

FOUNDATIONS OF ALGEBRA

Grade Level: 9, 10, 11, 12

Credit: 0.5 or 1.0

Prerequisite: None

Foundations of Algebra introduces algebraic concepts and prepares students for higher level math. It includes study of variables and expressions, algebraic properties, like terms, integer operations, fraction operations, decimals, number line analysis, solving equations, ratios & proportions, percent, and application of formulas. Study includes both math theory and real-life application of concepts. Appropriate technology, including calculators and application software, is used regularly for instruction and assessment.

Teacher Message

Lesson 1: Variables and Expressions

Learning Objectives

- Student will define and recognize a variable in an algebraic expression.
- Students will define and recognize a variable with exponents.
- Student will write and interpret algebraic expressions using variables, addition, subtraction, multiplication and division.
- Student will write and interpret algebraic expressions using inequalities.

Lesson 2. Evaluating Expressions

Learning Objectives

- Student will define the rules for Order of Operations.
- Student will apply the rules for Order of Operations to evaluate algebraic expressions.



Lesson 3. Properties Used in Algebra

Learning Objectives

- Student will recognize and apply ten algebraic properties: Additive Identity, Multiplicative Identity, Multiplicative Property of Zero, Reflexive Property, Symmetric Property, Transitive Property, Substitution, Distributive Property, Commutative Property and Associative Property

Lesson 4. Simplifying and Combining Like Terms

Learning Objectives

- Student will recognize "like" terms.
- Student will recognize constants.
- Student will recognize coefficients.
- Student will utilize the properties of algebra to simplify expressions that contain "like" terms, constants and coefficients.

Lesson 05. Integers and Adding Integers

Learning Objectives

- Student will recognize integers, fractions and decimals.
- Student will place integers, fractions and decimals on a number line.
- Student will perform addition with integers, from a number line perspective.

Lesson 6. Subtracting Integers

Learning Objectives

- Student will perform subtraction with integers, both positive and negative.



Lesson 7. Multiplying and Dividing Integers

Learning Objectives

- Student will perform multiplication and division with integers, both positive and negative.

Lesson 8. Integer Review

Lesson 9. Adding and Subtracting Fractions

Learning Objectives

- Student will define the numerator and denominator of fractions.
- Student will find the least common denominator of two or more fractions.
- Student will apply the rules for adding or subtracting fractions to perform those operations.

Lesson 10. Multiplying and Dividing Fractions

Learning Objectives

- Student will multiply and divide fractions.
- Student will write mixed numbers as improper fractions.
- Student will factor numerators or denominators, and cancel common factors.
- Student will reduce fractional results of multiplication or division.

Lesson 11. Fraction Review

Lesson 12. Decimals

Learning Objectives

- Student will add, subtract, multiply and divide decimals.



Lesson 13. Number Line Revisited

Learning Objectives

- Student will utilize number line placement to compare integers, fractions, mixed numbers and decimals.

Lesson 14. Equations

Learning Objectives

- Student will define and recognize equations
- Student will write equations that capture the meaning of a sentence or descriptive phrase.

Lesson 15. Solving Equations by Using Addition

Learning Objectives

- Student will solve equations by adding, using the concept of preserving equation balance and isolating a variable.

Lesson 16. Solving Equations Using Subtraction

Learning Objectives

- Student will solve equations by subtracting, using the concept of preserving equation balance and isolating a variable.

Lesson 17. Solving Equations Using Multiplication

Learning Objectives

- Student will solve equations by multiplying, using the concept of preserving equation balance and isolating a variable.



Lesson 18. Solving Equations Using More Than One Operation **Learning Objectives**

- Student will solve equations by adding, subtracting, multiplying or dividing, using the concept of preserving equation balance and isolating a variable.

Lesson 19. Solving Equations with The Variable On Both Sides **Learning Objectives**

- Student will solve equations with variables on both sides
- Student will solve equations by adding, subtracting, multiplying or dividing, using the concept of preserving equation balance and isolating a variable.

Lesson 20. More Equations **Learning Objectives**

- Student will solve complex equations requiring multiple steps of addition, subtraction, multiplication and division, and isolating a variable that appears on both sides of the equation.

Lesson 21. Equation Review

Lesson 22. Ratios and Proportions **Learning Objectives**

- Student will define and recognize a ratio
- Student will define and recognize a proportion
- Student will solve proportions by cross-multiplying.



Lesson 23. Percent
Learning Objectives

- Student will convert fractions to percent
- Student will solve percent problems by writing and solving proportions.

Lesson 24. Percent of Change
Learning Objectives

- Student will interpret percent of change problems.
- Student will write proportions from percent of change problems.
- Student will solve proportions to calculate percent of change.

Lesson 25. Formulas
Learning Objectives

- Student will solve problems, using the distance formula.
- Student will solve problems, using the simple interest formula.
- Student will review and utilize concepts from lessons 1 - 24.



Foundations of Algebra

Label	Outcome Description	Lesson
PA.1	articulate equations in verbal form	1
PA.2	recognize basic mathematic operations in a myriad of written forms	1
PA.3	formulate basic algebraic expressions	1
PA.4	evaluate exponents from both verbal and numeric expressions	1
PA.5	evaluate expressions following the order of operations	2
PA.6	solve basic equations through an intuitive understanding of addition and subtraction	14
PA.7	identify and use properties of numbers (commutative, associative, distributive, etc.).	3, 4, 10, 19, 20, 22
PA.8	add, subtract, multiply, and divide decimals, integers, fractions and mixed numbers.	5 - 13
PA.9	use order relations to compare, order, or locate whole numbers, integers, fractions, and decimals on a number line.	5, 9, 13
PA.10	substitute values, evaluate expressions involving variables, and calculate formulas to solve application problems.	2, 4, 25
PA.11	use ratios and proportions to solve for unknown variables	22
PA.12	recognize percents as a basic proportion of 100, and use percents in equations	23
PA.13	follow algebraic methods to arrive at non-intuitive results	4,
PA.14	solve equations with one operation. Operations include addition, subtraction, multiplication, and division.	5 - 19
PA.15	solve equations with variables on both sides	19
PA.16	solve multi-step linear equations in one variable and apply skills toward solving practical problems.	18 - 25

