

Unit 03: Ratio and Proportional Reasoning

Content Area: **Template**
Course(s):
Time Period: **Full Year**
Length: **FY**
Status: **Published**

Standards Alignment

New Jersey Student Learning Standards

MA.6.RP	Ratios and Proportional Relationships
MA.6.RP.A	Understand ratio concepts and use ratio reasoning to solve problems.
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.RP.A.3d	Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.
AAAA.K-12.1	Inquire, think critically, and gain knowledge.
AAAA.K-12.1.3	Responsibilities
AAAA.K-12.1.3.5	Use information technology responsibly.
AAAA.K-12.2.1	Skills
AAAA.K-12.2.1.4	Use technology and other information tools to analyze and organize information.
AAAA.K-12.3	Share knowledge and participate ethically and productively as members of our democratic society.
AAAA.K-12.3.1	Skills
AAAA.K-12.3.1.6	Use information and technology ethically and responsibly.

Integration of Career Readiness, Life Literacies and Key Skills

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.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.

Technology / Integration of Computer Science and Design Thinking

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.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.

Interdisciplinary Connections: NJSL for ELA, Social Studies, Science and/or Math Section

Capacities of the Literate Individual Students Who are College and Career Ready in Reading, Writing, Speaking, Listening, & Language

They demonstrate independence.

They build strong content knowledge.

They respond to the varying demands of audience, task, purpose, and discipline.

They comprehend as well as critique.

They value evidence.

They use technology and digital media strategically and capably.
They come to understand other perspectives and cultures.

LA.K-12.NJSLSA.R	Reading
MATH.K-12.1	Make sense of problems and persevere in solving them Key Ideas and Details
MATH.K-12.2	Reason abstractly and quantitatively
LA.K-12.NJSLSA.R1	Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
LA.RL.6.1	Cite textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferences drawn from the text.
MATH.K-12.3	Construct viable arguments and critique the reasoning of others
MATH.K-12.4	Model with mathematics
MATH.K-12.5	Use appropriate tools strategically
MATH.K-12.6	Attend to precision
MATH.K-12.7	Look for and make use of structure
MATH.K-12.8	Look for and express regularity in repeated reasoning
LA.K-12.NJSLSA.W	Writing Text Types and Purposes
LA.K-12.NJSLSA.W1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
LA.W.6.1	Write arguments to support claims with clear reasons and relevant evidence.
LA.W.6.1.A	Introduce claim(s) and organize the reasons and evidence clearly.
LA.W.6.1.B	Support claim(s) with clear reasons and relevant evidence, using credible sources and demonstrating an understanding of the topic or text.
LA.W.6.1.C	Use words, phrases, and clauses to clarify the relationships among claim(s) and reasons.
LA.K-12.NJSLSA.SL	Speaking and Listening
LA.W.6.1.D	Establish and maintain a formal/academic style, approach, and form. Comprehension and Collaboration
LA.W.6.1.E	Provide a concluding statement or section that follows from the argument presented.
LA.K-12.NJSLSA.SL1	Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
LA.SL.6.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.
LA.SL.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.
LA.SL.6.1.B	Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.
LA.SL.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.

Integration of Diversity, Equity and Inclusion; Climate Change; Informational and Media Literacy
New Section

see Crosswalks

21st Century Life and Careers

Stage I: Desired Results

Transfer/Overview/Rationale

Transfer / Overview / Rationale

Unit Rationale

The purpose of this unit...

Comparing numbers and quantities is an essential skill that allows people to make informed decisions throughout life.

Meaning

Essential Questions

Essential Questions

- How do we compare and represent a relationship between two quantities?

- How can we use equivalent ratios to find missing values in proportional relationships including percents?
- Why is it important to calculate a unit rate?
- How can I use graphs and tables to analyze and compare unit rates to solve real-life problems?

Enduring Understanding/Indicators of Understanding

Enduring Understanding/Indicators of Understanding

- A common and useful way to represent relationships between two quantities is by ratio.
- Because ratios are a way to compare two quantities, using equivalent ratios and proportions allows us to accurately and efficiently find missing values and convert to percentages.
- Because many things are presented in real life with unit rate, it is important to understand, particularly while shopping (price per pound, miles per gallon). Unit rate helps us make informed decisions.
- Comparing and contrasting large groups of information is more efficient using graphs, tables and charts.

Acquisition (Student Learning Objectives)

Knowledge

Knowledge

Students will know...

- How to analyze, interpret, apply, sort information to solve a specific problem
- Given a situation add, subtract, multiply, divide fractions, mixed numbers and decimals to solve real-world problems
- How to create ratios that compare two quantities.
- Represent, analyze and interpret a relationship between two quantities using ratios, ratio tables, graphs, and diagrams.
- Extend the knowledge of equivalent fractions to create equivalent ratios and unit rates to solve problems involving missing values, future values, and percentages.
- Use ratios to convert between a variety of units of measurement.
- Utilize equivalent ratios to find percent of a number, percent when given a part and a whole, and the whole when given the percent and the part.

Skills

Skills

Student will be skilled at ...

- Given a situation, analyze and interpret the relationship between two quantities using ratios.
- Create and organize equivalent ratios in ratio tables in order to understand and predict quantities in real-life situations.
- Calculate and compare unit rates using graphs and tables in order to find the higher/lower rate among two scenarios.
- Create percent proportions as equivalent ratios in order to find the part, whole, or percent.
- Write and solve ratios to convert units of measurement.

Stage 3: Learning Plan

Resource and Mentor Texts

Resources and Mentor Texts

[Unit 3 activities.docx](#)

[Unit 3- Cycle 4 Swat-Percent-of-a-number.doc](#)

[Unit 3 - PARCC practice.docx](#)

Formative Assessment Strategies

Formative Assessment Strategies

- ixl.com scores
- tenmarks.com scores
- teacher center observation
- STEM projects

Learning Activities/Unit of Study

Learning Activities/Unit of Study

Ratio and Proportional Reasoning: Approximately 5 Cycles

Cycle 1: Topics Covered

- Ratios-tape diagrams
- Ratio tables
- Activities/Centers
 - IXL.com centers
 - R.1 Write a ratio to describe objects in a picture
 - R.2 Ratio tables
 - R.3 Ratios: word problems
 - Tenmarks centers
 - 6.RP.1 Representing Ratios
 - 6.RP.3a Ratio Tables and Graphs
 - Hands-On/Creative Centers
 - Go from a ratio to a tape diagram to find equivalent ratios
file:///C:/Users/KKemeny/Downloads/math-g6-m1-topic-b-lesson-12-teacher.pdf
 - Online games
 - Complete the ratio table <http://www.mathgames.com/skill/6.66-ratio-tables>
 - Xtramath: review flashcards
 - Teacher Directed Stations
 - Bellringers: Week 29—page 199-200
 - Bellringers: Week 29—page 197-198
 - STEM activity: Rubik's cube activity http://www.youcandothecube.com/downloads/math-lessons/STEM_Rubiks_Cube_Middle_School.pdf

Cycle 2: Topics Covered

- Rates
 - Equivalent rates
 - Unit rates

- Graphing to compare rates

- Activities/Centers

- IXL.com centers
 - R.4 Equivalent ratios
 - R.5 Equivalent ratios: word problems
 - R.6 Compare ratios: word problems
 - R.8 Unit rates and equivalent rates
 - R.9 Unit rates: word problems
- Tenmarks centers
 - 6.RP.2 Expressing Unit Rate
 - 6.RP.3b Solving Problems Involving Unit Rate
- Hands-On/Creative Centers
 - Let's make a deal-work with a partner
file:///C:/Users/KKemeny/Downloads/LetsMakeADealUnitRateActivity.pdf
- Online games
 - Find the unit rate <http://www.sheppardsoftware.com/mathgames/ratios/MatchingRates.htm>
- Xtramath: review flashcards
- Teacher Directed Stations
 - Bellringers: Week 29—page 195-196
 - Bellringers: Week 29—page 194
 - Teacher created problems on white boards: which is the better buy?

Cycle 3: Topics Covered

- Percents as fractions
- Fractions as percents

- Activities/Centers

- IXL.com centers
 - R.11 Convert between percents, fractions, and decimals
 - R.12 Compare percents to each other and to fractions
 - R.13 Compare percents and fractions: word problems
 - R.14 Percents of numbers and money amounts
 - R.15 Percents of numbers: word problems
 - R.16 Percents of numbers - with fractional and decimal percents
 - R.17 Find what percent one number is of another
 - R.18 Find what percent one number is of another: word problems
- Tenmarks centers
 - 6.RP.3c Expressing Percents
 - 6.RP.3c Percent Relationships
 - 6.RP.3c Solving Percent Word Problems
- Hands-On/Creative Centers
 - Several percentage centers to work with a partner or group
https://www.stem.org.uk/system/files/elibrary-resources/legacy_files_migrated/24634-Percentages%20pack%201.pdf
- Online games
 - http://www.mathplayground.com/matching_fraction_percent.html
- Xtramath: review flashcards
- Teacher Directed Stations
 - Bellringers: Week 28—page 192-193
 - Bellringers: Week 28—page 190-191
 - Teacher created problems on white boards: converting decimals to fractions and vice versa

- STEM activity: Using art to show decimal, percent, and fraction equivalents
<http://mason.gmu.edu/~jsuh4/math%20masterpiece.pdf>

Cycle 4: Topics Covered

- Solving percent problems (mental math)
- Estimating percents
- Activities/Centers
 - IXL.com centers
 - R.14 Percents of numbers and money amounts
 - R.15 Percents of numbers: word problems
 - R.16 Percents of numbers - with fractional and decimal percents
 - R.17 Find what percent one number is of another
 - Tenmarks centers
 - 6.RP.3c Expressing Percents
 - 6.RP.3c Percent Relationships
 - 6.RP.3c Solving Percent Word Problems
 - Hands-On/Creative Centers
 - Swat game—estimating percents*
 - Online games
 - http://www.mathplayground.com/balloon_invaders_percent.html
 - Xtramath: review flashcards
 - Teacher Directed Stations
 - Bellringers: Week 28—page 188-189
 - Bellringers: Week 28—page 187
 - Teacher created problems on white boards: mental math percents
 - STEM activity: Dining out activity <http://www.actuarialfoundation.org/pdf/math-academy-dining-out.pdf>

Cycle 5: Topics Covered

- Converting measurements
- Activities/Centers
 - IXL.com centers
 - S.1 Estimate customary measurements
 - S.2 Estimate metric measurements
 - S.3 Convert and compare customary units
 - Tenmarks centers
 - 6.RP.3d Converting Measurement Units Using Ratio Reasoning
 - Hands-On/Creative Centers
 - Work with a partner at the variety of centers
<http://literacy.kent.edu/eureka/EDR/10/Converting%20Units%20of%20Measure.pdf>
 - Online games
 - <https://www.sheppardsoftware.com/mathgames/menus/measurement.htm>
 - Xtramath: review flashcards
 - Teacher Directed Stations
 - Bellringers: Week 27—page 185-186
 - Bellringers: Week 27—page 183-184

- Teacher created problems on white boards: convert in metric form
- PARCC practice*

Modifications and/or Accommodations

Suggested Modifications (ELL, Sp. Ed, Gifted, At-risk of Failure)

English Language Learners

Native language support: The teacher provides auditory or written content to students in their native language.

Adjusted Speech: The teacher changes speech patterns to increase student comprehension. This could include facing the students, paraphrasing, clearly indicating the most important ideas, and speaking more slowly.

Visuals: The teacher uses graphics, pictures, visuals, and manipulatives. This helps ELL students better understand and comprehend the subjects at hand.

Front-Loading Vocabulary: The teacher front loads vocabulary. This means providing students with a list of important vocabulary words they will need to know for a book, lesson, etc. prior to the lesson being taught. Including pictures to go with the vocabulary words is also very beneficial for the students.

Special Education Students

Chunking: The teacher presents information in a way that makes it easy for students to understand and remember. Chunking is based on the presumption that our working memory is easily overloaded by excessive detail. The best way to deliver information is to organize it into meaningful units. Because students with special needs get overloaded easily, chunking is an effective strategy to use with them.

Checking for Understanding: It is important to constantly check for understanding, especially for students who have accommodations. Teachers want to make sure students understand the concepts being covered in a way that makes sense to them.

Extra time: The teacher provides students with special needs extra time to complete work or answer questions. It is important to give students enough time to process their thoughts.

Oral Reading: The teacher will read work orally to students. Class work such as tests and literature circles may need to be read aloud to the student.

Timers: The teacher will use timers as an instructional tool. The use of timers is beneficial for students who have trouble completing tasks. Timers can be helpful so the student is aware of how

much time they have to complete an assignment.

Students with 504 Plans

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Gifted & Talented Strategies

Extensions/Enrichments: Teachers will provide gifted and talented students with extension/enrichment projects. Students will be challenged to further their understanding, to apply acquired knowledge, and/or to produce something in reference to acquired knowledge.

Modify/Change Activities: Teachers will monitor and modify activities to accommodate those students who need to be challenged further. Additional reading, problem-solving, writing, or project work is necessary for those students who are ready to move on at a rate more accelerated than their peers. In this way, G & T students are provided the same opportunity for support as special needs students.

Students at Risk of School Failure

Directions or Instructions: Make sure directions and/or instructions are given in limited numbers. Give directions/instructions verbally and in simple written format. Ask students to repeat the instructions or directions to ensure understanding occurs. Check back with the student to ensure he/she hasn't forgotten.

Peer Support: Peers can help build confidence in other students by assisting in peer learning. Many teachers use the 'ask 3 before me' approach. This is fine, however, a student at risk may have to have a specific student or two to ask. Set this up for the student so he/she knows who to ask for clarification before going to you.

Alternate or Modified Assignments: Always ask yourself, "How can I modify this assignment to ensure the students at risk are able to complete it?" Sometimes you'll simplify the task, reduce the length of the assignment or allow for a different mode of delivery. For instance, many students may hand something in, the at-risk student may jot notes and give you the information verbally. Or, it just

may be that you will need to assign an alternate assignment.

Increase One to One Time: When other students are working, always touch base with your students at risk and find out if they're on track or needing some additional support. A few minutes here and there will go a long way to intervene as the need presents itself.

Contracts: It helps to have a working contract between you and your students at risk. This helps prioritize the tasks that need to be done and ensure completion happens. Each day write down what needs to be completed, as the tasks are done, provide a checkmark or happy face. The goal of using contracts is to eventually have the student come to you for completion sign-offs.

Hands On: As much as possible, think in concrete terms and provide hands-on tasks. This means a child doing math may require a calculator or counters. The child may need to tape record comprehension activities instead of writing them. A child may have to listen to a story being read instead of reading it him/herself.

Tests/Assessments: Tests can be done orally if need be. Break tests down in smaller increments by having a portion of the test in the morning, another portion after lunch and the final part the next day.

Seating: Seat students near a helping peer or with quick access to the teacher. Those with hearing or sight issues need to be close to the instruction which often means near the front.