Unit 1: Ratios and Proportional Relationships

Content Area: **Mathematics**
Course(s): **Math 6**
Time Period: **September**
Length: **8 weeks**
Status: **Published**

Standards

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.6.RP.A.3a	Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.
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.3d	Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.
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.EE.C	Represent and analyze quantitative relationships between dependent and independent variables.
MA.6.EE.C.9	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.
MA.6.4.5.6 F.1	Use technology to gather, analyze, and communicate mathematical information.
MA.6.4.5.6 F.2	Use computer spreadsheets, software, and graphing utilities to organize and display quantitative information.
MA.6.4.5.6 F.4	Use calculators as problem-solving tools (e.g., to explore patterns, to validate solutions).
CAEP.9.2.8.B.3	Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.
TECH.8.1.8	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to

	create and communicate knowledge.
TECH.8.1.8.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
TECH.8.1.8.A.CS1	Understand and use technology systems.
TECH.8.1.8.A.CS2	Select and use applications effectively and productively.
TECH.8.1.8.B.CS2	Create original works as a means of personal or group expression.
TECH.8.1.8.C	Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
TECH.8.1.8.C.CS4	Contribute to project teams to produce original works or solve problems.
TECH.8.1.8.D	Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
TECH.8.1.8.D.1	Understand and model appropriate online behaviors related to cyber safety, cyber bullying, cyber security, and cyber ethics including appropriate use of social media.
TECH.8.1.8.D.CS1	Advocate and practice safe, legal, and responsible use of information and technology.
TECH.8.1.8.D.CS2	Demonstrate personal responsibility for lifelong learning.
TECH.8.1.8.D.CS3	Exhibit leadership for digital citizenship.
TECH.8.1.8.E	Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information.
TECH.8.1.8.E.1	Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.
TECH.8.1.8.F	Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.
TECH.8.1.8.F.CS2	Plan and manage activities to develop a solution or complete a project.
TECH.8.2.8.D.CS2	Use and maintain technological products and systems.

Unit Summary

The goal for this unit is to develop students' understanding of ratio concepts, rate and proportion reasoning, conversions between measurement units, and their applications to real life problem solving. Students will use their prior understanding of multiplication and division to solve ratio and rate problems about quantities. Students will discover the connection between ratios and fractions. In addition, students will be able to represent and analyze quantitative relationships between dependent and independent variables.

Student Learning Objectives

- Students will learn to identify basic ratios and equivalent ratios.
- Students will learn to determine a basic ratio by simplifying using Greatest Common Factor (simplifying fraction).
- Students will learn to identify rate situations.
- Students will learn to graph rate tables.
- Students will learn to solve constant speed problems.
- Students will learn to identify proportions as made up of equivalent ratios.

- Students will learn to use fraction notation for ratios.
- Students will learn to solve proportions and unit rate using cross- multiplication.
- Students will learn to use rate and ratio reasoning to solve real world and mathematical problems.
- Students will learn to use proportions and unit rate equations to convert different measurement units.
- Students will learn to complete function tables for missing quantity and plot on coordinate plane (distance/time).

Essential Questions

- How does comparing quantities describe their relationship?
- How can we represent relationships between quantities using the different numerical representations (decimals and fractions)?
- How can we represent relationships between quantities graphically?

Enduring Understandings

- Students will understand that proportional relationships express how quantities change in relationship to each other.
- Students will understand that a ratio is a relationship between two quantities of the same unit.
- Students will understand that a rate is a special ratio using different units.
- Students will understand that functions describe a proportional relationship.

Application

- Students will be able to independently use their learning to solve ratio and rate problems about quantities.
- Students will be able to independently use their learning to make rate tables and describe relationships between quantities.

Skills

Students will be skilled at:

- Describing a ratio relationship between two quantities.
- Simplifying ratios to basic ratios.
- Solving for unit rate (constant increase).
- Graphing an unit rate triangle.
- Completing a rate table using constant difference.
- Finding missing values in rate tables.
- Utilzing a data table to generate formulas representing relationships.
- Graphing values from rate table on coordinate plane and determining the constant rate.
- Determining the unit rate from the linear graph.
- Formulating an equation of problem situations (linear relationships).