

Unit 04-Ratios, Rates, Percents, & Proportions

Content Area: **Math**
Course(s):
Time Period: **Full Year**
Length: **6 weeks**
Status: **Published**

General Overview, Course Description or Course Philosophy

In the Ratios, Rates, Percents, and Proportions unit, students will develop an understanding of quantitative comparisons and scaling. This unit is designed to develop students' ability to make intelligent comparisons of quantitative information -- using ratios, fractions, decimals, rates, unit rates, and percents -- and to use quantitative comparison information to make larger or smaller scale models of given situations or to scale rates and ratios up and down as needed. Students will not only learn different ways to reason in proportional situations, but also recognize when such reasoning is appropriate. Students will investigate and explore ways of comparing using ratios and proportions, comparing and scaling rates, and markups and markdowns using ratios, percents, and proportions.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Objectives:

Ratios, Rates, and Percents:

- Understand ratios, rates, and percents
- Use ratios, rates, fractions, differences, and percents to write statements comparing two quantities in a given situation
- Distinguish between and use both part-to-part and part-to-whole ratios in comparisons
- Use percents to express ratios and proportions
- Recognize that a rate is a special ratio that compares two measurements with different units
- Analyze comparison statements made about quantitative data for correctness and quality
- Make judgments about which kind of comparison statements are most informative or best reflect a particular point of view in a specific situation

Proportionality:

- Understand proportionality in tables, graphs, and equations
- Recognize that constant growth in a table, graph, or equation is related to proportional situations
- Write an equation to represent the pattern in a table or graph of proportionally related variables
- Relate the unit rate and constant of proportionality to an equation, graph, or table describing a proportional situation

Reasoning Proportionally:

- Develop and use strategies for solving problems that require proportional reasoning
- Recognize situations in which proportional reasoning is appropriate to solve the problem
- Scale a ratio, rate, percent, or fraction to make a comparison or find an equivalent representation
- Use various strategies to solve for an unknown in a proportion, including scaling, rate tables, percent bars, unit rates, and equivalent ratios
- Set up and solve proportions that arise from real-world applications, such as finding discounts and markups and converting measurement units

Essential Questions:

- What is the purpose of finding a unit rate?
- Why are the two measurements of a unit rate different?
- How can you find a unit rate in a description, an equation, a table, or a graph?
- How can you decide if a relationship is proportional or not?

Enduring Understandings:

- Ratios make comparisons between two parts of the whole or between one part and the whole.
- Rates, unit rates, and percents are all types of ratios.
- Being able to change the form of a ratio is a useful problem-solving strategy.
- A proportional relationship has particular characteristics when represented in a table, graph or equation.
- Knowing the desired ratio between two variables allows you to scale the ratio or find a missing part of a ratio

CONTENT AREA STANDARDS

MA.7.RP.A	Analyze proportional relationships and use them to solve real-world and mathematical problems.
MA.7.RP.A.1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.
MA.7.RP.A.2	Recognize and represent proportional relationships between quantities.
MA.7.RP.A.3	Use proportional relationships to solve multistep ratio and percent problems.
MA.7.RP.A.2a	Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
MA.7.RP.A.2b	Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

MA.7.RP.A.2c	Represent proportional relationships by equations.
MA.7.RP.A.2d	Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points $(0, 0)$ and $(1, r)$ where r is the unit rate.
MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.

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

WRK.K-12.P.2	Attend to financial well-being.
WRK.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
WRK.K-12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.
WRK.K-12.P.9	Work productively in teams while using cultural/global competence.

STUDENT LEARNING TARGETS

Declarative Knowledge

Students will:

- The two measurements that create a unit rate are always different (miles per gallon, dollars per hour).
- Unit rates allow for the comparison of proportional units.
- Understand part-to-part and part-to-whole relationships
- Understand percent change, increase, and decrease.
- Understand commission & markup (markdown)

Procedural Knowledge

Students will be able to:

- Compare and scale ratios
- Define ratios, rates, and proportions
- Scale ratios to solve proportions
- Recognize situations in which proportional reasoning is appropriate to solve the problem
- Compute unit rates associated with ratios of fractions.
- Find a unit rate in a description, a table, equation, or a graph
- Identify the constant of proportionality (unit rate).
- Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation.
- Identify if a relationship is proportional
- Decide whether two quantities are in a proportional relationship.
- Represent proportional relationships by equations.
- Use proportional relationships to solve multi-step percent problems.

EVIDENCE OF LEARNING

Formative Assessments

- MathXL Assignments
- Do Now Check ins
- Formative Assessments - exit tickets, student-friendly proficiency scales, skill checklists ([Google Drive Folder](#))

Summative Assessments

- Summative Assessment [Google Drive Folder](#)
- OnCourse Assessments

RESOURCES (Instructional, Supplemental, Intervention Materials)

Instructional Materials:

- CMP3 - Comparing & Scaling ([Online link](#) - teacher and student resources)

- Resources for Unit 4 [Google Drive Folder](#)

Supplemental/Intervention Materials:

- Desmos - [The Running Game](#)
- [MathXL](#)
- [Khan Academy](#)
- [NCTM Illuminations](#)
- [Illustrative Math](#)
- [Illustrative Math Tasks](#)

INTERDISCIPLINARY CONNECTIONS

- Computations

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.