Unit 1 Ratios and Proportional Reasoning
Math 7 Accelerated
Last Update: August 1, 2025

Archdiocesan Curriculum > Grade 7 Acc > Math > Length of unit 20 to 22 days

Stage 1: Desired Results

General Information

In this unit, students will learn to analyze and represent proportional relationships using patterns, unit rates, tables, graphs, and equations in the form $y = kx$. They will solve real-world problems involving unit rates, scale drawings, and multi-step situations. Students will apply proportional reasoning to calculate percent increase or decrease, markups, markdowns, taxes, tips, and commissions. They will also solve problems involving simple interest and assess the reasonableness of their answers using equations and real-world contexts.

Mathematical Practices:
- MP1 – Make sense of problems and persevere in solving them
- MP2 – Reason abstractly and quantitatively
- MP4 – Model with mathematics

Essential Question(s)
- How can patterns, unit rates, and tables help us identify and describe proportional relationships in real-world situations?

- What does the equation $y = kx$ represent, and how can it be used to model and solve proportional problems?

- How can graphs and equations be used to determine whether a relationship is proportional and to identify the constant of proportionality?

- In what ways can proportional reasoning help us solve multi-step problems involving percent change, markups, taxes, tips, and commissions?

- How can we use proportional reasoning and equations to determine interest, earnings, and total costs—and how do we know if our answers make sense in context?

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.
- 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 reasonableness of answers.
- Use proportional reasoning to find total earnings for someone earning a base salary plus a commission. Use proportional reasoning

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 - fee - principal - simple interest	- unit rate - equation - ratio - reciprocal - dimension

to find fees (including fees as percent and as a constant) and assess the reasonableness of answers.
- Use proportional reasoning to calculate simple interest and the total value of an account earning simple interest, and assess the reasonableness of answers.

Review/Assess

Connections to Catholic Identity / Other Subjects	Differentiation

Religion/Catholic Identity:
● **Exodus 26:15-25**: contain instructions for constructing the Tabernacle, including the use of mathematical ratios and proportions
● 365 - number of days in a solar year (cf. Gen 5:23)
● The dimensions of Noah's Ark are based on Fibonacci relationships, which approximate the golden ratio
●
Other Subject Here:
 	
● **STEM:** Ratios and proportions are used in many real-life applications
    ○ cooking (measuring ingredients in a recipe) and comparing prices per unit when shopping at the grocery store
    ○ financial planning (calculating budget allocations, activity ratios),
    ○ map reading (interpreting scale), medical dosage calculations,
    ○ photography (maintaining aspect ratios),
    ○ sports analysis (batting averages),
    ○ scaled models in architectural design
    ○ traffic management
	Enrichment
	● **Extend Equations to Multi-Variable Contexts** – Have students apply proportional reasoning to more complex contexts, such as cost comparisons across multiple items, or situations involving different tax rates, then write and solve equations with multiple variables.
	● **Real-World Project: Financial Literacy Challenge** – Ask students to create a real-world budget or business scenario involving percent increase/decrease, markups, taxes, tips, and commission. They must justify pricing strategies and calculate earnings or expenses using proportional reasoning and equations.
	● **Analyze and Compare Graphs of Proportional Relationships** – Challenge students to interpret and compare multiple graphs of proportional relationships (e.g., different rates of pay or speed) and explain the meaning of the constant of proportionality in each case.
	● **Investigate Historical Scale Drawings** – Have students research historical maps or blueprints and use scale to solve real-world geometry problems, then create their own scaled floor plans or community layouts.
	● **Evaluate Interest Over Time** – Ask students to compare simple vs. compound interest using spreadsheet tools and graph the outcomes. Discuss the impact of interest rates and time on total earnings or costs.
	
	Support
	● **Unit Rate Sorting Activity** – Provide visual or tactile matching cards with ratios and unit rates. Have students practice identifying and converting rates to better understand proportionality.
	● **Interactive Table and Graph Practice** – Use manipulatives or digital tools to help students build and connect tables and graphs, identifying patterns and proportional relationships step-by-step.
	● **Scaffolded Word Problems** – Break down multi-step problems with guiding questions, visuals, and sentence frames to help students organize their reasoning and solutions.
	● **Anchor Charts for Percent Problems** – Post reference guides with examples of markup, discount, tax, tip, and commission problems alongside the equations used (e.g., $y = kx$) to support memory and application.
	● **Think-Alouds for Scale and Interest Problems** – Model strategies for solving scale drawing and simple interest problems by talking through estimation, reasoning, and equation setup out loud.

	● **Visual Equation Templates** – Provide fill-in-the-blank equation templates for problems involving tax, tips, and interest to help students focus on identifying the constant and substituting values correctly.

Standards & Benchmarks

Identify and Represent Proportional Relationships:

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.GM.1
Solve real-world and other mathematical problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing. Create a scale drawing by using proportional reasoning.

7.RP.1
Identify the unit rate or constant of proportionality in tables, graphs, equations, and verbal descriptions of proportional relationships.

7.RP.3
Represent real-world and other mathematical situations that involve proportional relationships. Write equations and draw graphs to represent these proportional relationships. Apply the definition of unit rate to $y = mx$. (E)

7.RP.A.3
Use proportional relationships to solve multistep ratio and percent problems. For example: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.

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

7.RP.A.2.c
Represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items bought at a constant price p, the relationship between the total cost and the number of items can be expressed as $t = pn$.

7.RP.A.2.a
Decide whether two quantities are in a proportional relationship. For example, 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.

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

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.RP.A.3
Use proportional relationships to solve multistep ratio and percent problems. For example: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.

7.EE.A.2
Describe how rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example, $a + 0.05a = 1.05a$ means that "increase by 5%" is the same as "multiply by 1.05."

7.RP.A.2.c
Represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items bought at a constant price p, the relationship between the total cost and the number of items can be expressed as $t = pn$.

7.RP.2c
Represent proportional relationships by equations.

7.RP.3
Use proportional relationships to solve multistep ratio and percent problems.

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
- **12 Activities For Practicing Proportions that Pop https://ideagalaxyteacher.com/proportions-activities/**
- **STEM enrichment activities** https://nrich.maths.org/ratio-and-proportion
- **The Surprising Ways That Ratios Have Entered Our Lives**
- **Desmos Free Classroom unit collection on scale drawings:Scale Drawings**

- **Percents and Proportions activities website:**Teaching Proportions and Percents