

Unit 1: Number Systems and Operations

Unit 1 Project: Crazy for Cocoa

Unit 1 Learning Mindset Focus: Perseverance: Checks for Understanding

Module 1: Integer Concepts

Recommended Pacing with Assessments: 8 Days

Module 1 Mathematical Progressions

Prior Learning	Current Development	Future Connections
<p>Students read, wrote, and compared decimals to the thousandths place.</p> <p>Students applied and extended previous understandings of numbers to the system of rational numbers.</p>	<p>Students use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.</p> <p>Students write, interpret, and explain statements of order for rational numbers in real-world contexts.</p> <p>Students interpret absolute value as magnitude for positive or negative quantities.</p>	<p>Students will describe situations in which opposite quantities combine to make 0.</p> <p>Students will solve real-world and mathematical problems using numerical and algebraic expressions and equations.</p> <p>Students will apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.</p>

Module 1 Vocabulary

absolute value	the distance of a number from zero on a number line; shown by $ $
inequality	a mathematical sentence that shows the relationship between quantities that are not equal
integers	elements of the set of whole numbers and their opposites
negative number	a number less than zero
opposites	two numbers that are the same distance from 0 on a number line but on opposite side
positive number	a number greater than zero

Lesson 1.1 Identify and Interpret Integers

Build Conceptual Understanding – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.

Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., $-(-3) = 3$, and that 0 is its own opposite.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Model with mathematics.

I Can Objective

I can graph positive and negative integers and find their opposites.

Learning Objective

Identify and interpret integers using a number line.

Language Objective

Use correct real-world terms for positive and negative values of values such as depth, temperature, and electric charge.

Vocabulary

New: integers, negative number, opposites, positive number

Lesson Materials

Number Lines (-20 to 20) (Teacher Resource Masters)

Lesson 1.2 Compare and Order Integers on a Number Line

Build Conceptual Understanding – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Write, interpret, and explain statements of order for rational numbers in real-world contexts.

Mathematical Practices and Processes

- Model with mathematics.
- Reason abstractly and quantitatively.

I Can Objective

I can order integers from least to greatest and use inequalities to compare integers.

Learning Objective

Use number lines to compare and order integers.

Language Objective

Use terms for relative distance and magnitude in real-world and mathematical contexts.

Vocabulary

New: inequality

Lesson Materials

Number Lines (-20 to 20) (Teacher Resource Masters)

Lesson 1.3 Find and Apply Absolute Value

Connect Concepts and Skills – 1 Day

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation.

Distinguish comparisons of absolute value from statements about order.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Model with mathematics.

I Can Objective

I can find and use absolute value and magnitude to describe real-world situations.

Learning Objective

Find and use absolute value in real-world situations.

Language Objective

Define the terms *absolute value* and *magnitude* and use both correctly when describing their reasoning.

Vocabulary

New: absolute value

Lesson Materials

Number Lines (-20 to 20) (Teacher Resource Masters)

Unit 1: Number Systems and Operations

Unit 1 Project: Crazy for Cocoa

Unit 1 Learning Mindset Focus: Perseverance: Checks for Understanding

Module 2: Rational Number Concepts

Recommended Pacing with Assessments: 8 Days

Module 2 Mathematical Progressions

Prior Learning	Current Development	Future Connections
Students compared decimals. Students found and used equivalent fractions. Students found factors and multiples.	Students write, interpret, and explain statements of order for rational numbers in real-world contexts. Students find the greatest common factor of two whole numbers less than or equal to 100. Students find the least common multiple of two whole numbers less than or equal to 12.	Students will find the greatest common factor and least common multiple of two whole numbers. Students will apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

Module 2 Vocabulary

common denominator	a denominator that is the same in two or more fractions
Distributive Property	the property that states if you multiply a sum by a number, you will get the same result if you multiply each addend by that number and then add the products
factor	a number that is multiplied by another number to get a product
greatest common factor	the largest common factor of two or more given numbers
least common multiple	the smallest number, other than zero, that is a multiple of two or more given numbers
rational number	a number that can be written in the form $\frac{a}{b}$, where a and b are integers and $b \neq 0$

Lesson 2.1 Interpret Rational Numbers

Connect Concepts and Skills – 1 Day

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Understand a rational number as a point on the number line. Extend number line diagrams

Find and position integers and other rational numbers on a horizontal or vertical number line diagram

Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation.

Distinguish comparisons of absolute value from statements about order.

Mathematical Practices and Processes

- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.

I Can Objective

I can find and use absolute values and the opposite of a number to solve real-world problems.

Learning Objective

Graph rational numbers on vertical and horizontal number lines.

Language Objective

Explain how to graph numbers on a number line.

Vocabulary

New: rational number

Lesson Materials

number lines (Teacher Resource Masters)

Lesson 2.2 Compare Rational Numbers on a Number Line

Apply and Practice – 1 Day

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram.

Find and position integers and other rational numbers on a horizontal or vertical number line diagram

Mathematical Practices and Processes

- Model with mathematics.
- Use appropriate tools strategically.

I Can Objective

I can compare positive and negative rational numbers using a number line.

Learning Objective

Compare rational numbers using a number line.

Language Objective

Explain how to compare rational numbers.

Lesson 2.3 Find and Apply LCM and GCF

Apply and Practice – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the Distributive Property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor.

Write, interpret, and explain statements of order for rational numbers in real-world contexts.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Attend to precision.
- Use structure.

I Can Objective

I can find and use the GCF or LCM to solve problems.

Learning Objective

Compare rational numbers using the GCF and LCM.

Language Objective

Students will explain how to find the GCF and LCM of rational numbers.

Vocabulary

Review: common denominator, denominator, Distributive Property, factor
New: greatest common factor, least common multiple

Lesson 2.4 Order Rational Numbers

Apply and Practice – 1 Day

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Write, interpret, and explain statements of order for rational numbers in real-world contexts. Use the Distributive Property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor.

Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the Distributive Property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor.

Mathematical Practices and Processes

- Attend to precision.
- Look for and make use of structure.

I Can Objective

I can order positive and negative rational numbers of different forms.

Learning Objective

Use strategies to order rational numbers.

Language Objective

Explain how to order rational numbers using number lines, least common multiple (LCM), and greatest common factor (GCF).

Unit 1: Number Systems and Operations

Unit 1 Project: Crazy for Cocoa

Unit 1 Learning Mindset Focus: Perseverance: Checks for Understanding

Module 3: Fraction Division

Recommended Pacing with Assessments: 12 Days

Module 3 Mathematical Progressions

Prior Learning	Current Development	Future Connections
Students found factors and multiples.	Students compute quotients of fractions.	Students will apply and extend previous understanding of multiplication of fractions to multiply rational numbers.
Students added and subtracted fractions with unlike denominators.	Students solve real-world problems involving division of fractions by fractions.	Students will apply and extend previous understanding of division of fractions to divide rational numbers.
Students multiplied a fraction or whole number by a fraction.	Students use least common multiple and greatest common factor to add, subtract, multiply, and divide fractions.	
Students divided unit fractions by whole numbers and whole numbers by unit fractions.		

Module 3 Vocabulary

denominator	the bottom number of a fraction that tells how many equal parts are in the whole
dividend	the number to be divided in a division problem
divisor	the number you are dividing by in a division problem
expression	a mathematical phrase that contains operations, numbers, and/or variables
numerator	the top number of a fraction that tells how many parts of a whole are being considered
quotient	the result when one number is divided by another
rectangle	a parallelogram with four right angles
simplify	to write a fraction in simplest form
multiplicative inverse	one of two numbers whose product is 1
reciprocal	one of two numbers whose product is 1

Lesson 3.1 Understand Fraction Division

Build Conceptual Understanding – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions.

Mathematical Practices and Processes

- Use appropriate tools strategically.
- Attend to precision.

I Can Objective

I can divide fractions with the same denominators with and without models.

Learning Objective

Divide fractions with the same denominators.

Language Objective

Explain how to divide fractions using a model.

Vocabulary

Review: dividend, divisor, expression, quotient

Lesson Materials

fraction strips (Teacher Resource Masters)

Lesson 3.2 Explore Division of Fractions with Unlike Denominators

Connect Concepts and Skills – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Use appropriate tools strategically.

I Can Objective

I can divide two fractions with unlike denominators using several methods.

Learning Objective

Divide fractions with unlike denominators.

Language Objective

Explain how to divide fractions with unlike denominators using reciprocals.

Vocabulary

Review: denominator, numerator

New: multiplicative inverse, reciprocal

Lesson Materials

Centimeter Grid Paper (Teacher Resource Masters)

Lesson 3.3 Explore Division of Mixed Numbers

Connect Concepts and Skills – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Attend to precision.

I Can Objective

I can find the quotient of a mixed number or fraction and a mixed number, fraction, or whole number.

Learning Objective

Divide mixed numbers.

Language Objective

Explain how to rewrite mixed numbers as fractions in order to divide.

Vocabulary

Review: simplify

Lesson Materials

fraction strips (Teacher Resource Masters)

Lesson 3.4 Practice and Apply Division of Fractions and Mixed Numbers

Apply and Practice – 1 Day

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Attend to precision.

I Can Objective

I can divide mixed numbers and fractions to solve problems.

Learning Objective

Divide fractions and mixed numbers.

Language Objective

Explain how to find the quotient of fractions and mixed numbers using the reciprocal.

Lesson 3.5 Practice Fraction Operations

Apply and Practice – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions.

Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Attend to precision.

I Can Objective

I can use the LCM and GCF to write fractions with like denominators and solve fraction problems using the four operations.

Learning Objective

Use LCM and GCF to add, subtract, multiply, and divide fractions.

Language Objective

Explain how to find and use the LCM and GCF to complete fraction operations.

Vocabulary

Review: simplest form

Unit 1: Number Systems and Operations

Unit 1 Project: Crazy for Cocoa

Unit 1 Learning Mindset Focus: Perseverance: Checks for Understanding

Module 4: Fluency with Multi-Digit Decimal Operations

Recommended Pacing with Assessments and Performance Task: 10 Days

Module 4 Mathematical Progressions

Prior Learning	Current Development	Future Connections
Students added and subtracted decimals to hundredths.	Students add and subtract multi-digit decimals.	Students will add and subtract rational numbers.
Students multiplied multi-digit whole numbers.	Students divide multi-digit numbers.	Students will multiply and divide rational numbers.
Students multiplied decimals to hundredths.	Students multiply and divide multi-digit decimals.	Students will solve real-world and mathematical problems involving the four operations with rational numbers.
Students found whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors.		
Students divided decimals to hundredths.		

Module 4 Vocabulary

equivalent having the same value

remainder the amount left over when an amount cannot be divided equally

Lesson 4.1 Add and Subtract Multi-Digit Decimals

Apply and Practice – 1 Day

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Mathematical Practices and Processes

- Model with mathematics.
- Attend to precision.

I Can Objective

I can add and subtract multi-digit decimals to the thousandths with or without a model.

Learning Objective

Add and subtract multi-digit decimals.

Language Objective

Explain how to add and subtract multi-digit decimals using mathematical language. Explain how a 10×10 grid is used to add and subtract multi-digit decimals.

Lesson Materials

Decimal Models (Teacher Resource Masters)

Lesson 4.2 Multiply Multi-Digit Decimals

Apply and Practice – 1 Day

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Model with mathematics.

I Can Objective

I can multiply multi-digit decimals up to thousandths.

Learning Objective

Multiply multi-digit decimals.

Language Objective

Explain how to multiply multi-digit decimals using mathematical language. Explain how models are used to multiply multi-digit decimals.

Lesson Materials

Decimal Models (Teacher Resource Masters)

Lesson 4.3 Divide Multi-Digit Whole Numbers

Apply and Practice – 1 Day

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Fluently divide multi-digit numbers using the standard algorithm.

Mathematical Practices and Processes

- Attend to precision.

I Can Objective

I can divide multi-digit whole numbers by multi-digit numbers with or without remainders.

Learning Objective

Divide multi-digit whole numbers using the standard algorithm.

Language Objective

Explain how to divide multi-digit whole numbers using mathematical language.

Vocabulary

Review: remainder

Lesson 4.4 Divide Multi-Digit Decimals

Apply and Practice – 1 Day

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Mathematical Practices and Processes

- Model with mathematics.
- Attend to precision.

I Can Objective

I can divide a multi-digit decimal by a decimal to the hundredths place.

Learning Objective

Divide multi-digit decimals using the standard algorithm.

Language Objective

Explain how to divide multi-digit decimals using mathematical language.

Vocabulary

Review: equivalent

Lesson 4.5 Apply Operations with Multi-Digit Decimals

Apply and Practice – 1 Day

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Mathematical Practices and Processes

- Model with mathematics.

I Can Objective

I can determine which operation is needed and use all four operations to solve problems with multi-digit decimals.

Learning Objective

Solve real-world problems involving operations with multi-digit decimals.

Language Objective

Identify words and phrases that suggest the operation to use to solve a real-world problem.

Unit 2: Ratio and Rate Reasoning

Unit 2 Project: Record-Deal Ratios

Unit 2 Learning Mindset Focus: Challenge-Seeking: Defines Own Challenges

Module 5: Ratios and Rates

Recommended Pacing with Assessments: 11 Days

Module 5 Mathematical Progressions

Prior Learning	Current Development	Future Connections
Students compared fractions using visual models.	Students understand the concept of ratio and use ratio language to describe a relationship between two quantities.	Students will connect rates and unit rates.
Students generated equivalent fractions.	Students make tables of equivalent ratios relating quantities with whole-number measurements.	Students will identify the unit rate given a table, verbal description, equation, or graph.
Students analyzed relationships.	Students solve unit rate problems including those involving unit pricing and constant speed.	

Module 5 Vocabulary

point	an exact location that has no size
equivalent ratios	ratios that name the same comparison
rate	a ratio that compares two quantities measured in different units
ratio	a comparison of two quantities by division
unit rate	a rate in which the second quantity in the comparison is one unit

Lesson 5.1 Understand the Concept and Language of Ratios

Build Conceptual Understanding – 1 Day

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Attend to precision.

I Can Objective

I can write ratios in three different ways given a diagram or a description.

Learning Objective

Understand and write ratios.

Language Objective

Define the term *ratio* and describe real-life examples of ratios.

Vocabulary

New: ratio

Lesson Materials

two-color counters

Lesson 5.2 Represent Ratios and Rates with Tables and Graphs

Connect Concepts and Skills – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.

Understand the concept of a unit rate $\frac{a}{b}$ associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Attend to precision.

I Can Objective

I can use a table or graph to find equivalent ratios and use the ratios to solve problems.

Learning Objective

Use tables and graphs to represent ratios and rate.

Language Objective

Define the terms *equivalent ratios*, *rate*, and *unit rate* and describe real-life examples.

Vocabulary

Review: point

New: equivalent ratio, rate, unit rate

Lesson Materials

Number Lines (Blank, -10 to 10) (Teacher Resource Masters)

Lesson 5.3 Compare Ratios and Rates

Apply and Practice – 1 Day

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Look for and make use of structure.

I Can Objective

I can compare ratios and rates using a table or a double number line.

Learning Objective

Use a table or double number lines to compare ratios and rates.

Language Objective

Use the terms *equivalent ratio*, *rate*, and *unit rate* to compare rates or ratios presented in a table.

Lesson 5.4 Find and Apply Unit Rates

Apply and Practice – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Understand the concept of a unit rate $\frac{a}{b}$ associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship.

Solve unit rate problems including those involving unit pricing and constant speed.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Attend to precision.
- Look for and make use of structure.

I Can Objective

I can find and use unit rates to solve problems.

Learning Objective

Find and use unit rates to solve problems.

Language Objective

Explain how to find and use unit rates.

Lesson 5.5 Solve Ratio and Rate Problems Using Proportional Reasoning

Apply and Practice – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

Solve unit rate problems including those involving unit pricing and constant speed.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Look for and make use of structure.

I Can Objective

I can find and use equivalent ratios using a table, model, or double number line to solve a real-world problem.

Learning Objective

Use equivalent ratios to solve real-world problems.

Language Objective

Explain how to write and use equivalent ratios to solve problems.

Unit 2: Ratio and Rate Reasoning

Unit 2 Project: Record-Deal Ratios

Unit 2 Learning Mindset Focus: Challenge-Seeking: Defines Own Challenges

Module 6: Apply Ratios and Rates to Measurement

Recommended Pacing with Assessments: 8 Days

Module 6 Mathematical Progressions

Prior Learning	Current Development	Future Connections
<p>Students understood the concept of a ratio and used ratio language to describe a ratio relationship between two quantities.</p> <p>Students identified and wrote equivalent ratios.</p>	<p>Students understand the concept of pi as the ratio of the circumference of a circle to its diameter.</p> <p>Students use ratio reasoning to convert measurement units.</p> <p>Students use ratio reasoning to solve real-world problems involving measurement conversion.</p>	<p>Students will recognize and represent proportional relationships between quantities.</p> <p>Students will connect constant rates of change given a table, verbal description, equation, or graph.</p> <p>Students will connect the constant of proportionality to real-world situations.</p>

Module 6 Vocabulary

circle	the set of all points in a plane that are the same distance from a given point called the center
customary system	the measurement system often used in the United States
metric system	a decimal system of weights and measures that is used universally in science and commonly throughout the world
circle graph	a graph that uses sections of a circle to compare parts to the whole and parts to other parts
conversion factor	a rate in which two quantities are equal, but use different units

Lesson 6.1 Use Ratio Reasoning with Circle Graphs

Connect Concepts and Skills – 1 Day

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Model with mathematics.

I Can Objective

I can use reasoning about equivalent ratios to make and interpret a circle graph.

Learning Objective

Apply ratio reasoning to make and interpret circle graphs.

Language Objective

Use ratio language associated with real-world data to find and interpret angle measures in circle graphs.

Vocabulary

Review: circle
New: circle graph

Lesson Materials

compass, protractor; Fraction Circles (Teacher Resource Masters)

Lesson 6.2 Use Rate Reasoning to Convert Within Measurement Systems

Connect Concepts and Skills – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Model with mathematics.
- Look for and make use of structure.

I Can Objective

I can write and use equivalent fractions or conversion factors to convert units within a measurement system.

Learning Objective

Convert units within a measurement system.

Language Objective

Explain how to convert units within a measurement system.

Vocabulary

New: conversion factor

Lesson Materials

Centimeter Grid Paper (Teacher Resource Masters)

Lesson 6.3 Use Rate Reasoning to Convert Between Measurement Systems

Connect Concepts and Skills – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

Mathematical Practices and Processes

- Use appropriate tools strategically.
- Attend to precision.

I Can Objective

I can write and use equivalent ratios or conversion factors to convert units between measurement systems.

Learning Objective

Use equivalent ratios to convert measurements between measurement systems.

Language Objective

Explain how to convert measurements between measurement systems.

Vocabulary

Review: customary system, metric system

Unit 2: Ratio and Rate Reasoning

Unit 2 Project: Record-Deal Ratios

Unit 2 Learning Mindset Focus: Challenge-Seeking: Defines Own Challenges

Module 7: Understand and Apply Percent

Recommended Pacing with Assessments and Performance Task: 10 Days

Module 7 Mathematical Progressions

Prior Learning	Current Development	Future Connections
<p>Students understood decimal notation for fractions.</p> <p>Students expressed a fraction with denominator 10 as an equivalent fraction with denominator 100.</p>	<p>Students find a percent of a quantity as a rate per 100.</p> <p>Students solve problems involving finding the whole, given a part and the percent.</p>	<p>Students will solve problems involving percent increase, percent decrease, and percent of change.</p> <p>Students will find sales tax, markups and markdowns, commissions, and simple interest.</p> <p>Students will use proportional reasoning to solve multi-step ratio and rate problems.</p>

Module 7 Vocabulary

percent a ratio comparing a number to 100

Lesson 7.1 Understand, Express, and Compare Percent Ratios

Connect Concepts and Skills – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means $\frac{30}{100}$ times the quantity); solve problems involving finding the whole, given a part and the percent.

Mathematical Practices and Processes

- Attend to precision.
- Model with mathematics.
- Use appropriate tools strategically.

I Can Objective

I can convert ratios to percents by applying one strategy.

Learning Objective

Write a ratio as a percent.

Language Objective

Describe ratios using the term *percent*. Describe *percent* using the language of ratios.

Use *percent* to explain and interpret solutions to real-world problems

Vocabulary

New: percent

Lesson Materials

Decimal Models (Teacher Resource Masters), Number Lines (Blank, -10 to 10) (Teacher Resource Masters)

Lesson 7.2 Use Strategies to Find a Percent of a Quantity

Connect Concepts and Skills – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means $\frac{30}{100}$ times the quantity); solve problems involving find the whole, given a part and a percent.

Mathematical Practices and Processes

- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.

I Can Objective

I can write a percent as a fraction or a decimal and use multiplication to find the percent of a number.

Learning Objective

Find a percent of a quantity.

Language Objective

Express *percent* as representing part of a quantity.

Explain how to use bar diagrams, multiplication, and proportions to find the percent of a quantity.

Lesson 7.3 Solve a Variety of Percent Problems

Apply and Practice – 1 Day

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means $\frac{30}{100}$ times the quantity); solve problems involving find the whole, given a part and a percent.

Mathematical Practices and Processes

- Use appropriate tools strategically.
- Look for and make use of structure.

I Can Objective

I can write a percent as a fraction or a decimal and use a variety of strategies to solve real-world problems.

Learning Objective

Use percents to solve real-world problems.

Language Objective

Explain how to solve real-world problems with percents.

Explain what percent means in a real-world context.

Unit 3: Expressions, Equations, and Inequalities

Unit 3 Project: Art in the Expression

Unit 3 Learning Mindset Focus: Resilience: Monitors Emotions

Module 8: Numerical and Algebraic Expressions

Recommended Pacing with Assessments: 11 Days

Module 8 Mathematical Progressions

Prior Learning	Current Development	Future Connections
<p>Students evaluated expressions using parentheses, brackets, or braces.</p> <p>Students wrote simple expressions.</p> <p>Students interpreted numerical expressions.</p>	<p>Students write and evaluate numerical expressions involving whole-number exponents.</p> <p>Students identify parts of an expression using mathematical terms and view one or more parts of an expression as a single entity.</p> <p>Students apply the properties of operations to generate equivalent expressions.</p> <p>Students use variables to represent numbers and write expressions to solve problems.</p>	<p>Students will apply properties of operations.</p> <p>Students will rewrite an expression in different forms.</p> <p>Students will use variables to represent quantities in real-world and mathematical problems.</p> <p>Students will construct simple equations and inequalities to solve problems.</p> <p>Students will expand expressions with rational coefficients.</p>

Module 8 Vocabulary

Associative Property of Addition	the property that states that for three or more numbers, their sum is always the same, regardless of their grouping
Associative Property of Multiplication	the property that states that for three or more numbers, their product is always the same, regardless of their grouping
Commutative Property of Addition	the property that states that two or more numbers can be added in any order without changing the sum
Commutative Property of Multiplication	the property that states that two or more numbers can be multiplied in any order without changing the product
Distributive Property	the property that states if you multiply a sum by a number, you will get the same result if you multiply each addend by that number and then add the products
order of operations	a rule for evaluating expressions: first perform the operations in parentheses, then compute powers and roots, then perform all multiplication and division from left to right, and then perform all addition and subtraction from left to right
perimeter	the distance around a polygon
triangle	a three-sided polygon
algebraic expression	an expression that contains at least one variable

base	when a number is raised to a power, the number that is used as a factor is the base
coefficient	the number that is multiplied by the variable in an algebraic expression
constant	a number whose value does not change
equivalent expressions	expressions that have the same value for all values of the variables
evaluate	to find the value of a numerical or algebraic expression
exponent	the number that indicates how many times the base is used as a factor
like terms	terms with the same variables raised to the same exponents
numerical expression	an expression that contains only numbers and operations
term	the parts of an expression that are added or subtracted
variable	a letter or symbol used to represent a quantity that can change

Lesson 8.1 Understand and Apply Exponents

Connect Concepts and Skills – 1 Day

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Write and evaluate numerical expressions involving whole-number exponents.

Mathematical Practices and Processes

- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

I Can Objective

I can write and evaluate numerical expressions involving whole-number exponents.

Learning Objective

Write and find the value of expressions involving exponents.

Language Objective

Use the terms *base* and *exponent* to write exponential expressions from repeated multiplication situations.

Vocabulary

New: base, exponent

Lesson Materials

Centimeter Grid Paper (Teacher Resource Masters)

Lesson 8.2 Write and Evaluate Numerical Expressions for Situations

Connect Concepts and Skills – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Write and evaluate numerical expressions involving whole-number exponents.

Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Look for and make use of structure.

I Can Objective

I can write and evaluate numerical expressions using the order of operations.

Learning Objective

Write and evaluate numerical expressions.

Language Objective

Describe an expression by its number of *terms* and show how to simplify by evaluating.

Vocabulary

Review: Distributive Property, order of operations

New: evaluate, numerical expression, term

Lesson 8.3 Write Algebraic Expressions to Model Situations

Connect Concepts and Skills – 1 Day

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Write expressions that record operations with numbers and with letters standing for numbers.

Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity.

Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

Mathematical Practices and Processes

- Model with mathematics.
- Look for and make use of structure.

I Can Objective

I can use variables to write an algebraic expression to represent a real-world problem.

Learning Objective

Write an algebraic expression to represent a situation.

Language Objective

Use the terms *algebraic expression*, *constant*, *variable*, and *coefficient* when writing expressions to represent problem situations.

Vocabulary

New: algebraic expression, coefficient, constant, variable

Lesson Materials

Centimeter Grid Paper (Teacher Resource Masters)

Lesson 8.4 Interpret and Evaluate Algebraic Expressions

Apply and Practice – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Attend to precision.

I Can Objective

I can interpret and evaluate algebraic expressions using the order of operations.

Learning Objective

Interpret and evaluate an algebraic expression.

Language Objective

Use the terms *evaluate* and *substitute* to explain the method for finding the value of algebraic expressions.

Vocabulary

Review: perimeter

Lesson 8.5 Identify and Generate Equivalent Algebraic Expressions

Apply and Practice – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Apply the properties of operations to generate equivalent expressions.

Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them).

Mathematical Practices and Processes

- Construct viable arguments and critique the reasoning of others.
- Attend to precision.

I Can Objective

I can use the properties of operations to determine if two expressions are equivalent and to generate equivalent algebraic expressions.

Learning Objective

Identify and generate equivalent expressions.

Language Objective

Use the properties *Associative Property*, *Commutative Property*, and *Distributive Property* to explain the method for finding equivalent expressions.

Vocabulary

Review: Associative Property of Addition, Associative Property of Multiplication, Commutative Property of Addition, Commutative Property of Multiplication, triangle
New: equivalent expression, like terms

Unit 3: Expressions, Equations, and Inequalities

Unit 3 Project: Art in the Expression

Unit 3 Learning Mindset Focus: Resilience: Monitors Emotions

Module 9: Solve Problems Using Equations and Inequalities

Recommended Pacing with Assessments: 11 Days

Module 9 Mathematical Progressions

Prior Learning	Current Development	Future Connections
Students wrote and evaluated numerical expressions.	Students learn that a variable can represent an unknown number.	Students will solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$.
Students wrote and evaluated expressions with variables.	Students use variables in expressions to solve real-world problems.	Students will graph the solution sets of inequalities.
Students found and positioned integers on a number line.	Students solve word problems by writing and solving equations in the form $x + p = q$ and $px = q$ where p, q and x are all non-negative rational numbers.	Students will write one-variable, two-step equations to represent real-world problems.
Students identified parts of an expression using mathematical terms.		
Students wrote and evaluated numerical expressions involving whole-number exponents.		
Students wrote, interpreted, and explained statements of order for rational numbers in real-world contexts.		
Students understood a rational number as a point on the number line.		

Module 9 Vocabulary

angle	a figure formed by two rays with a common endpoint called the vertex
degree	the unit of measure for angles or temperature
Addition Property of Equality	states that you can add the same number to both sides of an equation and the expression remains the same
constraint	a restriction of the value(s) of a quantity or variable
Division Property of Equality	states that you can divide both sides of an equation by the same number, excluding zero, and the expressions remain equal
equation	a mathematical sentence that shows that two expressions are equivalent

inequality	a mathematical sentence that shows the relationship between quantities that are not equal
Multiplication Property of Equality	states that you can multiply both sides of an equation by the same number and the expressions remain equal
solution of an equation	a value of values that make an equation true
solution of an inequality	a value of values that make an inequality true
Subtraction Property of Equality	states that you can subtract the same number from both sides of an equation and the expression remains equal

Lesson 9.1 Write Equations to Represent Situations

Connect Concepts and Skills – 1 Day

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.

Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q , and x are all non-negative rational numbers.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Model with mathematics.

I Can Objective

I can write and solve equations that model real-world situations involving all four operations.

Learning Objective

Model and write an equation to represent a situation.

Language Objective

Compare an expression to an equation, and use both terms to accurately describe mathematical statements.

Describe a solution to a one-variable equation as the value for the variable that makes the equation true.

Vocabulary

New: equation, solution of an equation

Lesson 9.2 Use Addition and Subtraction Equations to Solve Problems

Connect Concepts and Skills – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q , and x are all non-negative rational numbers.

Mathematical Practices and Processes

- Model with mathematics.
- Look for and make use of structure.

I Can Objective

I can write and solve equations using addition and subtraction to represent real-world situations involving an unknown.

Learning Objective

Solve equations that contain addition and subtraction.

Language Objective

Describe how the Addition Property of Equality and the Subtraction Property of Equality are useful for solving equations.

Explain how equations can be used to model and solve real-world problems.

Vocabulary

New: Addition Property of Equality, Subtraction Property of Equality

Lesson Materials

algebra tiles, base-ten materials (Teacher Resource Masters), equation mat, Number Lines (Fractions, Decimals, and Percent) (Teacher Resource Masters)

Lesson 9.3 Use Multiplication and Division Equations to Solve Problems

Connect Concepts and Skills – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q , and x are all non-negative rational numbers.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Model with mathematics.
- Look for and make use of structure.

I Can Objective

I can write and solve equations using multiplication and division to represent real-world situations involving an unknown.

Learning Objective

Solve equations that contain multiplication and division.

Language Objective

Describe how the Division Property of Equality and the Multiplication Property of Equality are useful for solving equations.

Describe how equations can be used to model and solve real-world problems.

Vocabulary

New: Division Property of Equality, Multiplication Property of Equality

Lesson Materials

algebra tiles, equation mat

Lesson 9.4 Use One-Step Equations to Solve a Variety of Problems

Apply and Practice – 1 Day

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q , and x are all non-negative rational numbers.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Model with mathematics.

I Can Objective

I can write and graph equations to solve a variety of real-world situations involving addition, subtraction, multiplication, or division.

Learning Objective

Write and use equations to represent situations and solve problems.

Language Objective

Describe the unknown quantity in a real-world situation.

Explain why addition, subtraction, multiplication, or division should be used to model a situation.

Vocabulary

Review: angle, degree

Lesson 9.5 Write and Graph Inequalities

Apply and Practice – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.

Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Model with mathematics.

I Can Objective

I can write and graph the solution of an inequality to represent a condition in a real-world or mathematical problem.

Learning Objective

Write and graph inequalities to represent real-world situations.

Language Objective

Correlate phrases such as “less than,” “greater than,” “at least,” and “at most” with the corresponding inequality symbols.

Vocabulary

New: constraint, inequality, solution of an inequality

Unit 3: Expressions, Equations, and Inequalities

Unit 3 Project: Art in the Expression

Unit 3 Learning Mindset Focus: Resilience: Monitors Emotions

Module 10: Real-World Relationships Between Variables

Recommended Pacing with Assessments and Performance Task: 10 Days

Module 10 Mathematical Progressions

Prior Learning	Current Development	Future Connections
<p>Students generated patterns using given rules.</p> <p>Students identified and graphed ordered pairs based on patterns.</p> <p>Students recognized the difference between additive and multiplicative numerical patterns given in a table or graph.</p> <p>Students represented real-world problems by graphing points and interpreted values in the context of the situation.</p>	<p>Students use variables to represent two quantities in real-world problems.</p> <p>Students write equations representing a situation with a dependent and independent variable.</p> <p>Students analyze the relationship between variables using graphs and tables.</p>	<p>Students will see a function as a rule that has one output for each input.</p> <p>Students will explore linear functions, including the equation $y = mx + b$.</p> <p>Students will construct functions to model linear relationships between two quantities.</p>

Module 10 Vocabulary

dependent variable	the output of a function; a variable whose value depends on the value of the input, or independent variable
independent variable	the input of a function; a variable whose value determines the value of the output, or dependent variable.

Lesson 10.1 Represent Equations in Tables and Graphs

Connect Concepts and Skills – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

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

Mathematical Practices and Processes

- Model with mathematics.
- Use appropriate tools strategically.

I Can Objective

I can represent a situation using a table, equation, or graph.

Learning Objective

Represent an equation in a table or graph.

Language Objective

Use the terms *dependent* and *independent* to describe variables represented in equations, tables, and graphs.

Vocabulary

New: dependent variable, independent variable

Lesson Materials

Grid of Quadrant I (Teacher Resource Masters)

Lesson 10.2 Write Equations from Verbal Descriptions

Apply and Practice – 1 Day

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

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

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Model with mathematics.

I Can Objective

I can identify the dependent and independent variables, write equations to represent a real-world situation, and use the equations to solve problems.

Learning Objective

Write an equation given a verbal description of a relationship.

Language Objective

Use understanding of math terms to find the operation and describe the relationship between two variables with an equation.

Lesson 10.3 Write Equations from Tables and Graphs

Apply and Practice – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

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

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Model with mathematics.

I Can Objective

I can identify patterns in tables and graphs and use the patterns to write equations to represent real-world situations.

Learning Objective

Write an equation using a table or graph.

Language Objective

Explain how to write an equation using a table or graph.

Lesson Materials

Grid of Quadrant I (Teacher Resource Masters)

Unit 4: Relationships in Geometry

Unit 4 Project: Think Outside the Box

Unit 4 Learning Mindset Focus: Strategic Help-Seeking: Identifies Need for Help

Module 11: Polygons on the Coordinate Plane

Recommended Pacing with Assessments: 11 Days

Module 11 Mathematical Progressions

Prior Learning	Current Development	Future Connections
<p>Students understood the first number in an ordered pair indicates how far to travel from the origin in the direction of the x-axis, and the second number indicates how far to travel in the direction of the y-axis.</p> <p>Students represented real-world problems by graphing points and interpreted values in the context of the situation.</p>	<p>Students understand that signs in ordered pairs indicate locations in quadrants and that signs are related to reflections across one or both axes.</p> <p>Students graph points in all four quadrants and use coordinates and absolute value to find distance between points.</p> <p>Students draw polygons on a coordinate plane and use coordinates to find side lengths.</p>	<p>Students will compute lengths of geometric figures to solve problems.</p> <p>Students will connect tables and verbal descriptions with a linear relationship.</p> <p>Students will relate graphs and equations with a linear relationship.</p> <p>Students will connect ordered pairs with an equation.</p>

Module 11 Vocabulary

area	the number of square units needed to cover a given surface
axes	the two perpendicular lines of a coordinate plane that intersect at the origin
base	a side of a polygon
coordinates	the numbers of an ordered pair that locate a point on a coordinate graph
height	the measure of a side perpendicular to the base
hexagon	a six-sided polygon
isosceles triangle	a triangle with at least two congruent sides
pentagon	a five-sided polygon
quadrilateral	a polygon with four sides and four angles
rectangle	a parallelogram with four right angles
right angle	an angle that measures 90°
right triangle	a triangle containing a right angle
transformation	a change in the size or position of a figure

x-coordinate	the first number in an ordered pair; it represents the distance to move right or left from the origin, (0, 0)
y-coordinate	the second number in an ordered pair; it represents the distance to move up or down from the origin, (0, 0)
coordinate plane	a plane formed by the intersection of a horizontal number line called the <i>x</i> -axis and a vertical number line called the <i>y</i> -axis
ordered pair	a pair of numbers that can be used to locate a point on a coordinate plane
origin	the point where the <i>x</i> -axis and <i>y</i> -axis intersect on the coordinate plane; (0, 0)
polygon	a closed plane figure formed by three or more line segments that intersect only at their endpoints
quadrant	the <i>x</i> - and <i>y</i> -axes divide the coordinate plane into four regions; each region is called a quadrant
reflection	a transformation of a figure that flips the figure across a line
vertex	on an angle or polygon, the point where two sides intersect
x-axis	the horizontal axis on a coordinate plane
y-axis	the vertical axis on a coordinate plane

Lesson 11.1 Graph Rational Numbers on the Coordinate Plane

Connect Concepts and Skills – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.

Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.

Mathematical Practices and Processes

- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

I Can Objective

I can identify and graph rational number ordered pairs in all four quadrants on a coordinate plane.

Learning Objective

Locate rational ordered pairs on the coordinate plane.

Language Objective

Use the terms *coordinate plane*, *x-axis*, *y-axis*, *origin*, *quadrant*, *ordered pair*, *x-coordinate*, *y-coordinate*, and *rational number* when describing points on a coordinate plane.

Vocabulary

Review: axes, coordinates, rectangle, *x*-coordinate, *y*-coordinate

New: coordinate plane, ordered pair, origin, quadrant, *x*-axis, *y*-axis

Lesson Materials

Coordinate Plane (Teacher Resource Masters)

Lesson 11.2 Graph Polygons on the Coordinate Plane

Connect Concepts and Skills – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.

Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Look for and make use of structure.
- Attend to precision.

I Can Objective

I can graph the given vertices of a figure and determine the coordinates of an unknown vertex to complete the figure given the classification of the polygon.

Learning Objective

Solve problems by graphing and identifying polygons in the coordinate plane.

Language Objective

Use *vertex*, *polygon*, *quadrilateral*, and similar terms to describe figures drawn on the coordinate plane.

Use the terms *coordinate plane*, *ordered pair*, *origin*, *quadrant*, *rational number*, *x-axis*, *x-coordinate*, *y-axis*, and *y-coordinate* when describing points on a coordinate plane.

Vocabulary

Review: hexagon, isosceles triangle, pentagon, quadrilateral, right angle, right triangle
New: polygon, vertex

Lesson Materials

Coordinate Plane (Teacher Resource Masters), Centimeter Grid Paper (Teacher Resource Masters), ruler

Lesson 11.3 Find Distance on the Coordinate Plane

Connect Concepts and Skills – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.

Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

Mathematical Practices and Processes

- Attend to precision.
- Use appropriate tools strategically.

I Can Objective

I can find the distance between two points with the same x - or y -coordinate across quadrants and use a scale in real-world problems to find actual distances.

Learning Objective

Use absolute value to find the distance between two points with the same x - or y -coordinate.

Language Objective

Use the term reflection to describe the relationship between points on a coordinate plane.

Use the term absolute value accurately while describing how to find the distance between two points on a coordinate plane.

Vocabulary

Review: transformation
New: reflection

Lesson Materials

Grid of Quadrant I (Teacher Resource Masters), ruler

Lesson 11.4 Find Perimeter and Area on the Coordinate Plane

Apply and Practice – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.

Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

I Can Objective

I can find the perimeter and area of polygons in the coordinate plane.

Learning Objective

Find the perimeter and area of polygons on the coordinate plane.

Language Objective

Use *area*, *isosceles*, *perimeter*, *polygon*, *quadrilateral*, and similar terms to describe shapes.

Vocabulary

Review: area, base, height

Unit 4: Relationships in Geometry

Unit 4 Project: Think Outside the Box

Unit 4 Learning Mindset Focus: Strategic Help-Seeking: Identifies Need for Help

Module 12: Area of Triangles and Special Quadrilaterals

Recommended Pacing with Assessments: 11 Days

Module 12 Mathematical Progressions

Prior Learning	Current Development	Future Connections
<p>Students recognized area as an attribute of plane figures and understood concepts of area measurement.</p> <p>Students related area to the operations of multiplication and addition.</p> <p>Students understood properties of triangles and quadrilaterals.</p>	<p>Students find the areas of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes.</p> <p>Students use information about area to solve real-world problems.</p> <p>Students evaluate expressions resulting from area formulas at specific values of their variables.</p>	<p>Students will explore the formulas for the area and circumference of a circle and use them to solve problems.</p> <p>Students will use area, volume, and surface area of two- and three-dimensional objects to solve real-world problems.</p>

Module 12 Vocabulary

base of a parallelogram	any side of a parallelogram
height of a parallelogram	the perpendicular distance from the base to the opposite vertex or side
parallelogram	a quadrilateral with two pairs of parallel sides
base of a trapezoid	either of two parallel sides of a trapezoid
base of a triangle	any side of a triangle
composite figure	a figure made up of simple geometric shapes
diagonal	a line segment that connects two nonadjacent vertices of a polygon
height of a trapezoid	in a trapezoid, the perpendicular distance from the base to the opposite vertex or side
height of a triangle	in a triangle, the perpendicular distance from the base to the opposite vertex or side
trapezoid	a quadrilateral with at least one pair of parallel sides

Lesson 12.1 Develop and Use the Formula for Area of Parallelograms

Connect Concepts and Skills – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Model with mathematics.

I Can Objective

I can understand the area formula for a parallelogram and use it to find area or to find unknown dimensions given the area.

Learning Objective

Find the area of parallelograms.

Language Objective

Identify the base length and height of a parallelogram and relate them to the length and width of a rectangle.

Vocabulary

Review: base of a parallelogram, height of a parallelogram, parallelogram

Lesson Materials

Centimeter Grid Paper (Teacher Resource Masters), geoboard, Tangram Pattern (Teacher Resource Masters)

Lesson 12.2 Develop and Use the Formula for Area of Triangles

Connect Concepts and Skills – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Model with mathematics.

I Can Objective

I can use the area formula for a triangle given either the base and height or the area and the height or the base.

Learning Objective

Find the area of triangles.

Language Objective

Use the terms *base* and *height* to describe the linear dimensions of a triangle.

Vocabulary

New: base of a triangle, diagonal, height of a triangle

Lesson Materials

Centimeter Grid Paper (Teacher Resource Masters)

Lesson 12.3 Develop and Use the Formula for Area of Trapezoids

Connect Concepts and Skills – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Model with mathematics.

I Can Objective

I can use the area formula for a trapezoid given the lengths of its bases and its height.

Learning Objective

Find the area of trapezoids.

Language Objective

Use the terms *trapezoid*, *parallelogram*, *base*, and *height* to explain how to find the area of a trapezoid

Vocabulary

New: base of a trapezoid, height of a trapezoid, trapezoid

Lesson Materials

ruler

Lesson 12.4 Find Area of Composite Figures

Apply and Practice – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Model with mathematics.

I Can Objective

I can find the area of any composite figure.

Learning Objective

Find the area of composite figures.

Language Objective

Use the terms *trapezoid*, *parallelogram*, *base*, and *height* to explain how to find the area of a composite figure.

Vocabulary

New: composite figure

Unit 4: Relationships in Geometry

Unit 4 Project: Think Outside the Box

Unit 4 Learning Mindset Focus: Strategic Help-Seeking: Identifies Need for Help

Module 13: Surface Area and Volume

Recommended Pacing with Assessments and Performance Task: 9 Days

Module 13 Mathematical Progressions

Prior Learning	Current Development	Future Connections
<p>Students applied the area and perimeter formulas for rectangles in real-world and mathematical problems.</p> <p>Students recognized volume as an attribute of solid figures.</p> <p>Students determined the volumes of rectangular prisms by using unit cubes and by multiplying edge lengths.</p> <p>Students related volume to the operations of multiplication and addition and solved problems involving prisms and composite solids made of prisms.</p>	<p>Students apply what they have learned about area as they use nets to find surface areas of prisms and pyramids.</p> <p>Students build on their understanding of volume by investigating rectangular prisms with fractional edge lengths and by applying volume formulas.</p> <p>Students evaluate expressions arising from the volume formula for a rectangular prism at specific values of their variables.</p>	<p>Students will use what they have learned about surface area and volume as they determine these measures for right prisms and figures composed of right prisms.</p>

Module 13 Vocabulary

solid figure	a three-dimensional figure
volume	the number of cubic units needed to fill a given space
net	an arrangement of two-dimensional figures that can be folded to form a solid figure
pyramid	a three-dimensional figure with a polygon base and triangular sides that all meet at a common vertex
surface area	the sum of the areas of the faces, or surfaces, of a three-dimensional figure

Lesson 13.1 Explore Nets and Surface Area

Build Conceptual Understanding – 2 Days

Conceptual
Build Conceptual Understanding

Conceptual and Procedural
Connect Concepts and Skills

Procedural
Apply and Practice

Mathematics Standards

Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Model with mathematics.

I Can Objective

I can make and use nets to find the surface areas of rectangular and triangular prisms and pyramids.

Learning Objective

Use nets to find surface area.

Language Objective

Use the terms *net* and *surface area* to describe the faces of a solid object.

Vocabulary

Review: solid figure

New: net, pyramid, surface area

Lesson Materials

Centimeter Grid paper (Teacher Resource Masters), Rectangular Prism Net (Teacher Resource Masters)

Lesson 13.2 Find Volume of Rectangular Prisms

Connect Concepts and Skills – 1 Day

Conceptual
Build Conceptual Understanding

Conceptual and Procedural
Connect Concepts and Skills

Procedural
Apply and Practice

Mathematics Standards

Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = lwh$ and $V = Bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.

Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Model with mathematics.

I Can Objective

I can find the volume of a rectangular prism using the formula $V = \ell wh$ or $V = Bh$.

Learning Objective

Find the volume of a rectangular prism.

Language Objective

Use the term *rectangular prism* to identify a class of solid objects, and use the terms *base*, *height*, *length*, and *width* to describe a rectangular prism and the formula for its volume.

Vocabulary

Review: volume

Lesson Materials

centimeter cubes

Lesson 13.3 Solve Volume Problems

Apply and Practice – 1 Day

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = lwh$ and $V = Bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.

Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Look for and express regularity in repeated reasoning.

I Can Objective

I can use the formula $V = lwh$ to find the volume or an unknown dimension of a rectangular prism.

Learning Objective

Write equations to solve problems involving volume of rectangular prisms.

Language Objective

Use the term *rectangular prism* to identify a class of solid objects, and use the terms *length*, *width*, *height* and *base* to describe a rectangular prism and the formula for its volume.

Unit 5: Data Collection and Analysis

Unit 5 Project: The Right Price

Unit 5 Learning Mindset Focus: Resilience: Monitors Knowledge and Skills

Module 14: Data Collection and Displays

Recommended Pacing with Assessments: 8 Days

Module 14 Mathematical Progressions

Prior Learning	Current Development	Future Connections
Students plotted fractions on a number line. Students constructed line plots to display measurement data.	Students identify statistical questions. Students examine a given data set to determine the attribute being measured and how the measurements were made. Students build on what they have learned about number lines and line plots as they display data in dot plots and histograms. Students describe the nature of an attribute, including how it is measured and its units of measurement.	Students will apply what they have learned about statistical questions as they use random samples to draw conclusions about populations. Students will extend what they have learned about representing univariate data in dot plots as they display bivariate data in scatter plots.

Module 14 Vocabulary

bar graph	a graph that uses vertical or horizontal bars to display data
interval	the space between marked values on a number line or the scale of a graph
line plot	a number line with marks or dots that show frequency
set	a group of items
data	a set of information collected about people or things, often to draw conclusions about them
dot plot	a visual display in which each piece of data is represented by a dot above a number line
frequency	the number of times a data value occurs
frequency table	a table that lists items together according to the number of times, or frequency, that the items occur
histogram	a bar graph that shows the frequency of data within equal intervals
statistical question	a question that has many different, or variable, answers

Lesson 14.1 Explore Statistical Data Collection

Build Conceptual Understanding – 1 Day

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.

Reporting the number of observations

Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Attend to precision.
- Look for and make use of structure.

I Can Objective

I can identify statistical questions, describe the nature of attributes under investigation, and report the number of observations.

Learning Objective

Identify a statistical question and describe data.

Language Objective

Explain the difference between a *statistical question* and other types of questions and use the term *attributes* to describe data.

Vocabulary

Review: set

New: data, statistical question

Lesson Materials

Number Lines (Blank, –10 to 10) (Teacher Resource Masters), two-color counters

Lesson 14.2 Display Data in Dot Plots

Apply and Practice – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Display numerical data in plots on a number line, including dot plots, histograms, and box plots.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Use appropriate tools strategically.
- Attend to precision.

I Can Objective

I can construct and analyze a dot plot.

Learning Objective

Use dot plots to display data.

Language Objective

Describe the features of a dot plot and explain how it is useful for displaying data.

Vocabulary

Review: line plot

New: dot plot, frequency

Lesson Materials

Number Lines (Blank, –10 to 10) (Teachers Resource Masters), two-color counters

Lesson 14.3 Make Histograms and Frequency Tables

Apply and Practice – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
---	---	---

Mathematics Standards

Display numerical data in plots on a number line, including dot plots, histograms, and box plots.

Mathematical Practices and Processes

- Use appropriate tools strategically.
- Look for and make use of structure.

I Can Objective

I can determine an appropriate interval for the data and construct a frequency table or histogram.

Learning Objective

Make histograms and frequency tables to display data.

Language Objective

Describe and compare a histogram and frequency table and explain how they are constructed.

Vocabulary

Review: bar graph, interval
New: frequency table, histogram

Unit 5: Data Collection and Analysis

Unit 5 Project: The Right Price

Unit 5 Learning Mindset Focus: Resilience: Monitors Knowledge and Skills

Module 15: Measures of Center

Recommended Pacing with Assessments: 6 Days

Module 15 Mathematical Progressions

Prior Learning	Current Development	Future Connections
<p>Students constructed line plots to display measurement data in fractions.</p> <p>Students performed operations with multi-digit decimals.</p>	<p>Students recognize that a measure of center for a numerical data set summarizes all of its values with a single number.</p> <p>Students report the number of observations.</p> <p>Students differentiate between a measure of center and a measure of variation.</p> <p>Students determine the mean, median, and mode of a data set.</p> <p>Students choose an appropriate measure of center to describe a data set.</p>	<p>Students will draw inferences about a population.</p> <p>Students will calculate measures of center for data taken from random samples and use these measures to draw conclusions about a population.</p> <p>Students will compare two populations by comparing their measures of center.</p>

Module 15 Vocabulary

average	the sum of the items in a set of data divided by the number of items in the set; also called <i>mean</i>
mean	the sum of the items in a set of data divided by the number of items in the set; also called <i>average</i>
measure of center	a measure used to describe the middle of a data set; also called <i>measure of central tendency</i>
median	the middle number or the mean (average) of the two middle numbers in an ordered set of data
mode	the number or numbers that occur most frequently in a set of data; when all numbers occur with the same frequency, we say there is no mode
outlier	a value much greater or much less than the others in a data set

Lesson 15.1 Explore Mean as Fair Share

Build Conceptual Understanding – 1 Day

Conceptual	Conceptual and Procedural	Procedural
Build Conceptual Understanding	Connect Concepts and Skills	Apply and Practice

Mathematics Standards

Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Use appropriate tools strategically.
- Attend to precision.

I Can Objective

I can find both the fair share and the balance point of a data set using a model or a number line.

Learning Objective

Understand how fair share and balance point are related to the mean.

Language Objective

Explain how the concepts of fair share and balance point are related to the mean of a data set.

Lesson Materials

two-color counters

Lesson 15.2 Find Measures of Center

Connect Concepts and Skills – 1 Day

Conceptual	Conceptual and Procedural	Procedural
Build Conceptual Understanding	Connect Concepts and Skills	Apply and Practice

Mathematics Standards

Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.

Reporting the number of observations.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Use appropriate tools strategically.
- Attend to precision.

I Can Objective

I can find and interpret the mean, median, and mode of a set of data.

Learning Objective

Describe a set of data using mean, median, and mode.

Language Objective

Use the terms *mean*, *median*, and *mode* to describe and compare data sets.

Vocabulary

New: average, mean, measure of center, median, mode

Lesson Materials

Number Lines (Blank, –10 to 10) (Teachers Resource Masters), two-color counters

Lesson 15.3 Choose a Measure of Center

Apply and Practice – 1 Day

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Attend to precision.

I Can Objective

I can find the mean, median, and mode for a given data set and determine the best measure of center to describe the data set.

Learning Objective

Choose an appropriate measure of center to describe a data set.

Language Objective

Use the terms *mean*, *median*, and *mode* to identify the most appropriate measure of center of a data set and to explain your reasoning.

Vocabulary

New: outlier

Unit 5: Data Collection and Analysis

Unit 5 Project: The Right Price

Unit 5 Learning Mindset Focus: Resilience: Monitors Knowledge and Skills

Module 16: Variability and Data Distribution

Recommended Pacing with Assessments and Performance Task: 14 Days

Module 16 Mathematical Progressions

Prior Learning	Current Development	Future Connections
Students calculated the mean and median of data sets. Students displayed numerical data in dot plots and histograms. Students interpreted a dot plot or histogram to identify properties of a data set.	Students use their prior knowledge of median to help them create box plots for sets of data. Students apply their understanding of the mean of a data set to calculate mean absolute deviation. Students determine the range and interquartile range of a data set. Students describe patterns in the distribution of a data set, such as gaps, clusters, peaks, and symmetry.	Students will use what they have learned about data distributions to assess the degree of overlap between two data sets. Students will use their prior knowledge of measures of variability to compare random samples and draw conclusions about populations.

Module 16 Vocabulary

box plot	a graph that shows how data are distributed by using the median, quartiles, least value, and greatest value; also called a box-and-whisker plot
interquartile range (IQR)	the difference of the third (upper) and first (lower) quartiles in a data set, representing the middle half of the data
lower quartile	the median of the lower half of the data
mean absolute deviation (MAD)	the mean distance between each data value and the mean of the data set
measure of variability	a single value used to describe how the values in a data set are spread out
range	in statistics, the difference between the greatest and least values in a data set
upper quartile	the median of the upper half of the data

Lesson 16.1 Explore Patterns of Data

Build Conceptual Understanding – 1 Day

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Summarize numerical data sets in relation to their context, such as by: Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

Mathematical Practices and Processes

- Model with mathematics.
- Look for and make use of structure.

I Can Objective

I can describe data distributions by their shapes.

Learning Objective

Describe overall patterns in a data set.

Language Objective

Use the terms *gap*, *cluster*, *peak*, and *symmetry* to explain the overall shape of the data distribution.

Lesson Materials

Number Lines (Blank, -10 to 10) (Teacher Resource Masters), two-color counters

Lesson 16.2 Display Data in Box Plots

Connect Concepts and Skills – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Display numerical data in plots on a number line, including dot plots, histograms, and box plots.

Mathematical Practices and Processes

- Model with mathematics.
- Attend to precision.

I Can Objective

I can draw and interpret box plots.

Learning Objective

Use box plots to display data.

Language Objective

Use the terms *lower quartile*, *median*, and *upper quartile* to describe data in box plots.

Vocabulary

New: box plot, lower quartile, upper quartile

Lesson Materials

Number Lines (Blank, -10 to 10) (Teachers Resource Masters)

Lesson 16.3 Find Mean Absolute Deviation

Connect Concepts and Skills – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Summarize numerical data sets in relation to their context, such as by: Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

Mathematical Practices and Processes

- Use appropriate tools strategically.
- Attend to precision.

I Can Objective

I can find the mean absolute deviation of a data set.

Learning Objective

Determine and use the mean absolute deviation of a set of data values.

Language Objective

Describe the *mean absolute deviation* as a measure of variability that describes a data set in mathematical and real-world problems.

Vocabulary

New: mean absolute deviation (MAD)

Lesson Materials

Number Lines (Blank, -10 to 10) (Teachers Resource Masters)

Lesson 16.4 Explore Measures of Variability

Apply and Practice – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Summarize numerical data sets in relation to their context, such as by: Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.

Summarize numerical data sets in relation to their context, such as by: Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Attend to precision.

I Can Objective

I can find and use range, IQR, and MAD to summarize a data set.

Learning Objective

Summarize a data set using range, interquartile range, and mean absolute deviation.

Language Objective

Use the terms *range*, *mean absolute deviation*, *interquartile range*, *measure of center*, *measure of variability*, and the concepts associated with these terms to describe real-world data sets.

Vocabulary

New: interquartile range (IQR), measure of variability, range

Lesson 16.5 Describe Distributions

Apply and Practice – 2 Days

Conceptual Build Conceptual Understanding	Conceptual and Procedural Connect Concepts and Skills	Procedural Apply and Practice
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Mathematics Standards

Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.

Summarize numerical data sets in relation to their context, such as by: Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

Summarize numerical data sets in relation to their context, such as by: Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

Mathematical Practices and Processes

- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Look for and make use of structure.

I Can Objective

I can describe the shape, distribution, and range of a data set, and use the shape, measures of center, or variability to draw conclusions about the data.

Learning Objective

Describe the distribution of a data set collected to answer a statistical question.

Language Objective

Describe why certain data is best displayed using certain displays, such as box plots, dot plots, or histograms.

Use the terms *cluster*, *gap*, *peak*, and *symmetry* to explain the overall shape of the data in a distribution. Use the terms *measure of center* and *measure of variability* to support conclusions drawn from data distributions.