# Grade 6 Ratios & Proportional Relationships
## Sample Unit Plan

This instructional unit guide was designed by a team of Delaware educators in order to provide a sample unit guide for teachers to use. This unit guide references some textbook resources used by schools represented on the team. This guide should serve as a complement to district curriculum resources.

# Unit Overview

**Ratios, Proportions, & Proportional Reasoning** is a critical unit in the middle school years because understanding ratios and proportional reasoning is necessary to be able to work with fractions, decimals, percents, rates, unit rates, and applications of proportions. This unit builds on students' understanding of multiplicative comparison and serves as an important foundation for grade 7 work with proportional reasoning and algebra.

Students will develop an understanding that a ratio is a multiplicative comparison of two or more quantities. When two quantities are related proportionally, the ratio of one quantity to the other is invariant as the numerical values of both quantities change by the same factor.

Proportional reasoning is useful in many real-life situations including making price comparisons, determining the best buy, finding gas mileage, scaling recipes up or down, distance on maps, calculating tips, taxes, discounts, unit conversions, etc. Students who have strong proportional reasoning are smarter consumers.

Working with ratios and proportions provides opportunities for students to reason *with* and use (e.g. for argumentation) a range of models and representations including ratio tables, tape models, double number lines, the coordinate plane, etc.

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# The Design Process

The writing team followed the principles of Understanding by Design (Wiggins & McTighe, 2005) to guide the unit development.  As the team unpacked the content standards for the unit, they considered the following:

**Stage 1: Desired Results**
- What long-term transfer goals are targeted?
- What meanings should students make? What essential questions will students explore?
- What knowledge and skills will students acquire?

**Stage 2: Assessment Evidence**
- What evidence must be collected and assessed, given the desired results defined in stage one?
- What is evidence of understanding (as opposed to recall)?

**Stage 3: The Learning Plan**
- What activities, experiences, and lessons will lead to achievement of the desired results and success at the assessments?
- How will the learning plan help students Acquisition, Meaning Making, and Transfer?
- How will the unit be sequenced and differentiated to optimize achievement for all learners?

The writing team incorporated components of the Learning-Focused (LFS) model, including the learning map, and a modified version of the Know-Understand-Do template.

The team also reviewed and evaluated the textbook resources they use in the classroom based on an alignment to the content standard for a given set of lessons. The intention is for a teacher to see what supplements may be needed to support instruction of those content standards. A list of open educational resources (OERs) are also listed with each lesson guide.

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# Content and Practice Standards

## Transfer Goals (Standards for Mathematical Practice)

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

1. Make sense of problems and persevere in solving them
2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of others
4. Model with mathematics
5. Use appropriate tools strategically
6. Attend to precision
7. Look for and make use of structure
8. Look for and express regularity in repeated reasoning

## Content Standards

**6.RP.A  Understand ratio concepts and use ratio reasoning to solve problems.**
6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
6.RP.A.3 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.
> 3a. 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.

6.RP.A.2 Understand the concept of a unit rate a/b associated with a ratio *a:b* with b ≠ 0, and use rate language in the context of a ratio relationship.
6.RP.A.3 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.
> 3b. Solve unit rate problems including those involving unit pricing and constant speed.
> 3c. Find a percent of a quantity as a rate per 100 (e.g. 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent; convert between forms of a number (fraction, decimal, percent).
> 3d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

# Enduring Understandings & Essential Questions

| Enduring Understanding (Teacher) | Essential Question(s) (Student) |
|---|---|
| **Understanding 1**<br>Understand the difference between part to part and part to whole and how those relationships are represented as ratios.<br><br>**Understanding 2**<br>A ratio relationship is a multiplicative comparison of two quantities in which both quantities change by the same factor.<br><br>**Understanding 3**<br>A rate is a set of infinitely many equivalent ratios.<br><br>**Understanding 4**<br>Reasoning with ratios involves attending to and coordinating two quantities.<br><br>**Understanding 5**<br>Forming a ratio as a measure of a real-world attribute involves isolating that attribute from other attributes and understanding the effect of changing each quantity on the attribute of interest | EQ1. How can rates, ratios, and proportional reasoning help us better understand the use of ratios and rates in the world around us?<br><br>EQ2. What is a ratio and how do we make sense of whether two or more ratios are proportional? |
| **Understanding 6**<br>A proportion is a relationship of equality between two ratios that can be represented in a variety of ways. In a proportion, the ratio of two quantities remains constant as the corresponding values of the quantities change. For instance, in a ratio table, both quantities in a ratio must be multiplied or divided by the same factor to maintain the proportional relationship. | EQ3. How can I use models (tape diagrams, double number lines, ratio tables, coordinate plane, etc.) to display an understanding of ratios and proportional relationships? |

**\*Enduring understandings and essential questions adapted from NCTM Enduring Understandings**
Source:  Lobato, J.E. (2010). *Developing Essential Understanding of Ratios, Proportions & Proportional Reasoning for Teaching Mathematics in Grades 6 - 8.* Reston, VA:  The National Council of Teachers of Mathematics, Inc.

# Acquisition

| Conceptual Understandings (Know/Understand) | Procedural Fluency (Do) | Application (Apply) |
|---|---|---|
| Understand the concept of a ratio and use ratio language to identify the relationship between two quantities. | Identify the various ratio forms:  *a:b*  and  *a/b* | Identifying the items representing quantities that will be compared in real world situations. |
| Understand the concept of a unit rate *a/b* associated with a ratio *a:b* where **b** = 1 and **a** represents any rational number. Use rate language in the context of a ratio relationship. | Identify a unit rate as a fraction of *a/b*, where *b* = 1 and *a* = any rational number. Convert a rate to a unit rate by scaling. | Solve real-world problems using unit rates. |
| Equivalent ratios have the same value when written as a fraction, decimal, or percent. Equivalent ratios can be represented on the coordinate plane through a linear pattern passing through the origin. Justify that a given set of equivalent ratios is proportional using a visual model. | Flexibly use and represent equivalent ratios through a double number lines, tape diagram, table, and/or graph. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in tables, and plot pairs of values on the coordinate plane. Use tables to compare ratios. | Find the whole or part when given a set of equivalent part to part or part to whole ratios through the use of different representations. |
| Understand that a measurement conversion is a ratio. | Convert measurement units. | Use measurement conversions to compare constant speed and different standard units of measure. |
| Define a percent as a rate per 100. | Find the percent of a quantity. | Use percents to determine the whole or part (original price, discount, tax, tip etc.) |
| Define a rate as a comparison of two quantities. | Solve rate and unit rate problems including those involving unit pricing and constant speed. | Use scaling to find missing quantities in equivalent ratios. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?* |

# Reach Back/Reach Ahead Standards

How does this unit relate to the progression of learning?  What prior learning do the standards in this unit build upon?  How does this unit connect to essential understandings of later content in this course and in future courses?  The table below outlines key standards from previous and future courses that connect with this instructional unit of study.

| Reach Back Standards | Reach Ahead Standards |
|---|---|
| 4.OA.2 Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison. | 6.EE.C.9 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. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation $d = 65t$ to represent the relationship between distance and time. |
| 4.MD.A.1 Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. | |
| 5.NF.B.3 Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. | 6.EE.B.7 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 nonnegative rational numbers. |
| 5.NF.B.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. | 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. |
| 5.NF.B.5 Interpret multiplication as scaling (resizing). | |
| 5.NF.B.6 Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem. | 7.RP.A.2a Recognize and represent proportional relationships between quantities. |
| | 7.RP.A.2b Recognize and represent proportional relationships between quantities. |
| 5.NF.B.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. | 7.RP.A.3 Use proportional relationships to |

| | solve multistep ratio and percent problems. |
|---|---|
| 5.OA.A.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.<br><br>5.OA.B.3 Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane.<br><br>5.G.A.1 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond.<br><br>5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. | 7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.<br><br>HS.G-MG.A.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).<br><br>HS.N-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. |

## Common Misunderstandings

Students may….
- switch the order of the ratio.
- misunderstand that scaling involves multiplication, not addition.
- use different operations when scaling.
- confuse the scale factors for each quantity.
- misinterpret contextualizing part to part and part to whole ratios with word problems.
- not scale to the unit rate in order to create a proportional comparison.

# Grade 6 Smarter Balanced Blueprints

**Smarter Balanced** Assessment Consortium

**Mathematics Summative Assessment Blueprint**
As of 02/09/15

| Target Sampling Mathematics Grade 6 | | | | | | |
|---|---|---|---|---|---|---|
| **Claim** | **Content Category** | **Assessment Targets** | **DOK** | **Items** | | **Total Items** |
| | | | | **CAT** | **PT** | |
| 1. Concepts and Procedures | Priority Cluster | E. Apply and extend previous understandings of arithmetic to algebraic expressions. | 1 | 5-6 | 0 | 16-19 |
| | | F. Reason about and solve one-variable equations and inequalities. | 1, 2 | | | |
| | | A. Understand ratio concepts and use ratio reasoning to solve problems. | 1, 2 | 3-4 | | |
| | | G. Represent and analyze quantitative relationships between dependent and independent variables. | 2 | 2 | | |
| | | B. Apply and extend previous understandings of multiplication and division to divide fractions by fractions. | 1, 2 | | | |
| | | D. Apply and extend previous understandings of numbers to the system of rational numbers. | 1, 2 | 2 | | |
| | Supporting Cluster | C. Compute fluently with multi-digit numbers and find common factors and multiples. | 1, 2 | 4-5 | | |
| | | H. Solve real-world and mathematical problems involving area, surface area, and volume. | 1, 2 | | | |
| | | I. Develop understanding of statistical variability. | 2 | | | |
| | | J. Summarize and describe distributions. | 1, 2 | | | |

| Target Sampling Mathematics Grade 6 | | | | | | |
|---|---|---|---|---|---|---|
| **Claim** | **Content Category** | **Assessment Targets** | **DOK** | **Items** | | **Total Items** |
| | | | | **CAT** | **PT** | |
| 2. Problem Solving 4. Modeling and Data Analysis | Problem Solving (drawn across content domains) | A. Apply mathematics to solve well-posed problems arising in everyday life, society, and the workplace. | 2, 3 | 2 | 1–2 | 8-10 |
| | | B. Select and use appropriate tools strategically. C. Interpret results in the context of a situation. D. Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flow charts, or formulas). | 1, 2, 3 | 1 | | |
| | Modeling and Data Analysis (drawn across content domains) | A. Apply mathematics to solve problems arising in everyday life, society, and the workplace. D. Interpret results in the context of a situation. | 2, 3 | 1 | 1–3 | |
| | | B. Construct, autonomously, chains of reasoning to justify mathematical models used, interpretations made, and solutions proposed for a complex problem. E. Analyze the adequacy of and make improvements to an existing model or develop a mathematical model of a real phenomenon. | 2, 3, 4 | 1 | | |
| | | C. State logical assumptions being used. F. Identify important quantities in a practical situation and map their relationships (e.g., using diagrams, two-way tables, graphs, flow charts, or formulas). | 1, 2, 3 | 1 | | |
| | | G. Identify, analyze, and synthesize relevant external resources to pose or solve problems. | 3, 4 | 0 | | |
| 3. Communicating Reasoning | Communicating Reasoning (drawn across content domains) | A. Test propositions or conjectures with specific examples. D. Use the technique of breaking an argument into cases. | 2, 3 | 3 | 0-2 | 8-10 |
| | | B. Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures. E. Distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in the argument—explain what it is. | 2, 3, 4 | 3 | | |
| | | C. State logical assumptions being used. F. Base arguments on concrete referents such as objects, drawings, diagrams, and actions. G. At later grades, determine conditions under which an argument does and does not apply. (For example, area increases with perimeter for squares, but not for all plane figures.) | 2, 3 | 2 | | |

Available at https://portal.smarterbalanced.org/library/en/mathematics-summative-assessment-blueprint.pdf
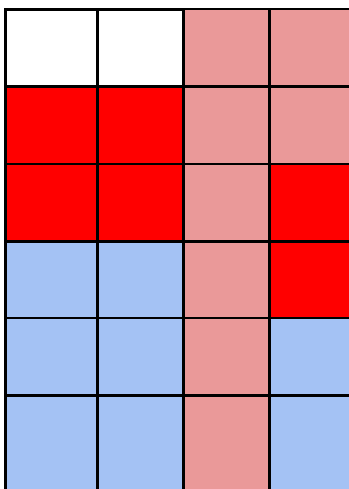
# Assessment Evidence

**EQ #1**

Students will be able to:
- Identify, comprehend, and setup ratios and rates. (Math Practice 1)
- Apply your knowledge of ratios and rates in order to make comparisons to solve real world problems. (Math Practice 2)
- Use proportional relationships to make predictions. (Math Practice 3)

**Example #1**



**Birds**



**Fish**



**Dogs**



**Cats**



Describe how the figure above can be represented with each of the following ratios:

1 to 3                                    1:4                                    3:4

**EQ #2**

Students will be able to
- Demonstrate that a ratio relationship is a multiplicative comparison of two quantities. (Math Practice 4)

- Justify that ratios are proportional by scaling. (Math Practice 3)

**Example #1**
The Escalator, Assessment Variation: https://www.illustrativemathematics.org/content-standards/6/RP/A/2/tasks/1181


**Example #2**
James is setting up a fish tank.  He is buying a breed of goldfish that typically grows to be  5 inches long.  It is recommended that there be 1.5 gallons of water for every inch of fish length in the tank.  What is the recommended ratio of gallons of water per fully-grown goldfish in the tank?
Complete the ratio table to help answer the following questions:

| Number of Fish | Gallons of Water |
|---|---|
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

a.   What size tank (in gallons) is needed for James to have full-grown goldfish?
b.   How many fully-grown goldfish can go in a 40 gallon tank?
 c.   What can you say about the values of the ratios in the table?

Source: https://www.engageny.org/resource/grade-6-mathematics-module-1-topic-b-lesson-9


**EQ #3**
Students will be able to
- Create a model to represent a ratio relationship. (Math Practice 4 and 5)
- Use a model to justify proportionality. (Math Practice 3, 4, and 5)

**Example #1**
Fizzy Juice: https://www.illustrativemathematics.org/content-standards/6/RP/A/3/tasks/205

**Example #2**
The Escalator, Assessment Variation: https://www.illustrativemathematics.org/content-standards/6/RP/A/2/tasks/1181

**Example #3**

Use 1 cup of sugar for every 3 cups of flour in a chocolate chip recipe.   Create a

table that represents the number of cups of sugar and flour needed.  Then, use that table to construct a coordinate graph to show how many cups of sugar will be needed when 15 cups of flour are used.

*Note: Depending on when this unit is taught, this task may need to be differentiated for students that do not have the background knowledge of how to construct a coordinate plane.*

**Smarter Samples:**
**2014 SBAC Math Scoring Guide:  Question 12, 13, 26, 27, 26**

**Sample Illustrative Mathematics**
**6.RP.A.1**
Games at Recess (Links to an external site.)
Ratios of Boys to Girls (Links to an external site.)
Voting for Two, Variation 1 (Links to an external site.)
Voting for Two, Variation 2 (Links to an external site.)
Voting for Two, Variation 3 (Links to an external site.)

6.RP.A.3a
Mixing Concrete
Running at a Constant Speed
Walk-a-thon 1
Voting for Three, Variation 1
Voting for Three, Variation 2
Voting for Three, Variation 3
Jim and Jesse's Money
Bags of Marbles  https://www.illustrativemathematics.org/illustrations/63

**6.RP.A.2 & 6.RP.A.3b**
Mangos for Sale
Price Per Pound and Pounds Per Dollar
Riding at a Constant Speed, Assessment Variation
The Escalator, Assessment Variation
Hippos Love Pumpkins
Ticket Booth
Friends Meeting on Bicycles
Running at a Constant Speed
Data Transfer
Which detergent is a better buy?
Giana's Job

**6.RP.A.3c**
Shirt Sale
Security Camera
Dana's House
Kendall's Vase-Tax
Overlapping Squares
Anna in D.C.
Exam Scores

**6.RP.A.3d**
Converting Square Units
Currency Exchange
Dana's House
Unit Conversions
Speed Conversions

# The Learning Plan: LFS Student Learning Map

**Key Learning:**
A ratio is a comparison of two quantities that are related proportionally. We will explore ratio concepts and use ratio reasoning to solve real world problems.

**Unit Essential Questions:**
1. How can rates, ratios, and proportional reasoning help us better understand the use of ratios and rates in the world around us?
2. What is a ratio and how do we make sense of whether two or more ratios are proportional?
3. How can I use models (tape diagrams, double number lines, ratio tables, coordinate planes, etc.) to display an understanding of ratios and proportional relationships?

| Concept: 6.RP.A.1 Ratios | Concept: 6.RP.A.2 Unit Rates | Concept: 6.RP.A.3 Percents and Measures |
|---|---|---|
| **LEQ:** <br> 1. How can you represent a relationship between two quantities? <br> 2. How can you write associated ratios from a given context? <br> 3. How can you recognize ratios that are proportional to one another? <br> 4. How can you compare two ratios? | **LEQ:** <br> 1. What is a rate? <br> 2. When given a rate, how can you find a unit rate? <br> 3. How can you identify equivalent rates? | **LEQ:** <br> 1. What is the connection between rates and percents? <br> 2. How do you find the percent of a quantity? <br> 3. How do you solve problems involving finding the whole, given a part and a percent? <br> 4. How can you use ratio reasoning to convert measurement units? |
| **Vocabulary:** <br> • Ratio <br> • Equivalent ratios <br> • Number line <br> • Double number line <br> • Tape diagram <br> • Ratio table <br> • Coordinate plane <br> • Scaling <br> • Quantity <br> • Part to part <br> • Part to whole | **Vocabulary:** <br> • Rate <br> • Unit rate <br> • Per <br> • Equivalent rates | **Vocabulary:** <br> • Percent <br> • Conversion factor |

# Unit at a Glance

**Note: This is a suggested guideline for pacing of this set of standards.  Add in days for remediation, extra practice or assessment as needed.**

| | | | | |
|---|---|---|---|---|
| **Day 1** - I can define and identify ratios.<br><br><br><br><br><br><br>Standard: 6.RP.A.1 | **Day 2** - I can define and identify the different ways to represent a ratio (part to part, part to whole).<br><br>Standard: 6.RP.A.1 | **Day 3** - I can identify multiple ratios that represent the same proportional relationship using multiple representations.<br><br>Standard: 6.RP.A.3 | **Day 4** - I can identify multiple ratios that represent the same proportional relationship using multiple representations<br><br>Standard: 6.RP.A.3 | **Day 5** - I can use ratio reasoning and models to solve real world ratio problems.<br><br><br><br>Standard: 6.RP.A.3a |
| **Day 6** - I can use ratio reasoning and models to solve real world ratio problems.<br><br>Standard: 6.RP.A.3a | **Day 7** - I can use ratio reasoning and models to solve real world ratio problems.<br><br>Standard: 66.RP.A.3b | **Day 8** - I can use ratio reasoning and models to solve real world ratio problems.<br><br>Standard: 6.RP.A.3a | **Day 9** - I can define and model equivalent rates.<br><br><br><br>Standards: 6.RP.A.2 6.RP.A.3b | **Day 10** - I can create a unit rate when given a rate.<br><br><br><br>Standards: 6.RP.A.2 |
| **Day 11** - I can use my knowledge of unit rates to compare real world scenarios (for example, gas mileage, better buy, rate of speed).<br><br>Standards: 6.RP.A.2 6.RP.A.3b | **Day 12** - I can use my knowledge of unit rates to compare real world scenarios (for example, gas mileage, better buy, rate of speed).<br><br>Standards: 6.RP.A.2 6.RP.A.3b | **Day 13** - I can use my knowledge of unit rates to compare real world scenarios (for example, gas mileage, better buy, rate of speed).<br><br>Standards: 6.RP.A.2; 6.RP.A.3b | **Day 14** - Review<br><br><br><br><br><br><br><br>Standards: 6.RP.A.1 6.RP.A.2 6.RP.A.3a 6.RP.A.3b | **Day 15** -Quiz<br><br><br><br><br><br><br><br>Standards: 6.RP.A.1 6.RP.A.2 6.RP.A.3a 6.RP.A.3b |

| | | | | |
|---|---|---|---|---|
| **Day 16 -** *Activating prior knowledge day* I can convert fluently between decimals, fractions, and percents.<br><br>Standards: 4.NF.C.6 6.RP.A.3c | **Day 17 -** I can define a percent as a rate per 100.<br><br>Standard: 6.RP.A.3c | **Day 18 -** I can solve real world percent problems using ratio reasoning.<br><br>Standards: 6.RP.A.3c | **Day 19 -** I can solve real world percent problems using ratio reasoning.<br><br>Standards: 6.RP.A.3c | **Day 20 -** I can solve real world percent problems using ratio reasoning.<br><br>Standards: 6.RP.A.3c |
| **Day 21 -** I can convert between various units of measure to solve real world problems.<br><br>Standard: 6.RP.A.3 | **Day 22 -** I can convert between various units of measure to solve real world problems.<br><br>Standard: 6.RP.A.3 | **Day 23 -** I can demonstrate my understanding of ratios, rate reasoning, and proportional relationships when given real world scenarios.<br><br>Standards: 6.RP.A.1 6.RP.A.2 6.RP.A.3a 6.RP.A.3b 6.RP.A.3c 6.RP.A.3d | **Day 24 -** I can demonstrate my understanding of ratios, rate reasoning, and proportional relationships when given real world scenarios.<br><br>Standards: 6.RP.A.1 6.RP.A.2 6.RP.A.3a 6.RP.A.3b 6.RP.A.3c 6.RP.A.3d | **Day 25 -** I can demonstrate my understanding of ratios, rate reasoning, and proportional relationships when given real world scenarios.<br><br>Standards: 6.RP.A.1 6.RP.A.2 6.RP.A.3a 6.RP.A.3b 6.RP.A.3c 6.RP.A.3d |

# Day 1: Defining Ratios

**Learning Target:** I can define and identify ratios.

**Mathematical Practice Standards**
MP.4 Model with Mathematics
MP.6. Attend to Precision

**Linked Content Standard:**
**6.RP.A Understand ratio concepts and use ratio reasoning to solve problems.**
6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.

**Instructional Notes:**

| Reach Back | Reach Ahead |
|---|---|
| In order for students to succeed with this standard and concepts taught during days 5-8, students will need to have the prior knowledge of:<br>● Converting units of measurement (4.MD.A.1)<br>● The four mathematical operations (4.OA.A.2)<br>● Multiplication and division of fractions (5.NF.B.3)<br>● Write and interpret numerical expressions (5.OA.A.2)<br>● Analyze patterns and relationships (5.OA.B.3) | Students will use the knowledge gained on day 1 to:<br>● Finding unit rates (6.RP.A.2)<br>● Solving real world problems using ratios (6.RP.A.3)<br>● Write equations to express the independent and dependent variables (6.EE.C.9)<br>● Analyze the relationship between the independent and dependent variables using tables, graphs, and equations (6.EE.C.9)<br>● Reason about and solve one step equations (6.EE.B.7) |

| Linked Essential Understanding(s): | Linked Unit EQ(s): |
|---|---|
| **Understanding 2.** A ratio is a multiplicative comparison of two quantities, or it is a joining of two quantities in a composed unit.<br><br>**Understanding 4.** Reasoning with ratios involves attending to and coordinating two quantities. | EQ1. How can rates, ratios, and proportional reasoning help us better understand the use of ratios and rates in the world around us?<br><br>EQ2: What is a ratio and how do we make sense of whether two or more ratios are proportional? |

**LEQ:** How can you represent a relationship between two quantities?

**Text Alignment:**

| Text | Big Ideas Mathematics (2014) | Eureka Math (2015) | Glencoe Mathematics (2014) | Mathematics in Context (2001) |
|---|---|---|---|---|
| Section(s) | 5.1 | Module 1 Lesson 1 & 2 | Ch. 1 Lesson 2 | |
| Strength of Alignment | Aligned | Aligned | Aligned | Weak Alignment |

**Sample Lesson Activities/Resources:**
http://map.mathshell.org/download.php?fileid=1610 -
This is a resource that can be used throughout the ratios and proportional reasoning unit covering everything including ratio notation, language, equivalent ratios, & unit rates.

Video Introduction:  This video introduces students to the concept of a ratio.
https://www.mathantics.com/section/lesson-video/ratios-and-rates

Ways to Write Ratios: This blurb summarizes how to write a ratio using different notation and how to find equivalent ratios.
http://www.math.com/school/subject1/lessons/S1U2L1DP.html

Lesson – Ratios: This lesson introduces students to the definition of a ratio.
https://www.engageny.org/resource/grade-6-mathematics-module-1-topic-lesson-1

Lesson – Ratios: This lesson highlights how order changes the description of a ratio.
https://www.engageny.org/resource/grade-6-mathematics-module-1-topic-lesson-2

Games at Recess: In this task, students need to be able to write sentences describing ratio relationships, they also need to see and use the appropriate symbolic notation for ratios
https://www.illustrativemathematics.org/content-standards/6/RP/A/1/tasks/76\

Many Ways to Say It: In this task, students distinguish which statements correctly use ratio language to describe quantities in the context of the situation.
https://www.illustrativemathematics.org/content-standards/6/RP/A/1/tasks/2151

Representing a Context with a Ratio: In this task, students draw a picture and name two ratios that represent the situation.
https://www.illustrativemathematics.org/content-standards/6/RP/A/1/tasks/2158

Example Problem: Every bag of skittles has 13 lemon flavored. There are 50 skittles in each bag. List 3 different ways you could write this ratio:          13:50    13/50          13 to 50

# Day 2: Representing Ratios

**Learning Target:** I can define and identify the different ways to represent a ratio (part to part, part to whole).

**Mathematical Practice Standards**
MP.4 Model with Mathematics
MP.6. Attend to Precision

**Linked Content Standard:**
**6.RP.A  Understand ratio concepts and use ratio reasoning to solve problems.**
6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.

**Instructional Notes:**

| Reach Back | Reach Ahead |
|---|---|
| In order for students to succeed with this standard and concepts taught during days 5-8, students will need to have the prior knowledge of:<br>● Converting units of measurement (4.MD.A.1)<br>● The four mathematical operations (4.OA.A.2)<br>● Multiplication and division of fractions (5.NF.B.3)<br>● Write and interpret numerical expressions (5.OA.A.2)<br>● Analyze patterns and relationships (5.OA.B.3) | Students will use the knowledge gained on day 2 to:<br>● Finding unit rates (6.RP.A.2)<br>● Solving real world problems using ratios (6.RP.A.3)<br>● Write equations to express the independent and dependent variables (6.EE.C.9)<br>● Analyze the relationship between the independent and dependent variables using tables, graphs, and equations (6.EE.C.9)<br>● Reason about and solve one step equations (6.EE.B.7) |

| Linked Essential Understanding(s): | Linked Unit EQ(s): |
|---|---|
| Understanding 1. Understand the difference between part to part and part to whole and how those relationships are relationship. | EQ1. How can rates, ratios, and proportional reasoning help us better understand the use of ratios and rates in the world around us?<br><br>EQ2: What is a ratio and how do we make sense of whether two or more ratios are proportional? |

**LEQ:** How can you write associated ratios from a given context?

**Text Alignment:**

| Text | Big Ideas Mathematics (2014) | Eureka Math (2015) | Glencoe Mathematics (2014) | Mathematics in Context (2001) |
|---|---|---|---|---|
| Section(s) | 5.1 | Module 1 Lesson 7 | Chapter 1 Lesson 2 | The Ratio Table -School Supplies (pg. 2-8) (part to part) -Additional Practice Section A (part to whole) |
| Strength of Alignment | Aligned | Aligned | Somewhat aligned | Somewhat aligned |

**Sample Lesson Activities/Resources:**

This slide show presentation teaches students how to solve problems by creating equivalent ratios defining the part and whole
https://www.slideshare.net/foreverun/ratios-partpart-and-partwhole

Identify each statement as part to part or part to whole.
1. For every 3 girls, there are 5 boys.
2. There are 5 brown candies out of 50 candies.
3. For every blue car, there are 3 silver cars.
4. There are 4 red marbles in each bag of 25 marbles.
5. For every 2 green balloons there are 3 yellow balloons.

Evaluating Ratio Statements: This task evaluates students understanding of true ratio statements for a given context.
https://www.illustrativemathematics.org/content-standards/6/RP/A/1/tasks/2091

Apples to Apples: The purpose of this task is to connect students' understanding of multiplicative relationships to their understanding of equivalent ratios.
https://www.illustrativemathematics.org/content-standards/6/RP/A/1/tasks/2146

# Days 3-4: Equivalent Ratios

**Learning Target:**  I can identify multiple ratios that represent the same proportional relationship using multiple representations, including tape diagrams, ratio tables, and graphing relationships.

**Mathematical Practice Standards:**
MP.4 Model with Mathematics
MP.7 Look for and make use of structure

**Linked Content Standard:**
6.RP.A.3 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.
> 3a. 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.

**Instructional Notes:**

| Reach Back | Reach Ahead |
|---|---|
| In order for students to succeed with this standard and concepts taught during days 5-8, students will need to have prior knowledge of:<br>● Graphing points on a coordinate plane (5.G.A.1)<br>● Constructing a coordinate graph (5.G.A.2)<br>● Ratio language and comparing two quantities in ratio format (6.RP.A.1) | Students will use the knowledge gained in Day 4 to:<br>● Write equations to express the independent and dependent variables (6.EE.C.9)<br>● Analyze the relationship between the independent and dependent variables using tables, graphs, and equations (6.EE.C.9)<br>● Analyzing proportional relationships to solve real world problems (7.RP.A.2)<br>● Use proportional reasoning to solve multistep ratio and percent problems (7.RP.A.3)<br>● Create equations to define a set of infinite ratios in a proportional relationship (7.EE.B4)<br>● Apply concepts of density based on area and volume in models (HS.G-MG.A.2)<br>● Use units to understand and solve multi-step problems (HS.N-Q.A.1) |

| Linked Essential Understanding(s): | Linked Unit EQ(s): |
|---|---|
| Understanding 6. A proportion is a | EQ2. What is a ratio and how do we make |

| relationship of equality between two ratios that can be represented in a variety of ways. In a proportion, the ratio of two quantities remains constant as the corresponding values of the quantities change. For instance, in a ratio table, both quantities in a ratio must be multiplied or divided by the same factor to maintain the proportional relationship. | sense of whether two or more ratios are proportional?<br><br>EQ3. How can I use models (tape diagrams, double number lines, ratio tables, coordinate plane, etc) to display an understanding of ratios and proportional relationships? |
|---|---|

**LEQs:** How can you recognize ratios that are proportional to one another?
How can you compare two ratios?

**Text Alignment:**

| Text | Big Ideas Mathematics (2014) | Eureka Math (2015) | Glencoe Mathematics (2014) | Mathematics in Context (2001) |
|---|---|---|---|---|
| **Section(s)** | 5.1, 5.2, 5.4 | Module 1 Lesson 3 & 4 | Chapter 1 Lesson 3 Inquiry Lab and Lesson 7 Inquiry lab | The Bar Model -School Garden |
| **Strength of Alignment** | Somewhat aligned | Aligned | Somewhat aligned | Aligned |

**Sample Lesson Activities/Resources:**

Lesson: Equivalent Ratios:

This lesson teaches students how to identify equivalent ratios and use tape diagrams to solve problems.

https://www.engageny.org/resource/grade-6-mathematics-module-1-topic-lesson-4

The Escalator: Assessment Variation

This task assesses students understanding of order in a ratio relationship to describe equivalent ratios and the unit rate.

https://www.illustrativemathematics.org/content-standards/6/RP/A/1/tasks/1181

Bag of Marbles:

This task assesses understanding of the relationship between fractions and ratios. It provides an opportunity to translate from fractions to ratios and then back again to fractions.

https://www.illustrativemathematics.org/content-standards/6/RP/A/1/tasks/912

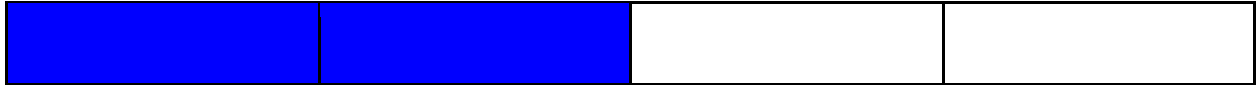**Linked Lesson on Tape Diagrams:**

This lesson teaches students to represent a ratio using a tape diagram and a ratio table to determine the value of a part, given the value of the other part.
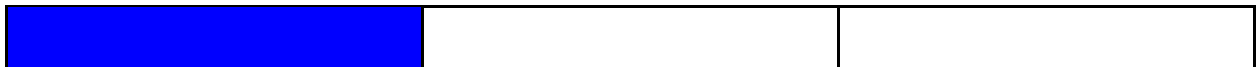
A
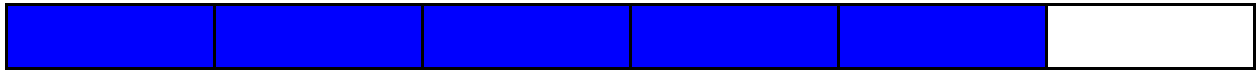
B

C

D

E

Write a ratio for each tape model. Identify which tape models are equivalent.

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Plot the ratio table on a coordinate a coordinate graph:

A truck travels 45 miles per hour.

| Time (hrs) | 1 | 2 | 3 | 4 | 10 | 15 | 22.5 | 26.25 |
|---|---|---|---|---|---|---|---|---|
| Distance (mi) | 45 | 90 | 135 | 180 | 450 | 675 | 1012.5 | 1181.25 |

**Smarter Interims:** IAB RatPropRel Sample Smarter Balanced Question #4 (To view items, log into IMS, select DeSSA/DCAS, Smarter ELA/Math, then Assessment Viewing Application)

# Days 5-8: Applying Ratios to Real-World Problems

**Learning Target:**  I can use ratio reasoning and models to solve real world ratio problems.

**Mathematical Practice Standards:**
MP.1 Make sense of problems and persevere in solving them
MP.2 Reason abstractly and quantitatively
MP.4 Model with Mathematics
MP.5 Use appropriate tools strategically

**Linked Content Standard:**
6.RP.A.3 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.

> 3a. 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.

**Instructional Notes:**

| Reach Back | Reach Ahead |
|---|---|
| In order for students to succeed with this standard and concepts taught during days 5-8, students will need to have the prior knowledge of:<br>● Graphing points on a coordinate plane (5.G.A.1)<br>● Constructing a coordinate graph (5.G.A.2)<br>● Ratio language and comparing two quantities in ratio format (6.RP.A.1) | Students will use the knowledge gained in day 4 to:<br>● Write equations to express the independent and dependent variables (6.EE.C.9)<br>● Analyze the relationship between the independent and dependent variables using tables, graphs, and equations (6.EE.C.9)<br>● Analyzing proportional relationships to solve real world problems (7.RP.A.2)<br>● Use proportional reasoning to solve multistep ratio and percent problems (7.RP.A.3)<br>● Create equations to define a set of infinite ratios in a proportional relationship (7.EE.B4)<br>● Apply concepts of density based on area and volume in models (HS.G-MG.A.2)<br>● Use units to understand and solve multi-step problems (HS.N-Q.A.1) |

| Linked Essential Understanding(s): | Linked Unit EQ(s): |
|---|---|
| **Understanding 2.** A ratio is a multiplicative comparison of two quantities, or it is a joining of two quantities in a composed unit.<br><br>**Understanding 4.** Reasoning with ratios involves attending to and coordinating two quantities.<br><br>**Understanding 5.** Forming a ratio as a measure of a real-world attribute involves isolating that attribute from other attributes and understanding the effect of changing each quantity on the attribute of interest. | EQ1. How can rates, ratios, and proportional reasoning help us better understand the use of ratios and rates in the world around us?<br><br>EQ3. How can I use models (tape diagrams, double number lines, ratio tables, coordinate plane, etc) to display an understanding of ratios and proportional relationships? |

**LEQ:** How can you use ratio reasoning and models to solve real world ratio problems?

**Text Alignment:**

| Text | Big Ideas Mathematics (2014) | Eureka Math (2015) | Glencoe Mathematics (2014) | Mathematics in Context (2001) |
|---|---|---|---|---|
| Section(s) | 5.2, 5.4 | Module 1 Lesson 5 & 6 | Chapter 1 Lesson 5 | Section E, Choose Your Model Additional Practice p. 65 |
| Strength of Alignment | Somewhat aligned | Aligned | Aligned | Aligned |

**Sample Lesson Activities/Resources:**

Michael runs about 10 km/hr. At the same average speed, how many kilometers does he run in 2 ¾ hours?

Around April of every year, all sixth, seventh, and eighth grade students at Springer Middle School go on an overnight camping trip. To make preparations, Mrs. Jones prepares the following list for this year's trip:
- 6th Grade - 54 students
- 7th Grade- 32 students
- 8th Grade- 45 students

Students are riding by bus to the camp site. Each bus can hold 18 students. How many buses are needed to send all of the students to camp?

The campsite is located at Have Fun Camping Park, which is 120 miles from school.  Jared wonders how long it will take to travel to the campsite.  He estimates that the buses will drive about 40 miles per hour on average.  Choose a model that can best determine the time needed to travel to the campsite.

**Lesson/Performance Task- Beginning pg. 2 Maximizing Profit: Selling Soup**
This performance task has students using proportional relationships to solve a multistep, complex real world problem.  This task may take up to 140 minutes to complete.
http://map.mathshell.org/download.php?fileid=1586

# Day 9: Modeling Equivalent Ratios

**Learning Target:** I can define and model equivalent rates.

**Mathematical Practice Standards:**
MP.1 Make sense of problems and persevere in solving them
MP.2 Reason abstractly and quantitatively
MP.4 Model with Mathematics
MP.5 Use appropriate tools strategically

**Linked Content Standard:**
6.RP.A.2 Understand the concept of a unit rate a/b associated with a ratio *a:b* with, and use rate language in the context of a ratio relationship.
6.RP.A.3 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.
      3b. Solve unit rate problems including those involving unit pricing and constant speed.

**Instructional Notes:**

| Reach Back | Reach Ahead |
|---|---|
| This 4th grade standard teaches students the concept of a multiplicative comparison through which they can define a ratio. (4.OA.A.2)<br><br>This 5th grade standard teaches students the structure of a fraction as division from which they can determine a unit rate as *a/b*. (5.NF.B.3)<br><br>This 5th grade standard teaches students the concept of scaling in which a rate is transformed into a unit rate. Additionally, equivalent ratios are developed through scaling. (5.NF.B.5) | This 7th grade standard teaches students to build from computing a unit rate to creating a unit rate with complex fractions. (7.RP.A.1)<br><br>This 7th grade standard teaches students to build on their understanding of equivalent ratios to then define them as proportional relationships. (7.RP.A.2)<br><br>This 7th grade standard teaches students to build on their understanding of a unit rate and equivalent ratios to define a set of infinite ratios in a proportional relationship through the creation of equations. (7.EE.B.4) |

| Linked Essential Understanding(s): | Linked Unit EQ(s): |
|---|---|
| **Understanding 3**<br>A rate is a set of infinitely many equivalent ratios.<br>**Understanding 6**<br>A proportion is a relationship of equality between two ratios that can be represented in | EQ1. How can rates, ratios, and proportional reasoning help us better understand the use of ratios and rates in the world around us?<br><br>EQ3. How can I use models (tape diagrams, double number lines, ratio tables, coordinate plane, etc.) to display an understanding of |

| | | | |
|---|---|---|---|
| a variety of ways. In a proportion, the ratio of two quantities remains constant as the corresponding values of the quantities change. For instance, in a ratio table, both quantities in a ratio must be multiplied or divided by the same factor to maintain the proportional relationship. | ratios and proportional relationships? | | |

**LEQ:** How can we transform ratios to define and model equivalent rates?

**Text Alignment:**

| Text | Big Ideas Mathematics (2014) | Eureka Math (2015) | Glencoe Mathematics (2014) | Mathematics in Context (2001) |
|---|---|---|---|---|
| Section(s) | 5.3 | Module 1 Lesson 16-17 | Chapter 1 Lesson 6 | Recipe and School Supplies Problem Pgs. 1-8; #3 p. 11 |
| Strength of Alignment | Aligned | Aligned | Aligned | Somewhat Aligned.  (#3 more aligned) |

**Sample Lesson Activities/Resources:**
Diet cola was on sale last week. It cost $10 for every 4 packs of diet cola.(Eureka Module 1 Lesson 16)
- How much do 2 packs of diet cola cost?
- How much does 1 pack of diet cola cost?

Once a commercial plane reaches the desired altitude, the pilot often travels at a cruising speed. On average, the cruising speed is 570 miles/hour. If a plane travels at this cruising speed for 7 hours, how far does the plane travel while cruising at this speed?

This assessment tests students' understanding of how to use equivalent ratios to solve problems. https://www.opened.com/assessment/final-test-unit-1-rates-ratios-proportions/1095860

This game promotes student fluency to recognize equivalent ratios given a time limit. http://www.arcademics.com/games/ratio-stadium/ratio-stadium.html

The purpose of this task is to make explicit the fact that equivalent ratios have the same unit rate. https://www.illustrativemathematics.org/content-standards/6/RP/A/2/tasks/2223

# Day 10: Unit Rates

**Learning Target:**  I can create a unit rate when given a rate.

**Mathematical Practice Standards:**
MP.1 Make sense of problems and persevere in solving them
MP.3 Construct Viable Arguments and Critique the reasoning of others
MP.7 Look for and make use of structure

**Linked Content Standard:**
**6.RP.A  Understand ratio concepts and use ratio reasoning to solve problems.**
6.RP.A.2 Understand the concept of a unit rate a/b associated with a ratio *a:b* with , and use rate language in the context of a ratio relationship.

**Instructional Notes:**

| Reach Back | Reach Ahead |
|---|---|
| This 4th grade standard teaches students the concept of a multiplicative comparison through which they can define a ratio. (4.OA.A.2)<br><br>This 5th grade standard teaches students the structure of a fraction as division from which they can determine a unit rate as *a/b*. (5.NF.B.3)<br><br>This 5th grade standard teaches students the concept of scaling in which a rate is transformed into a unit rate. Additionally, equivalent ratios are developed through scaling. (5.NF.B.5) | This 7th grade standard teaches students to build from computing a unit rate to creating a unit rate with complex fractions. (7.RP.A.1)<br><br>This 7th grade standard teaches students to build on their understanding of equivalent ratios to then define them as proportional relationships.(7.RP.A.2)<br><br>This 7th grade standard teaches students to build on their understanding of a unit rate and equivalent ratios to define a set of infinite ratios in a proportional relationship through the creation of equations. (7.EE.B.4) |

| Linked Essential Understanding(s): | Linked Unit EQ(s): |
|---|---|
| **Understanding 3**<br>A rate is a set of infinitely many equivalent ratios.<br><br>**Understanding 6**<br>A proportion is a relationship of equality between two ratios that can be represented in a variety of ways. In a proportion, the ratio of two quantities remains constant as the corresponding values of the quantities change. For instance, in a ratio table, both | EQ1. How can rates, ratios, and proportional reasoning help us better understand the use of ratios and rates in the world around us?<br><br>EQ3. How can I use models (tape diagrams, double number lines, ratio tables, coordinate plane, etc.) to display an understanding of ratios and proportional relationships? |

| | |
|---|---|
| quantities in a ratio must be multiplied or divided by the same factor to maintain the proportional relationship. | |

**LEQ:** How can we transform a rate to determine a unit rate?

**Text Alignment:**

| Text | Big Ideas Mathematics (2014) | Eureka Math (2015) | Glencoe Mathematics (2014) | Mathematics in Context (2001) |
|---|---|---|---|---|
| Section(s) | 5.3 | Module 1 Lesson 18 | Chapter 1 Lesson 3 and Lesson 3 Inquiry lab | Recipe Problem pg. 1 #3 p. 11 |
| Strength of Alignment | Aligned | Aligned | Aligned | Somewhat Aligned |

**Sample Lesson Activities/Resources:**

Lesson: Comparison Shopping: This lesson provides students the opportunity to solve real world problems using different unit rates. https://www.engageny.org/resource/grade-6-mathematics-module-1-topic-c-lesson-19

Solving Unit Rates Problem Video:  This video demonstrates the steps to solve a unit rate problem. https://www.opened.com/video/solving-unit-rates-problem/183270

This assessment tests student understanding of how to compare rates using the unit rate. https://www.opened.com/assessment/unit-rates-and-unit-prices/8954049

Solving Unit Price Problem Video: This video demonstrates the steps to solve a unit price problem. https://www.opened.com/video/solving-unit-price-problem/183269

This lesson has students solve problems by analyzing different unit rates given in tables, equations, and graphs. https://www.engageny.org/resource/grade-6-mathematics-module-1-topic-c-lesson-19/file/106201

This task has students represent the unit rate two different ways (changing the order) within the same context.  https://www.illustrativemathematics.org/content-standards/6/RP/A/2/tasks/2223

**Smarter Interims:** IAB RatPropRel Sample Smarter Balance Questions #5, 7, 8 (To view items, log into IMS, select DeSSA/DCAS, Smarter ELA/Math, then Assessment Viewing Application)

# Days 11-13: Using Unit Rates to Solve Real-World Problems

**Learning Target:** I can use my knowledge of unit rates to compare real world scenarios (for example, gas mileage, better buy, rate of speed).

**Mathematical Practice Standards:**
MP.1 Make sense of problems and persevere in solving them
MP.2 Reason abstractly and quantitatively
MP.4 Model with Mathematics

**Linked Content Standard:**
**6.RP.A  Understand ratio concepts and use ratio reasoning to solve problems.**
6.RP.A.2 Understand the concept of a unit rate a/b associated with a ratio *a:b* with , and use rate language in the context of a ratio relationship.
6.RP.A.3 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.
      3b. Solve unit rate problems including those involving unit pricing and constant speed.

**Instructional Notes:**

| Reach Back | Reach Ahead |
|---|---|
| In order for students to succeed with this standard and concepts taught during days 11-13, students will need to have the prior knowledge of:<br>● Converting units of measurement (4.MD.A.1)<br>● The four mathematical operations (4.OA.A.2)<br>● Multiply fractions by fractions or whole numbers  (5.NF.B.4)<br>● Scaling to convert a rate into a unit rate and equivalent ratios. (5.NF.B.5)<br>● Multiply fractions and mixed numbers (5.NF.B.6)<br>● Divide whole numbers by unit fractions and vice versa (5.NF.B.7)<br>● Write and interpret numerical expressions (5.OA.A.2)<br>● Analyze patterns and relationships (5.OA.B.3)<br>● Graphing points on a coordinate plane (5.G.A.1)<br>● Constructing a coordinate graph (5.G.A.2) | Students will use the knowledge gained in days 11-13 to:<br>● Write equations to express the independent and dependent variables (6.EE.C.9)<br>● Analyze the relationship between the independent and dependent variables using tables, graphs, and equations (6.EE.C.9)<br>● Write and solve equations using nonnegative rational numbers (6.EE.B.7)<br>● Compute unit rates associated with ratios of fractions (7.RP.A.1)<br>● Analyzing proportional relationships to solve real world problems (7.RP.A.2)<br>● Use proportional reasoning to solve multistep ratio and percent problems (7.RP.A.3)<br>● Construct simple equations and inequalities to solve problems (7.EE.B.1)<br>● Apply concepts of density based on area and volume in models (HS.G-MG.A.2) |

| | ● Use units to understand and solve multi-step problems (HS.N-Q.A.1) |
|---|---|

| Linked Essential Understanding(s): | Linked Unit EQ(s): |
|---|---|
| **Understanding 3**<br>A rate is a set of infinitely many equivalent ratios.<br><br>**Understanding 6**<br>A proportion is a relationship of equality between two ratios that can be represented in a variety of ways. In a proportion, the ratio of two quantities remains constant as the corresponding values of the quantities change. For instance, in a ratio table, both quantities in a ratio must be multiplied or divided by the same factor to maintain the proportional relationship. | EQ1. How can rates, ratios, and proportional reasoning help us better understand the use of ratios and rates in the world around us?<br><br>EQ3. How can I use models (tape diagrams, double number lines, ratio tables, coordinate plane, etc) to display an understanding of ratios and proportional relationships? |

**LEQ:** How can we use unit rates to make better consumer decisions?

**Text Alignment:**

| Text | Big Ideas | Eureka | Glencoe | MIC |
|---|---|---|---|---|
| Section(s) | 5.3 | Module 1 Lesson 19-22 | Chapter 1 Lesson 7 and Lesson 7 Inquiry Lab | Supplemented |
| Strength of Alignment | Aligned | Aligned | Somewhat aligned | Not aligned |

**Sample Lesson Activities/Resources:**
Which car has the better gas mileage?  Explain your reasoning.

| Car | A | B |
|---|---|---|
| Distance (miles) | 375 | 324 |
| Gallons Used | 15 | 12 |

You can buy a 20-pound bag of dog food for $19.00 or a 30-pound bag of dog food for $27.90. Which bag of dog food is the better buy?

6.RP Ticket Booth: In this task, students need to be able to compare unit rates to determine which ticket offer is the better deal.

https://www.illustrativemathematics.org/content-standards/6/RP/A/2/tasks/1975

Which Detergent is a Better Buy?:  In this task, students need to be able to compare ratios using an appropriate method of their choosing, such as a ratio table, finding unit rates, or selecting equivalent ratios which can be compared directly.
https://www.illustrativemathematics.org/content-standards/6/RP/A/3/tasks/1636

Assessment:  In this task, students need to be able to compare unit rates or use ratio reasoning to choose all of the beverages that are the best buy.
https://www.opened.com/homework/6-rp-3-use-ratio-and-rate-reasoning-to-solve-real-world/3691338?run=true

Assessment:  In this task, students need to be able to compare rates to solve a problem about paintings produced per week.
https://www.khanacademy.org/math/pre-algebra/pre-algebra-ratios-rates/pre-algebra-rates/e/rate_problems_0.5

# Days 14-15: Review & Quiz

**Learning Targets:**

I can define and identify the different ways to represent a ratio (part to part, part to whole).

I can identify multiple ratios that represent the same proportional relationship using tape diagrams and ratio tables.

I can use ratio reasoning and models to solve real world ratio problems.

I can model equivalent rates.

I can create a unit rate when given a rate.

I can use my knowledge of unit rates to compare real world scenarios.

**Mathematical Practice Standards:**

MP.1 Make sense of problems and persevere in solving them

MP.2 Reason abstractly and quantitatively

MP.4 Model with Mathematics

MP.6. Attend to Precision

MP.7 Look for and make use of structure

**Linked Content Standards:**

**6.RP.A  Understand ratio concepts and use ratio reasoning to solve problems.**

6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.

6.RP.A.3 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.

> 3a. 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.

6.RP.A.2 Understand the concept of a unit rate a/b associated with a ratio *a:b* with , and use rate language in the context of a ratio relationship.

6.RP.A.3 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.

> 3b. Solve unit rate problems including those involving unit pricing and constant speed.

**Instructional Notes:**

| Reach Back | Reach Ahead |
|---|---|
| In order for students to succeed with this standard and concepts taught during days 14-15, students will need to have the prior knowledge of:<br>● Converting units of measurement | Students will use the knowledge gained in days 14-15 to:<br>● Write equations to express the independent and dependent variables (6.EE.C.9) |

- (4.MD.A.1)
- The four mathematical operations (4.OA.A.2)
- Multiply fractions by fractions or whole numbers (5.NF.B.4)
- Scaling to convert a rate into a unit rate and equivalent ratios. (5.NF.B.5)
- Multiply fractions and mixed numbers (5.NF.B.6)
- Divide whole numbers by unit fractions and vice versa (5.NF.B.7)
- Write and interpret numerical expressions (5.OA.A.2)
- Analyze patterns and relationships (5.OA.B.3)
- Graphing points on a coordinate plane (5.G.A.1)
- Constructing a coordinate graph (5.G.A.2)

- Analyze the relationship between the independent and dependent variables using tables, graphs, and equations (6.EE.C.9)
- Write and solve equations using nonnegative rational numbers (6.EE.B.7)
- Compute unit rates associated with ratios of fractions (7.RP.A.1)
- Analyzing proportional relationships to solve real world problems (7.RP.A.2)
- Use proportional reasoning to solve multistep ratio and percent problems (7.RP.A.3)
- Construct simple equations and inequalities to solve problems (7.EE.B.1)
- Apply concepts of density based on area and volume in models (HS.G-MG.A.2)
- Use units to understand and solve multi-step problems (HS.N-Q.A.1)

| Linked Essential Understanding(s): | Linked Unit EQ(s): |
|---|---|
| **Understanding 1**<br>Understand the difference between part to part and part to whole and how those relationships are represented as ratios.<br><br>**Understanding 2**<br>A ratio relationship is a multiplicative comparison of two quantities in which both quantities change by the same factor.<br><br>**Understanding 3**<br>A rate is a set of infinitely many equivalent ratios.<br><br>**Understanding 6**<br>A proportion is a relationship of equality between two ratios that can be represented in a variety of ways. In a proportion, the ratio of two quantities remains constant as the corresponding values of the quantities change. For instance, in a ratio table, both quantities in a ratio must be multiplied or divided by the same factor to maintain the proportional relationship. | EQ1. How can rates, ratios, and proportional reasoning help us better understand the use of ratios and rates in the world around us?<br><br>EQ2. What is a ratio and how do we make sense of whether two or more ratios are proportional?<br><br>EQ3. How can I use models (tape diagrams, double number lines, ratio tables, coordinate plane, etc) to display an understanding of ratios and proportional relationships? |

**LEQ:** How can you use ratio reasoning to solve real world problems?

**Text Alignment:**

| Text | Big Ideas Mathematics (2014) | Eureka Math (2015) | Glencoe Mathematics (2014) | Mathematics in Context (2001) |
|---|---|---|---|---|
| Section(s) | 5.1, 5.2, 5.3, 5.4 | Module 1 Lesson 1-23 | Chapter 1 | Section E: Choose your model |
| Strength of Alignment | Somewhat aligned | Aligned | Aligned | Somewhat aligned |

**Sample Lesson Activities/Resources:**

Video- Ratey the Math Cat:  This is an animated video on solving real world proportions.
https://www.youtube.com/watch?v=tT9A2jlL1s8

Jeopardy Ratio, Unit Rate, and Proportions (Topics include ratios, unit rate, proportional or not questions, solving proportions, and word problems)
https://jeopardylabs.com/play/ratios-unit-rate-and-proportions

# Day 16: Fractions, Decimals, & Percents

**Learning Target:** (*Activating prior knowledge day*) I can convert fluently between decimals, fractions, and percents.

**Mathematical Practice Standards:**
MP.1 Make sense of problems and persevere in solving them
MP.6. Attend to Precision
MP.7 Look for and make use of structure

**Linked Content Standard:**
**6.RP.A  Understand ratio concepts and use ratio reasoning to solve problems.**
6.RP.A.3 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.

> 3c. Find a percent of a quantity as a rate per 100 (e.g. 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent; convert between forms of a number (fraction, decimal, percent).

**Instructional Notes:**

| Reach Back | Reach Ahead |
|---|---|
| In order for students to succeed with this standard and concepts taught during day 16, students will need to have the prior knowledge of:<br>● Graphing points on a coordinate plane (5.G.A.1)<br>● Constructing a coordinate graph (5.G.A.2) | Students will use the knowledge gained in day 16 to:<br>● Analyze the relationship between the independent and dependent variables using tables, graphs, and equations (6.EE.C.9)<br>● Write and solve equations using nonnegative rational numbers (6.EE.B.7)<br>● Compute unit rates associated with ratios of fractions (7.RP.A.1)<br>● Analyzing proportional relationships to solve real world problems (7.RP.A.2)<br>● Construct simple equations and inequalities to solve problems (7.EE.B.1) |

| Linked Essential Understanding(s): | Linked Unit EQ(s): |
|---|---|
| **Understanding 3**<br>A rate is a set of infinitely many equivalent ratios. | EQ1. How can rates, ratios, and proportional reasoning help us better understand the use of ratios and rates in the world around us? |
| **Understanding 6** | EQ3. How can I use models (tape diagrams, |

| A proportion is a relationship of equality between two ratios that can be represented in a variety of ways. In a proportion, the ratio of two quantities remains constant as the corresponding values of the quantities change. For instance, in a ratio table, both quantities in a ratio must be multiplied or divided by the same factor to maintain the proportional relationship. | double number lines, ratio tables, coordinate plane, etc) to display an understanding of ratios and proportional relationships? |
|---|---|

**LEQ:** How do you convert between decimals, fractions, and percents?

**Text Alignment:**

| Text | Big Ideas Mathematics (2014) | Eureka Math (2015) | Glencoe Mathematics (2014) | Mathematics in Context (2001) |
|---|---|---|---|---|
| Section(s) | 5.5 | Module 1 Lesson 24 & 25 | Chapter 2 Lessons 1-3 | Summary of Bar Model p. 22 |
| Strength of Alignment | Weak alignment | Aligned | Aligned | Not Aligned |

**Sample Lesson Activities/Resources:**

In the 6th grade there are 100 students. 15% of them have cat. What fraction of the students have a cat? What percent of students do not have a cat? How can you write this percent as a decimal?

Lesson: Converting decimals, fractions and percents.
http://map.mathshell.org/lessons.php?unit=6120&collection=8&redir=1

# Day 17: Percent Problems

**Learning Target:** I can define a percent as a rate per 100.

**Mathematical Practice Standards:**
MP.1 Make sense of problems and persevere in solving them
MP.6. Attend to Precision
MP.7 Look for and make use of structure

**Linked Content Standard:**
**6.RP.A  Understand ratio concepts and use ratio reasoning to solve problems.**
6.RP.A.3 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.

>   3c. Find a percent of a quantity as a rate per 100 (e.g. 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent; convert between forms of a number (fraction, decimal, percent).

**Instructional Notes:**

| Reach Back | Reach Ahead |
|---|---|
| In order for students to succeed with this standard and concepts taught during day 17, students will need to have the prior knowledge of:<br>● Graphing points on a coordinate plane (5.G.A.1)<br>● Constructing a coordinate graph (5.G.A.2) | Students will use the knowledge gained in day 17 to:<br>● Analyze the relationship between the independent and dependent variables using tables, graphs, and equations (6.EE.C.9)<br>● Write and solve equations using nonnegative rational numbers (6.EE.B.7)<br>● Compute unit rates associated with ratios of fractions (7.RP.A.1)<br>● Analyzing proportional relationships to solve real world problems (7.RP.A.2)<br>● Construct simple equations and inequalities to solve problems (7.EE.B.1) |

| Linked Essential Understanding(s): | Linked Unit EQ(s): |
|---|---|
| **Understanding 3**<br>A rate is a set of infinitely many equivalent ratios. | EQ1. How can rates, ratios, and proportional reasoning help us better understand the use of ratios and rates in the world around us? |

**LEQ:** How can percent be represented as a rate per 100?

**Text Alignment:**

| Text | Big Ideas Mathematics (2014) | Eureka Math (2015) | Glencoe Mathematics (2014) | Mathematics in Context (2001) |
|---|---|---|---|---|
| Section(s) | 5.5, 5.6 | Module 1 Lesson 24-25 | Chapter 2 Lessons 2,3,4 | Section B:The Bar Model - Percents on the Computer |
| Strength of Alignment | Weak alignment | Aligned | Weak Alignment | Aligned |

**Sample Lesson Activities/Resources:**
Cameron took a quiz in his math class. He correctly answered 20 of the 25 questions correctly. Cameron wants to earn at least a B+ on his quiz, so he needs a minimum of an 85%. Did Cameron earn a B+? If not, how many questions would Cameron need to correctly answer in order to earn a B+?

Lesson: Percent of a Quantity: These are real world problems where student has to find a percent of a number.
https://www.engageny.org/resource/grade-6-mathematics-module-1-topic-d-lesson-26

Security Camera: Students have to find the greatest area a security camera can cover in an irregular shaped space.
https://www.illustrativemathematics.org/content-standards/6/RP/A/3/tasks/115

Dana's House: Students have to find what percent of land a house covers.
https://www.illustrativemathematics.org/content-standards/6/RP/A/3/tasks/118


**Smarter Interims:** IAB RatPropRel Sample Smarter Balance Questions #1, 3, 9, 10, 11, 13 (To view items, log into IMS, select DeSSA/DCAS, Smarter ELA/Math, then Assessment Viewing Application)

# Days 18-20: Ratio Reasoning and Percent Problems

**Learning Target:**  I can solve real world percent problems using ratio reasoning.

**Mathematical Practice Standards:**
MP.1 Make sense of problems and persevere in solving them
MP.2 Reason abstractly and quantitatively
MP.4 Model with Mathematics
MP.6. Attend to Precision
MP.7 Look for and make use of structure

**Linked Content Standard:**
**6.RP.A  Understand ratio concepts and use ratio reasoning to solve problems.**
6.RP.A.3 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.

> 3c. Find a percent of a quantity as a rate per 100 (e.g. 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent; convert between forms of a number (fraction, decimal, percent).

**Instructional Notes:**

| Reach Back | Reach Ahead |
|---|---|
| In order for students to succeed with this standard and concepts taught during days 18-20, students will need to have the prior knowledge of: <ul><li>Graphing points on a coordinate plane (5.G.A.1)</li><li>Constructing a coordinate graph (5.G.A.2)</li></ul> | Students will use the knowledge gained in days 18-20 to: <ul><li>Analyze the relationship between the independent and dependent variables using tables, graphs, and equations (6.EE.C.9)</li><li>Write and solve equations using nonnegative rational numbers (6.EE.B.7)</li><li>Compute unit rates associated with ratios of fractions (7.RP.A.1)</li><li>Analyzing proportional relationships to solve real world problems (7.RP.A.2)</li><li>Construct simple equations and inequalities to solve problems (7.EE.B.1)</li></ul> |

| Linked Essential Understanding(s): | Linked Unit EQ(s): |
|---|---|
| **Understanding 3**<br>A rate is a set of infinitely many equivalent ratios. | EQ1. How can rates, ratios, and proportional reasoning help us better understand the use of ratios and rates in the world around us? |

| Understanding 6<br>A proportion is a relationship of equality between two ratios that can be represented in a variety of ways. In a proportion, the ratio of two quantities remains constant as the corresponding values of the quantities change. | EQ3. How can I use models (tape diagrams, double number lines, ratio tables, coordinate plane, etc) to display an understanding of ratios and proportional relationships? |
| --- | --- |

**LEQ:** How do you solve real world percent problems using ratio reasoning?

**Text Alignment:**

| Text | Big Ideas Mathematics (2014) | Eureka Math (2015) | Glencoe Mathematics (2014) | Mathematics in Context (2001) |
| --- | --- | --- | --- | --- |
| Section(s) | 5.6 | Module 1 Lesson 26-29 | Chapter 2 Lessons 6-8 | Section B: Bar Model: Percents on the Computer |
| Strength of Alignment | Aligned | Aligned | Aligned | Aligned |

**Sample Lesson Activities/Resources:**

Jason wants to buy a new bicycle. He finds two stores that are having sales on the bike he wants. Store A is selling the bike for $120 and offering 40% off the regular price. Store B is also selling the bike for $120, but they are offering 30% off the regular prices and then 10% off the sales price. Which store is offering the better buy?

Lesson - Solving Percent Problems: This has students solving percent problems with whole and part percent analysis using tables, double number lines, and tape diagrams.
https://www.engageny.org/resource/grade-6-mathematics-module-1-topic-d-lesson-27

Lesson - Solving Percent Problems: Students apply percents to problems involving purchasing goods. https://www.engageny.org/resource/grade-6-mathematics-module-1-topic-d-lesson-28

Task - Shirt Sale: This task requires students to find the original price when given percent off of the discount. https://www.illustrativemathematics.org/content-standards/tasks/54

Task - Kendall's Vase: This task has students finding the total price when given the original price and sales tax. https://www.illustrativemathematics.org/content-standards/6/RP/A/3/tasks/131

**Smarter Interims:** IAB RatPropRel Sample Smarter Balance Questions #6, 12 (To view items, log into IMS, select DeSSA/DCAS, Smarter ELA/Math, then Assessment Viewing Application)

# Days 21-22: Converting Units of Measure

**Learning Target:** I can convert between various units of measure to solve real world problems.

**Mathematical Practice Standards:**
MP.1 Make sense of problems and persevere in solving them
MP.2 Reason abstractly and quantitatively
MP.4 Model with Mathematics
MP.6. Attend to Precision
MP.7 Look for and make use of structure

**Linked Content Standard:**
**6.RP.A  Understand ratio concepts and use ratio reasoning to solve problems.**
6.RP.A.3 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.

> 3b. Solve unit rate problems including those involving unit pricing and constant speed.
> 3c. Find a percent of a quantity as a rate per 100 (e.g. 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent; convert between forms of a number (fraction, decimal, percent).
> 3d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

**Instructional Notes:**

| Reach Back | Reach Ahead |
|---|---|
| In order for students to succeed with this standard and concepts taught during days 21-22, students will need to have the prior knowledge of:<br><br>● Graphing points on a coordinate plane (5.G.A.1)<br>● Constructing a coordinate graph (5.G.A.2) | Students will use the knowledge gained in days 21-22 to:<br><br>● Analyze the relationship between the independent and dependent variables using tables, graphs, and equations (6.EE.C.9)<br>● Write and solve equations using nonnegative rational numbers (6.EE.B.7)<br>● Compute unit rates associated with ratios of fractions (7.RP.A.1)<br>● Analyzing proportional relationships to solve real world problems (7.RP.A.2)<br>● Construct simple equations and inequalities to solve problems (7.EE.B.1) |

| Linked Essential Understanding(s): | Linked Unit EQ(s): |
|---|---|
| **Understanding 2**<br>A ratio relationship is a multiplicative comparison of two quantities in which both quantities change by the same factor.<br>.<br>**Understanding 4**<br>Reasoning with ratios involves attending to and coordinating two quantities.<br><br>**Understanding 5**<br>Forming a ratio as a measure of a real-world attribute involves isolating that attribute from other attributes and understanding the effect of changing each quantity on the attribute of interest. | EQ1. How can rates, ratios, and proportional reasoning help us better understand the use of ratios and rates in the world around us?<br><br>EQ3. How can I use models (tape diagrams, double number lines, ratio tables, coordinate plane, etc) to display an understanding of ratios and proportional relationships? |

**LEQ:**  How can you convert between various units of measure to solve real world problems?

**Text Alignment:**

| Text | Big Ideas Mathematics (2014) | Eureka Math (2015) | Glencoe Mathematics (2014) | Mathematics in Context (2001) |
|---|---|---|---|---|
| **Section(s)** | 5.7 | **Module 1 Lesson 19-22** | **Chapter 4 Lesson 5** | **Section E: Choose Your Model - Meter Spotting** |
| **Strength of Alignment** | **Weak alignment** | **Aligned** | **Weak Alignment** | **Aligned** |

**Sample Lesson Activities/Resources:**
Lesson: This is a basic measurement conversion lesson with conversion tables attached.
**https://www.engageny.org/resource/grade-6-matfhematics-module-1-topic-c-lesson-21**

Task - Unit Conversions: Students have to convert between different units of measure.
**https://www.illustrativemathematics.org/content-standards/6/RP/A/3/tasks/1969**

Task - Simple Unit Conversion: This task asks students to convert ingredients from cups to tablespoons. **https://www.illustrativemathematics.org/content-standards/6/RP/A/3/tasks/2174**

**Smarter Interims:** IAB RatPropRel Sample Smarter Balance Question #2 (To view items, log into IMS, select DeSSA/DCAS, Smarter ELA/Math, then Assessment Viewing Application)

# Days 23-25: Review & Summative Assessment

**Learning Target:** I can demonstrate my understanding of ratios, rate reasoning, and proportional relationships when given real world scenarios.

**Linked Content Standard:**
**6.RP.A  Understand ratio concepts and use ratio reasoning to solve problems.**
6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
6.RP.A.3 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.
> 3a. 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.

6.RP.A.2 Understand the concept of a unit rate a/b associated with a ratio *a:b* with , and use rate language in the context of a ratio relationship.
6.RP.A.3 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.
> 3b. Solve unit rate problems including those involving unit pricing and constant speed.
> 3c. Find a percent of a quantity as a rate per 100 (e.g. 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent; convert between forms of a number (fraction, decimal, percent).
> 3d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

**Instructional Notes:**

| Reach Back | Reach Ahead |
|---|---|
| In order for students to succeed with this standard and concepts taught during days 11-13, students will need to have the prior knowledge of:<br>● Converting units of measurement (4.MD.A.1)<br>● The four mathematical operations (4.OA.A.2)<br>● Multiply fractions by fractions or whole numbers  (5.NF.B.4)<br>● Scaling to convert a rate into a unit rate and equivalent ratios. (5.NF.B.5)<br>● Multiply fractions and mixed numbers (5.NF.B.6)<br>● Divide whole numbers by unit | Students will use the knowledge gained in days 11-13 to:<br>● Write equations to express the independent and dependent variables (6.EE.C.9)<br>● Analyze the relationship between the independent and dependent variables using tables, graphs, and equations (6.EE.C.9)<br>● Write and solve equations using nonnegative rational numbers (6.EE.B.7)<br>● Compute unit rates associated with ratios of fractions (7.RP.A.1)<br>● Analyzing proportional relationships to |

| | |
|---|---|
| fractions and vice versa (5.NF.B.7)<br>● Write and interpret numerical expressions (5.OA.A.2)<br>● Analyze patterns and relationships (5.OA.B.3)<br>● Graphing points on a coordinate plane (5.G.A.1)<br>● Constructing a coordinate graph (5.G.A.2) | solve real world problems (7.RP.A.2)<br>● Use proportional reasoning to solve multistep ratio and percent problems (7.RP.A.3)<br>● Construct simple equations and inequalities to solve problems (7.EE.B.1)<br>● Apply concepts of density based on area and volume in models (HS.G-MG.A.2)<br>● Use units to understand and solve multi-step problems (HS.N-Q.A.1) |

| Linked Essential Understanding(s): | Linked Unit EQ(s): |
|---|---|
| **Understanding 1**<br>Understand the difference between part to part and part to whole and how those relationships are represented as ratios.<br><br>**Understanding 2**<br>A ratio relationship is a multiplicative comparison of two quantities in which both quantities change by the same factor.<br><br>**Understanding 3**<br>A rate is a set of infinitely many equivalent ratios.<br><br>**Understanding 4**<br>Reasoning with ratios involves attending to and coordinating two quantities.<br><br>**Understanding 5**<br>Forming a ratio as a measure of a real-world attribute involves isolating that attribute from other attributes and understanding the effect of changing each quantity on the attribute of interest. | EQ1. How can rates, ratios, and proportional reasoning help us better understand the use of ratios and rates in the world around us?<br><br>EQ2. What is a ratio and how do we make sense of whether two or more ratios are proportional? |
| **Understanding 6**<br>A proportion is a relationship of equality between two ratios that can be represented in a variety of ways. In a proportion, the ratio of two quantities remains constant as the corresponding values of the quantities change. For instance, in a ratio table, both | EQ3. How can I use models (tape diagrams, double number lines, ratio tables, coordinate plane, etc) to display an understanding of ratios and proportional relationships? |

| quantities in a ratio must be multiplied or divided by the same factor to maintain the proportional relationship. | |
|---|---|

**LEQ:** How can you demonstrate your knowledge of rates, ratios, and proportional reasoning when given real world applications?

**Text Alignment:**

| Text | Big Ideas Mathematics (2014) | Eureka Math (2015) | Glencoe Mathematics (2014) | Mathematics in Context (2001) |
|---|---|---|---|---|
| **Section(s)** | **5.1-5.7** | **N/A** | **Ch. 1&2 Review** | **All** |
| **Strength of Alignment** | **Somewhat aligned** | **N/A** | **Somewhat aligned** | **Somewhat aligned** |

**Sample Lesson Activities/Resources:**
Teachers should create activities for students to review key understandings.