02: Ratios, Rates, Percents, & Proportional Reasoning

Content Area: **Math**
Course(s):
Time Period: **Full Year**
Length: **5 weeks**
Status: **Published**

General Overview, Course Description or Course Philosophy

In this unit, students will develop skills in using fractions, decimals, ratios and percents to measure and to compare quantities.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Objectives:

- Recognize that a ratio is a relationship that represents a comparison of two quantities
- Represent a ratio in all three ways
- Write and identify equivalent ratios
- Use ratio and rate reasoning to solve real-world problems
- Graph ratios
- Use rate tables to find equivalent ratios
- Write the two unit rates that can represent a given situation
- Calculate unit rate and unit price
- Apply unit rate to solve real-world problems
- Compare unit rates and unit prices
- Convert between fractions, decimals, and percents
- Order fractions, decimals, and percents from least to greatest
- Solve percent problems (including discounts, tax & tip)
- Find the fraction and percent of a number

Essential Questions:

- How do you recognize and represent proportional relationships between quantities?
- What does it mean for two ratios or fractions to be equivalent?
- In what way is a percent like a ratio and like a fraction?

Enduring Understandings:

- Proportional reasoning allows measured quantities to be compared through multiplication and division.
- A comparison of quantities can be expressed in a variety of different but useful ways.
- Given comparison data can be used to make predictions about unknown quantities.

CONTENT AREA STANDARDS

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

6.NS -C. Apply and extend previous understandings of numbers to the system of rational numbers

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.6.RP.A	Understand ratio concepts and use ratio reasoning to solve problems.
MA.K-12.2	Reason abstractly and quantitatively.
MA.6.RP.A.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.6.RP.A.2	Understand the concept of a unit rate a/b associated with a ratio $a{:}b$ with $b \neq 0$, and use rate language in the context of a ratio relationship.
MA.K-12.4	Model with mathematics.
MA.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.
MA.K-12.5	Use appropriate tools strategically.
MA.6.RP.A.3b	Solve unit rate problems including those involving unit pricing and constant speed.
MA.K-12.6	Attend to precision.
MA.6.RP.A.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.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.
MA.6.NS.C.5	Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.
MA.6.NS.C.6	Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.
MA.6.NS.C.6a	Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that 0 is its own opposite.
MA.6.NS.C.6c	Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.
MA.6.NS.C.7	Understand ordering and absolute value of rational numbers.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

9.1.8.FI.1: Identify the factors to consider when selecting various financial service providers.

LA.K-12.NJSLSA.R10	Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.
LA.K-12.NJSLSA.SL1	Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
CS.K-12.3	Recognizing and Defining Computational Problems
CS.K-12.3.a	Identify complex, interdisciplinary, real-world problems that can be solved computationally.
CS.K-12.3.b	Decompose complex real-world problems into manageable sub-problems that could integrate existing solutions or procedures.
WRK.K-12.P.4	Demonstrate creativity and innovation.
WRK.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.

STUDENT LEARNING TARGETS

Refer to the 'Declarative Knowledge' and 'Procedural Knowledge sections.

Declarative Knowledge

Students will understand that:

- Content-specific vocabulary: mixed number, ratio, benchmarks, equivalent fractions, percent, unit rate, improper fraction, rate table
- The concept of a ratio.
- The concept of a unit rate a/b associated with a ratio a:b with b≠0.
- A percent of a quantity as a rate per 100.

Procedural Knowledge

Students will be able to:

- Use ratio language to describe a relationship between two quantities.
- Use rate language in the context of a ratio relationship.
- Use ratio reasoning to convert measurement units.
- Make tables of equivalent ratios relating quantities with whole number measurements.
- Plot pairs of values from tables of equivalent ratios on the coordinate plane.
- Solve unit rate problems including those involving unit pricing and constant speed.
- Solve problems involving finding the whole, given a part and the percent.

EVIDENCE OF LEARNING

Refer to the 'Formative Assessments' and 'Summative Assessments' sections.

Alternate Assessments

- Portfolios

- Verbal Assessment (instead of written)

- Multiple choice

- Modified Rubrics

- Performance Based Assessments

Benchmark Assessments

- BOY Diagnostic Snapshot Assessment
- MP1 Quarterly Assessment
- MP2 Quarterly Assessment
- MP3 Quarterly Assessment
- MP4 Quarterly Assessment
- EOY Diagnostic Snapshot Assessment

Formative Assessments

- Observations
- Classwork
- Homework Assignments
- Do Now Questions
- Exit Tickets
- Self Assessment Questions
- Proficiency Scale

Summative Assessments

- Quizzes

- Unit Assessments

- Graded Assignments

- Projects

RESOURCES (Instructional, Supplemental, Intervention Materials)

Core Instructional Resources

- *CMP3 Comparing Bits & Pieces*
- *CMP3 Decimals Ops (Investigation 4 Only)*
- Savvas Realize (teacher and student resources)

Supplemental Resources

- Additional Resources linked HERE
- Math 6 Enriched Comparing Bits & Pieces folder linked HERE
- Khan Academy
- Delta Math
- Illustrative Math Performance Tasks:
  - 6.RP.A.1 Evaluating Ratio Statements
  - 6.RP.A.2 Equivalent Ratios and Unit Rates

  - 6.RP.A.2 Price per Pound and Pounds per Dollar

  - 6.RP.A.2, 6.RP.A.3 Riding at a Constant Speed, Assessment Variation

  - 6.RP.A.2, 6.RP.A.3a Ticket Booth

- IXL- Recommended Skills Practice
  - R. Ratios & Rates
  - S. Percents
  - V. Consumer Math

INTERDISCIPLINARY CONNECTIONS
- Computations
- Financial/Economic/Business/Entrepreneurial Literacy

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.