Probability

When all possible outcomes are equally likely, the **theoretical probability** of an event is the ratio of the number of favorable outcomes to the number of possible outcomes.

$$P(\text{event}) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$$

Fundamental Counting Principle

An event M has m possible outcomes. An event N has n possible outcomes. The total number of outcomes of event M followed by event N is $m \times n$.

Probability of Dependent Events

The probability of two dependent events A and B is the probability of A times the probability of B after A occurs.

$$P(A \text{ and } B) = P(A) \cdot P(B \text{ after } A)$$

What's the Point?

The ability to use probability and statistics is very useful in real life when you are making important decisions like what your college major should be. Ask your student what they want their career to be. Then have them research job openings to see what type of degrees employers are looking for. Based on this data, what is the probability of finding employment in their fields of interest?

The STEM Videos available online show ways to use mathematics in real-life situations. The Chapter 10: Massively Multiplayer Rock Paper Scissors STEM Video is available online at www.bigideasmath.com.

Games

- Anything But Eight
- Take Your Chances

These are available online in the *Game Closet* at www.bigideasmath.com.