Unit 5: Understand and Use Ratio and Rate

Content Area: **Mathematics**
Course(s):
Time Period: **February**
Length: **4-5 weeks**
Status: **Published**

Essential Questions

- How can I create and solve ratio problems by creating equivalent ratios?
- How can use ratios to compare different quantities and solve unit rates problems?
- How can I use unit rates and conversion factors to convert customary, metric, or both units of measure?

Enduring Understandings

- Ratios can be used to describe 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 can be used to compare ratios and solve problems.
- Equivalent ratios can be represented in a table, and the paris 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, can be used to solve problems.
- Unit rates and conversion factors can be used to convert customary and metric units of measure and convert between customary and metric units of measure.

Critical Knowledge and Skills

Vocabulary

Ratio

Terms

Equivalent Ratio

Rate

Unit Rate

Unit Price

Constant Speed

Conversion Factor

Dimensional Analysis

Learning Objectives

- 5-1: Understand Ratios
    - Use Ratios to describe the relationship between two quantities.
    - Use bar diagrams and double number line diagrams to model ratio relationships.
- 5-2: Generate Equivalent Ratios
    - Use multiplication and division to find equivalent ratios.
    - Solve Problems by finding equivalent ratios.
- 5-3: Compare Ratios
    - Use ratio tables to compare ratios
    - Compare ratios to solve problems.
- 5-4: Represent and Graph Ratios
    - Represent equivalent ratios on graphs
    - Use ratio tables and graphs to solve problems
- 5-5: Understand Rates and Unit Rates
    - Use rates to describe ratios in which the terms have different units
    - Use rates and unit rates to solve problems
- 5-6: Compare Unit Rates
    - Use ratio reasoning to compare rates and solve problems
- 5-7: Solve Unit Rate Problems
    - Use unit rates to solve problems involving constant speed
    - Use unit rates to solve problems involving unit price
    - Solve unit rate problems using an equations.
- 5-8: Ratio Reasoning: Convert Customary Units
    - Use ratio reasoning and conversion factors to convert customary units of measure.
- 5-9: Ratio Reasoning: Convert Metric Units
    - Use ratio reasoning and conversion factors to convert metric units of measure.
- 5-10: Relate Customary and Metric Units

- Use ratio reasoning and conversion factors to convert between customary and metric units of measure.

Resources

- Lesson Resources
  - Student Edition
  - Additional Practice Workbook
  - Teaching Resources
    - Reteach to Build Understanding, Additional Vocabulary Support, Build Mathematical Literacy, Enrichment
  - Digital Lesson Courseware
    - Today's Challenge, Visual Learning Animation Plus, Key Concepts, Additional Examples, 3-Act Mathematical Modeling, Online Practice powered by MathXL for School, Virtual Nerd Video Tutorials, Animated Glossary, Digital Math Tools, Online Math Games
- Topic Resources
  - Student's Edition
    - Review What You Know, Build Literacy in Mathematics, Mid-Topic Checkpoint and Performance Task, Topic Review, Fluency Practice Activity, STEM Project
  - Digital Topic Support for Students
    - Math Practice Animations, STEM Project, 3-Act Mathematical Modeling Lesson

Standards for Mathematical Practice and Content

CCSS.Math.Practice.MP1	Make sense of problems and persevere in solving them.
CCSS.Math.Practice.MP2	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.
CCSS.Math.Practice.MP3	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.
CCSS.Math.Practice.MP4	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.

CCSS.Math.Practice.MP5	Use appropriate tools strategically.
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.6.RP.A.3b	Solve unit rate problems including those involving unit pricing and constant speed.
CCSS.Math.Practice.MP6	Attend to precision.
CCSS.Math.Practice.MP7	Look for and make use of structure.
MA.6.RP.A.3d	Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.
CCSS.Math.Practice.MP8	Look for and express regularity in repeated reasoning.

INTERDISCIPLINARY CONNECTIONS

Career Readiness, Life Literacies, & Key Skills (CLKS)

Career Readiness, Life Literacies, and Key Skills Practices describe the habits of the mind that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. These practices should be taught and reinforced in all content areas with increasingly higher levels of complexity and expectation as a student advances through a program of study.

Practices:

Act as a responsible and contributing community members and employee

Attend to financial well-being

Demonstrate creativity and innovation

Utilize critical thinking to make sense of problems and persevere in solving them

Model integrity, ethical leadership and effective management

Use technology to enhance productivity increase collaboration and communicate effectively

Work productively in teams while using cultural/global competence

9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option

9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.

9.4.8.IML.2: Identify specific examples of distortion, exaggeration, or misrepresentation of information.

9.4.8.IML.3: Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping (e.g., 6.SP.B.4, 7.SP.B.8b). •

9.4.8.IML.4: Ask insightful questions to organize different types of data and create meaningful visualizations.

9.4.8.TL.3: Select appropriate tools to organize and present information digitally

Computer Science & Design Thinking (CS & DT)

Computing Systems

Troubleshooting a problem is more effective when knowledge of the specific device along with a systematic process is used to identify the source of a problem.

Data & Analysis

People use digital devices and tools to automate the collection, use, and transformation of data.

8.1.8.CS.1: Recommend improvements to computing devices in order to improve the ways users interact with the devices.

8.2.8.NT.1: Examine a malfunctioning tool, product, or system and propose solutions to the problem.

NJSLS Companion Standards Grades 6-8

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RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.

RST.6-8.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

NJSLSA.W4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.