Unit # 6 Pre-Algebra

Content Area: **Mathematics**
Course(s):
Time Period: **September**
Length: **1 Marking Period**
Status: **Published**

Unit Overview

In this unit students will apply the rules for adding, subtracting, multiplying, and dividing integers to evaluating algebraic expressions. Students use the Cartesian coordinate system to graph points in all four quadrants of the coordinate grid. This unit will allow students to further their understanding of the number system. They will explore rational numbers and perform numerous operations using them.

Enduring Understandings

- Algebraic expressions and equations can help solve real-world application problems.
- Previous understanding of operations of numbers can be directly applied to rational numbers.
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- Rational numbers can be used to solve real word problems.
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Essential Questions

- How can we use rational numbers to solve real world application problems?
- How can you use ordered pairs to locate a point on the coordinate plane?
- How do operations affect rational numbers?
- How will you identify using verbal and arithmetic expression can be applied in solving real-world problems?
- What are some real life applications where integers can be used?
- What are the basic properties of Integers?
- What process can be used to compare rational numbers with each other?
- Why is it important to be able to perform any operations with fractions that are alike or not alike?
- Why is it important to be able to write rational numbers as decimals, percents, and fractions?

Student Learning Objectives (SLOs)

- Solve real world problems using rational numbers.
- Apply prior knowledge of the number system to problems involving integers.
- Apply prior knowledge of the number system to problems involving rational numbers.
- Apply properties to help simplify expressions

- Compare and Order Integers.
- Define variables
- Determine a given rule for a given pattern.
- Evaluate rational expressions by applying the rules for adding, subtracting, multiplying and dividing rational numbers.
- Evaluative integers by applying the appropriate rules for adding, subtracting, multiplying and dividing integers.
- Find absolute value to an expression.
- Graph points on a coordinate plane.
- Solve real world problems using integers.
- Transform rational numbers into decimals.
- Translate phrases into numerical expressions.
- Use equivalent expressions to demonstrate the relationship between quantities and determine simpler solutions to a problem
- Use graphs to represent relations.
- Use Order of Operations to evaluate expressions.
- Use variables to represent quantities in a real-world or mathematical problem by constructing simple equations and inequalities to represent problems.

Standards/Indicators

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.7.NS	The Number System
MA.7.NS.A	Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.
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.K-12.8	Look for and express regularity in repeated reasoning.
MA.7.NS.A.1a	Describe situations in which opposite quantities combine to make 0.
MA.7.NS.A.1b	Understand $p + q$ as the number located a distance $\|q\|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
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.2	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
MA.7.NS.A.2a	Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
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.7.NS.A.2d	Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.
MA.7.NS.A.3	Solve real-world and mathematical problems involving the four operations with rational numbers.
MA.7.EE.A	Use properties of operations to generate equivalent expressions.
MA.7.EE.A.1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
MA.7.EE.A.2	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.
MA.7.EE.B	Solve real-life and mathematical problems using numerical and algebraic expressions and equations.
MA.7.EE.B.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.

Lesson Titles

- Adding and Subtracting Like Fractions
- Adding and Subtracting Unlike Fractions
- Adding Integers
- Comparing and Ordering Fractions and Decimals
- Comparing and Ordering Integers and Absolute Value
- Dividing Integers
- Dividing Rational Numbers
- Dividing Rational Numbers
- Graphing in 4 Quadrants
- Multiplying Integers
- Multiplying Rational Numbers
- Ordered Pairs and Relations
- Properties

- Rational Numbers
- Subtracting Integers
- Variables and Expressions
- Words and Expressions
- Words, Expressions, Tables and Graphs

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.

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

- Apply and justify the properties to simplify algebraic expressions with a partner.
- 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 worksheets on using order of operations to evaluate expressions.
- Discuss Ordered Pairs and Relations
- Examples of translating phrase into expressions and vice versa
- Graphing ordered pairs on a coordinate plane.
- Introduction, notes and examples on converting fractions to decimals and vice versa.
- Introduction, notes, examples on adding, subtracting, multiplying and dividing integers.
- Introduction, notes, examples on adding, subtracting, multiplying and dividing rational numbers.
- Introduction, notes, examples on using order of operations
- Note cards on converting fractions & decimals
- Note cards on Integer Rules
- Review homework - student work on board
- Review Properties
- Students will work as a group or with a partner.
- Students will work independently.
- Tutoring during Academic Enrichment
- Using number lines to compare and order integers
- Using Number lines to compare and order rational numbers
- Using number lines to find absolute value
- Worksheet on compare and order rational numbers.

Modifications

ELL Modifications

Content specific vocabulary important for ELL students to understand include:

Tools of Algebra

Order of Operations, Key words for Adding, Subtracting, Multiplying and Dividing, different forms of parenthesis

Integers

integer, inverse, fractions, decimals, numerator, denominator, cross simplify, reciprocal, improper fraction, mixed number, least, greatest

Operations with Rational Numbers

Fraction, numerator/denominator, greatest/least, absolute value, signs, negative, opposite, improper fraction, mixed number, inverse

- Anticipate where needs will be
- Assign a peer to help keep student on task
- Break tests down in smaller increments
- 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
- 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
- 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
- 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 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
- Think in concrete terms and provide hands-on-tasks
- Tutoring during Academic Enrichment
- Use a balance to show how equations are solved
- Working contract between you and student at risk

G & T Modifications

- Compare and order with more integers and rational numbers
- Evaluating algebraic expressions with more than one variable
- Have students create their own number lines and coordinate planes when asked to graph
- Introduce operations (addition, subtraction, multiplication, division) with integers
- Mixing all types of rational numbers when comparing and ordering them
- Multi-step equations containing only fractions
- Multi-step equations containing variables on both sides of the equal sign
- Simplifying algebraic expressions with multiple terms and variables
- Simplifying numerical expressions with more than 4 operations involved
- Tutoring during Academic Enrichment

Formative Assessment

- Choral Responses
- Collaborative work
- Constructed Responses
- Crossmatics
- Exit Card - Order of Operations
- Graphing Worksheets
- Guided Practice
- Hand Signals
- Independent Practice
- PARCC Questions - Compare and Order Rational Numbers
- PARCC Questions - Coordinate Plane
- PARCC Questions - Integer Rules
- PARCC Questions - Order of Operations
- PARCC Vocabulary
- Quick Quizzes
- Quiz - Adding & Subtracting Integers
- Quiz - Adding and Subtracting Rational Numbers
- Quiz - benchmark fractions
- Quiz - Comparing and Ordering Rational Numbers
- Quiz - Multiplying and Dividing Integers
- Quiz - Multiplying and Dividing Rational Numbers
- Quiz - Order of Operations
- Quiz - Properties
- Quiz on Writing expressions
- 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 Fractions, decimals, adding and subtracting rational numbers
- Mid Chapter Tests Comparing and ordering integers, adding and subtracting integers
- Project - Coordinate graph

- Test on Integers
- Test on Order of Operations
- Test on Rational Numbers
- Unit Tests

Benchmark Assessments (MPAs)

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

Resources & Materials

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

Technology

Intro to Integers video https://www.youtube.com/watch?v=x0E4vxLydNY

Postive likes video https://www.youtube.com/watch?v=_OBlgSz8sSM

Negative Dislikes video https://www.youtube.com/watch?v=kffacxfA7G4&disable_polymer=true

Algebra tiles http://www.glencoe.com/sites/common_assets/mathematics/ebook_assets/vmf/VMF-Interface.html

Integer Game http://www.arcademics.com/games/orbit-integers/orbit-integers.html

- 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.