Unit 1: Algebra Fundamentals

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Week 1**
Length: **4 Weeks**
Status: **Published**

Unit Overview

In this unit, students will review and build upon concepts covered in Pre-Algebra. These will include evaluating algebraic and numeric expressions using real numbers, applying the order of operations to solve problems, writing and translating algebraic expressions, finding absolute value, solving problems with integers and rational numbers, calculating unit rates, applying the distributive property, applying the properties of addition and multiplication, and finding square roots

Standards

MA.A-SSE.A.1	Interpret expressions that represent a quantity in terms of its context.
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.
MA.8.NS.A.1	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.
MA.A-SSE.A.1a	Interpret parts of an expression, such as terms, factors, and coefficients.
MA.8.NS.A.2	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2).
MA.A-SSE.A.1b	Interpret complicated expressions by viewing one or more of their parts as a single entity.
MA.A-SSE.A.2	Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.
MA.A-SSE.B.3	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
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.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.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.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.
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.
MA.N-VM.C.6	Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.
MA.N-VM.C.7	Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled.
MA.N-VM.C.8	Add, subtract, and multiply matrices of appropriate dimensions.
MA.N-VM.C.9	Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties.

Essential Questions

1. What makes an algebraic algorithm both effective and efficient?

2. How can change be represented mathematically?

Application of Knowledge and Skills...

Students will know that...

- 1. Fractions and decimals can be used to represent the same number.
- 2. An exponent indicates repeated multiplication of a factor.
- 3. Verbal sentences can be translated into mathematical equations or inequalities.
- 4. Real numbers can be compared and ordered.
- 5. Properties of addition and multiplication can be used to simplify expressions.
- 6. Algebraic expressions can be evaluated.
- 7. Order of operations can be applied to simplify expressions.
- 7. Order of operations can be applied to simplify expressions.
- 8. Square roots can be rational or irrational.

Students will be able to:

- A. Evaluate algebraic expressions and use exponents.
- B. Use the order of operations to evaluate expressions.
- C. Translate verbal phrases into expressions.
- D. Translate verbal sentences into equations or inequalities.
- E. Graph and compare positive and negative numbers.
- F. Add, subtract, multiply, and divide positive and negative numbers.
- G. Apply the distributive property.

Assessments

- Communicator Practice Diagnostic: Other written assessments
- Daily Warm-Up Problems Diagnostic: Other written assessments Students will complete daily warm-up problems to assess readiness.
- Pre-Test Diagnostic: Written Test
- Quiz 2 Formative: Written Test
- Students will complete one or two problems to assess knowledge and skills learned during the class period
- Students will solve practice problems on communicators to receive immediate feedback.
- Students will take a pre-course pre-test.
- Students will take a quiz on using all four operations with real numbers
- Students will take a test on all material covered in the unit.
- Ticket to Leave Problems Formative: Other written assessments
- Unit Test Summative: Written Test

Activities

Textbook Scavenger Hunt

Students will complete a scavenger hunt to become familiar with the textbook.

I Have, Who Has, Translating Verbal Expressions Game

Each student will get a card with either a verbal or algebraic expression on it. Students must match the verbal expression with the appropriate algebraic expression.

Real Number Bingo

Students will play bingo with a focus on solving problems with rational numbers and integers.

Human Number Line

Each student will get a card with a real number on it. Students will have to get in order from least to greatest.

Graphic Organizer: Real Numbers

Students will complete a graphic organizer that organizes the real, rational, and whole numbers, and integers.

Four-Corners Mathematical Properties Game

Students are given a card with an expression on it. They must go to the appropriate wall or corner in the room where the name of the property it represents is listed.

Worksheet Races

Students will work in small groups to solve problems. They will check their answers with the teacher. The goal is to complete all problems accurately and as quickly as possible.

Modeling the Distributive Property

Students will model the distributive property using algebra tiles.

Patterns and Expressions Activity

Students will use an algebraic expression to describe geometric patterns.

Graphing Calculator Activity Using Order of Operations

Students will use the graphing calculator to evaluate the BMI (Body Mass Index) for men and women.

Enrichment Activity:Add, subtract, and multiply matrices

Matrix Magic

Students will perform all three operations using matrices.

Order of Operations Activity

Activities to Differentiate Instruction

Differentiation for special education:

- General modifications may include:
  - Modifications & accommodations as listed in the student's IEP
  - Assign a peer to help keep student on task
  - Modified or reduced assignments
  - Reduce length of assignment for different mode of delivery
  - Increase one-to-one time
  - Working contract between you and student at risk
  - Position student near helping peer or have quick access to teacher
  - Break tests down in smaller increments

- **Content specific modifications may include:**
  - Provide personal handout for integer rules
  - Provide graphic organizer for remembering angle relationships
  - Provide completed examples for practice work and homework.
  - Provide calculator to assist with calculations.
  - Provide students with a formula sheet with one type of problem for each formula worked out for them already.

Differentiation for ELL's:

- General modifications may include:
  - Strategy groups
  - Teacher conferences
  - Graphic organizers
  - Modification plan

- **Content specific vocabulary important for ELL students to understand include:** fraction, decimal, exponent, multiplication, factor, equation, inequality, real number, simplify, expression, order of operations, square pool, rational, irrational, positive number, negative number, distributive property

Differentiation to extend learning for gifted students may include:

- Challenge and enrichment homework, worksheets, and activity

- Optional weekly challenge problems

Integrated/Cross-Disciplinary Instruction

Resources

McDougal Littell Algebra 1 textbook and resource materials

Website: www.classzone.com (see link)

Kuta Software

Algebra with Pizzazz

Punchline Algebra

Smart Exchange Website (see link)

NJ Ask Review Workbook Grade 7

- McDougal Littel website
- Smart Exchange Website

21st Century Skills

CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace

	with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CRP.K-12.CRP11.1	Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
CRP.K-12.CRP12.1	Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.