

Unit 3: Ratios, Proportions, and Percentages

Algebra Prep Honors

14 meetings

Revised April 2024

Essential Questions

- How can ratios and rates be used to relate and compare numbers?
- What kinds of relationships can proportions represent in real-world situations?

Enduring Understandings with Unit Goals

EU 1: Ratios compare two numbers and rates divide a ratio.

- Write and simplify ratios using the three different forms.
- Compare rates by calculating the unit rate.
- The units of rates can be converted when the conversion factor is known.
- Use conversion factors to convert unit rates to a given unit

EU 2: A proportion is an equation that states that two ratios are equal.

- Derive and solve proportions using real-world information.
- Create proportions to solve percentage problems in the real world including percent change.

Standards

Common Core State Standards/College and Career Readiness Anchor Standards:

- **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.
- **7.RP.A.2:** Recognize and represent proportional relationships between quantities.
- **7.RP.A.3:** Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.
- **6.RP.A.3.D:** Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

ISAAC Vision of the Graduate Competencies

Competency 1: Write effectively for a variety of purposes.

Competency 2: Speak to diverse audiences in an accountable manner.

Competency 3: Develop the behaviors needed to interact and contribute with others on a team.

Competency 4: Analyze and solve problems independently and collaboratively.

Competency 5: Be responsible, creative, and empathetic members of the community.

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Unit Content Overview

1. Ratios/Unit Rates

- Write and Simplifying Ratios
- Comparing Unit Rates
- Vocabulary: coefficient, cross-canceling, cross-multiplication, cross-product, cross-product property, equivalent, graph, linear equation, lowest common multiple (lcm), rate, ratio, slope, table of values, unit rate, units, variable

2. Conversions

- Write and Simplify Expressions to Convert Units
- Vocabulary: coefficient, conversion factor, conversion ratio, cross-canceling, equivalent, linear equation, lowest common multiple (lcm), multi-step conversion, place value, rate, ratio, table of values, unit rate, units, variable

3. Proportions

- Solve Proportions
- Solve a Multi-Step Proportion
- Use Proportions to Solve Problems
- Vocabulary: coefficient, cross-multiplication, cross-product, cross-product property, equivalent, graph, lowest common multiple (lcm), means and extremes, place value, proportion, proportional relationship, ratio, table of values, variable

4. Percentages

- Solve for a part, whole, or percent using proportions
- Use proportions to solve real-world percentage problems
- Vocabulary: coefficient, cross-multiplication, cross-product, cross-product property, equivalent, lowest common multiple (lcm), percent, percent problem, place value, proportion, proportional relationship, ratio, table of values, units, variable

5. Change Expressed as a Percent

- Find a Percent Decrease
- Find a Percent Increase
- Vocabulary: coefficient, cross-multiplication, cross-product, cross-product property, discount, equivalent, lowest common multiple (lcm), means and extremes, percent, percent of change, percent problem, place value, proportion, proportional relationship, ratio, sales tax, table of values, units, variable

Interdisciplinary Connections

- Language Arts- Accountable Talk, Word Problems

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Daily Learning Objectives with *TWPS Activities*

Students will be able to...

- Compare and contrast numbers using ratios
 - *TWPS – Name 2 differences between the given list of numbers. Explain using mathematical reasoning.*
- Write ratios as fractions and calculate the unit rates
 - *TWPS – Which one doesn't belong? Explain using mathematical reasoning.*
- Analyze and justify unit rates to determine which is a better buy
 - *TWPS – Find the error in finding the unit rate. Explain using mathematical reasoning.*
- Convert unit rates into other given units by applying the properties of real numbers *
 - *TWPS – Write out the steps to solve a problem involving a unit rate. Explain using mathematical reasoning.*
- Calculate unknown values in proportion and apply them to real-world situations.
 - *TWPS – Which one doesn't belong? Explain using mathematical reasoning.*
- Solve problems involving percentages using proportions
 - *TWPS – Find the error in setting up the proportion. Explain using mathematical reasoning.*
- Apply a proportion to find the percent of change in real-world situations.
 - *TWPS – How would you describe a percent increase or percent decrease? Explain using mathematical reasoning.*
- Find discount and sales tax
 - *TWPS – Describe an example of getting a discount and including sales tax. Explain using mathematical reasoning.*

Instructional Strategies/Differentiated Instruction

- TWPS
- Whole-group instruction
- Creating authentic connections for students
- Rephrasing and restatement of information and concepts
- Guided notes
- Student-led instruction
- Small group instruction
- Independent problem-solving
- Collaborative problem-solving
- Cross-curricular problem solving (independent and collaborative)
- Accountable Talk
- Manipulatives
- Homework

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EL DIFFERENTIATED INSTRUCTION:

- Word Walls with visuals
- TWPS (Think, Write, Pair, Share)
- Pre-reading strategies
- Culturally responsive teaching
- Explicit Modeling
- Key Vocabulary
- Graphic Organizers
- Strategic Grouping
- Non-verbal Assessments

Assessments

FORMATIVE ASSESSMENTS:

- Accountable Talk Discussions
- Daily Think-Write-Pair Share (TWPS)
- Warm-ups (SBAC prep)
- ABCD Cards
- Whiteboards
- Mid-class check-ins
- Exit Slips
- Student-led instruction
- Homework
- Performance Task - Camping Trip

SUMMATIVE ASSESSMENTS:

- Edulastic Quiz – EU 1
- Unit 4 Test – Edulastic EU 1 and 2
- FIAB: Ratios and Proportional Relationships
- Performance Task - Camping Trip

Unit Task

Unit Task Name: Camping Trip

Description: Students will use information learned in this unit about how ratios and rates are used to compare quantities (EU 1) and how to convert rates into different units (EU 2) to solve problems about a campsite and its distance away from other places. Students will use a map and ratios to compare the distances of a campsite from a parking lot. Students will convert a path from a map from inches to miles using proportions. They will then use the distances of two paths to find the error a student made in comparing two distances, their units, and how the student made the error. Using these distances and a given speed, students will also use ratios to find the fastest path. This information will also help students explain which path they would take and why.

Evaluation: Problem Solving Rubric

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Unit Resources

- Flipped Google Classroom Videos
- Worksheets
- Calculator
- Laptops
- SBAC Prep Online
- Edulastic
- Kahn Academy
- Match Fishtank
- Map.Mathshell.org
- Online resources