Unit 2 Ratios and Proportions

Content Area: **Math**
Course(s): **Sample Course**
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Title Section

Department of Curriculum and Instruction

Belleville Public Schools

Curriculum Guide

Mathematics

Grade 6 Accelerated

Unit 2

Belleville Board of Education

102 Passaic Avenue

Belleville, NJ 07109

Prepared by: Ms. Shital Patel

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Unit Overview

Students should expect to learn from this Unit:

- How to express ratios in different mathematical notations
- Understand ratios and ratio relationship between two quantities
- Represent ratios using models
- Create equivalent ratios using tables and graphs
- Solve proportions using scale up and scale down method
- Create and use unit rates to compare and solve real world applications
- Extend ratios to include percents
- Estimate and use benchmark percents as fractions and decimals
- Construct and evaluate equivalent fractions, decimals, and percents using hunderedths grids
- Determine the unknown part given the percent and the whole
- Order and compare fractions, decimals, and percents
- Convert measurment units of length, weight, and capacity using ratios and proportions
- Calculate percent of a number, discount, gratuity, and sales tax

NJSLS

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.

Exit Skills

By the end of this Unit:

- **Connect ratio and rate to whole number multiplication and division and use concepts of ratio and rate to solve problems:**

Students use reasoning about multiplication and division to solve ratio and rate problems about quantities. By viewing equivalent ratios and rates as deriving from, and extending, pairs of rows (or columns) in the multiplication table, and by analyzing simple drawings that indicate the relative size of quantities, students connect their understanding of multiplication and division with ratios and rates. Thus students expand the scope of problems for which they can use multiplication and division to solve problems, and they connect ratios and fractions. Students solve a wide variety of problems involving ratios and rates.

Enduring Understanding

- Proportional relationships express how quantities change in relationship to each other
- Rates compare two values
- Rates are part-to-part or part-to-whole
- Ratios are expressed in colon notation, written notation, or fractional notation
- A proportion is a relationship between two ratios
- Equivalent ratios are the same as equivalent fractions
- Define rate, ratio, and percent
- Fractions may represent a ratio

- A unit rate is a ratio relationship
- Metric unit of measurement is widely used system of measurement
- A measurement has two parts: a number and a unit of measure
- Percent is always a fraction based on 100
- Percents always have a denominator of 100
- Convert the percent into a decimal and multiply to calculate discount, tip, and sales tax

Essential Questions

- Why does one need to compare numbers?
- When does one need ratios to compare quantities?
- How can one compare and contrast quantities?
- How can one use ratios to compare two values in everyday life?
- What is a rate and how is it related to proportional reasoning?
- How are ratios related to fractions and division?
- Why is it important to know how to solve for unit rates?
- How can one model and represent rates and ratios?
- What are the similarities and differences between fractions and ratios?
- How can one compare unit rates to determine cost, unit pricing, and constant rate?
- How can one use rates, and ratios, and percents to solve real world situations?
- What are the standard units of measurement and how do we use them in the real world?
- What type(s) of problems can be solves using rates, ratios, and percents?
- How and where is discount, sales tax, and gratuity used in the real world?

Learning Objectives

Students will be able to:

- Distinguish between rates and ratios
- Define percent, ratios, proportion, and rates
- Express and recognize ratios written in different forms
- Use ratio reasoning to solve problems
- Identify and create equivalent decimals and percents using hundredth grids
- Create and analyze models of rates and ratios
- Compare and order percents
- Convert unit rates of measurement
- Represent ratios and proportions using models

- Relate percents to fractions and decimals
- Analyze and solve percent problems
- Calculate discount, sales tax of items
- Determine gratuity in various types of businesses
- Translate real world problems into ratios and percents

Below are examples of action verbs associated with each level of the Revised Bloom's Taxonomy. These are useful in writing learning objectives, assignment objectives and exam questions.

If you are utilizing the objective, but want to use rigor, use the chart below.

Remember	Understand	Apply	Analyze	Evaluate	Create
Choose	Classify	Choose	Categorize	Appraise	Combine
Describe	Defend	Dramatize	Classify	Judge	Compose
Define	Demonstrate	Explain	Compare	Criticize	Construct
Label	Distinguish	Generalize	Differentiate	Defend	Design
List	Explain	Judge	Distinguish	Compare	Develop
Locate	Express	Organize	Identify	Assess	Formulate
Match	Extend	Paint	Infer	Conclude	Hypothesize
Memorize	Give Examples	Prepare	Point out	Contrast	Invent
Name	Illustrate	Produce	Select	Critique	Make
Omit	Indicate	Select	Subdivide	Determine	Originate
Recite	Interrelate	Show	Survey	Grade	Organize
Select	Interpret	Sketch	Arrange	Justify	Plan
State	Infer	Solve	Breakdown	Measure	Produce
Count	Match	Use	Combine	Rank	Role Play
Draw	Paraphrase	Add	Detect	Rate	Drive
Outline	Represent	Calculate	Diagram	Support	Devise
Point	Restate	Change	Discriminate	Test	Generate
Quote	Rewrite	Classify	Illustrate		Integrate
Recall	Select	Complete	Outline		Prescribe
Recognize	Show	Compute	Point out		Propose
Repeat	Summarize	Discover	Separate		Reconstruct
Reproduce	Tell	Divide			Revise
	Translate	Examine			Rewrite
	Associate	Graph			Transform
	Compute	Interpolate			
	Convert	Manipulate			
	Discuss	Modify			
	Estimate	Operate			
	Extrapolate	Subtract			
	Generalize				
	Predict				

Interdisciplinary Connections

- Science
- Social Studies
- Health/Nutrition

- Music

Alignment to 21st Century Skills & Technology

Key SUBJECTS AND 21st CENTURY THEMES

Mastery of key subjects and 21st century themes is essential for all students in the 21stcentury.

Key subjects include:

- English, reading or language arts
- World languages
- Arts
- Mathematics
- Economics
- Science
- Geography
- History
- Government and Civics

21st Century/Interdisciplinary Themes

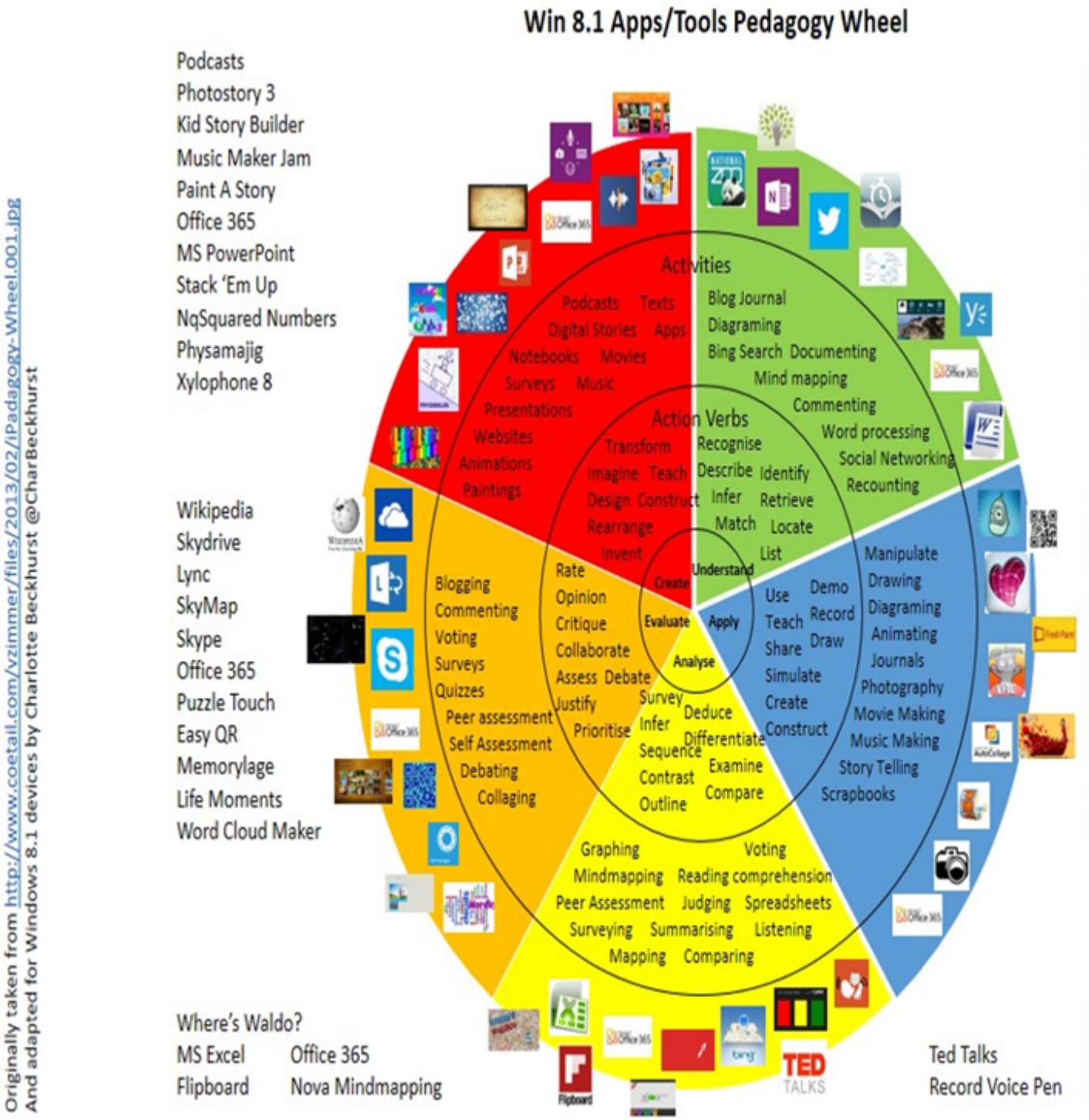
- Civic Literacy
- Environmental Literacy
- Financial, Economic, Business and Entrepreneurial Literacy
- Global Awareness
- Health Literacy

21st Century Skills

- Communication and Collaboration
- Creativity and Innovation
- Critical thinking and Problem Solving
- ICT (Information, Communications and Technology) Literacy
- Information Literacy
- Life and Career Skills
- Media Literacy

Technology Infusion

What technology can be used in this unit to enhance learning?



Differentiation

- Preteach new vocabulary and meaning of symbols

- Connect new vocabulary and symbols to backgrouund knowledge for experience
- Break down terms to familiar parts, suffixes, or prefixes
- Make dictionary available to learner
- Increase exposure to acadmemic vocabulary and language
- Provide flash cards
- Incorporote as many of learner's senses as possible to enhance retention
- Brainstorm examples of use of new terms or symbols making real world applications
- Engage students in relevant discussions about conceptual processes
- Post and refer to math guides and anchor charts when applicable
- Clarify the relationships between the operations
- Develop graphic representation of math processes
- Make connections to formulae concepts or structures previously learned
- Utilize manipulatives to display structures
- Offer various ways to solve math problems
- Provide opportunities do integrate math technology & art
- Provide graphic organizers and anchor charts for all symbols and formulas
- Create student math journals for terms, formulas, and symbols
- Develop interactive games and activities to promote retention
- Intergrate videos
- Utilize graphics, diagrams, and charts

Special Education

- printed copy of board work/notes provided
- additional time for skill mastery
- assistive technology
- behavior management plan
- Center-Based Instruction
- check work frequently for understanding
- computer or electronic device utilizes
- extended time on tests/ quizzes
- have student repeat directions to check for understanding
- highlighted text visual presentation
- modified assignment format
- modified test content
- modified test format
- modified test length
- multiple test sessions
- multi-sensory presentation
- preferential seating
- preview of content, concepts, and vocabulary

- reduced/shortened reading assignments
- Reduced/shortened written assignments
- secure attention before giving instruction/directions
- shortened assignments
- student working with an assigned partner
- teacher initiated weekly assignment sheet
- Use open book, study guides, test prototypes

ELL

- teaching key aspects of a topic. Eliminate nonessential information
- using videos, illustrations, pictures, and drawings to explain or clarif
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning;
- allowing students to correct errors (looking for understanding)
- allowing the use of note cards or open-book during testing
- decreasing the amount of workpresented or required
- having peers take notes or providing a copy of the teacher's notes
- modifying tests to reflect selected objectives
- providing study guides
- reducing or omitting lengthy outside reading assignments
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using computer word processing spell check and grammar check features
- using true/false, matching, or fill in the blank tests in lieu of essay tests

Intervention Strategies

- allowing students to correct errors (looking for understanding)
- teaching key aspects of a topic. Eliminate nonessential information
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning
- allowing students to select from given choices
- allowing the use of note cards or open-book during testing
- collaborating (general education teacher and specialist) to modify vocabulary, omit or modify items to reflect objectives for the student, eliminate sections of the test, and determine how the grade will be determined prior to giving the test.
- decreasing the amount of workpresented or required
- having peers take notes or providing a copy of the teacher's notes
- marking students' correct and acceptable work, not the mistakes

- modifying tests to reflect selected objectives
- providing study guides
- reducing or omitting lengthy outside reading assignments
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using authentic assessments with real-life problem-solving
- using true/false, matching, or fill in the blank tests in lieu of essay tests
- using videos, illustrations, pictures, and drawings to explain or clarify

Evidence of Student Learning-CFU's

Please list ways educators may effectively check for understanding in this secion.

- Admit Tickets
- Anticipation Guide
- Common benchmarks
- Compare & Contrast
- Create a Multimedia Poster
- Define
- Describe
- Evaluate
- Evaluation rubrics
- Exit Tickets
- Explaining
- Fist- to-Five or Thumb-Ometer
- Illustration
- Journals
- KWL Chart
- Newspaper Headline
- Outline
- Question Stems
- Quickwrite
- Quizzes
- Red Light, Green Light
- Self- assessments
- Socratic Seminar
- Study Guide
- Teacher Observation Checklist
- Think, Pair, Share
- Think, Write, Pair, Share

- Top 10 List
- Unit tests

Primary Resources

Carnegie Learning Math Series - Course 1

resouces.carnegielearning.com

Ancillary Resources

www.AAAmath.com

www.ixl.com

www.khanacademy.com

www.coolmath.com