Unit 3: Ratios, Rates, and Proportions

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Week 13**
Length: **3 weeks**
Status: **Published**

Unit Overview

In this unit, students will learn how to set up and solve different types of proportions. The unit will begin with students learning the three different ways to represent a ratio. When writing a ratio different ways, students will learn how to convert different units of measure to the same unit. For example students will write a ratio comparing hours to minutes, but the final answer must be expressed in the same unit of measure. Next, students will learn about the idea of unit rate (including fractional unit rates). Students will learn how to calculate the unit rate for a given situation followed by using the unit rate to determine what the best deal is for a given situation. After learning about unit rates, students will be exposed to the idea of proportions. Students will learn what a proportion is, and will learn different methods on how to solve a proportion. The culmination of this unit will be applying the idea of proportions to real world problems.

Standards

MA.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.
MA.7.RP.A.2b	Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
MA.7.RP.A.3	Use proportional relationships to solve multistep ratio and percent problems.
MA.7.EE.B.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.

Essential Questions

- How are ratios and proportions used to compare quantities?
- Why is the unit rate such an important concept in math?
- Why is it helpful to have multiple ways to solve a proportion?
- How can solving proportions help you solve real world problems?

Application of Knowledge: Students will know that...

- A proportion can be solved by creating two equivalent ratios.
- A proportion can be solved by cross multiplying.
- A proportion states that you have two equivalent ratios.
- A ratio can be written in one of three different ways: using a colon, with the word "to", and as a fraction.
- A ratio uses division to compare two quantities of the same unit.
- Equivalent ratios simplify to the same fraction
- It is possible to convert rates into different units of measure.
- Proportions can be used to solve real world problems
- The unit rate is a comparison to a quantity of "one".

Application of Skills: Students will be able to...

- Apply the unit rate for a given context to solve a multifaceted mathematical problem.
- Calculate the unit rate for a given situation
- Convert rates into the same unit of measure.
- Create and solve a proportion to model a given word problem.
- Solve a proportion using any method.
- Write equivalent ratios
- Write ratios in simplest form in three different ways.

Assessments

- Do Now's: Will be used to check for prior knowledge and to determine mastery of particular topics. If needed the teacher will remediate the previous lesson before continuing.
- Tickets to leave: Will be used to measure student understanding of the lesson and assist in determining whether remediation is needed for the topic.
- Communicator Practice: Will be used as a quick whole-class assessment tool to check for complete comprehension.
- Unit Quiz: focusing only on rates, ratios, and unit rates.
- Unit test: focusing on all concepts covered within the "Ratios, Rates, and Proportions" unit.
- Gallery Walk reviewing rates and unit rates
- Information from this unit will be included on a locally developed, mid-year or end of year benchmark assessment that may take the form of a test, performance based project, or other summative assessment. From this unit, proportions will be covered in depth especially in the context of percentages. Unit rates will be built upon and covered again on the end of year assessment when dealing with proportional relationships.

Suggested Activities

- Digits launch activities (Topic 1).
- Review games using communicators.

- Student centered SMART Board lessons: "star" word problems practice and the kooshball review game.
- Unit Rate Olympics: Have students compete in different activities (jumping up and down, push ups, etc) for different units of time. Students will then calculate the unit rate for each of their classmates to determine who the "best" was for each event.
- Clue "walk-around" activity to review the concepts from the unit: focus will be on solving basic proportion problems, applying unit rate to real world situations, and real world proportion application problems. Students will complete review problems that are posted around the room on topics from this unit. The theme of the gallery walk is based off of the board game "Clue". Each problem will rule out possibilities for the suspect, weapon, and location. Once all of the problems are completed correctly, students will be left with the suspect, weapon, and location for the fictional crime.
- "4 Square" communicator activity. Students are given a square with a problem to complete. Once all 4 "squares" from the group are completed, the group adds all 4 answers together and writes it in the center of the page. This is used only when solving proportions in this unit.

Activities to Differentiate Instruction

Differentiation for special education:

- General modifications may include:
  - Modifications & accommodations as listed in the student's IEP
  - Assign a peer to help keep student on task
  - Modified or reduced assignments
  - Reduce length of assignment for different mode of delivery
  - Increase one-to-one time
  - Working contract between you and student at risk
  - Position student near helping peer or have quick access to teacher
  - Break tests down in smaller increments
- **Content specific modifications may include:**
  - Personal handout for remembering integer rules (can be taped to desk).
  - Graphic organizer for remembering integer rules.
  - Provide completed examples for practice work and homework.
  - Step by step directions on the process of cross multiplying.

Differentiation for ELL's:

- General modifications may include:
  - Strategy groups
  - Teacher conferences
  - Graphic organizers
  - Modification plan
- **Content specific vocabulary important for ELL students to understand include:**
  - Ratio, rate, unit rate, proportion, conversion, simplest form, equivalent

Differentiation to extend learning for gifted students may include:

- When solving proportions, give students true algebraic proportions that will result in a multi-step

equation.
- Work more with rational numbers rather than integers when solving proportions.

Technology Integration

- iPads or Chromebooks as appropriate to the activity.
- Online learning components including use of the Digits digital textbook and resources.
- Teacher integration of the SMART board to facilitate active student engagement throughout the course of the lesson.
- Software or online programs that teachers may use to create students materials or generate problems such as Kuta software.
- Additional practice provided through the use of IXL.

Integrated/Cross-Disciplinary Instruction

ELA: Practice formulating complete and grammatically correct responses to open-ended questions.

P.E.: Have students compete in the "unit rate" Olympics.

Economics: Have students make predictions of the price of certain items if they keep increasing/decreasing at the same rate.

Resources

Digits teacher materials and support: www.pearsonrealize.com

Digits student access and support: www.mymathuniverse.com

IXL practice: www.ixl.com

Digits video examples

SMART Board lessons

Kuta software generated worksheets

21st Century Skills

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.