Questions Galore!

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STUDY GUIDE:
ALGEBRA TERMS

Absolute value: The positive number that describes the distance of a number from zero on a number line. For example, the absolute value of 7 is 7. The absolute value of -9 is 9, and the absolute value of zero is zero.

Abstract fraction: A fraction that contains one or more variables.

Additive identity: The number 0.

Additive inverse: A number that is added to another number, resulting in a sum of zero.
7 and -7 are additive inverses. Opposites are the same as additive inverses.

Algebra: A branch of mathematics that uses variables to express general rules about numbers, their relationships, and operations.

Algebraic expression: A group of numbers, symbols, and variables that express an operation or a series of operations.

Algorithm: A step-by-step procedure used when solving any mathematical operation.

Axiom: A postulate or statement that is assumed to be true, even if there is no actual proof of its validity.

Base: In algebra, the base is the number that is raised by a power. In the expression 7^3, the 7 is the base.

Binomial: A polynomial with two terms.   The expressions $7x - 12$ and $x^5 + 3x$ are binomials.

Brackets: Grouping symbols used in a mathematical expression. [ ]

Certain event: An event that is definitely going to occur. It has a probability of 1.

Chance: The probability that events will occur, usually expressed as a fraction, decimal, ratio, or percentage.

Coefficient: The number that multiplies a variable or variables. 4 is the coefficient of $4xy^2$.

Composite number: A number that is divisible by at least two factors.

Conditional equation: An equation whose truth or falsity depends on the numbers used to replace the variables in the equation.

Conjunction: Two conditions of a statement that must both be true in order for the entire statement to be true.

Consecutive integers: Integers that are one unit apart. 1, 2, 3, 4, and 5 are consecutive integers. Consecutive even integers are even numbers that appear in sequence. 2, 4, 6, 8, and 10 are consecutive even integers. Consecutive odd integers are odd numbers that appear in sequence. 3, 5, 7, 9, and 11 are examples of consecutive odd integers.

Consistent equations: Equations that have a single solution.

Constant: A quantity whose value does not change or vary.

Contrapositive: A logical assumption that can be made by expressing an if/then statement in negative terms. An if/then statement states: If $y = 56$, then $x = 18$. The contrapositive of this statement is: If y does not equal 56, then x does not equal 18.

Coordinates: The x and y values assigned to a point on a coordinate graph. In the ordered pair (9, 7), the 9 refers to the position of the point on the x-axis and the 7 refers to the position of the point on the y-axis. A coordinate graph always displays points as ordered pairs.

Correlation: An association between two variables in the field of statistics.

Cross-products: The numbers represented by taking two pairs of fractions and multiplying the numerator of the first fraction by the denominator of the second fraction and vice versa. For example, take the fractions $^2/_3$ and $^5/_6$. The cross-products would be 2 x 6 and 5 x 3. This method provides a way of determining whether a proportion is true.

Cube root: The number that must be multiplied by itself and then by itself again to obtain another number. The cube root of 125 is 5, because 5 x 5 x 5 = 125.

Cubic equation: A polynomial equation in which the highest power of a variable is three. For example, $3x^3 + 5x + 4 = 8$.

Degree of a polynomial: 1) The degree of its highest-degree term. For example, $4x^2 + xyz + 6n$ is a third-degree polynomial because the degree of its highest degree term (xyz) is 3. The degree of the equation $x^3 = y^2 - x$ is 3 because 3 is the highest exponent used in the equation.

Degree of a term: The sum of the exponents of all the variables in a term. For example, $5x^3$ and $8xyz$ are all third-degree terms. The degree of x^4y^2 is 6. The degree of xyz^7 is 9, because the exponent for both the x and the y is 1.

Dependent variable: A variable whose value depends on the value assigned to another variable, called the independent variable. In the expression $y = 5x + 7$, y is the dependent variable. If the value of x, the independent variable, is 9, the value of y is 52. If the value of x is 10, the value of y is 57.

Dependent events: Two events in which the outcome of the first event affects the outcome of the second event.

Deviation: The difference between a number in a set of data and the mean of all the numbers in the set.

Direct variation: A relationship between two variables in which the value of one variable is the product of a constant and the value of the other variable. For example, the equation $y = 5x$ defines a direct variation between x and y.

Disjunction: Only one condition of the two statements given in a condition must be true in order for the statement to be true.

Distribution: The frequency pattern that appears for a set of data.

Domain: The set of numbers, which are permissible replacement values for the independent variable in a particular equation or inequality.

Empty set: A set containing no members.

Equally likely: Two or more possible outcomes of a given situation that have the same probability, or the same chance of occurring.

Equation: An algebraic statement consisting of two algebraic expressions connected by an equal sign.

Equivalent: Equal in value.

Equivalent expression: Two different ways to write an expression. For example, $3(3x - 1)$ can also be written as $9x - 3$. Thus the two values are equivalent expressions.

Estimation: An approximation or rough calculation of a number that is close to another number.

Evaluate: A verb meaning to find the value of a mathematical expression.

Experimental probability: A statement of probability based on the results of a series of trials.

Exponent: A number that indicates how many times the base is multiplied by itself. In the expression $8x^4$, 4 is the exponent.

Expression: A variable or combination of variables, numbers, and symbols that represents a mathematical relationship.

Extremes: The first and last terms in the ratios of a proportion. In the proportion a/c = d/g, the extremes are a and g.

Factor: A number or expression that is multiplied by another number or expression to produce a product. 3 and 6 are factors of 18.

Factorial (!): The product of a whole number and every positive whole number less than itself. Factorial is abbreviated as n! and pronounced as n factorial. For example, 4! is equal to 4 x 3 x 2 x 1, or 24.

Factorize: (1.) To find the factors of a number or expression. (2.) To write a number or expression as a product of its factors.

Favorable outcome: In probability, the outcome you are interested in measuring.

Formula: A general mathematical statement or rule.

Frequency: The number of times something occurs in an interval.

Function: A relation in which every value of x has a unique value of y.

Functional notation: The use of letters and parentheses to indicate a functional relationship. For example, $f(x) = x^3 + 3x + 2$. If $f(x) = 4$, then $f(x) = x^3 + 3x + 2$ is 78, as the number 4 replaces each x in the equation.

Greatest common factor: The largest possible factor of two or more integers. The greatest common factor of 20 and 36 is 4.

Independent event: An event whose outcome does not influence or affect the outcome of other events.

Independent variable: A variable in an equation whose value can be selected. In the equation $y = 3x - 18$, x is the independent variable. The value of y depends upon the value assigned to x.

Index: The number that indicates the root that is to be taken in any radical.

Inequality: A mathematical statement in which one of the values is larger or smaller than another. The symbols greater than (>), less than (<), greater than or equal to (≥) and less than or equal to (≤) are used when writing inequalities.

Integers: Whole numbers and their opposites.

Intercept: The place where a line, curve, or other surface is cut by another line. On a coordinate graph, the y-intercept is the place where the line of the graph intersects, or cuts, the y-axis.

Inverse operations: Two operations that undo each other. For example, addition and subtraction are inverse operations, as are multiplication and division.

Inverse variation: A comparison of two quantities such that their product is a constant. For example, the equation $xy = 12$ expresses an inverse relationship between x and y.

Irrational numbers: Numbers that cannot be expressed as finite or repeating decimals. The square root of 2 and the value assigned to pi are both irrational numbers.

Lead coefficient: The coefficient of a term in a polynomial with the greatest exponent. For example, in the polynomial $7x^2 - 4x + 2$ the lead coefficient is 7.

Least common multiple: The smallest whole number that is a multiple of two or more other whole numbers. For example, the least common multiple of 4, 12, and 9 is 36.

Like terms: Terms that have the same variables and the same corresponding exponents.

Linear equation: An equation where the highest power of a variable is one. For example, $5x + 8y = c$.

Logarithm (log): The number of times a factor is used to produce another number.

Mean: The mathematical average of a set of numbers.

Median: The middle number in a set of numbers when the set is arranged in sequence according to values.

Mode: The number that occurs most frequently in a set of numbers.

Monomial: An algebraic expression consisting of a number, a variable, or a product of numbers and variables. Each of the following is an example of monomial: 7, x, $3x^2$, $-8yz^4$.

Multiplicative inverse: Another name for the reciprocal. The multiplicative inverse of 4 is ¼ because the product of 4 and ¼ is 1.

Multivariable equation: An equation that contains more than one variable.

Natural numbers: The set of positive integers: 1, 2, 3, 4, …..

Null set: Another name for the empty set or the set that has no members.

Order of operations: The order in which operations are performed in an algebraic expression.

Ordered pair: A set of two numbers enclosed in parentheses that designate the value of the x point and the y point on a graph. The first number inside the parentheses refers to the x value and the second number refers to the y value.

Ordinate: The value of the y-coordinate on a coordinate graph.

Origin: The point (0, 0) on a coordinate graph. The x-axis and the y-axis intersect at this point.

Outcome: A possible result in a probability problem.

Pi: The ratio of the circumference of a circle to its diameter. The accepted values of pi are 3.14 and $^{22}/_7$.

Polynomial: A single term or the sum of two or more terms that contain whole number exponents on their variables. Polynomials can be monomials, binomials, or trinomials.

Power: A number to which a term is being raised by an exponent.

Prime number: A number having only two factors; itself and one.

Prime polynomial: A polynomial that cannot be factored.

Probability: The chance or likelihood of an event occurring.

Product: The result obtained by multiplying two numbers or variables.

Proportion: An equation showing that two ratios are equivalent.

Proportional: Having equivalent ratios.

Quadrant: One-fourth of a circle or coordinate graph.

Quadratic equation: A polynomial equation in which the highest power of the variable is 2. General form: $ax^2 + bx + c = 0$.

Quadratic trinomial: A trinomial in which the highest power of the variable is 2.

Quotient: The answer to a division problem.

Radical sign: Another name for the square root sign.

Range: The difference in value between the smallest member in a set and the largest number in that set.

Rate: A ratio comparing two different units.

Ratio: A comparison of two numbers. If x and y are quantities having the same units, the x/y is a ratio that compares the two numbers.

Rational number: A number that can be written as a fraction.

Rational expression: An algebraic expression that is written in fractional form.

Rational equation: An equation in which at least one term is a rational expression.

Real numbers: All negative numbers, zero, and all positive numbers. Rational numbers and irrational numbers are included in the set of all real numbers.

Reciprocal: Another name for the multiplicative inverse. Two numbers whose products equal one are reciprocals.

Repeating decimal: A number in which one or more digits repeat forever. For example, the decimal 0.898989 is a repeating decimal. This is often indicated by placing a straight line above the digits that repeat.

Rise: The vertical movement between two points on a line.

Run: The horizontal movement between two points on a line.

Rule of Three: From ancient Hindu mathematics: In a proportion, the product of the means equals the product of the extremes.

Scientific notation: A system of writing numbers using exponents and powers of ten. For example, $8{,}381 = 8.381 \times 10^3$.

Simplify: To break down into the simplest, most easily understood form.

Slope: A measure of a line's slant or the ratio of the rise to the run.

Slope-Intercept form: An equation $y = mx + b$ where m equals the slope of the line and b equals the y-intercept.

Square: To multiply a number by itself. Nine squared is 81.

Square root: The number that when multiplied by itself produces a particular number. 5 is the square root of 25 because 5 x 5 equals 25.

Solution: Any value for a variable that makes an equation true. For example, the solution of $2x = 24$ is $x = 12$.

Standard form: In reference to a polynomial equation, one in which the terms are in descending powers of the variable with all nonzero terms to the left of the equals sign.

Term: A number, variable, product, or quotient in an expression. A term is not a sum or difference. For example, in $6x^2 + 5x + 3$, there are three terms: $6x^2$, 5x, and 3.

Terminating decimal: A decimal that ends and does not repeat.

Trinomial: A polynomial with three terms.

Truncate: To cut off a number after a particular decimal place.

Variable: A letter or symbol used to represent an unknown number in an expression or equation.

x-axis: The horizontal line on a coordinate graph.

x- intercept: The point at which a line cuts across the x-axis of a graph.

y-axis: The vertical line on a coordinate graph.

y-intercept: The location along the y-axis where the line intercepts the y-axis.

Properties:

Additive Property of Equality: States that if a, b, and c are any real numbers such that $a = b$ then $a + b = b + c$ and $c + a = c + b$. In other words, if the same number is added to each side of an equation, the value remains the same.

Additive Property of Inequality: States that if a, b, and c are any real numbers such that $a > b$ then $a + c > b + c$ and $c + a > c + b$.

Associative Property of Addition: States that $(a + b) + c = a + (b + c)$, where a, b, and c stand for any real numbers and the grouping of the addends will not change the sum. In other words, a set of values can be added in any order and the sum will still be the same, no matter how the addends are grouped.

Associative Property of Multiplication: States that $(a \cdot b) \cdot c = a \cdot (b \cdot c)$, where a, b, and c stand for any real numbers and the grouping of the factors will not change the product. A group of numbers can be multiplied in any order and the product will always be the same.

Commutative Property of Addition: States that $(a + b) = (b + a)$, where a and b are any real numbers and the sum stays the same when the order of the addends is changed.

Commutative Property of Multiplication: States that $(a \cdot b) = (b \cdot a)$, where a and b are any real numbers and the product stays the same when the order of the factors is changed.

Distributive Property: States that $a \cdot (b + c) = (a \cdot b) + (a \cdot c)$ and that $a \cdot (b - c) = (a \cdot b) - (a \cdot c)$, where a b, and c stand for any real numbers. In words, this property states that multiplying a sum by a number is the same as multiplying each addend by that number and then adding the two products.