

Unit # 1: The Real Number System

Content Area: **Mathematics**
Course(s): **College Prep Math 2**
Time Period: **January**
Length: **12 days**
Status: **Published**

Unit Overview

In this unit, the concept of exponents is incorporated into the rules for order of operations. Basic inequalities and the identification of the various inequality symbols are also covered in this unit. The concepts of variables, expressions, and equations are presented in are presented in this unit . Literal skills are addressed through the translation of sentences into equations. Focus will be on using the four operations and the properties of real numbers to simplify numerical and algebraic expressions.

Enduring Understandings

- Algebraic and numeric procedures are interconnected and build on one another to produce a coherent whole.
- Variables are symbols that take the place of numbers or ranges of numbers; they have different meanings depending on how they are being used.

Essential Questions

- How are arithmetic operations related to functions?
- How can numeric operations be extended to algebraic objects?

Standards / Indicators / Student Learning Objectives (SLOs)

- SWBAT add tow numbers with the same signs and different signs.
- SWBAT apply the rules for order of operations properly.
- SWBAT clssify numbers and graph them on number lines.
- SWBAT combine like terms.
- SWBAT compare two real numbers and determine which is less.
- SWBAT distinguish between expressions and equatins.
- SWBAT evaluate algebraic expressions, given values for the variables.
- SWBAT find the absolute value of a rel number.
- SWBAT find the difference of two numbers.
- SWBAT find the opposite of a real number.
- SWBAT find the product and quotient of two numbers with the same sign and two numbers with opposite signs.
- SWBAT identify terms, like terms, and numerical coefficients.

- SWBAT recognize and use the following symbols properly : ($\neq$, $<$, $>$, $\leq$, and $\geq$)
- SWBAT simplify expressions.
- SWBAT simplify subtraction problems that involve brackets.
- SWBAT translate phrases from words to algebraic expressions.
- SWBAT translate sentences to equations.
- SWBAT translate word statements to symbols.
- SWBAT use rules for order of operations with real numbers.
- SWBAT use the commutative , associative , identity, distributive, and inverse properties correctly .

MA.5.OA.A.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

MA.K-12.6 Attend to precision.

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

MA.K-12.7 Look for and make use of structure.

Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y .

MA.7.NS.A.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

MA.7.NS.A.1a Describe situations in which opposite quantities combine to make 0.

MA.7.NS.A.1c Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.

MA.7.NS.A.1d Apply properties of operations as strategies to add and subtract rational numbers.

MA.7.NS.A.2b Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.

MA.7.NS.A.2c Apply properties of operations as strategies to multiply and divide rational numbers.

MA.6.NS.C.6c Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

MA.6.EE.A.1	Write and evaluate numerical expressions involving whole-number exponents.
MA.6.EE.A.2c	Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).
MA.6.EE.B.6	Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

Lesson Titles :

- Adding Real Numbers
- Exponents, Order of Operations, and Inequality
- Multiplying and Dividing Real Numbers
- Properties of Real Numbers
- Real Numbers and the Number Line
- Simplifying Expressions
- Subtracting Real Numbers
- Variables, Expressions, and Equations

Career Readiness, Life Literacies & Key Skills

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.

Inter-Disciplinary Connections

LA.RH.11-12.4	Determine the meaning of words and phrases as they are used in a text, including analyzing how an author uses and refines the meaning of a key term over the course of a text (e.g., how Madison defines faction in Federalist No. 10).
LA.WHST.11-12.2.E	Provide a concluding paragraph or section that supports the argument presented.
SCI.HS-PS4-1	Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.
SCI.MS-LS4-6	Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

Instructional Strategies, Learning Activities, and Blooms/DOK:

- Review, examples, and practice with variable expressions and equations

- Examples and practice with translation of word statements into symbols.
- Review, examples, and practice using order of operations with exponents.
- Review, examples, and practice adding real numbers
- Review, examples, and practice classifying and ordering real numbers.
- Review, examples, and practice multiplying and dividing real numbers
- Review, examples, and practice simplifying expressions with variables
- Review, examples, and practice subtracting real numbers.
- Review, examples, and practice with identification of number properties.
- Review, examples, and practice with opposites and absolute value.
- Tutoring during Delsea One

Modifications

ELL Modifications

- Use manipulatives where possible
- Assess ELL students continuously using formative assessment methods
- Tap prior knowledge
- Use real objects when possible

IEP and 504 Modifications

- Allowing student to correct mistakes or answer wrong questions correctly for additional credit if failed the first test (another way to re-teach material)
- Less questions per page (so not visually overwhelming)
- Providing study guides that don't lead the student to study too much extraneous information (less unnecessary details)/scaffolded study guides
- Rewording questions so that there are not higher level vocabulary within the question

G & T Modifications

- Provide additional rigorous challenge problems for advanced students
- Additional reinforcement activities soliciting a deeper understanding of curriculum.
- Different test items
- Peer leadership or mentoring.

At Risk Modifications :

- Additional help during tutoring/Delsea One/Academic Enrichment
- Guided notes
- Hands-on Instruction
- Modeling and showing lots of examples
- Review, restate, reword directions
- Study guides
- Tutoring during Delsea One
- Visuals

Formative Assessment

- Accuplacer practice problem
- Begin the homework assignment and periodically check answers together
- Class discussions
- Graded classwork
- Graded homework
- Guided practice
- Individual practice
- Oral questioning
- Oral response
- Teacher observation
- Warm up problems - add 2 numbers with different signs
- Warm up problems - add 2 numbers with the same sign
- Warm up problems - classifying numbers and graphing them on number lines
- Warm up problems - comparing integers
- Warm up problems - evaluating algebraic expressions, given values for the variables
- Warm up problems - evaluating expressions involving variables
- Warm up problems - finding the absolute value of a real number
- Warm up problems - finding the opposite of a real number
- Warm up problems - finding the product of 2 negative numbers
- Warm up problems - finding the product of a positive and a negative number
- Warm up problems - identifying like terms and combining them correctly
- Warm up problems - identifying terms and numerical coefficients
- Warm up problems - interpreting the meaning of phrases containing inequality symbols
- Warm up problems - simplifying expressions from word phrases.
- Warm up problems - simplifying expressions using order of operations
- Warm up problems - translating phrases from words to algebraic expressions
- Warm up problems - translating sentences into equations
- Warm up problems - translating sentences to equations

- Warm up problems - translating word statements into symbols
- Warm up problems - translating words and phrases involving multiplication and division
- Warm up problems - translating words and phrases that indicate addition and subtraction
- Warm up problems - use rules for order of operations with real numbers
- Warm up problems - use subtraction with problems that involve brackets
- Warm up problems - using order of operations to multiply and divide signed numbers
- Warm up problems - using the commutative, associative, identity, inverse, and distributive properties correctly
- Warm up problems -finding the difference of 2 numbers
- Written work

Summative Assessment

- Accuplacer Practice Test
- Accuplacer Test
- Quiz on exponents, order of operations , variable expressions and equations, and adding real numbers - (sections 1.1 - 1.3)
- Unit Test on The Real Number System

Resources & Materials

- Computer Generated Warm Ups (see formative assessment section for specific topics)
- Internet worksheets (see formative assessment section for specific topics)
- Teacher made worksheets (see formative assessment section for specific topics)
- Text: Introductory Algebra (2010) (Ninth Edition)
- Warm up problems (see formative assessment section)

Technology

- Chrome book
- Internet Sources: <http://accuplacer.collegeboard.org/students>
- Math XL
- Smart Board

TECH.8.1.12.C

Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

TECH.8.1.12.D.CS2

Demonstrate personal responsibility for lifelong learning.