Unit 3: Ratios and Proportional Relationships

Content Area: **Mathematics**
Course(s):
Time Period: **Marking Period 2**
Length: **8 weeks**
Status: **Published**

Brief Summary of Unit

Introduction: The "Ratios and Proportional Relationships" unit is designed to help 7th-grade students develop a deep understanding of ratios, rates, proportional relationships, percents, and their applications. Through a variety of instructional strategies and real-world applications, students will learn to recognize and represent proportional relationships, solve proportions, and use these concepts to understand scale drawings. students will explore the relationship between fractions, decimals, and percents, learn about the percent proportion and equation, and apply their knowledge to solve problems involving percent increase and decrease, discounts, markups, and simple interest. The unit emphasizes real-world applications and problem-solving strategies to help students develop a strong understanding of these topics.

Revision Date: 5/31/24

Standards

Diversity and Inclusion: Students will focus on equity, inclusion, and tolerance when analyzing the comparison of various quantities regarding characteristics of people. Equality will also be highlighted which can be associated with both numerical representations and the connection between people. This can be associated with treating people fairly and equally. These topics will be represented through real world applications involving proportional reasoning and equations.

1	Make sense of problems and persevere in solving them
P.2	Attend to financial well-being.
7.RP.A.1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.
2	Reason abstractly and quantitatively
P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
3	Construct viable arguments and critique the reasoning of others
7.RP.A.2	Recognize and represent proportional relationships between quantities.
7.RP.A.2.a	Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
4	Model with mathematics
7.RP.A.2.b	Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

7.RP.A.2.c	Represent proportional relationships by equations.
5	Use appropriate tools strategically
7.RP.A.2.d	Explain what a point (□, □) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, □) where □ is the unit rate.
6	Attend to precision
7.RP.A.3	Use proportional relationships to solve multistep ratio and percent problems.
L.VL.7.3	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 7 reading and content, including technical meanings, choosing flexibly from a range of strategies.
7	Look for and make use of structure
8	Look for and express regularity in repeated reasoning
L.VI.7.4	Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.
7.EE.B	Solve real-life and mathematical problems using numerical and algebraic expressions and equations

Enduring Understandings

- Discounts and tip can often be calculated mentally through estimation.
- Percents are often used to describe change when analyzing real world applications such as the economy, sports, etc.
- Percents have a wide variety of real world applications.
- Proportional relationships have a constant rate of change known as the constant of proportionality.
- Proportions can be used to solve problems involving mixtures, such as mixing cement, and sand in a given ratio.
- Ratios cannot be expressed as whole numbers because ratios are comparisons of two numbers and should be written with a numerator and denominator.
- Scale drawings and scale factor can be used in blue prints for construction, photography, medical research and many other applications.
- There is a distinction between a rate and a ratio.

Essential Questions

- How do fractions, decimals, and percents relate to each other, and how can we convert between them?
- How do percent changes, discounts, markups, and simple interest affect everyday transactions, and how can we calculate and interpret them?
- How do proportions help us solve problems involving equivalent ratios, and how can we apply this concept to real-world situations?
- How do ratios and rates help us compare quantities and make decisions in real-world situations?
- What are proportional relationships, and how can we identify and represent them using tables, equations, and graphs?
- What are the percent proportion and percent equation, and how can they be used to solve real-world problems involving percentages?

Students Will Know

- How to calculate percent changes, discounts, markups, and simple interest, and interpret their significance in real-world scenarios.
- How to identify proportional relationships in tables, equations, and graphs, and interpret the constant of proportionality.
- How to represent proportional relationships graphically and interpret graphs to analyze proportional situations.
- The concept of scale drawings and how to create and interpret them to represent objects or spaces accurately.
- The concepts of the percent proportion and percent equation, and how to use them to solve percentage problems.
- The definitions of ratios, rates, and proportional relationships, and how they apply in various contexts.
- The process of writing and solving proportions to compare ratios and solve problems.
- The relationship between fractions, decimals, and percents, and how to convert between them.

Students Will Be Skilled At

- Applying the percent proportion and percent equation to solve various percentage problems, including finding the part, whole, or percent.
- Applying their knowledge of percentages to solve real-world problems and make informed decisions in financial transactions.
- Calculating and interpreting ratios and rates to compare quantities and solve problems.
- Calculating percent changes to analyze increases or decreases in quantities.
- Calculating simple interest to determine the interest earned or paid on loans or investments.
- Converting between fractions, decimals, and percents fluently and accurately.
- Creating and interpreting scale drawings to accurately represent objects or spaces at a reduced or enlarged scale.
- Determining discounts and markups to calculate sale prices or retail prices.
- Finding the unit rate and making comparisons such as better buy.
- Graphing proportional relationships on a coordinate plane and interpreting graphs to determine the constant of proportionality.
- Identifying proportional relationships and writing equations to represent them using the constant of proportionality.

Evidence/Performance Tasks

Assessments

- Formative: Daily assessments using examples from class notes, iReady MyPath, Big Ideas Math online platform problems, and NJSLA test bank problems

- Summative: Teacher-created assessments, NJSLA test bank problems, Big Ideas Math online platform problems, Big Ideas Math unit assessments
- Benchmark: iReady diagnostic assessments and district placement assessments in addition to unit assessments from Big Ideas Math
- Alternative Assessments: Student-centered activities such as scavenger hunts, various projects involving real world applications, and adaptive learning tasks in iReady, Khan Academy, and Big Ideas Math

- Answer essential questions
- Class discussion of daily topic
- Classwork and homework that assess the essential questions
- Complete Grade 7 Unit 3 Model Curriculum Assessment
- Identify and use constant of proportionality in various contexts.
- Provide alternative means of assessments for certain students
- Show knowledge of identifying ratios, rates and proportional relationships
- Teacher Observation
- Tests and quizzes that assess the essential questions
- Use proportional relationships with percents to solve real world problems.
- Written assignments that assess the essential questions that involves providing explanations

Learning Plan

Week 1: Ratios and Rates

Day 1-2: Ratios and Ratio Tables

- Introduction to Ratios: Define ratios and explain how they compare quantities.
- Creating Ratio Tables: Practice creating and interpreting ratio tables.
- Guided Practice: Step-by-step exercises on solving problems using ratio tables.
- Real-World Applications: Apply ratios to solve real-life problems, such as mixing ingredients or comparing quantities.

Day 3-4: Rates and Unit Rates

- Understanding Rates: Define rates and explain how they differ from ratios.
- Calculating Unit Rates: Practice finding unit rates by dividing quantities.

- Guided Practice: Exercises on solving problems using unit rates.
- Real-World Applications: Apply unit rates to scenarios like calculating speed or cost per item. Compare unit rates and find answers to questions such as “Who is the fastest swimmer?” or “Which item is the better deal?”

Week 2: Proportional Relationships

Day 5-7: Identifying Proportional Relationships and Writing/Using Equations with Constant of Proportionality Using $y = kx$

- Introduction to Proportional Relationships: Define and identify proportional relationships in tables, graphs, and equations.
- Constant of Proportionality: Explain the concept of the constant of proportionality (k) and how to find it. Explain the relation of k to unit rates.
- Writing Equations: Practice writing equations in the form $y = kx$ to represent proportional relationships.
- Guided Practice: Step-by-step exercises on identifying and writing proportional relationships.
- Real-World Applications: Apply the concept of proportionality to solve real-life problems.

Day 8-10: Writing and Solving Proportions

- Introduction to Proportions: Define proportions and explain their use in comparing ratios.
- Writing Proportions: Practice writing proportions to represent equivalent ratios.
- Solving Proportions: Step-by-step exercises on solving proportions using cross-multiplication.
- Problem-Solving: Apply proportion-solving techniques to real-life scenarios, such as scaling recipes or converting measurements.

Week 3: Graphs and Scale Drawings

Day 11-13: Graphs of Proportional Relationships

- Graphing Proportional Relationships: Explain how to graph proportional relationships on a coordinate plane.
- Interpreting Graphs: Practice interpreting graphs to determine the constant of proportionality.
- Guided Practice: Step-by-step exercises on graphing and analyzing proportional relationships.
- Real-World Applications: Use graphs to solve real-life problems involving proportional relationships, such as distance-time graphs or cost analysis.

Day 14-15: Scale Drawings

- Introduction to Scale Drawings: Define scale drawings and explain their use in representing objects or

spaces.

- Creating and Interpreting Scale Drawings: Practice creating scale drawings and interpreting them to find actual measurements.
- Guided Practice: Exercises on solving problems involving scale drawings.
- Real-World Applications: Apply scale drawing techniques to scenarios such as creating maps or designing models.

Week 4: Fractions, Decimals, and Percents

Day 16-17: Fractions, Decimals, and Percents

- Understanding Percentages: Define percentages and explain their relationship to fractions and decimals.
- Converting Between Forms: Practice converting fractions to decimals and percents, and vice versa.
- Guided Practice: Exercises on converting between fractions, decimals, and percents.
- Real-World Applications: Apply percentage conversions to practical scenarios, such as calculating discounts or tips.

Week 5: Percent Proportion, Percent Equation, and Applications

Day 18-19: The Percent Proportion

- Introduction to Percent Proportion: Define the percent proportion and explain its use in solving percentage problems.
- Setting Up Percent Proportion Problems: Practice setting up and solving percent problems using the percent proportion.
- Guided Practice: Step-by-step exercises on solving percent proportion problems.
- Real-World Applications: Apply the percent proportion to solve real-life problems involving percentages.

Day 20-21: The Percent Equation

- Introduction to the Percent Equation: Define the percent equation and explain its use in solving percentage problems.
- Setting Up Percent Equation Problems: Practice setting up and solving percent problems using the percent equation.
- Guided Practice: Step-by-step exercises on solving percent equation problems.
- Real-World Applications: Apply the percent equation to solve real-life problems involving percentages.

Week 6-7: Percent Changes and Applications

Day 22-23: Percents of Increase and Decrease

- Understanding Percent Changes: Define percent of increase and percent of decrease and explain their calculation.
- Calculating Percent Changes: Practice calculating percent increases and decreases.
- Guided Practice: Step-by-step exercises on calculating percent changes.
- Real-World Applications: Apply percent changes to scenarios like sale prices, salary increases, or population growth.

Day 24-25: Discounts and Markups

- Understanding Discounts and Markups: Define discounts and markups and explain how they affect prices.
- Calculating Discounts and Markups: Practice calculating discounts and markups.
- Guided Practice: Step-by-step exercises on calculating discounts and markups.
- Real-World Applications: Apply discounts and markups to scenarios like shopping sales or pricing products.

Day 26-27: Simple Interest

- Introduction to Simple Interest: Define simple interest and explain its calculation.
- Calculating Simple Interest: Practice calculating simple interest on loans or investments.
- Guided Practice: Step-by-step exercises on calculating simple interest.
- Real-World Applications: Apply simple interest to scenarios like loans, investments, or savings accounts.

Materials

Core instructional materials: Core Book List including Big Ideas Math textbook and online platform for all levels of grade 6, 7, 8, and Algebra 1

Supplemental materials: Khan Academy, Edia, Delta Math, & iReady.

Additional Materials: Calculators, Graph paper for scale drawings.

- Calculators/Math Tools
- District approved textbook
- Manipulatives
- Teacher created activiites
- Teacher created notes
- Websites, such as Khan Academy

Suggested Strategies for Modifications

Possible accommodations/modifications for Grade 7