Unit 1 - Ratios and Proportional Reasoning

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Week 1**
Length: **6 Weeks**
Status: **Published**

Unit Overview

In this unit, students will become acquainted with the topics of ratios, rates, and proportions. They will begin the unit by reviewing least common multiples and greatest common factors. Afterwards, they will investigate unit rates and ratios. Then, they will learn about proportions and apply them to real-life situations using problem-solving methods. They will use charts and equations to solve for missing numbers in a proportion. They also will solve problems involving scale drawings and models. They will see that there is a connection between ratios and scale drawings and why they are useful in everyday life. They will conclude the unit by examining the relationships between fractions, decimals, and percents.

Standards

MA.6.RP.A.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
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.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.6.RP.A.3b	Solve unit rate problems including those involving unit pricing and constant speed.
MA.6.RP.A.3c	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.
MA.6.NS.B.4	Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor.
MA.6.G.A.1	Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

Essential Questions

- How can we use mathematical models to describe physical relationships?
- How are ratios, rates, and proportions related?
- How do you use equivalent rates in the real world?

- How can you use ratios to represent a larger scale?
- How do you choose when to use fractions, decimals, or percents?

Application of Knowledge: Students will know that...

- a rate is a ratio comparing two quantities of different kinds of units.
- a unit rate has a denominator of 1 unit when the rate is written as a fraction.
- decimals, fractions and percents can be converted into each other.
- equivalent ratios can be found by scaling, which is multiplying or dividing two related quantities by the same number.
- equivalent ratios express the same relationship between quantities.
- greatest common factors and least common multiples can be used to manipulate and relate ratios to each other.
- proportions can be used to find missing values in equivalent ratios.
- ratios are a comparison of two quantities by division that can be written in three ways: a/b, a:b, a to b.
- ratios are used to compare data.
- ratios can be compared by examining their unit rates.
- ratios can be graphed as ordered pairs and the steepness of the lines that are graphed can be used to compare ratio relationships.
- the values in each column of a ratio table share the same ratio.

Application of Skills: Students will be able to...

- compare ratios by comparing their unit rates, graphing them, or comparing their fractional values.
- convert between decimals, fractions, and percents.
- find the greatest common factor or least common multiple of a given set of numbers.
- find the rate when given a real world situation.
- find the unit rate when given a real world situation.
- graph ratios and analyze the lines that are created.
- use ratio tables to find missing values.
- use scaling to solve proportions.
- write a ratio in three forms: a/b, a:b, a to b.

Assessments

- Do Now: These daily assessments will include a few questions to check for prior knowledge and to determine mastery of particular topics. Remediation can also be done through this activity on an as needed basis.
- Exit Tickets and Quick Checks: These will be used to measure student understanding of the lesson and assist in determining whether remediation is needed for the topic or if there were any common

misconceptions amongst the students.
- Communicator Practice: During guided practice, this will be used as a quick whole-class assessment tool to check for complete comprehension.
- IXL Practice: This online tool will be used to formatively assess students during independent practice. This will provide students with practice and immediate self-check.
- Homework and Classwork: These will be used to formatively assess students. Some examples of activities that can be used in class as assessments are listed in suggested activities (Ratio Scavenger Hunt, Let's Make a Deal!, Scale Drawing Cartoon Project, Super Bowl Comparison)
- Marzano learning goals self-assessment: Students will complete tiered questions to determine their own proficiency in the topic on a scale of 0 to 4
- Informal Observations: Walking around the room, listening to productive conversations, and checking in on students will help to formatively assess their learning.
- Mid-Chapter Quiz: This will be used to formatively assess students halfway through the chapter.
- Chapter Test: This will be used to summatively assess students at the end of the chapter.
- Information from this unit will be included on a locally developed, mid-year or end of year benchmark assessment that may take the form of a test, performance based project, or other summative assessment.

Suggested Activities

- Grade 6 Digits Topic 10, 11, 12 Launches
- Inquiry labs using bar diagrams and chips to demonstrate ratios and rates
- Student centered Smart Board lessons using movable, interactive chips that students can drag and drop to find simplified ratios and bars that students can physically draw and divide to represent ratios
- Review games using communicators
- Marzano learning goals self-assessment: Students will complete tiered questions to determine their own proficiency in the topic on a scale of 0 to 4
- Ratio Scavenger Hunt: Students go around the room comparing objects and people around the room and find the ratios of these proposed items
- Let's Make a Deal!: Students are given two different rates for purchasable items and they must find the unit rate to compare which store has the better deal.
- Scale Drawing Cartoon Project: Students will use ratios and scaling to expand a small picture onto a large poster. They will then answer questions based on the original picture and their drawing that will assess their knowledge of ratios.
- Super Bowl Comparison: Students will portray super bowl stats in fractions, decimals, and percents and compare each teams wins and losses

Activities to Differentiate Instruction

Differentiation for special education:

- General modifications may include:
    - Modifications & accommodations as listed in the student's IEP
    - Assign a peer to help keep student on task

    - Modified or reduced assignments
    - Reduce length of assignment for different mode of delivery
    - Increase one-to-one time
    - Working contract between you and student at risk
    - Prioritize tasks
    - Think in concrete terms and provide hands-on-tasks
    - Position student near helping peer or have quick access to teacher
    - Anticipate where needs will be
    - Break tests down in smaller increments
- Content specific modifications may include:
    - Provide multiple methods when computing greatest common factors and least common multiples (e.g. Ladder Method or Creating a List)
    - Provide handout with guided notes or step-by-step instructions on ratios, rates, and solving proportions
    - Provide handout with rules and examples on conversions between decimals, fractions, and percents
    - Provide list of common decimal, fraction, and percent conversions (e.g. 0.5 = 1/2 = 50%)
    - Provide completed worked out examples on classwork and homework that students may use as a guide
    - Use manipulatives such as bars and chips to help students visualize concept of ratios

Differentiation for ELL's:

- General modifications may include:
    - Strategy groups
    - Teacher conferences
    - Graphic organizers
    - Modification plan
    - Collaboration with ELL Teacher
- Content specific vocabulary important for ELL students to understand include:
    - Greatest Common Factor, Least Common Multiple, Ratio, Rate, Unit Rate, Proportions, Equivalent Ratios, Ratio Tables, Ordered Pairs, Scaling, Decimal, Fraction, Percent

Differentiation to extend learning for gifted students may include:

- Finding the greatest common factor or least common multiple of more than 3 numbers
- Simplifying ratios, rates, and unit rates with larger, more obscure numbers, requiring more proficiency of divisibility rules
- Solving Proportions using algebra rather than scaling
- Solving for missing values in ratio tables the require two steps: scaling backwards and forwards

Technology Integration

- iPads or Chromebooks as appropriate to the activity.
- Online learning components including use of the Digits digital textbook, Buzzmath, KhanAcademy,

and other resources.
- Teacher integration of the SMART board to facilitate active student engagement throughout the course of the lesson.
- Software or online programs that teachers may use to create students materials or generate problems such as Kuta software.
- Additional practice provided through the use of IXL

Integrated/Cross-Disciplinary Instruction

- **ELA:** Using grammatically correct sentences, descriptive words, and transitions when analyzing and comparing ratios
- **Science:** Integrating science topics when students are finding ratios of certain objects (e.g. ratio of planets to moons). Relating ratios to how results discovered in a lab experiment can represent events on a larger scale
- **Social Studies:** Comparing currencies from different locations and eras in the form of ratios
- **Physical Education:** Integrating sports statistics or general physical activities in finding and comparing ratios
- **Music:** Finding ratios in different beat values of notes
- **Art/Architecture:** Using ratios in scale drawings
- **Economics:** Comparing unit prices

Resources

- Digits student access and support: www.MyMathUniverse.com
- Digits teacher materials and support: www.pearsonrealize.com
- IXL: www.ixl.com
- SMART Exchange: www.exchange.smartteach.com
- SMART Board Lessons
- Pizzazz worksheets (self-correcting)
- Kuta software generated worksheets
- Khanacademy: www.khanacademy.org
- Buzzmath: www.buzzmath.com
- NCTM Illuminations: www.illuminations.nctm.org
- New Jersey Center for Teaching and Learning: www.njctl.org

21st Century Skills

CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP6	Demonstrate creativity and innovation.

CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.