Math 8 Unit 2: Rational Numbers & Proportions

Content Area: **Math**
Course(s):
Time Period: **Marking Period 2**
Length: **5 weeks**
Status: **Published**

Course Pacing Guide

This pacing guide should include the vision and mission of the course. It will be the same for all units in your course.

The simpler, the better. Pacing guide flaws come when they are too constricting, so big ideas is best (Cobb, McClain, de Silva Lamberg, & Dean, 2003; Wiggins, Wiggins, & McTighe, 2005)

Unit	MP/Trimester	Weeks
Integers, Equations, and Inequalities	1	8
Rational Numbers and Proportions	1/2	5
Geometry and Measurement	2/3	9
Transformations	3	4
Functions	3/4	7
Data Analysis and Probability	4	4

Unit Overview

This unit allows students to master rules for evaluating and simplifying exponents and exponential expressions. Students will be introduced to negative and zero exponents and the rules necessary to simplify them. This unit also focuses on the use of scientific notation for small and large numbers. Students will convert between standard form and scientific notation. They will also perform operations with numbers in scientific notation.

Enduring Understandings

Powers with the same base being multiplied can be simplified by finding the sum of the exponents

Powers with the same base being divided can be simplified by finding the difference between the exponents

Any number raised to the 0 power is equal to 1

Negative exponents can be evaluated by taking the reciprocal of the base and making the exponent positive

Scientific notation can be used to write very large or very small numbers using shorthand

Scientific notation requires the number to be between between 1 and 10

Essential Questions

How do you multiply two powers with the same base?

How do you divide two powers with the same base?

How can we simplify negative exponents?

How can we evaluate bases being raised to the 0 power?

Explain why 2-3 is the same as ⅛

Why would a form of shorthand (scientific notation) be an advantage for very small and very large numbers?

New Jersey Student Learning Standards (No CCS)

MA.8.EE.A	Work with radicals and integer exponents.
MA.8.EE.A.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions.
MA.8.EE.A.2	Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational.
MA.8.EE.A.3	Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.
MA.8.EE.A.4	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

Interdisciplinary Connections

9-12.HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more

	manageable problems that can be solved through engineering.
TECH.8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
TECH.8.1.8.B.CS1	Apply existing knowledge to generate new ideas, products, or processes.

Technology Standards

TECH.8.1.12.D.CS3	Exhibit leadership for digital citizenship.
TECH.8.1.12.F.CS3	Collect and analyze data to identify solutions and/or make informed decisions.
TECH.8.1.12.E.CS4	Process data and report results.
TECH.8.1.12.C.CS4	Contribute to project teams to produce original works or solve problems.
TECH.8.2.12.C.CS2	The application of engineering design.
TECH.8.1.12.F.CS4	Use multiple processes and diverse perspectives to explore alternative solutions.

21st Century Themes/Careers

CAEP.9.2.8.B.3	Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.
CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.

Financial Literacy Integration

PFL.9.1.8.A.2	Relate how career choices, education choices, skills, entrepreneurship, and economic conditions affect income.
PFL.9.1.8.A.6	Explain how income affects spending decisions.
PFL.9.1.8.B.9	Determine the most appropriate use of various financial products and services (e.g., ATM, debit cards, credit cards, check books).
PFL.9.1.8.D.1	Determine how saving contributes to financial well-being.
PFL.9.1.8.D.5	Explain the economic principle of supply and demand.
PFL.9.1.8.E.1	Explain what it means to be a responsible consumer and the factors to consider when making consumer decisions.
PFL.9.1.8.F.3	Relate the impact of business, government, and consumer fiscal responsibility to the economy and to personal finance.

Instructional Strategies & Learning Activities

- Provide access to online textbook

- Provide access to review problems/extra practice
- Provide access to answer keys for self-checking
- Tic-Tac-Toe
- Scavenger hunts
- Partner work
- Pair-Square
- Clock partners
- Supplemental worksheets
- Scientific Notation Battleship
- Student discovery - scientific notation in real-world examples
- Exponent BINGO
- Exponent Rules Color By Number

Differentiated Instruction

- Inquiry/Problem-Based Learning
- Learning preferences integration (visual, auditory, kinesthetic)
- Tiered Learning Targets
- Meaningful Student Voice & Choice
- Relationship-Building & Team-Building
- Self-Directed Learning
- Debate
- Student Data Inventories
- Game-Based Learning
- Grouping
- Rubrics
- Jigsaws
- Learning Through Workstations

- Concept Attainment
- Flipped Classroom
- Mentoring
- Assessment Design & Backwards Planning

Formative Assessments

- Daily homework checks
- Quiz
- Chapter Test
- Exit Tickets
- Warm-Ups

Summative Assessment

- Unit Test
- Unit Project

Benchmark Assessments

Students will take NJSLA Algebra 1 Benchmark A

Alternate Assessments

- Modified homework
- Modified quizzes

- Modified tests
- Modified projects

Resources & Technology

- Google docs, spreadsheets, slides
- TI graphing calculator
- Chromebooks
- Promethean board
- Websites: Desmos, Geogebra, EdPuzzle, Quizlet
- Google classroom

BOE Approved Texts

Holt Larson Pre-Algebra 9780547614830

Closure

- Low-Stakes Quizzes - Give a short quiz using technologies like Kahoot or a Google form.
- Have students write down three quiz questions (to ask at the beginning of the next class).
- Have students dramatize a real-life application of a skill.
- Ask a question. Give students ten seconds to confer with peers before you call on a random student to answer. Repeat.
- Have kids orally describe a concept, procedure, or skill in terms so simple that a child in first grade would get it.
- Direct kids to raise their hands if they can answer your questions. Classmates agree (thumbs up) or disagree (thumbs down) with the response.

- Have kids create a cheat sheet of information that would be useful for a quiz on the day's topic.
- Kids write notes to peers describing what they learned from them during class discussions.
- Have students fill out a checklist with the objectives for the day.
- Have students complete an exit ticket without putting their name on it. Hand back exit tickets the next day in class and have students correct as a warm up.
- Ask students to write what they learned, and any lingering questions on an "exit ticket". Before they leave class, have them put their exit tickets in a folder or bin labeled either "Got It," "More Practice, Please," or "I Need Some Help!"
- After writing down the learning outcome, ask students to take a card, circle one of the following options, and return the card to you before they leave: "Stop (I'm totally confused. Go (I'm ready to move on.)" or "Proceed with caution (I could use some clarification on . . .)"

ELL

- Alternate Responses
- Advance Notes
- Extended Time
- Teacher Modeling
- Simplified Written and Verbal Instructions
- Frequent Breaks
- E-Dictionaries
- Google Translate

Special Education

- Shorten assignments to focus on mastery of key concepts.
- Specify and list exactly what the student will need to learn to pass.
- Evaluate the classroom structure against the student’s needs (flexible structure, firm limits, etc.).
- Keep workspaces clear of unrelated materials.

- Keep the classroom quiet during intense learning times.
- Reduce visual distractions in the classroom (mobiles, etc.).
- Provide a computer for written work.
- Seat the student close to the teacher or a positive role model.
- Provide an unobstructed view of the whiteboard, teacher, movie screen, etc.
- Keep extra supplies of classroom materials (pencils, books) on hand.
- Maintain adequate space between desks.
- Give directions in small steps and in as few words as possible.
- Number and sequence the steps in a task.
- Have student repeat the directions for a task.
- Provide visual aids.
- Go over directions orally.
- Provide a vocabulary list with definitions.
- Permit as much time as needed to finish tests.
- Allow tests to be taken in a room with few distractions (e.g., the library).
- Have test materials read to the student, and allow oral responses.
- Divide tests into small sections of similar questions or problems.
- Allow the student to complete an independent project as an alternative test.
- Allow take-home or open-book tests.
- Show a model of the end product of directions (e.g., a completed math problem or finished quiz).
- Stand near the student when giving directions or presenting a lesson.
- Mark the correct answers rather than the incorrect ones.
- Permit a student to rework missed problems for an additional credit grade.
- Average grades out when assignments are reworked, or grade on corrected work.

- preferential seating
- extended time on tests and assignments
- reduced homework or classwork
- verbal, visual, or technology aids
- modified textbooks or audio-video materials
- behavior management support
- adjusted class schedules or grading
- verbal testing
- excused lateness, absence, or missed classwork
- pre-approved nurse's office visits and accompaniment to visits
- occupational or physical therapy

At Risk

- Have student restate information
- Provision of notes or outlines
- Concrete examples
- Assistance in maintaining uncluttered space
- Weekly home-school communication tools (notebook, daily log, phone calls or email messages)
- Peer or scribe note-taking
- Lab and math sheets with highlighted instructions
- Graph paper to assist in organizing or lining up math problems
- Use of manipulatives
- No penalty for spelling errors or sloppy handwriting
- Follow a routine/schedule
- Teach time management skills
- Verbal and visual cues regarding directions and staying on task

- Adjusted assignment timelines
- Visual daily schedule
- Immediate feedback
- Work-in-progress check
- Pace long-term projects
- Preview test procedures
- Cue/model expected behavior
- Use peer supports and mentoring
- Chart progress and maintain data

Gifted and Talented

- Offer the Most Difficult First
- Pretest for Volunteers
- Offer choice
- Speak to Student Interests
- Allow G/T students to work together
- Tiered learning
- Focus on effort and practice
- Encourage risk taking