Ratios, Rates, and Percents

Content Area: **Math**
Course(s):
Time Period: **MP3**
Length: **45**
Status: **Published**

Unit Overview

Unit Summary	Unit Rationale
-Understand ratio concepts and use ratio reasoning to solve problems. Understand percent and use percent reasoning to solve problems	Unit 3 begins work with the concept of ratio. Learners will use ratio language to describe a ratio relationship and use rate language in the context of a ratio relationship. Learners use ratio and rate reasoning to solve real-world and mathematical problems. They reason about tables of equivalent ratios, solve unit rate problems, find a percent of a quantity as a rate per 100, solve problems involving finding the whole, given a part and the percent, and use ratio reasoning to convert measurement units.

NJSLS

MATH.6.RP.A.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
MATH.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.
MATH.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.
MATH.6.RP.A.3.a	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.
MATH.6.RP.A.3.b	Solve unit rate problems including those involving unit pricing and constant speed.
MATH.6.RP.A.3.c	Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.
MATH.6.RP.A.3.d	Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

Standards for Mathematical Practice

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP3	Attend to personal health and financial well-being.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.

Unit Focus

Enduring Understandings	Essential Questions
• A ratio describes the relationship between two quantities where for every x units of one quantity, there are y units of another quantity. • Equivalent ratios can be found by multiplying or dividing both terms by the same nonzero number. • Ratio tables compare ratios to solve problems. • Equivalent ratios can be represented in a table, and the pairs of values can be plotted on a coordinate plane. • A rate is a special type of ratio that compares two quantities with different units of measure. • A unit rate is a special rate that compares a quantity to one unit of another quantity. • Rates are easily compared when they are expressed as unit rates. -Unit rates, including unit prices, are used to solve problems. • Unit rates and conversion factors can be used to convert customary units of measure, to convert metric units of measure, and to convert between customary and metric units of measure. • A percent is a rate in which the first term is compared to 100. The percent is the number of hundredths that represent the part of the whole. • Fractions, decimals and percents are three ways to show parts of a whole. • A percent greater than 100 is equivalent to more than the whole. A percent less than 1 is equivalent to less than 1/100 of the whole. • Equivalent fractions and compatible numbers can be used to estimate the percent of a number. • Finding the percent of a whole is similar to	• What are ratios and rates? • How can you use ratios and rates to describe quantities and solve problems? • How can you find two ratios that describe the same relationship? • How can you use rates to describe changes in real-life problems? • How can you compare two ratios? • How can you compare lengths between the customary and metric systems? • What is the meaning of percent? • How can percent be estimated and found? • What is the connection between ratios, fractions, and percents? • How can you use mental math to find the percent of a number?

finding the fractional part of a whole. • Models and equations can be used to find the whole amount when the percent and a part are known. • Mathematical models can represent many real-world problem situations, but the models may not represent a real-world situation exactly	

Instructional Focus

Learning Targets
● Use ratios to describe the relationship between two quantities. Use bar diagrams and double number line diagrams to model ratio relationships. ● Use multiplication and division to solve problems by finding equivalent ratios. ● Use ratio tables and graphs to compare ratios and to solve problems. ● Represent equivalent ratios in ratio tables and on graphs to solve problems. ● Use rates to describe ratios in which the terms have different units. Use rates and unit rates to solve problems. ● Use ratio reasoning to compare rates and solve problems. ● Use unit rates to solve problems, including problems involving constant speed and unit price. Solve unit rate problems using an equation. ● Use ratio reasoning and conversion factors to convert customary units of measure. ● Use ratio reasoning and conversion factors to convert metric units of measure. ● Use ratio reasoning and conversion factors to convert between customary and metric units of measure. ● Represent and find the percent of a whole. ● Write equivalent values as fractions, decimals and percents, including when the denominator of the fraction is not 100. ● Find percents that are greater than 100 and that are less than 1. ● Estimate the percent of a number. ● Use the decimal form of a percent to find the percent of a number. Write an equation to solve a percent

problem.

● Find the whole amount when given a part and a percent.

Prerequisite Skills

- Analyze patterns and relationships.
- Use models to represent fractional relationships.
- Understand four quadrants of a coordinate plane.
- Graph equations using a table of values.
- Convert standard measurement units within the same measurement system.
- Explain patterns in the placement of the decimal point when multiplying or dividing a decimal by a power of 10.
- Use equivalent fractions to add and subtract fractions and mixed numbers.
- Use rounding and compatible numbers to estimate.
- Use models, number sense and properties to multiply decimals.
- Multiply whole numbers and decimals in the same way that students multiply whole numbers and then place the decimal point in the product.
- Understand algebraic expressions and generate equivalent algebraic expressions. Use patterns to write and solve equations. Write and solve multiplication and division equations.

Common Misconceptions

Students may think that the inverse of a ratio is also true or means the same thing. Students may think that a unit rate can only be written one way. Students may have difficulty identifying the “part” or the “whole” that the percent refers to. Students may have difficulty with multi-step conversations.

Spiraling For Mastery

Current Unit Content/Skills	Spiral Focus	Activity
• ratio reasoning • rates • concept of percent • find the percent, the whole or a part	• fraction concepts and computations • convert measurement units • equivalent fractions • multiplying decimals	• Math Diagnostic and Intervention System Activities (MDIS)

Assessment

Formative Assessment	Summative Assessment

• Homework • Lesson Checks • MathXL • Quizzes • Exit Tickets • Lesson Reflections • Performance Tasks	• Topic Tests (Common Assessments) • Unit 3 Benchmark (Link-It)

Resources

Key Resources	Supplemental Resources
Savvas EnVision Math 6 Pacing Guide	• IXL • Delta Math • Desmos • Khan Academy

Career Readiness, Life Literacies, and Key Skills

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.

Interdisciplinary Connections

ELA.L.KL.6.2	Use knowledge of language and its conventions when writing, speaking, reading, or listening.
ELA.SL.PE.6.1.A	Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.
ELA.SL.PE.6.1.C	Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.
6-8.MS-ETS1-3.4.1	Analyze and interpret data to determine similarities and differences in findings.
6-8.MS-ETS1-3.ETS1.B.1	There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem.