

01 - Proportional Relationships & Percents

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

General Overview, Course Description or Course Philosophy

Pre-Algebra 7A units were created and organized in line with the areas of focus as identified by the New Jersey Student Learning Standards. Each unit consists of standards that are considered major content along with standards that are supporting and/or additional content. The expectation is that students will have many opportunities to develop fluency with rational number arithmetic and solving multi-step problems (including those involving positive and negative rational numbers and word problems leading to one variable equations) throughout the school year. This course prepares students to take Algebra 1 in Grade 8 by addressing a combination of Grade 7 and Grade 8 standards in one school year.

The standards in this unit require the students to analyze proportional relationships and use them in problem solving. The students will continue to use ratios and proportional reasoning in multi-step ratio and percent problems. Students will not only learn different ways to reason in proportional situations, but also recognize when such reasoning is appropriate.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Objectives:

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
- Recognize problem situations in which two variables have a proportional relationship
- Identify and describe the patterns of change between the independent and dependent variables for proportional relationships represented by tables, graphs, equations, or contextual settings
- Construct tables, graphs, and symbolic equations that represent proportional relationships
- Identify the rate of change between two variables and the x- and y-intercepts from

graphs, tables, and equations that represent proportional relationships

- Translate information about proportional relationships given in a contextual setting, a table, a graph, or an equation to one of the other forms

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

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?
- What does it mean for two quantities to be in a proportional relationship?
- How can you decide if a relationship is proportional or not?
- How can percents describe the change of a quantity?

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

7.RP

A. Analyze proportional relationships and use them to solve real-world and mathematical problems

7.NS

A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers

MA.K-12.1	Make sense of problems and persevere in solving them.
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.K-12.2	Reason abstractly and quantitatively.
MA.7.RP.A.2	Recognize and represent proportional relationships between quantities.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
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.K-12.4	Model with mathematics.
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.K-12.5	Use appropriate tools strategically.
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-12.6	Attend to precision.
MA.7.RP.A.3	Use proportional relationships to solve multistep ratio and percent problems.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.
MA.7.EE.A.2	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.

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

- 9.1.8.FP.6: Compare and contrast advertising messages to understand what they are trying to accomplish. •
- 9.1.8.FP.7: Identify the techniques and effects of deceptive advertising.

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:

- Understand part-to-part and part-to-whole relationships
- Understand how a proportional relationship can exist between quantities.
- 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
- Use models and ratio reasoning to understand how a proportional relationship can exist between quantities.
- 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.
- Analyze the relationship between two quantities represented in tables to determine proportionality.
- Analyze the relationship between two quantities graphed on a coordinate plane to determine proportionality.
- Write equations to represent proportional relationships.
- Solve problems involving proportional relationships.

- Use proportional relationships to solve percent problems.
- Solve problems involving percent of increase and percent decrease.
- Solve multi-step ratio and percent problems involving tax.
- Solve multi-step ratio and percent problems involving tips and markups.
- Solve multi-step ratio and percent problems involving discounts.
- Solve problems involving simple interest.
- Solve problems involving commission and fees.
- Solve problems involving percent error.

EVIDENCE OF LEARNING

Benchmark Assessments

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

Alternate Assessments

- Portfolios
- Verbal Assessment (instead of written)
- Multiple choice
- Modified Rubrics
- Performance Based Assessments

Formative Assessments

- Delta Math 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
- Teacher created assessments (both test generator and teacher generated questions)
- Delta Math - Teacher generated assessments

RESOURCES (Instructional, Supplemental, Intervention Materials)

Instructional Materials:

- Reveal Math Accelerated - Proportional Relationships & Percents (Modules 1 & 2) ([Online link](#) - teacher and student resources)
- Resources for Unit 1 [Google Drive Folder](#)

Supplemental/Intervention Materials:

- Desmos - [The Running Game](#)
- [Delta Math](#)
- [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.

