Unit 3 Ratios and Proportions and Percents

Content Area: **Mathematics**
Course(s): **Honors Pre-Algebra 7, CCSS Math 7**
Time Period: **January**
Length: **1 Marking Period**
Status: **Published**

Unit Overview

This unit will give students the opportunity to analyze proportional relationships to solve rations, proportions and real-world math problems. This unit will also introduce students to percents. They will learn the different types of percent problems and how to represent the percent equations algebraically. They will also learn how to solve real world application problems involving percents.

Enduring Understandings

- Percents are used in real world problems
- Percents can be applied to problems in different ways
- Utilize proportional relaionships to solve real-world problems.

Career Readiness, Life Literacies & Key Skills

WRK.K-12.P.1	Act as a responsible and contributing community members and employee.
WRK.K-12.P.4	Demonstrate creativity and innovation.
WRK.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
WRK.K-12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.
WRK.K-12.P.9	Work productively in teams while using cultural/global competence.

Essential Questions

- Hoe do you apply proportions?
- How do you recognize and represent proportional relationships between quantities?

Student Learning Objectives (SLOs)

- Calculate unit rate
- Determine an unknown in an equivalent ratio
- Determine if ratios are equivalent
- Find the constant of proportionality in a graph or table

- Find unit rate and rate in a graph
- Solve Real world word problems by using proportions
- Solve real world word problems with unit rate
- Use proportions to determine the relationship in a table and graph
- Use proportions to solve problems involving scale drawings and similar figures
- Write ratios for various situations

Standards/Indicators

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.7.RP	Ratios and Proportional Relationships
MA.7.RP.A	Analyze proportional relationships and use them to solve real-world and mathematical problems.
MA.K-12.2	Reason abstractly and quantitatively.
MA.7.RP.A.1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction (1/2)/(1/4) miles per hour, equivalently 2 miles per hour.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.7.RP.A.2	Recognize and represent proportional relationships between quantities.
MA.7.RP.A.2a	Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
MA.7.RP.A.2b	Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
MA.K-12.4	Model with mathematics.
MA.7.RP.A.2c	Represent proportional relationships by equations.
MA.K-12.5	Use appropriate tools strategically.
MA.7.RP.A.2d	Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.
MA.7.RP.A.3	Use proportional relationships to solve multistep ratio and percent problems.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.

Lesson Titles

- Circle Graphs
- Converting Rates and Measurements
- Find a Percent of a Number Mentally
- Fraction and Percents

- Fraction, Decimals, Percents
- Indirect Measurement
- Percent of Change
- Proportional and Non Proportional Relationships
- Rate of Change
- Ratios
- Scale Drawings and Models
- Similar Figures
- Simple Interest
- Solving Proportions
- Unit Rates
- Using Percent Equations
- Using Percent Proportions

Equity Considerations

LGBTQ and Disabilities Mandate

Students will engage in discussion centered around the LBGTQ and disability population.

STEM

LGBTQ:

Sir Francis Bacon (1561–1626)

Florence NightingaleFrancis Bacon | Philosophy, Scientific Method, & Facts | Britannica(1820-1910)

George Washington Carver (1861-1943)

Sara Josephine Baker (1873-1945)

Alan Turing (1912-1954)

Allan Cox (1926-1987)

Sally Ride (1951-2012)

Ben Barres (1954-2017)

Ruth Gates (1962-2018)

Tim Cook (1960)

Disabilities:

Leonardo da Vinci (1452-1519)- Dyslexia

Isaac Newton (1664-1727)- Epilepsy

Thomas Edison (1847-1931)- Hearing

Charles Darwin (1809-1882)- Stutter, Dyslexia

Alexander Graham Bell (1847-1922)- Deaf

Albert Einstein (1879-1955)- Aspergers

Florence B. Seibert (1897-1991)- Mobility

Stephen Hawking (1942-2019)- ALS

John Forbes Nash (1928-2015)- Schizophrenia

Temple Grandin (1947)- Autism

- Social

Asian American and Pacific Islander Mandate

https://ideas.ted.com/8-asian-americans-and-pacific-islanders-whose-innovations-have-changed-your-life-really/
https://www.ngpf.org/blog/math/math-monday-celebrating-aapi-mathematicians/

Shakuntala Devi is known as “The Human Computer”, Shakuntala Devi was a famous mathematician who holds the Guinness World Record for the “Fastest Human Computation.” In addition to her computational prowess, Devi was also an outspoken LGBTQ+ advocate, novelist, and political hopeful. Her life story was adapted into the biopic Shakuntala Devi in 2020.

Dr. Kamuela Yong is an associate professor of mathematics at the University of Hawai‘i–West O‘ahu. He is the first Native Hawaiian to earn a Ph.D. in applied mathematics and is the co-founder of the organization Indigenous Mathematicians.

- Social

Climate Change

Students will make connections between math and STEM processes.

Students analyze the melting of the polar ice caps and its effects on the Earth and humanity

How fast are the polar ice caps melting, and why is this rate important to human life on Earth?

https://www.oercommons.org/authoring/7876-climate-change-cross-curricular-math-english-scien/view

https://jancovici.com/en/climate-change/risks/will-oceans-submerge-everything/

- Social

SCI.MS-ESS3-5	Ask questions to clarify evidence of the factors that have caused climate change over the past century.

Inter-Disciplinary Connections

- Art - Graphing
- History - Current Events
- History - Math History
- LAL - Key Terms
- LAL - Vocabulary
- LAL - Word Wall
- Note Taking
- Sci - Making Predictions
- Tech -Web

LA.RL.7.4	Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings; analyze the impact of rhymes and other repetitions of sounds (e.g., alliteration) on a specific verse or stanza of a poem or section of a story or drama.
SCI.7-8.5.1.8.B.2	Gather, evaluate, and represent evidence using scientific tools, technologies, and computational strategies.
SCI.7-8.5.1.8.B.b	Mathematics and technology are used to gather, analyze, and communicate results.
SCI.7-8.5.1.8.B.c	Carefully collected evidence is used to construct and defend arguments.
SCI.7-8.5.1.8.D.1	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.

Anticipatory Set

- Current Events
- Display
- Mathematics History
- Relate to prior knowledge
- Videos

Instructional Strategies, Learning Activities, and Levels of Blooms/DOK

- Blooms # 6 Evaluation - Make and defend judgements based on internal evidence or external criteria
- Blooms #1 Knowledge - Remember Previously learned information.
- Blooms #2 Comprehension - Demonstrate an understanding of facts.
- Blooms #3- Application - Apply knowledge to actual situations
- Blooms #4 Analysis - Break down objects or ideas into simpler parts and find evidence to support generalizations.
- Blooms #5 Synthesis - Compile component ideas into a new whole or propose alternative solutions.
- Complete Teacher generated worksheet
- Complete worksheets
- Introduction, notes and examples on ratios
- Introduction, notes, examples on function tables
- Introduction, notes, examples on percent of change
- Introduction, notes, examples on percent of increase/decrease
- Introduction, notes, examples on percent proportions
- Introduction, notes, examples on percents
- Introduction, notes, examples on proportions
- Introduction, notes, examples on simple interest
- Introduction, notes, examples on unit rate
- Note cards on Integer Rules
- Note cards on solving proportions
- Review circle graphs
- Review homework - student work on board
- Students will work as a group or with a partner.
- Students will work independently.
- Tutoring during Academic Enrichment
- Worksheets on comparing and ordering Percents
- Worksheets on fraction, decimal and percent conversions

Modifications

ELL Modifications

Content specific vocabulary important for ELL students to understand include:

Rates Ratios and Proportions

- When solving proportions, give students true algebraic proportions that will result in a multi-step

equation

- Work more with rational numbers rather than integers when solving proportions

Percents

- 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

- Anticipate where needs will be
- Assign a peer to help keep student on task
- Break tests down in smaller increments
- Calculator to assist with calculations
- Collaboration with ELL Teacher
- Graphic organizers
- Increase one-to-one time
- Modification plan
- Modifications & accommodations as listed in the student's IEP
- Modified or reduced assignments
- Modify assignments to give percent problems that will result in an integer answer
- Personal Handout for remembering integer rules (can be taped to the desk)
- Position student near helping peer or have quick access to teacher
- Prioritize tasks
- Provide guided notes and step-by-step instructions on solving equations
- Provide worked out examples on classwork and homework that students can use as a guide when working independently
- Reduce length of assignment for different mode of delivery
- Step by Step directions the process of cross multiplying
- Strategy groups
- Teacher conferences

- Think in concrete terms and provide hands-on-tasks
- Tutoring during Academic Enrichment
- Use patterns that are easily discernible in function tables
- Working contract between you and student at risk

IEP & 504 Modifications

- Anticipate where needs will be
- Assign a peer to help keep student on task
- Break tests down in smaller increments
- Graphic organizer for remembering integer rules.
- Increase one-to-one time
- Modifications & accommodations as listed in the student's IEP
- Modified or reduced assignments
- Modify assignments to give percent problems that will result in an integer answer
- Personal handout for remembering integer rules (can be taped to desk)
- Position student near helping peer or have quick access to teacher
- Prioritize tasks
- Provide a calculator to assist with calculations
- Provide example list of rational and irrational numbers
- Provide guided notes and step-by-step instructions on solving equations
- Provide personal handout for integer rules
- Provide worked out examples on classwork and homework that students can use as a guide when working independently
- Reduce length of assignment for different mode of delivery
- Step by step directions on the process of cross multiplying
- Think in concrete terms and provide hands-on-tasks
- Tutoring during Academic Enrichment
- Working contract between you and student at risk

G & T Modifications

- Finding the greatest common factor or least common multiple of more than 3 numbers
- Simplify ratios, rates, and unit rates with larger, more obscure numbers, requiring more proficiency of divisibility rules
- Solve proportions using algebra rather than scaling
- Solving for missing values in ratio tables that require two steps
- Tutoring during Academic Enrichment

- When solving proportions, give students true algebraic proportions that will result in a multi-step equation
- Work more with rational numbers rather than integers when solving proportions

Formative Assessment

- Choral Responses
- Collaborative work
- Constructed Responses
- Crossmatics
- Exit Card - Proportions
- Guided Practice
- Hand Signals
- Independent Practice
- PARCC Questions - Finding the unit rate in a graph
- PARCC Questions - Percent of increase or decrease
- PARCC Questions - Percent Proportions
- PARCC Questions - Proportions with measurements
- PARCC Questions - Rates and ratios
- PARCC Questions - Unit Rate
- PARCC Questions -Percent of Change
- PARCC Vocabulary
- Quick Quizzes
- Quiz - Circle Graphs
- Quiz - convert, compare and order percents
- Quiz - Percent Increase or Decrease
- Quiz - Percent of a number
- Quiz - Ratios and rates
- Quiz - Simple Interst
- Quiz - Unit Rates
- Rubrics
- Self Assessments
- Senteo Response
- Teacher Observation
- Think Pair Share
- Turn to your partner

Summative Assessment

- Marking Period Assessment
- Mid Chapter Test on Comparing and ordering Fraction, decimals, and percents, and percent of a number..
- Mid Chapter Tests on ratios, rates, unit rates
- Project - Graphing Unit Rates
- Test on Percent topics
- Test on Ratios, Rates and Unit Rates

Benchmark Assessments

- MPA 1
- MPA 2
- MPA 3
- MPA 4
- Skills-based assessment

Resources & Materials

- Calculators
- Chromebooks
- PMI practice questions online
- Senteo Response Questions
- Smartboard

Technology

- Answer Garden
- Calculator
- Chromebooks
- GoGaurdian
- Google Classroom
- Kahoot
- Khan Academy - order of operations, integers, rational numbers
- PARCC Online Practice Assessment
- PMI - Senteo Response
- Quizlet - Volcabulary
- Smartboard

TECH.8.1.8.A.CS1	Understand and use technology systems.
TECH.8.1.8.A.CS2	Select and use applications effectively and productively.

TECH.8.1.8.C.CS1	Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media.
TECH.8.1.8.D.CS1	Advocate and practice safe, legal, and responsible use of information and technology.
TECH.8.1.8.D.CS2	Demonstrate personal responsibility for lifelong learning.
TECH.8.1.8.D.CS3	Exhibit leadership for digital citizenship.
TECH.8.1.8.E.CS3	Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.