

Pre-Algebra Learning Targets

The following are the learning targets for Pre-Algebra. They are the concepts a student in Pre-Algebra should know and be able to apply consistently by the end of each unit. Since mathematics is cumulative in nature, many learning targets are expected to be used not only in the unit where they are introduced, but throughout the course. The learning targets are broken up by quarter and by unit of study. Since we do not have a textbook for Pre-Algebra, it is very important for students to keep organized copies of the notes we take in class to ensure progression towards the learning targets.

1st Quarter:

Unit 1: Problem Solving and The Language of Algebra

1. Use problem solving strategies such as finding a pattern, making a table, drawing a diagram, using logical reasoning, and working backward.
2. Perform addition, subtraction, multiplication, and division of whole numbers without using a calculator.
3. Simplify expressions using the Order of operations (PEMDAS) on whole numbers.
4. Write an expression involving whole numbers and exponents in expanded form.
5. Simplify expressions with exponents and square roots on whole numbers.
6. Recognize that a square root undoes squaring.
7. Identify arithmetic operation key words and translate from English to algebra and vice-versa.
8. Understand when to use a variable and how to assign variable.
9. Apply commonly used unit conversions and the factor-label method to convert units.

Unit 2: Integers

1. Use the number line to order integers.
2. Use integers to model a real-life situation.
3. Perform addition, subtraction, multiplication, and division of integers without using a calculator.
4. Predict the sign of an answer without using a calculator.
5. Simplify expressions using the Order of operations (PEMDAS) on integers.
6. Write an expression involving integers and exponents in expanded form.
7. Simplify expressions with exponents and square roots on integers.
8. Identify valid and invalid uses of the commutative, associative, and distributive properties.
9. Define absolute value as the distance from zero.
10. Evaluate absolute value problems.
11. Plot points on the coordinate plane and describe their positions.

Unit 3: Solving Equations and Inequalities

1. Simplify expressions by distributing and combining like terms.
2. Undo operations with their inverse operation (e.g., undo addition with subtraction).
3. Solve an equation in one-variable.
4. Solve an inequality in one-variable.
5. Recall when to reverse the direction of an inequality when solving (if you multiply or divide by a negative number).
6. Represent the solution to an inequality graphically.
7. Verify a solution to an equation or inequality.
8. Define unknowns for a real-world problem.
9. Write an equation to model a real-world problem.

Unit 4: Introduction to Geometry

1. Recognize the similarities and differences between segments, lines, rays, and angles and use correct notation for each.
2. Classifying an angle is acute, right, or obtuse.
3. Measure and construct acute, right, and obtuse angles using protractors.
4. Measure and construct linear distances using rulers.
5. Construct various geometric shapes using a protractor and ruler.
6. Appropriately name and label angles and figures.
7. Use the definition of the angles of a triangle add up to 180° to find missing angles.
8. Determine the perimeters and areas of different closed figures such as rectangles, triangles, and circles.
9. Add and subtract areas to find the areas of combined figures or areas with pieces that are removed.

2nd Quarter:

Unit 5: Percents, Fractions, Decimals

1. Convert between fraction, decimal, percent.
2. Solve percent applications using fraction bars, multiplication, and proportions.
3. Use the key word “of” to write and solve equations.
4. Use the concept of “percent means per 100” to write and solve proportions.
5. Find percent of increase or decrease.
6. Recognize equivalent fractions.
7. Reduce a fraction to lowest terms.
8. Multiply and divide fractions.
9. Add and subtract fractions.
10. Solve an equation involving fractions in one-variable.
11. Solve equations containing fractions by clearing the denominators.

Unit 6: Statistics

1. Collect data from student created surveys.
2. Calculate and analyze measures of central tendency.
3. Order a set of data.
4. Locate the minimum, maximum, and quartile values after data is ordered.
5. Describe data with a useful graphic representation.
6. Make an inference or answer a question based on examining data.
7. Create various graphic representations of data (e.g., histogram, box plot).

Unit 7: Proportions and Similarity

1. Write a ratio as the comparison of two quantities.
2. Write a proportion as equivalent ratios.
3. Determine ratios and rates in lowest terms and include appropriate labels.
4. Setup proportions from real-world problems and use cross multiplying to solve.
5. Appropriately label the answer to solving the unknown in a proportion.
6. Determine if shapes are similar and provide supportive evidence.
7. Use the properties of similar figures to find missing angle measures and to setup proportions to solve for unknown lengths of sides.
8. Create a scale drawing or model using a scale factor.

3rd Quarter:

Unit 8: Linear Equations

1. Plot points on the Cartesian plane.
2. Find ordered pairs that are solutions to a linear equation.
3. Calculate slope as rise/run or using the slope formula.
4. Describe slope in a table, in a written statement, with a graph, or using the slope formula.
5. Understand the difference between a line with positive slope and one with negative slope.
6. Solve for y to put an equation in slope-intercept form
7. Find the equation of a line (given a graph, given the slope and a point on the line, given two points on the line).
8. Model a real-world situation using a linear equation.
9. Interpret the slope and y-intercept of a real-world linear equation.
10. Use a linear model to make a prediction.

Unit 9: Systems of Linear Equations (two variables)

1. Solve a system graphically or algebraically using substitution or elimination.
2. Write solutions to a system as intersection points or ordered pairs.
3. Model real-world problems using linear systems, determine what the variables represent, solve the system, and write the solution as a sentence using the real-world context.
4. Determine the reasonableness of answers to real-world problems, and check solutions.

Unit 10: Exponents

1. Use exponents to represent repeated multiplication.
2. Rewrite an exponential expression in expanded form.
3. Perform operations using exponents.
4. Apply the rules of exponents.
5. Evaluate an exponential expression without a calculator.
6. Recognize the difference between a negative number raised to an exponent and the opposite of a positive number raised to an exponent.
7. Use scientific notation.
8. Apply commonly used unit conversions, use the factor-label method to convert units, and record answers using scientific notation.

Unit 11: Polynomials and Factoring

1. Determine whether an expression is a polynomial, and describe the type of polynomial.
2. Classify a polynomial by degree or number of terms.
3. Add and subtract polynomials (combine like terms).
4. Distribute a monomial to a polynomial.
5. Model the product of binomials using the box method.
6. Distribute a binomial to a binomial using FOIL.
7. Model the product of a binomial and trinomial using the box method.
8. Distribute a binomial to a trinomial using the above/below method.
9. List factors of integers.
10. Use a factor tree to determine the prime factorization.
11. Find and factor out the greatest common factor.
12. Factor the difference of squares.
13. Factor a trinomial in the form $x^2 + bx + c$.
14. Factor a perfect square trinomial.
15. Factor a trinomial in the form $ax^2 + bx + c$, where a and c are prime numbers.
16. Verify factors by multiplying.

4th Quarter:

Unit 12: Simplifying Square Roots

1. Find the square root of a square integer.
2. Recognize that some numbers do not have a real number square root (i.e. square root of a negative number).
3. Approximate the square root of a non-square integer.
4. Simplify radicals by removing perfect square factors.
5. Recognize that some integers do not have perfect square factors.
6. Multiply radicals and simplify.
7. Simplify radicals of a quotient.
8. Add and subtract radicals by combining like terms.

Unit 13: Pythagorean Theorem and Right Triangles

1. Find the hypotenuse of a right triangle given the two legs.
2. Find the missing leg of a right triangle given the hypotenuse and other leg.
3. Use the Pythagorean Theorem to determine if a triangle is a right triangle and draw a sketch.
4. Find the distance between two points on the coordinate plane using a right triangle.
5. Apply the Pythagorean Theorem to real-world situations.
6. Record solutions as exact answers and as approximate values.

Unit 14: Quadratics

1. Use the zero product property to find solutions to quadratics in factored form.
2. Solve quadratics by factoring and using the zero product property.
3. Solve a quadratic using the quadratic formula.
4. Create a table of values to graph a parabola.
5. Use symmetry to assist in graphing a parabola.
6. Identify if a parabola opens up or down.
7. Identify if a parabola's vertex is a minimum or maximum.
8. Graph a quadratic by factoring, finding the x-intercepts, and finding the vertex (the average of the x-intercepts).