Unit 1 Proportional Relationships
Math 7 Reg

Last Update: August 1, 2025

Archdiocesan Curriculum > Grade 7 > Math > Days 26 to 30

Stage 1: Desired Results

General Information

In this unit, students will analyze and represent proportional relationships using tables, graphs, and equations in the form $y = kx$. They will apply unit rates and proportional reasoning to solve real-world problems, including scale drawings, percent increase/decrease, markups, discounts, taxes, tips, commissions, and simple interest. Students will also assess the reasonableness of their solutions and review key concepts throughout the unit.

Mathematical Practices:

- Make sense of problems and persevere in solving them
- Reason abstractly and quantitatively
- Model with mathematics
- Attend to precision
- Look for and make use of structure

Essential Question(s)

- How can you determine if a relationship is proportional, and how is it represented in different forms?
- What does the constant of proportionality tell us about a situation?
- How can proportional reasoning help solve real-world problems involving money, measurements, and percentages?
- In what ways can we use equations and graphs to represent and analyze proportional relationships?
- How do we assess whether our solutions using proportional reasoning are reasonable and accurate?

Enduring Understanding/Knowledge

Students will:

- Use patterns and unit rates to analyze and describe relationships.
- Determine if a relationship represented in a table is proportional, identify the constant of proportionality, and write an equation in the form of y = kx.
- Use unit rates involving fractions to solve real-world problems.
- Students will identify the characteristics of a proportional relationship when graphed.
- Use a proportional relationship to solve multi-step problems.
- Use scale drawings to solve problems.

Review/Assess

- Use proportional reasoning to calculate percent increase or decrease.
- Calculate markups, markdowns, retail prices, and discount prices, and represent them using equations of the form y = kx.
- Represent taxes, gratuities, and total cost using equations in the form y = kx by applying proportional reasoning.
- Use the equations to solve problems and assess the reasonableness of their answers.
- Use proportional reasoning to find total earnings for someone earning a base salary plus a commission.
- Use proportional reasoning to find fees (including fees as percent and as a constant) and assess the reasonableness of their answers.

Vocabulary

New	Review
• constant of proportionality • proportional relationship • scale • scale drawing • percent change • percent decrease • percent increase • markdown • markup • retail price • gratuity • sales tax • tip • commission • commission rate • principal • simple interest	• unit rate • equation • ratio • reciprocal • dimension • cost • fee

● Use proportional reasoning to calculate simple interest, the total value of an account earning simple interest, and assess the reasonableness of their answers. Review/Assess		

Connections to Catholic Identity / Other Subjects

Religion/Catholic Identity:

- 42 - number of months in 3½ years (half of seven years; see also 1260 days) 100 = 10x10
- 144 - = 12x12, thus perfect completion
- 360 - number of days in a lunar year
- 365 - number of days in a solar year (cf. Gen 5:23

Other Subject Here:

- **Science:** using ratios in experiments, rate of change with experiments, scales
- **Social Studies:** People pay a percent of their wages in taxes to the federal government.

Differentiation

Enrichment

- **Explore Proportional Relationships with Real-World Data-** Ask students to analyze a set of real-world data (such as sales data from a business or a recipe with scaling proportions) and identify if the relationships are proportional. Have them calculate the constant of proportionality (k) and write the equation in the form of y = kx, extending to different real-world contexts, such as economy or environmental data.
- **Investigate Complex Unit Rate Problems -**Challenge students to solve complex real-world problems involving unit rates, such as comparing fuel efficiency in different vehicles, and explain how the unit rates influence decision-making in various professions or industries.
- **Create and Solve Multi-Step Proportional Problems-** Have students create multi-step word problems involving proportional relationships, including calculating taxes, discounts, and commissions, and solve them using equations in the form y = kx. Ask them to write a reflection on how the proportional reasoning applies to real-world situations.
- **Design and Present a Proportional Relationship Model-** Encourage students to design a model (using a chart, graph, or a computer simulation) that demonstrates proportional relationships, such as comparing a base salary with commission over time. Have them present their model to the class, explaining their findings.

Support

- **Visualizing Proportional Relationships with Tables-** Provide students with tables that show both proportional and nonproportional relationships. Use color-coded guides to help them identify which relationships are proportional and how to find the constant of proportionality (k). Guide them in writing the corresponding equations.
- **Unit Rate Practice with Fraction-Based Problems** Use simple, visual fraction problems to help students practice unit rates. For example, use models like pizza slices or portions of a recipe to demonstrate fractional unit rates, and guide students through solving related word problems.
- **Graphing Proportional Relationships** Have students work in pairs or small groups to graph proportional relationships, using different tools like graphing calculators or online graphing tools. Provide scaffolding by using a guided graph with pre-plotted points and asking students to identify the constant of proportionality (k) and the linear equation.
- **Step-by-Step Error Analysis** Review common mistakes in proportional reasoning (e.g., incorrect setup of equations or improper scaling) through error analysis. Use think-alouds to

	model the correct reasoning and discuss the steps taken to correct errors. ● **Proportional Reasoning with Visual Aids** Use visual aids like pie charts, bar graphs, or scaled drawings to help students grasp the concept of proportional relationships. For example, show how to represent a markup or discount on a graph and explain how the proportional equation (y = kx) applies to this scenario. ● **Simple Interest Practice with Real-Life Examples** Provide students with real-life examples of simple interest, such as savings accounts or loan calculations. Have them work through problems to find the total value of an account after a given time, using proportional reasoning to calculate interest, and check the reasonableness of their answers.

Standards & Benchmarks

Identify and Represent Proportional Relationships:

PR.1
Students will… Calculate unit rates of length, area, and other quantities measured in like or different units that include ratios or fractions.

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.

7.RP.A.2
Recognize and represent proportional relationships between quantities.

7.RP.A.2b
Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

7.RP.A.3
Use proportional relationships to solve multi-step ratio and percent problems.

7.RP.2
Use proportional relationships to solve ratio and percent problems with multiple operations (e.g., simple interest, tax, markups, markdowns, gratuities, conversions within and across measurement systems, and percent increase and decrease). (E)

Proportional Reasoning with Percents:

7.RP.2
Use proportional relationships to solve ratio and percent problems with multiple operations (e.g., simple interest, tax, markups, markdowns, gratuities, conversions within and across measurement systems, and percent increase and decrease). (E)

7.EE.A.2
Rewrite and connect equivalent expressions in different forms in a contextual problem to provide multiple ways of interpreting the problem and investigating how the quantities in it are related.

7.RP.2
Use proportional relationships to solve ratio and percent problems with multiple operations (e.g., simple interest, tax, markups, markdowns, gratuities, conversions within and across measurement systems, and percent increase and decrease). (E)

7.RP.A.3
Use proportional relationships to solve multi-step ratio and percent problems.

7.NS.A.3
Solve real-world and mathematical problems involving the four operations with rational numbers.

8.NS.4
Solve real-world problems with rational numbers by using multiple operations. (E)

7.AF.2
Solve real-world problems with rational numbers by using one or two operations. (E)

Teaching Ideas/Resources

Websites/Resources:

- **Percentages** – Using a current list of prices for food and clothing, the students will practice math skills related to percentages.
- **Shower vs. Bath: Ratio and Rate –** Use knowledge about ratios and rates to make predictions about whether it is more cost effective to take a shower or a bath.
- Illustrative Mathematics: Double discounts
- Gimkit - live learning game show
- Mash Up Math provides games, worksheets, etc…