

## Unit 3: Ratios & Proportional Relationships

### Grade 7 Math

11 Class Meetings

*Revised June 2022*

#### Essential Questions

- When and why do you use proportional comparisons in the real world?
- How does comparing quantities describe the relationship between them?

#### Enduring Understandings with Unit Goals

**EU 1:** The proportional relationship between two quantities is a collection of equivalent ratios, related to each other by a constant of proportionality.

- Compare, analyze, and interpret proportional relationships between quantities in double number lines, tables, graphs and equations.
- Utilize the constant of proportionality (unit rate) to identify proportional relationships.
- Evaluate unit rates in equations in the form of  $y=kx$  and in graphs of proportional relationships as the ordered pair  $(l,r)$ .
- Evaluate two quantities ratios for their equivalency or straight line passing through the origin.
- Solve ratio and rate problems using proportional reasoning, including fractional price increase and decrease, commissions, and fees

**EU 2:** Proportional relationships can be used to create drawing and models at differing scales.

- Compute areas and create geometric figures with scale drawings.
- Analyze scale drawings to find the scale factor and actual measurements.

#### Standards

##### Common Core State 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.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.
- **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.
- **7.RP.A.2.D:** Explain what a point  $(x, y)$  on the graph of a proportional relationship means in terms of the situation, with special attention to the points  $(0, 0)$  and  $(1, r)$  where  $r$  is the unit rate.
- **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.
- **7.G.A.1:** Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

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#### 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.

#### Unit Content Overview

##### 1. Fractions, Decimals, and Percent

- Convert between fractions, decimals and percents
- **Vocabulary and Key Terms** – Convert, Percent, Fractions, Decimals, Equivalent, Multiply, Divide, Long division

##### 2. Proportional Relations with Fractions

- Solve ratio and rate problems
- Apply part to part ratios
- Apply part to whole ratios
- Compute unit rates associated with ratios of fractions
- Compute ratios of lengths, areas, and other quantities measured in like or different units
- Identify independent and dependent variables
- Use double number lines, tables, and unit rate
- Define the constant of proportionality
- Solve for missing values
- Write equations from proportional relationships from word problems
- **Vocabulary and Key Terms** – Convert, Fractions, Decimals, Equivalent, Multiply, Divide, Rates, Ratios, Unit Rate, Denominator, Numerator, Greatest common factor, Least common Multiple, Part, Whole, Is, Of, Quantities, Variables, Independent, Dependent, Double number lines, tables, constant of proportionality, Unknown Quantity, Proportional relationships, Proportion

##### 3. Proportional Relationship in Graphs

- Evaluate unit rates in equations in the form of  $y=kx$
- Evaluate in graphs of proportional relationships as the ordered pair  $(l,r)$ .
- Identify the linear relationship does go through the origin
- Write equations from proportional relationships in graphs
- Interpret proportional relationships represented in graphs
- **Vocabulary and Key Terms** – Convert, Fractions, Decimals, Equivalent, Multiply, Divide, Rates, Ratios, Unit Rate, Denominator, Numerator, Greatest common factor, Least Common Multiple, Part, Whole, Is, Of, Quantities, Variables, Independent, Dependent, Double number lines, tables, constant of proportionality, Unknown quantity, Proportional relationships, Proportion, Origin, Graph is proportional

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#### 4. Proportional Relationship in Tables

- Represent proportional relationships in tables
- Determine the constant of proportionality in tables
- Write equations from proportional relationships presented in tables
- **Vocabulary and Key Terms** – Convert, Fractions, Decimals, Equivalent, Multiply, Divide, Rates, Ratios, Unit Rate, Denominator, Numerator, Greatest common factor, Least Common Multiple, Part, Whole, Is, Of, Quantities, Variables, Independent, Dependent, Double number lines, tables, constant of proportionality, Unknown Quantity, Proportional relationships, Proportion

#### 5. Nonproportional Relationships

- Compare proportional and nonproportional relationships
- Identify the linear relationship does not go cross through the origin
- **Vocabulary and Key Terms** – Convert, Fractions, Decimals, Equivalent, Multiply, Divide, Rates, Ratios, Unit Rate, Denominator, Numerator, Greatest common factor, Least Common Multiple, Part, Whole, Is, Of, Quantities, Variables, Independent, Dependent, Double number lines, tables, constant of proportionality, Unknown Quantity, Proportional relationships, Proportion

#### 6. Scale Drawing

- Define and identifying scale drawings
- Determine scale factor between two images
- Use scale factor to draw scale images
- Evaluate a scale to determine actual measurements
- Create and evaluate maps using scales to find actual distance between locations
- Evaluate floor plans using scales to find actual measurements and dimensions
- Compute actual areas from scale drawings
- Draw scale drawing at different scales using proportions.
- **Vocabulary and Key Terms** – Convert, Fractions, Decimals, Equivalent, Multiply, Divide, Rates, Ratios, Unit Rate, Denominator, Numerator, Greatest common factor, Least Common Multiple, Part, Whole, Is, Of, Quantities, Variables, Independent, Dependent, Double number lines, tables, constant of proportionality, Unknown Quantity, Proportional relationships, Proportion, Equivalent, Scale Drawing, Scale Factor, Scale, Scaled Copy, Corresponding, Similar

#### **Interdisciplinary Connection:**

- Language Arts - Word Problems
- Science – Word Problems

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#### Daily Learning Objectives with *Do Now Activities*

##### Students will be able to...

- Compute the unit rate associated with ratios of fractions
  - Solve for the variable in equations and inequalities
- Calculate the cross product to determine if the two ratios are in proportion (equivalent)
  - Solve for the variable in equations and inequalities
- Analyze ratios in a table/diagram to determine if the ratios are equivalent by finding constant of proportionality
  - Solve for the variable in equations and inequalities
- Construct and analyze graphs of ratios on a coordinate plane to determine if the ratios are proportional
  - Solve for the variable in equations and inequalities
- Compute and explain the rate of change/slope from a graph (rise over run) or equation ( $y=mx$ )
  - Write and solve equation & inequality word problems
- Produce and solve equations from a proportional relationship
  - Write and solve equation & inequality word problems
- Evaluate a graph to find the rate of proportionality
  - Determine proportionality, identify constant of proportionality in graphs and equations & solve multistep ratio and percent problems
- Justify the meaning of a point on a graph  $y=mx$  of a real-life situation
  - Determine proportionality, identify constant of proportionality in graphs and equations & solve multistep ratio and percent problems
- Compute the actual length of a figure from a scale drawing
  - Determine proportionality, identify constant of proportionality in tables and equations & solve multistep ratio and percent problems
- Apply a scale from one drawing to create a second scale for that drawing
  - Determine proportionality, identify constant of proportionality in tables and equations & solve multistep ratio and percent problems
- Solve problems using scale drawings of geometric figures
  - Interpret a coordinate point on a graph and solve multistep ratio and percent problems

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#### **Instructional Strategies/Differentiated Instruction**

- Whole group instruction
- 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
- Highlighted words
- Fill in the blanks
- Access to multiplication chart
- Access to calculator
- Color coded notes
- Pre-teaching/Reteaching

#### **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:**

- Warm-ups (SBAC)
- Whiteboards
- Mid-class check-ins
- Exit Slips
- Accountable Talk Discussions
- Do Now
- Student-led instruction
- Homework
- Performance Task – Which Pizza Is the Best Value for My Money?
  - Future Rubric Assessment in 2021-2022

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#### **SUMMATIVE ASSESSMENTS:**

- Quiz 1 - EU 1 (Edulastic)
- Unit 3 Test (Edulastic)
- Performance Task – IAB PT: Camping Trip

#### **Unit Task**

**Unit Task Name:** Which Pizza Is the Best Value for My Money? Performance Task

**Description:** Students will use information learned in this unit to determine the best value for their money when ordering pizza for themselves (using cost per topping) and for a group (using cost per person) to find the best deal. They will find unit rate and solve using proportional relationships (EU 1 & 2). Students will justify their work.

**Evaluation:** Summative Assessment and Future Rubric in 2021-2022 school year

#### **Unit Resources**

- Match FishTank
- Illustrative Mathematics
- Khan Academy
- SolvemeMobiles.org
- Flipped Google Classroom Videos
- Worksheets
- Calculator
- Laptops
- SBAC Prep Online
- Performance Task - Iggy's Ice Cream
- Blooket
- Edulastic
- 99math.com
- Legends of Learning