Keystone Exams: Algebra

Glossary to the Assessment Anchor & Eligible Content

The Keystone Glossary includes terms and definitions associated with the Keystone Assessment Anchors and Eligible Content. The terms and definitions included in the glossary are intended to assist Pennsylvania educators in better understanding the Keystone Assessment Anchors and Eligible Content. The glossary does not define all possible terms included on an actual Keystone Exam, and it is not intended to define terms for use in classroom instruction for a particular grade level or course.

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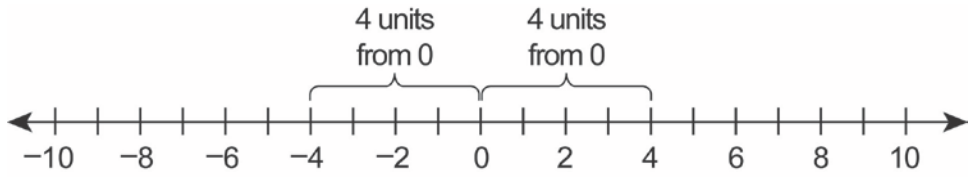
Absolute Value

A number's distance from zero on the number line. It is written |*a*| and is read "the absolute value of *a*." It results in a number greater than or equal to zero (e.g., |4| = 4 and |¯4| = 4). Example of absolute values of ¯4 and 4 on a number line:



Additive Inverse

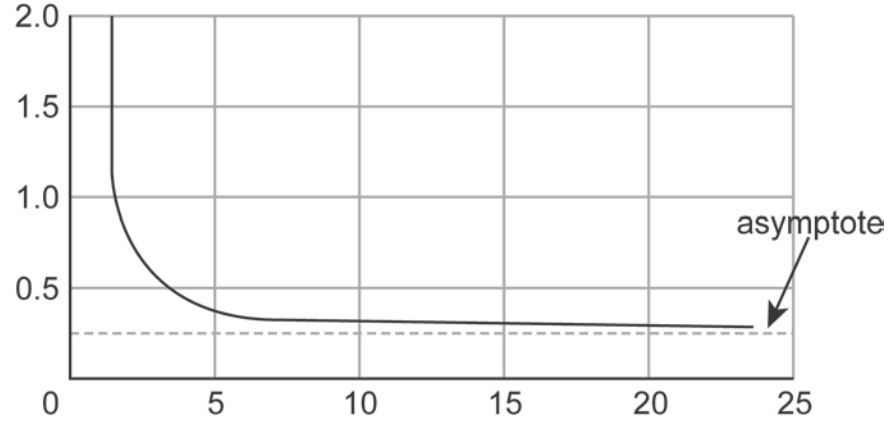
The opposite of a number (i.e., for any number *a*, the additive inverse is ¯*a*). Any number and its additive inverse will have a sum of zero (e.g., ¯4 is the additive inverse of 4 since 4 + ¯4 = 0; likewise, the additive inverse of ¯4 is 4 since ¯4 + 4 = 0).

Arithmetic Sequence

An ordered list of numbers that increases or decreases at a constant rate (i.e., the difference between numbers remains the same). Example: 1, 7, 13, 19, … is an arithmetic sequence as it has a constant difference of +6 (i.e., 6 is added over and over).

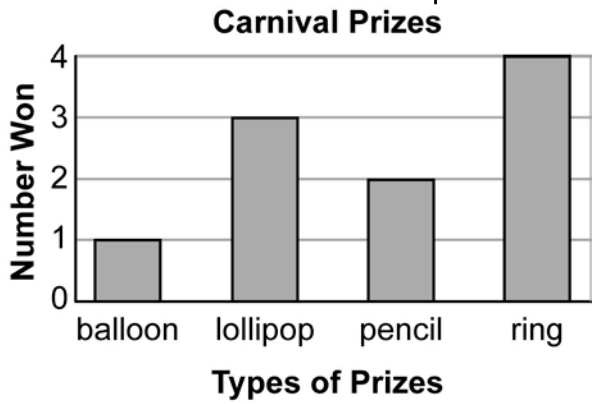
Asymptote

A straight line to which the curve of a graph comes closer and closer. The distance between the curve and the asymptote approaches zero as they tend to infinity. The asymptote is denoted by a dashed line on a graph. The most common asymptotes are horizontal and vertical. Example of a horizontal asymptote:



Bar Graph

A graph that shows a set of frequencies using bars of equal width, but heights that are proportional to the frequencies. It is used to summarize discrete data. Example of a bar graph:

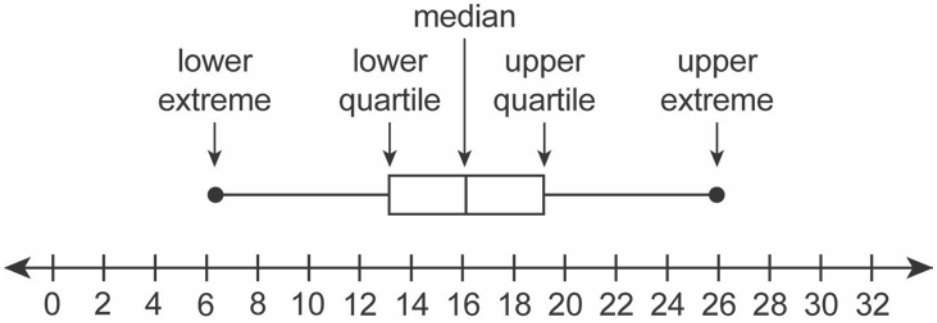


Binomial

A polynomial with two unlike terms (e.g., $3x + 4y$ or $a^3 - 4b^2$). Each term is a monomial, and the monomials are joined by an addition symbol (+) or a subtraction symbol (–). It is considered an algebraic expression.

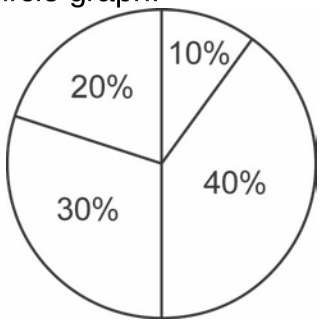
Box-and-Whisker Plot

A graphic method for showing a summary and distribution of data using median, quartiles, and extremes (i.e., minimum and maximum) of data. This shows how far apart and how evenly data is distributed. It is helpful when a visual is needed to see if a distribution is skewed or if there are any outliers. Example of a box-and-whisker plot:



Circle Graph (or Pie Chart)

A circular diagram using different-sized sectors of a circle whose angles at the center are proportional to the frequency. Sectors can be visually compared to show information (e.g., statistical data). Sectors resemble slices of a pie. Example of a circle graph:



Coefficient The number, usually a constant, that is multiplied by a variable in a term (e.g., 35 is the coefficient of $35x^2y$); the absence of a coefficient is the same as a 1 being present (e.g., x is the same as $1x$).

Combination An unordered arrangement, listing or selection of objects (e.g., two-letter combinations of the three letters X, Y, and Z would be XY, XZ, and YZ; XY is the same as YX and is not counted as a different combination). A combination is similar to, but not the same as, a permutation.

Common Logarithm A logarithm with base 10. It is written log x. The common logarithm is the power of 10 necessary to equal a given number (i.e., $\log x = y$ is equivalent to $10^y = x$).

Complex Number The sum or difference of a real number and an imaginary number. It is written in the form $a + bi$, where a and b are real numbers and i is the imaginary unit (i.e., $i = \sqrt{-1}$). The a is called the real part, and the bi is called the imaginary part.

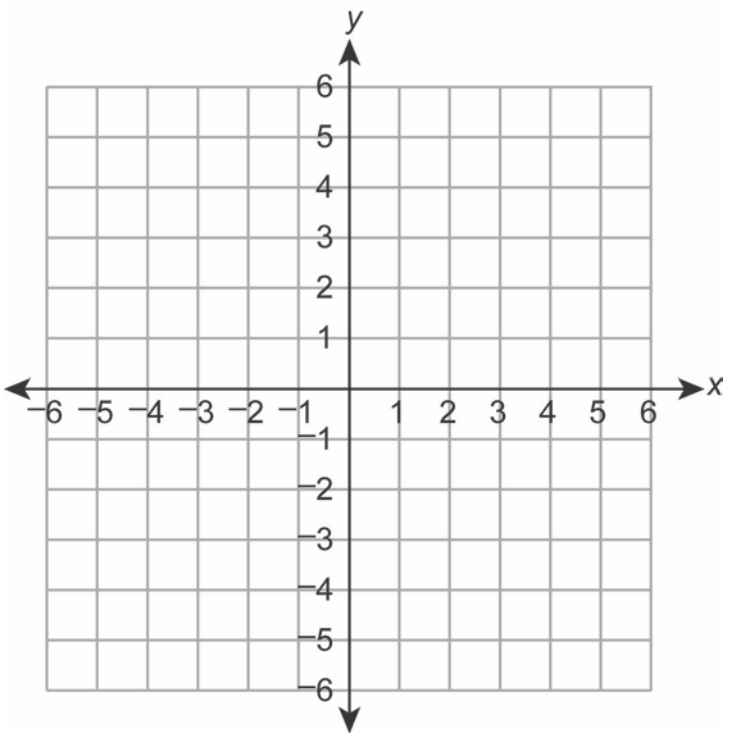
Composite Number Any natural number with more than two factors (e.g., 6 is a composite number since it has four factors: 1, 2, 3, and 6). A composite number is not a prime number.

Compound (or Combined) Event An event that is made up of two or more simple events, such as the flipping of two or more coins.

Compound Inequality When two or more inequalities are taken together and written with the inequalities connected by the words *and* or *or* (e.g., $x > 6$ and $x < 12$, which can also be written as $6 < x < 12$).

Constant A term or expression with no variable in it. It has the same value all the time.

Coordinate Plane A plane formed by perpendicular number lines. The horizontal number line is the *x*-axis, and the vertical number line is the *y*-axis. The point where the axes meet is called the origin. Example of a coordinate plane:



Cube Root — One of three equal factors (roots) of a number or expression; a radical expression with a degree of 3 (e.g., $\sqrt[3]{a}$). The cube root of a number or expression has the same sign as the number or expression under the radical (e.g., $\sqrt[3]{-343x^6} = -(7x^2)$ and $\sqrt[3]{343x^6} = 7x^2$).

Curve of Best Fit (for a Scatter Plot) — See line or curve of best fit (for a scatter plot).

Degree (of a Polynomial) — The value of the greatest exponent in a polynomial.

Dependent Events — Two or more events in which the outcome of one event affects or influences the outcome of the other event(s).

Dependent Variable — The output number or variable in a relation or function that depends upon another variable, called the independent variable, or input number (e.g., in the equation $y = 2x + 4$, y is the dependent variable since its value depends on the value of x). It is the variable for which an equation is solved. Its values make up the range of the relation or function.

Domain (of a Relation or Function) — The set of all possible values of the independent variable on which a function or relation is allowed to operate. Also, the first numbers in the ordered pairs of a relation; the values of the x-coordinates in (x, y).

Elimination Method — See linear combination.

Equation A mathematical statement or sentence that says one mathematical expression or quantity is equal to another (e.g., $x + 5 = y - 7$). An equation will always contain an equal sign (=).

Estimation Strategy An approximation based on a judgment; may include determining approximate values, establishing the reasonableness of answers, assessing the amount of error resulting from estimation, and/or determining if an error is within acceptable limits.

Exponent The power to which a number or expression is raised. When the exponent is a fraction, the number or expression can be rewritten with a radical sign (e.g., $x^{3/4} = \sqrt[4]{x^3}$). See also positive exponent and negative exponent.

Exponential Equation An equation with variables in its exponents (e.g., $4^x = 50$). It can be solved by taking logarithms of both sides.

Exponential Expression An expression in which the variable occurs in the exponent (such as 4^x rather than x^4). Often it occurs when a quantity changes by the same factor for each unit of time (e.g., "doubles every year" or "decreases 2% each month").

Exponential Function (or Model) A function whose general equation is $y = a \cdot b^x$ where a and b are constants.

Exponential Growth/Decay A situation where a quantity increases or decreases exponentially by the same factor over time; it is used for such phenomena as inflation, population growth, radioactivity or depreciation.

Expression A mathematical phrase that includes operations, numbers, and/or variables (e.g., $2x + 3y$ is an algebraic expression, 13.4 – 4.7 is a numeric expression). An expression does not contain an equal sign (=) or any type of inequality sign.

Factor (noun) The number or expression that is multiplied by another to get a product (e.g., 6 is a factor of 30, and $6x$ is a factor of $42x^2$).

Factor (verb) To express or write a number, monomial, or polynomial as a product of two or more factors.

Factor a Monomial To express a monomial as the product of two or more monomials.

Factor a Polynomial To express a polynomial as the product of monomials and/or polynomials (e.g., factoring the polynomial $x^2 + x - 12$ results in the product $(x - 3)(x + 4)$).

Frequency How often something occurs (i.e., the number of times an item, number, or event happens in a set of data).

Function A relation in which each value of an independent variable is associated with a unique value of a dependent variable (e.g., one element of the domain is paired with one and only one element of the range). It is a mapping which involves either a one-to-one correspondence or a many-to-one correspondence, but not a one-to-many correspondence.

Fundamental Counting Principle

A way to calculate all of the possible combinations of a given number of events. It states that if there are *x* different ways of doing one thing and *y* different ways of doing another thing, then there are *xy* different ways of doing both things. It uses the multiplication rule.

Geometric Sequence

An ordered list of numbers that has the same ratio between consecutive terms (e.g., 1, 7, 49, 343, … is a geometric sequence that has a ratio of 7/1 between consecutive terms; each term after the first term can be found by multiplying the previous term by a constant, in this case the number 7 or 7/1).

Greatest Common Factor (GCF)

The largest factor that two or more numbers or algebraic terms have in common. In some cases the GCF may be 1 or one of the actual numbers (e.g., the GCF of $18x^3$ and $24x^5$ is $6x^3$).

Imaginary Number

The square root of a negative number, or the opposite of the square root of a negative number. It is written in the form *bi*, where *b* is a real number and *i* is the imaginary root (i.e., $i = \sqrt{^-1}$ or $i^2 = {}^-1$).

Independent Event(s)

Two or more events in which the outcome of one event does *not* affect the outcome of the other event(s) (e.g., tossing a coin and rolling a number cube are independent events). The probability of two independent events (*A* and *B*) occurring is written *P*(*A* and *B*) or $P(A \cap B)$ and equals $P(A) \bullet P(B)$ (i.e., the product of the probabilities of the two individual events).

Independent Variable

The input number or variable in a relation or function whose value is subject to choice. It is not dependent upon any other values. It is usually the *x*-value or the *x* in *f*(*x*). It is graphed on the *x*-axis. Its values make up the domain of the relation or function.

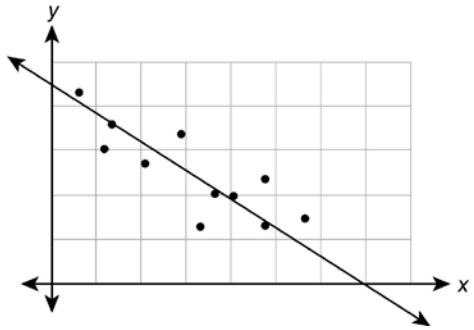
Inequality	A mathematical sentence that contains an inequality symbol (i.e., >, <, ≥, ≤, or ≠). It compares two quantities. The symbol > means greater than, the symbol < means less than, the symbol ≥ means greater than or equal to, the symbol ≤ means less than or equal to, and the symbol ≠ means not equal to.
Integer	A natural number, the additive inverse of a natural number, or zero. Any number from the set of numbers represented by {…, ⁻3, ⁻2, ⁻1, 0, 1, 2, 3, …}.
Interquartile Range (of Data)	The difference between the first (lower) and third (upper) quartile. It represents the spread of the middle 50% of a set of data.
Inverse (of a Relation)	A relation in which the coordinates in each ordered pair are switched from a given relation. The point (x, y) becomes (y, x), so (3, 8) would become (8, 3).
Irrational Number	A real number that cannot be written as a simple fraction (i.e., the ratio of two integers). It is a non-terminating (infinite) and non-repeating decimal. The square root of any prime number is irrational, as are π and e.
Least (or Lowest) Common Multiple (LCM)	The smallest number or expression that is a common multiple of two or more numbers or algebraic terms, other than zero.
Like Terms	Monomials that contain the same variables and corresponding powers and/or roots. Only the coefficients can be different (e.g., $4x^3$ and $12x^3$). Like terms can be added or subtracted.

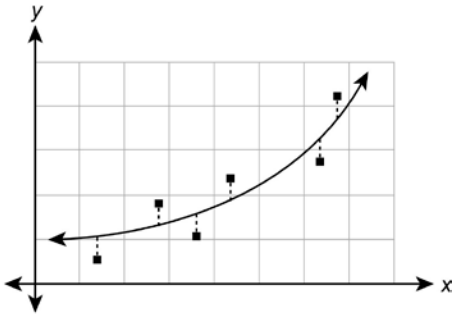
Line Graph

A graph that uses a line or line segments to connect data points, plotted on a coordinate plane, usually to show trends or changes in data over time. More broadly, a graph to represent the relationship between two continuous variables.

Line or Curve of Best Fit (for a Scatter Plot)

A line or curve drawn on a scatter plot to best estimate the relationship between two sets of data. It describes the trend of the data. Different measures are possible to describe the best fit. The most common is a line or curve that minimizes the sum of the squares of the errors (vertical distances) from the data points to the line. The line of best fit is a subset of the curve of best fit. Examples of a line of best fit and a curve of best fit:





Linear Combination

A method by which a system of linear equations can be solved. It uses addition or subtraction in combination with multiplication or division to eliminate one of the variables in order to solve for the other variable.

Linear Equation

An equation for which the graph is a straight line (i.e., a polynomial equation of the first degree of the form $Ax + By = C$, where A, B, and C are real numbers and where A and B are not both zero; an equation in which the variables are not multiplied by one another or raised to any power other than 1).

Linear Function

A function for which the graph is a non-vertical straight line. It is a first degree polynomial of the common form $f(x) = mx + b$, where m and b are constants and x is a real variable. The constant m is called the slope and b is called the y-intercept. It has a constant rate of change.

Linear Inequality

The relation of two expressions using the symbols <, >, ≤, ≥, or ≠ and whose boundary is a straight line. The line divides the coordinate plane into two parts. If the inequality is either ≤ or ≥, then the boundary is solid. If the inequality is either < or >, then the boundary is dashed. If the inequality is ≠, then the solution contains everything except for the boundary.

Logarithm

The exponent required to produce a given number (e.g., since 2 raised to a power of 5 is 32, the logarithm base 2 of 32 is 5; this is written as $\log_2 32 = 5$). Two frequently used bases are 10 (common logarithm) and e (natural logarithm). When a logarithm is written without a base, it is understood to be base 10.

Logarithmic Equation

An equation which contains a logarithm of a variable or number. Sometimes it is solved by rewriting the equation in exponential form and solving for the variable (e.g., $\log_2 32 = 5$ is the same as $2^5 = 32$). It is an inverse function of the exponential function.

Mapping

The matching or pairing of one set of numbers to another by use of a rule. A number in the domain is matched or paired with a number in the range (or a relation or function). It may be a one-to-one correspondence, a one-to-many correspondence, or a many-to-one correspondence.

Maximum Value (of a Graph)

The value of the dependent variable for the highest point on the graph of a curve.

Mean	A measure of central tendency that is calculated by adding all the values of a set of data and dividing that sum by the total number of values. Unlike median, the mean is sensitive to outlier values. It is also called “arithmetic mean” or “average”.
Measure of Central Tendency	A measure of location of the middle (center) of a distribution of a set of data (i.e., how data clusters). The three most common measures of central tendency are mean, median, and mode.
Measure of Dispersion	A measure of the way in which the distribution of a set of data is spread out. In general the more spread out a distribution is, the larger the measure of dispersion. Range and interquartile range are two measures of dispersion.
Median	A measure of central tendency that is the middle value in an ordered set of data or the average of the two middle values when the set has two middle values (occurs when the set of data has an even number of data points). It is the value halfway through the ordered set of data, below and above which there is an equal number of data values. It is generally a good descriptive measure for skewed data or data with outliers.
Minimum Value (of a Graph)	The value of the dependent variable for the lowest point on the graph of a curve.
Mode	A measure of central tendency that is the value or values that occur(s) most often in a set of data. A set of data can have one mode, more than one mode, or no mode.
Monomial	A polynomial with only one term; it contains no addition or subtraction. It can be a number, a variable, or a product of numbers and/or more variables (e.g., $2 \bullet 5$ or x^3y^4 or $\frac{4}{3}\pi r^2$).

Multiplicative Inverse The reciprocal of a number (i.e., for any non-zero number a, the multiplicative inverse is $\frac{1}{a}$; for any rational number $\frac{b}{c}$, where $b \neq 0$ and $c \neq 0$, the multiplicative inverse is $\frac{c}{b}$). Any number and its multiplicative inverse have a product of 1 (e.g., $\frac{1}{4}$ is the multiplicative inverse of 4 since $4 \bullet \frac{1}{4} = 1$; likewise, the multiplicative inverse of $\frac{1}{4}$ is 4 since $\frac{1}{4} \bullet 4 = 1$).

Mutually Exclusive Events Two events that cannot occur at the same time (i.e., events that have no outcomes in common). If two events A and B are mutually exclusive, then the probability of A or B occurring is the sum of their individual probabilities: $P(A \cup B) = P(A) + P(B)$. Also defined as when the intersection of two sets is empty, written as $A \cap B = \varnothing$.

Natural Logarithm A logarithm with base e. It is written ln x. The natural logarithm is the power of e necessary to equal a given number (i.e., $\ln x = y$ is equivalent to $e^y = x$). The constant e is an irrational number whose value is approximately 2.71828….

Natural Number A counting number. A number representing a positive, whole amount. Any number from the set of numbers represented by {1, 2, 3, …}. Sometimes, it is referred to as a "positive integer".

Negative Exponent An exponent that indicates a reciprocal that has to be taken before the exponent can be applied (e.g., $5^{-2} = \frac{1}{5^2}$ or $a^{-x} = \frac{1}{a^x}$). It is used in scientific notation for numbers between ⁻1 and 1.

Number Line A graduated straight line that represents the set of all real numbers in order. Typically, it is marked showing integer values.

Odds A comparison, in ratio form (as a fraction or with a colon), of outcomes. “Odds in favor” (or simply “odds”) is the ratio of favorable outcomes to unfavorable outcomes (e.g., the odds in favor of picking a red hat when there are 3 red hats and 5 non-red hats is 3:5). “Odds against” is the ratio of unfavorable outcomes to favorable outcomes (e.g., the odds against picking a red hat when there are 3 red hats and 5 non-red hats is 5:3).

Order of Operations Rules describing what order to use in evaluating expressions:

(1) Perform operations in grouping symbols (parentheses and brackets),
(2) Evaluate exponential expressions and radical expressions from left to right,
(3) Multiply or divide from left to right,
(4) Add or subtract from left to right.

Ordered Pair A pair of numbers used to locate a point on a coordinate plane, or the solution of an equation in two variables. The first number tells how far to move horizontally, and the second number tells how far to move vertically; written in the form (x-coordinate, y-coordinate). Order matters: the point (x, y) is **not** the same as (y, x).

Origin The point (0, 0) on a coordinate plane. It is the point of intersection for the x-axis and the y-axis.

Outlier A value that is much greater or much less than the rest of the data. It is different in some way from the general pattern of data. It directly stands out from the rest of the data. Sometimes it is referred to as any data point more than 1.5 interquartile ranges greater than the upper (third) quartile or less than the lower (first) quartile.

Pattern (or Sequence) A set of numbers arranged in order (or in a sequence). The numbers and their arrangement are determined by a rule, including repetition and growth/decay rules. See arithmetic sequence and geometric sequence.

Perfect Square A number whose square root is a whole number (e.g., 25 is a perfect square since $\sqrt{25} = 5$). A perfect square can be found by raising a whole number to the second power (e.g., $5^2 = 25$).

Permutation An ordered arrangement of objects from a given set in which the order of the objects is significant (e.g., two-letter permutations of the three letters X, Y, and Z would be XY, YX, XZ, ZX, YZ, and ZY). A permutation is similar to, but not the same as, a combination.

Point-Slope Form (of a Linear Equation) An equation of a straight, non-vertical line written in the form $y - y_1 = m(x - x_1)$, where m is the slope of the line and (x_1, y_1) is a given point on the line.

Polynomial An algebraic expression that is a monomial or the sum or difference of two or more monomials (e.g., $6a$ or $5a^2 + 3a - 13$ where the exponents are natural numbers).

Polynomial Function A function of the form $f(x) = a_n x^n + a_{n-1}x^{n-1} + \ldots + a_1 x + a_0$, where $a_n \neq 0$ and natural number n is the degree of the polynomial.

Positive Exponent Indicates how many times a base number is multiplied by itself. In the expression x^n, n is the positive exponent, and x is the base number (e.g., $2^3 = 2 \bullet 2 \bullet 2$).

Power

The value of the exponent in a term. The expression a^n is read "*a* to the power of *n*." To raise a number, *a*, to the power of another whole number, *n*, is to multiply *a* by itself *n* times (e.g., the number 4^3 is read "four to the third power" and represents 4 • 4 • 4).

Power of a Power

An expression of the form $(a^m)^n$. It can be found by multiplying the exponents (e.g., $(2^3)^4 = 2^{3 \cdot 4} = 2^{12} = 4{,}096$).

Powers of Products

An expression of the form $a^m \cdot a^n$. It can be found by adding the exponents when multiplying powers that have the same base (e.g., $2^3 \cdot 2^4 = 2^{3+4} = 2^7 = 128$).

Prime Number

Any natural number with exactly two factors, 1 and itself (e.g., 3 is a prime number since it has only two factors: 1 and 3). [Note: Since 1 has only one factor, itself, it is not a prime number.] A prime number is not a composite number.

Probability

A number from 0 to 1 (or 0% to 100%) that indicates how likely an event is to happen. A very unlikely event has a probability near 0 (or 0%) while a very likely event has a probability near 1 (or 100%). It is written as a ratio (fraction, decimal, or equivalent percent). The number of ways an event could happen (favorable outcomes) is placed over the total number of events (total possible outcomes) that could happen. A probability of 0 means it is impossible, and a probability of 1 means it is certain.

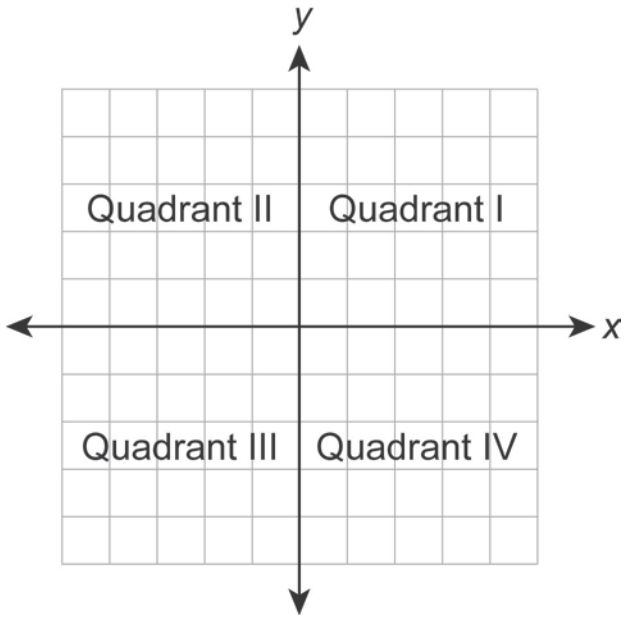
Probability of a Compound (or Combined) Event

There are two types:

1. The union of two events A and B, which is the probability of A *or* B occurring. This is represented as $P(A \cup B) = P(A) + P(B) - P(A) \cdot P(B)$.
2. The intersection of two events A and B, which is the probability of A *and* B occurring. This is represented as $P(A \cap B) = P(A) \cdot P(B)$.

Quadrants

The four regions of a coordinate plane that are separated by the *x*-axis and the *y*-axis, as shown below.



(1) The first quadrant (Quadrant I) contains all the points with positive *x* and positive *y* coordinates (e.g., (3, 4)).
(2) The second quadrant (Quadrant II) contains all the points with negative *x* and positive *y* coordinates (e.g., ($^{-}$3, 4)).
(3) The third quadrant (Quadrant III) contains all the points with negative *x* and negative *y* coordinates (e.g., ($^{-}$3, $^{-}$4)).
(4) The fourth quadrant (Quadrant IV) contains all the points with positive *x* and negative *y* coordinates (e.g., (3, $^{-}$4)).

Quadratic Equation

An equation that can be written in the standard form $ax^2 + bx + c = 0$, where *a*, *b*, and *c* are real numbers and *a* does not equal zero. The highest power of the variable is 2. It has, at most, two solutions. The graph is a parabola.

Quadratic Formula

The solutions or roots of a quadratic equation in the form $ax^2 + bx + c = 0$, where $a \neq 0$, are given by the formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

Quadratic Function

A function that can be expressed in the form $f(x) = ax^2 + bx + c$, where $a \neq 0$ and the highest power of the variable is 2. The graph is a parabola.

Quartile

One of three values that divides a set of data into four equal parts:

1. Median divides a set of data into two equal parts.
2. Lower quartile (25th percentile) is the median of the lower half of the data.
3. Upper quartile (75th percentile) is the median of the upper half of the data.

Radical Expression

An expression containing a radical symbol ($\sqrt[n]{a}$). The expression or number inside the radical (a) is called the radicand, and the number appearing above the radical (n) is the degree. The degree is always a positive integer. When a radical is written without a degree, it is understood to be a degree of 2 and is read as "the square root of a." When the degree is 3, it is read as "the cube root of a." For any other degree, the expression $\sqrt[n]{a}$ is read as "the nth root of a." When the degree is an even number, the radical expression is assumed to be the principal (positive) root (e.g., although $(^{-}7)^2 = 49$, $\sqrt{49} = 7$).

Range (of a Relation or Function)

The set of all possible values for the output (dependent variable) of a function or relation; the set of second numbers in the ordered pairs of a function or relation; the values of the y-coordinates in (x, y).

Range (of Data) In statistics, a measure of dispersion that is the difference between the greatest value (maximum value) and the least value (minimum value) in a set of data.

Rate A ratio that compares two quantities having different units (e.g., $\frac{168 \text{ miles}}{3.5 \text{ hours}}$ or $\frac{122.5 \text{ calories}}{5 \text{ cups}}$). When the rate is simplified so that the second (independent) quantity is 1, it is called a unit rate (e.g., 48 miles per hour or 24.5 calories per cup).

Rate (of Change) The amount a quantity changes over time (e.g., 3.2 cm per year). Also the amount a function's output changes (increases or decreases) for each unit of change in the input. See slope.

Rate (of Interest) The percent by which a monetary account accrues interest. It is most common for the rate of interest to be measured on an annual basis (e.g., 4.5% per year), even if the interest is compounded periodically (i.e., more frequently than once per year).

Ratio A comparison of two numbers, quantities or expressions by division. It is often written as a fraction, but not always (e.g., $\frac{2}{3}$, 2:3, 2 to 3, 2 ÷ 3 are all the same ratios).

Rational Expression An expression that can be written as a polynomial divided by a polynomial, defined only when the latter is not equal to zero.

Rational Number

Any number that can be written in the form $\frac{a}{b}$ where *a* is any integer and *b* is any integer except zero.

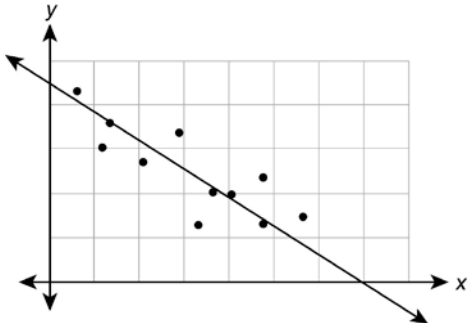
All repeating decimal and terminating decimal numbers are rational numbers.

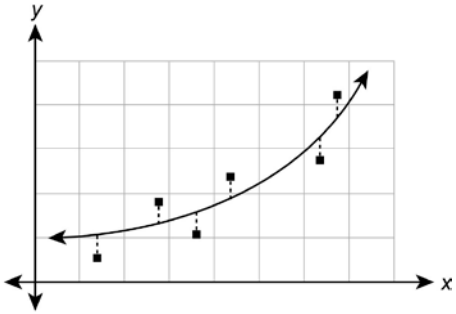
Real Number

The combined set of rational and irrational numbers. All numbers on the number line. Not an imaginary number.

Regression Curve

The line or curve of best fit that represents the least deviation from the points in a scatter plot of data. Most commonly it is linear and uses a "least squares" method. Examples of regression curves:





Relation

A set of pairs of values (e.g., {(1, 2), (2, 3) (3, 2)}). The first value in each pair is the input (independent value), and the second value in the pair is the output (dependent value). In a relation, neither the input values nor the output values need to be unique.

Repeating Decimal

A decimal with one or more digits that repeats endlessly (e.g., 0.666…, 0.727272…, 0.08333…). To indicate the repetition, a bar may be written above the repeated digits (e.g., 0.666… = $0.\overline{6}$, 0.727272… = $0.\overline{72}$, 0.08333… = $0.08\overline{3}$). A decimal that has either a 0 or a 9 repeating endlessly is equivalent to a terminating decimal (e.g., 0.375000… = 0.375, 0.1999… = 0.2). All repeating decimals are rational numbers.

Rise

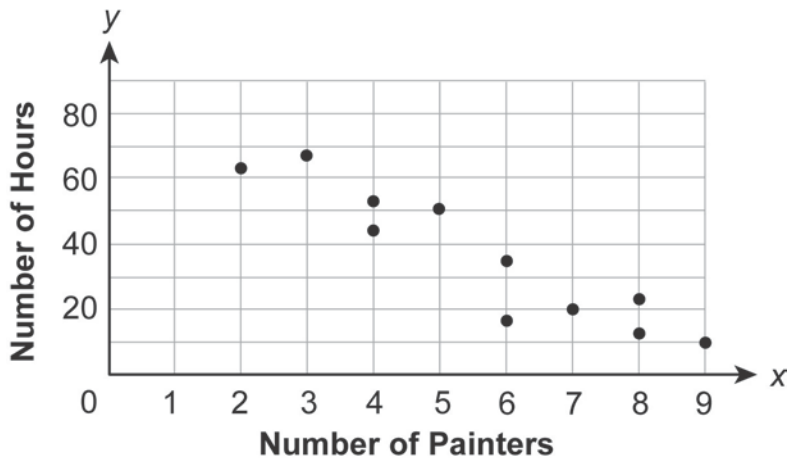
The vertical (up and down) change or difference between any two points on a line on a coordinate plane (i.e., for points (x_1, y_1) and (x_2, y_2), the rise is $y_2 - y_1$). See slope.

Run

The horizontal (left and right) change or difference between any two points on a line on a coordinate plane (i.e., for points (x_1, y_1) and (x_2, y_2), the run is $x_2 - x_1$). See slope.

Scatter Plot

A graph that shows the "general" relationship between two sets of data. For each point that is being plotted there are two separate pieces of data. It shows how one variable is affected by another. Example of a scatter plot:

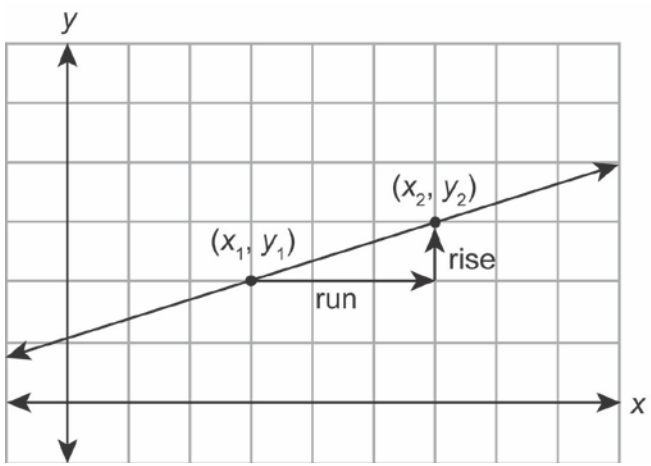


Simple Event When an event consists of a single outcome (e.g., rolling a number cube).

Simplest Form (of an Expression) When all like terms are combined (e.g., $8x + 2(6x - 22)$ becomes $20x - 44$ when in simplest form). The form which no longer contains any like terms, parentheses, or reducible fractions.

Simplify To write an expression in its simplest form (i.e., remove any unnecessary terms, usually by combining several or many terms into fewer terms or by cancelling terms).

Slope (of a Line) A rate of change. The measurement of the steepness, incline, or grade of a line from left to right. It is the ratio of vertical change to horizontal change. More specifically, it is the ratio of the change in the *y*-coordinates (rise) to the corresponding change in the *x*- coordinates (run) when moving from one point to another along a line. It also indicates whether a line is tilted upward (positive slope) or downward (negative slope) and is written as the letter *m* where $m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$. Example of slope:



rise = up 1 unit
run = right 3 units

$$\text{slope} = \frac{+1 \text{ unit}}{+3 \text{ units}} = \frac{1}{3}$$

Slope-Intercept Form

An equation of a straight, non-vertical line written in the form $y = mx + b$, where m is the slope and b is the y-intercept.

Square Root

One of two equal factors (roots) of a number or expression; a radical expression ($\sqrt{a}$) with an understood degree of 2. The square root of a number or expression is assumed to be the principal (positive) root (e.g., $\sqrt{49x^4} = 7x^2$). The square root of a negative number results in an imaginary number (e.g., $\sqrt{-49} = 7i$).

Standard Form (of a Linear Equation)

An equation of a straight line written in the form $Ax + By = C$, where A, B, and C are real numbers and where A and B are not both zero. It includes variables on one side of the equation and a constant on the other side.

Stem-and-Leaf Plot

A visual way to display the shape of a distribution that shows groups of data arranged by place value; a way to show the frequency with which certain classes of data occur. The stem consists of a column of the larger place value(s); these numbers are not repeated. The leaves consist of the smallest place value (usually the ones place) of every piece of data; these numbers are arranged in numerical order in the row of the appropriate stem (e.g., the number 36 would be indicated by a leaf of 6 appearing in the same row as the stem of 3). Example of a stem-and-leaf plot:

Number of Sit-ups

Each tens digit is called a *stem*.

3	4	6	8	8
4	0	3	6	7
5	0	0	1	2

Each ones digit is called a *leaf*.

Key
3 | 6 = 36

Substitution The replacement of a term or variable in an expression or equation by another that has the same value in order to simplify or evaluate the expression or equation.

System of Linear Equations A set of two or more linear equations with the same variables. The solution to a system of linear equations may be found by linear combination, substitution, or graphing. A system of two linear equations will either have one solution, infinitely many solutions, or no solutions.

System of Linear Inequalities Two or more linear inequalities with the same variables. Some systems of inequalities may include equations as well as inequalities. The solution region may be closed or bounded because there are lines on all sides, while other solutions may be open or unbounded.

Systems of Equations A set of two or more equations containing a set of common variables.

Term A part of an algebraic expression. Terms are separated by either an addition symbol (+) or a subtraction symbol (–). It can be a number, a variable, or a product of a number and one or more variables (e.g., in the expression $4x^2 + 6y$, $4x^2$ and $6y$ are both terms).

Terminating Decimal A decimal with a finite number of digits. A decimal for which the division operation results in either repeating zeroes or repeating nines (e.g., 0.375000… = 0.375, 0.1999… = 0.2). It is generally written to the last non-zero place value, but can also be written with additional zeroes in smaller place values as needed (e.g., 0.25 can also be written as 0.2500). All terminating decimals are rational numbers.

Trinomial A polynomial with three unlike terms (e.g., $7a + 4b + 9c$). Each term is a monomial, and the monomials are joined by an addition symbol (+) or a subtraction symbol (–). It is considered an algebraic expression.

Unit Rate A rate in which the second (independent) quantity of the ratio is 1 (e.g., 60 words per minute, $4.50 per pound, 21 students per class).

Variable A letter or symbol used to represent any one of a given set of numbers or other objects (e.g., in the equation $y = x + 5$, the y and x are variables). Since it can take on different values, it is the opposite of a constant.

Whole Number A natural number or zero. Any number from the set of numbers represented by {0, 1, 2, 3, …}. Sometimes it is referred to as a "non-negative integer".

***x*-Axis** The horizontal number line on a coordinate plane that intersects with a vertical number line, the *y*-axis; the line whose equation is $y = 0$. The x-axis contains all the points with a zero y-coordinate (e.g., (5, 0)).

***x*-Intercept(s)** The x-coordinate(s) of the point(s) at which the graph of an equation crosses the *x*-axis (i.e., the value(s) of the x-coordinate when $y = 0$). The solution(s) or root(s) of an equation that is set equal to 0.

***y*-Axis** The vertical number line on a coordinate plane that intersects with a horizontal number line, the *x*-axis; the line whose equation is $x = 0$. The y-axis contains all the points with a zero x-coordinate (e.g., (0, 7)).

***y*-Intercept(s)** The y-coordinate(s) of the point(s) at which the graph of an equation crosses the *y*- axis (i.e., the value(s) of the y-coordinate when $x = 0$). For a linear equation in slope-intercept form ($y = mx + b$), it is indicated by b.

Keystone Exams: Algebra I

Assessment Anchors and Eligible Content with Sample Questions and Glossary

January 2013

Keystone Exams: Algebra

Glossary to the Assessment Anchor & Eligible Content

The Keystone Glossary includes terms and definitions associated with the Keystone Assessment Anchors and Eligible Content. The terms and definitions included in the glossary are intended to assist Pennsylvania educators in better understanding the Keystone Assessment Anchors and Eligible Content. The glossary does not define all possible terms included on an actual Keystone Exam, and it is not intended to define terms for use in classroom instruction for a particular grade level or course.

Pennsylvania Department of Education

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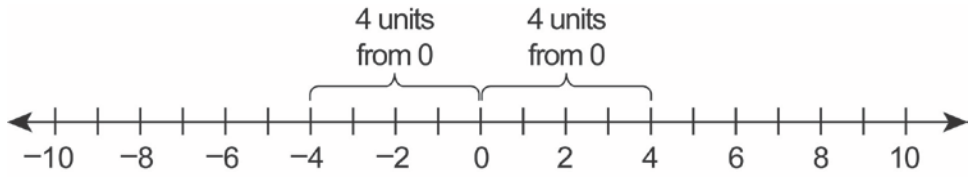
January 2013

Absolute Value

A number's distance from zero on the number line. It is written |*a*| and is read "the absolute value of *a*." It results in a number greater than or equal to zero (e.g., |4| = 4 and |¯4| = 4). Example of absolute values of ¯4 and 4 on a number line:



Additive Inverse

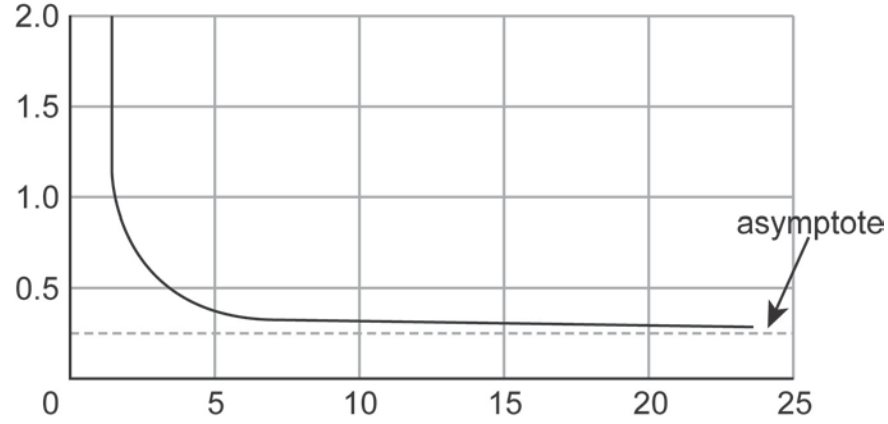
The opposite of a number (i.e., for any number *a*, the additive inverse is ¯*a*). Any number and its additive inverse will have a sum of zero (e.g., ¯4 is the additive inverse of 4 since 4 + ¯4 = 0; likewise, the additive inverse of ¯4 is 4 since ¯4 + 4 = 0).

Arithmetic Sequence

An ordered list of numbers that increases or decreases at a constant rate (i.e., the difference between numbers remains the same). Example: 1, 7, 13, 19, … is an arithmetic sequence as it has a constant difference of +6 (i.e., 6 is added over and over).

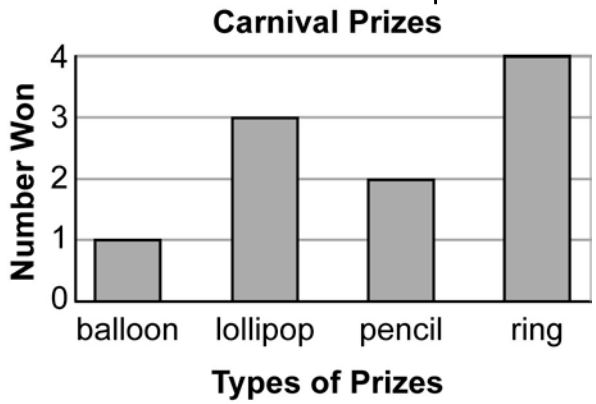
Asymptote

A straight line to which the curve of a graph comes closer and closer. The distance between the curve and the asymptote approaches zero as they tend to infinity. The asymptote is denoted by a dashed line on a graph. The most common asymptotes are horizontal and vertical. Example of a horizontal asymptote:



Bar Graph

A graph that shows a set of frequencies using bars of equal width, but heights that are proportional to the frequencies. It is used to summarize discrete data. Example of a bar graph:

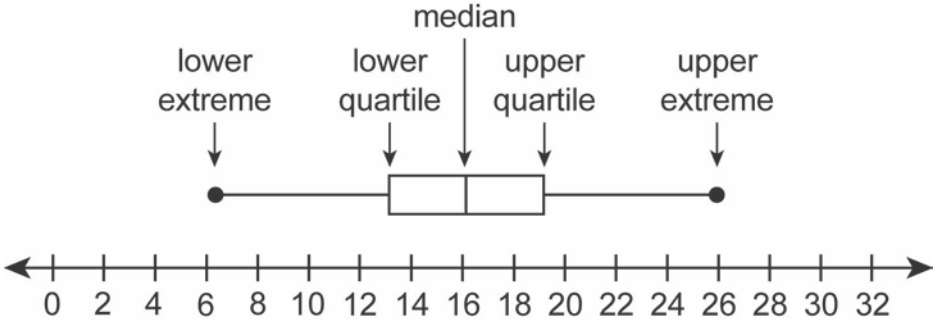


Binomial

A polynomial with two unlike terms (e.g., $3x + 4y$ or $a^3 - 4b^2$). Each term is a monomial, and the monomials are joined by an addition symbol (+) or a subtraction symbol (–). It is considered an algebraic expression.

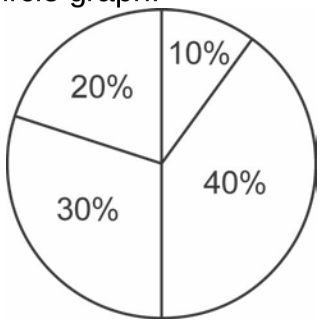
Box-and-Whisker Plot

A graphic method for showing a summary and distribution of data using median, quartiles, and extremes (i.e., minimum and maximum) of data. This shows how far apart and how evenly data is distributed. It is helpful when a visual is needed to see if a distribution is skewed or if there are any outliers. Example of a box-and-whisker plot:



Circle Graph (or Pie Chart)

A circular diagram using different-sized sectors of a circle whose angles at the center are proportional to the frequency. Sectors can be visually compared to show information (e.g., statistical data). Sectors resemble slices of a pie. Example of a circle graph:



Coefficient The number, usually a constant, that is multiplied by a variable in a term (e.g., 35 is the coefficient of $35x^2y$); the absence of a coefficient is the same as a 1 being present (e.g., x is the same as $1x$).

Combination An unordered arrangement, listing or selection of objects (e.g., two-letter combinations of the three letters X, Y, and Z would be XY, XZ, and YZ; XY is the same as YX and is not counted as a different combination). A combination is similar to, but not the same as, a permutation.

Common Logarithm A logarithm with base 10. It is written log x. The common logarithm is the power of 10 necessary to equal a given number (i.e., $\log x = y$ is equivalent to $10^y = x$).

Complex Number The sum or difference of a real number and an imaginary number. It is written in the form $a + bi$, where a and b are real numbers and i is the imaginary unit (i.e., $i = \sqrt{-1}$). The a is called the real part, and the bi is called the imaginary part.

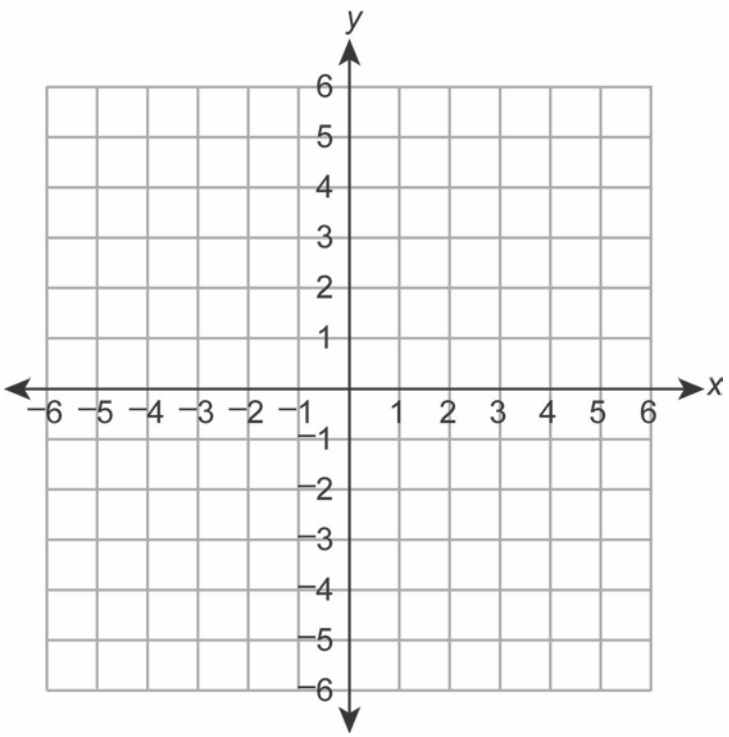
Composite Number Any natural number with more than two factors (e.g., 6 is a composite number since it has four factors: 1, 2, 3, and 6). A composite number is not a prime number.

Compound (or Combined) Event An event that is made up of two or more simple events, such as the flipping of two or more coins.

Compound Inequality When two or more inequalities are taken together and written with the inequalities connected by the words *and* or *or* (e.g., $x > 6$ and $x < 12$, which can also be written as $6 < x < 12$).

Constant A term or expression with no variable in it. It has the same value all the time.

Coordinate Plane A plane formed by perpendicular number lines. The horizontal number line is the *x*-axis, and the vertical number line is the *y*-axis. The point where the axes meet is called the origin. Example of a coordinate plane:



Cube Root — One of three equal factors (roots) of a number or expression; a radical expression with a degree of 3 (e.g., $\sqrt[3]{a}$). The cube root of a number or expression has the same sign as the number or expression under the radical (e.g., $\sqrt[3]{-343x^6} = -(7x^2)$ and $\sqrt[3]{343x^6} = 7x^2$).

Curve of Best Fit (for a Scatter Plot) — See line or curve of best fit (for a scatter plot).

Degree (of a Polynomial) — The value of the greatest exponent in a polynomial.

Dependent Events — Two or more events in which the outcome of one event affects or influences the outcome of the other event(s).

Dependent Variable — The output number or variable in a relation or function that depends upon another variable, called the independent variable, or input number (e.g., in the equation $y = 2x + 4$, y is the dependent variable since its value depends on the value of x). It is the variable for which an equation is solved. Its values make up the range of the relation or function.

Domain (of a Relation or Function) — The set of all possible values of the independent variable on which a function or relation is allowed to operate. Also, the first numbers in the ordered pairs of a relation; the values of the x-coordinates in (x, y).

Elimination Method — See linear combination.

Equation A mathematical statement or sentence that says one mathematical expression or quantity is equal to another (e.g., $x + 5 = y - 7$). An equation will always contain an equal sign (=).

Estimation Strategy An approximation based on a judgment; may include determining approximate values, establishing the reasonableness of answers, assessing the amount of error resulting from estimation, and/or determining if an error is within acceptable limits.

Exponent The power to which a number or expression is raised. When the exponent is a fraction, the number or expression can be rewritten with a radical sign (e.g., $x^{3/4} = \sqrt[4]{x^3}$). See also positive exponent and negative exponent.

Exponential Equation An equation with variables in its exponents (e.g., $4^x = 50$). It can be solved by taking logarithms of both sides.

Exponential Expression An expression in which the variable occurs in the exponent (such as 4^x rather than x^4). Often it occurs when a quantity changes by the same factor for each unit of time (e.g., "doubles every year" or "decreases 2% each month").

Exponential Function (or Model) A function whose general equation is $y = a \cdot b^x$ where a and b are constants.

Exponential Growth/Decay A situation where a quantity increases or decreases exponentially by the same factor over time; it is used for such phenomena as inflation, population growth, radioactivity or depreciation.

Expression A mathematical phrase that includes operations, numbers, and/or variables (e.g., $2x + 3y$ is an algebraic expression, 13.4 – 4.7 is a numeric expression). An expression does not contain an equal sign (=) or any type of inequality sign.

Factor (noun) The number or expression that is multiplied by another to get a product (e.g., 6 is a factor of 30, and $6x$ is a factor of $42x^2$).

Factor (verb) To express or write a number, monomial, or polynomial as a product of two or more factors.

Factor a Monomial To express a monomial as the product of two or more monomials.

Factor a Polynomial To express a polynomial as the product of monomials and/or polynomials (e.g., factoring the polynomial $x^2 + x - 12$ results in the product $(x - 3)(x + 4)$).

Frequency How often something occurs (i.e., the number of times an item, number, or event happens in a set of data).

Function A relation in which each value of an independent variable is associated with a unique value of a dependent variable (e.g., one element of the domain is paired with one and only one element of the range). It is a mapping which involves either a one-to-one correspondence or a many-to-one correspondence, but not a one-to-many correspondence.

Fundamental Counting Principle

A way to calculate all of the possible combinations of a given number of events. It states that if there are *x* different ways of doing one thing and *y* different ways of doing another thing, then there are *xy* different ways of doing both things. It uses the multiplication rule.

Geometric Sequence

An ordered list of numbers that has the same ratio between consecutive terms (e.g., 1, 7, 49, 343, … is a geometric sequence that has a ratio of 7/1 between consecutive terms; each term after the first term can be found by multiplying the previous term by a constant, in this case the number 7 or 7/1).

Greatest Common Factor (GCF)

The largest factor that two or more numbers or algebraic terms have in common. In some cases the GCF may be 1 or one of the actual numbers (e.g., the GCF of $18x^3$ and $24x^5$ is $6x^3$).

Imaginary Number

The square root of a negative number, or the opposite of the square root of a negative number. It is written in the form *bi*, where *b* is a real number and *i* is the imaginary root (i.e., $i = \sqrt{^-1}$ or $i^2 = {}^-1$).

Independent Event(s)

Two or more events in which the outcome of one event does *not* affect the outcome of the other event(s) (e.g., tossing a coin and rolling a number cube are independent events). The probability of two independent events (*A* and *B*) occurring is written *P*(*A* and *B*) or $P(A \cap B)$ and equals $P(A) \bullet P(B)$ (i.e., the product of the probabilities of the two individual events).

Independent Variable

The input number or variable in a relation or function whose value is subject to choice. It is not dependent upon any other values. It is usually the *x*-value or the *x* in *f*(*x*). It is graphed on the *x*-axis. Its values make up the domain of the relation or function.

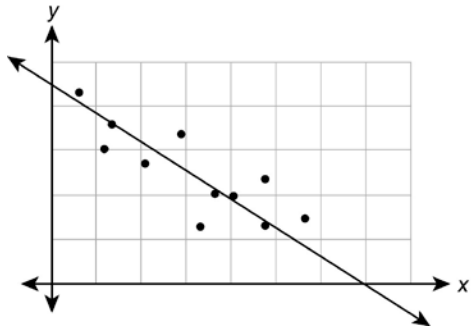
Inequality	A mathematical sentence that contains an inequality symbol (i.e., >, <, ≥, ≤, or ≠). It compares two quantities. The symbol > means greater than, the symbol < means less than, the symbol ≥ means greater than or equal to, the symbol ≤ means less than or equal to, and the symbol ≠ means not equal to.
Integer	A natural number, the additive inverse of a natural number, or zero. Any number from the set of numbers represented by {…, ⁻3, ⁻2, ⁻1, 0, 1, 2, 3, …}.
Interquartile Range (of Data)	The difference between the first (lower) and third (upper) quartile. It represents the spread of the middle 50% of a set of data.
Inverse (of a Relation)	A relation in which the coordinates in each ordered pair are switched from a given relation. The point (x, y) becomes (y, x), so (3, 8) would become (8, 3).
Irrational Number	A real number that cannot be written as a simple fraction (i.e., the ratio of two integers). It is a non-terminating (infinite) and non-repeating decimal. The square root of any prime number is irrational, as are π and e.
Least (or Lowest) Common Multiple (LCM)	The smallest number or expression that is a common multiple of two or more numbers or algebraic terms, other than zero.
Like Terms	Monomials that contain the same variables and corresponding powers and/or roots. Only the coefficients can be different (e.g., $4x^3$ and $12x^3$). Like terms can be added or subtracted.

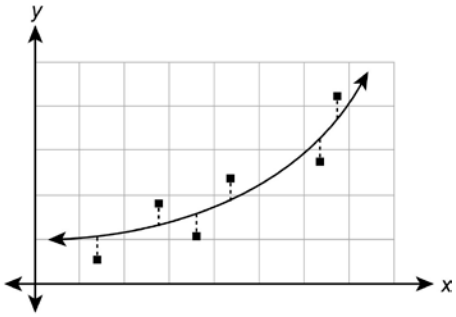
Line Graph

A graph that uses a line or line segments to connect data points, plotted on a coordinate plane, usually to show trends or changes in data over time. More broadly, a graph to represent the relationship between two continuous variables.

Line or Curve of Best Fit (for a Scatter Plot)

A line or curve drawn on a scatter plot to best estimate the relationship between two sets of data. It describes the trend of the data. Different measures are possible to describe the best fit. The most common is a line or curve that minimizes the sum of the squares of the errors (vertical distances) from the data points to the line. The line of best fit is a subset of the curve of best fit. Examples of a line of best fit and a curve of best fit:





Linear Combination

A method by which a system of linear equations can be solved. It uses addition or subtraction in combination with multiplication or division to eliminate one of the variables in order to solve for the other variable.

Linear Equation

An equation for which the graph is a straight line (i.e., a polynomial equation of the first degree of the form $Ax + By = C$, where A, B, and C are real numbers and where A and B are not both zero; an equation in which the variables are not multiplied by one another or raised to any power other than 1).

Linear Function

A function for which the graph is a non-vertical straight line. It is a first degree polynomial of the common form $f(x) = mx + b$, where m and b are constants and x is a real variable. The constant m is called the slope and b is called the y-intercept. It has a constant rate of change.

Linear Inequality

The relation of two expressions using the symbols <, >, ≤, ≥, or ≠ and whose boundary is a straight line. The line divides the coordinate plane into two parts. If the inequality is either ≤ or ≥, then the boundary is solid. If the inequality is either < or >, then the boundary is dashed. If the inequality is ≠, then the solution contains everything except for the boundary.

Logarithm

The exponent required to produce a given number (e.g., since 2 raised to a power of 5 is 32, the logarithm base 2 of 32 is 5; this is written as $\log_2 32 = 5$). Two frequently used bases are 10 (common logarithm) and e (natural logarithm). When a logarithm is written without a base, it is understood to be base 10.

Logarithmic Equation

An equation which contains a logarithm of a variable or number. Sometimes it is solved by rewriting the equation in exponential form and solving for the variable (e.g., $\log_2 32 = 5$ is the same as $2^5 = 32$). It is an inverse function of the exponential function.

Mapping

The matching or pairing of one set of numbers to another by use of a rule. A number in the domain is matched or paired with a number in the range (or a relation or function). It may be a one-to-one correspondence, a one-to-many correspondence, or a many-to-one correspondence.

Maximum Value (of a Graph)

The value of the dependent variable for the highest point on the graph of a curve.

Mean	A measure of central tendency that is calculated by adding all the values of a set of data and dividing that sum by the total number of values. Unlike median, the mean is sensitive to outlier values. It is also called “arithmetic mean” or “average”.
Measure of Central Tendency	A measure of location of the middle (center) of a distribution of a set of data (i.e., how data clusters). The three most common measures of central tendency are mean, median, and mode.
Measure of Dispersion	A measure of the way in which the distribution of a set of data is spread out. In general the more spread out a distribution is, the larger the measure of dispersion. Range and interquartile range are two measures of dispersion.
Median	A measure of central tendency that is the middle value in an ordered set of data or the average of the two middle values when the set has two middle values (occurs when the set of data has an even number of data points). It is the value halfway through the ordered set of data, below and above which there is an equal number of data values. It is generally a good descriptive measure for skewed data or data with outliers.
Minimum Value (of a Graph)	The value of the dependent variable for the lowest point on the graph of a curve.
Mode	A measure of central tendency that is the value or values that occur(s) most often in a set of data. A set of data can have one mode, more than one mode, or no mode.
Monomial	A polynomial with only one term; it contains no addition or subtraction. It can be a number, a variable, or a product of numbers and/or more variables (e.g., $2 \bullet 5$ or x^3y^4 or $\frac{4}{3}\pi r^2$).

Multiplicative Inverse The reciprocal of a number (i.e., for any non-zero number a, the multiplicative inverse is $\frac{1}{a}$; for any rational number $\frac{b}{c}$, where $b \neq 0$ and $c \neq 0$, the multiplicative inverse is $\frac{c}{b}$). Any number and its multiplicative inverse have a product of 1 (e.g., $\frac{1}{4}$ is the multiplicative inverse of 4 since $4 \bullet \frac{1}{4} = 1$; likewise, the multiplicative inverse of $\frac{1}{4}$ is 4 since $\frac{1}{4} \bullet 4 = 1$).

Mutually Exclusive Events Two events that cannot occur at the same time (i.e., events that have no outcomes in common). If two events A and B are mutually exclusive, then the probability of A or B occurring is the sum of their individual probabilities: $P(A \cup B) = P(A) + P(B)$. Also defined as when the intersection of two sets is empty, written as $A \cap B = \varnothing$.

Natural Logarithm A logarithm with base e. It is written ln x. The natural logarithm is the power of e necessary to equal a given number (i.e., $\ln x = y$ is equivalent to $e^y = x$). The constant e is an irrational number whose value is approximately 2.71828….

Natural Number A counting number. A number representing a positive, whole amount. Any number from the set of numbers represented by {1, 2, 3, …}. Sometimes, it is referred to as a "positive integer".

Negative Exponent An exponent that indicates a reciprocal that has to be taken before the exponent can be applied (e.g., $5^{-2} = \frac{1}{5^2}$ or $a^{-x} = \frac{1}{a^x}$). It is used in scientific notation for numbers between ⁻1 and 1.

Number Line A graduated straight line that represents the set of all real numbers in order. Typically, it is marked showing integer values.

Odds A comparison, in ratio form (as a fraction or with a colon), of outcomes. “Odds in favor” (or simply “odds”) is the ratio of favorable outcomes to unfavorable outcomes (e.g., the odds in favor of picking a red hat when there are 3 red hats and 5 non-red hats is 3:5). “Odds against” is the ratio of unfavorable outcomes to favorable outcomes (e.g., the odds against picking a red hat when there are 3 red hats and 5 non-red hats is 5:3).

Order of Operations Rules describing what order to use in evaluating expressions:

(1) Perform operations in grouping symbols (parentheses and brackets),
(2) Evaluate exponential expressions and radical expressions from left to right,
(3) Multiply or divide from left to right,
(4) Add or subtract from left to right.

Ordered Pair A pair of numbers used to locate a point on a coordinate plane, or the solution of an equation in two variables. The first number tells how far to move horizontally, and the second number tells how far to move vertically; written in the form (x-coordinate, y-coordinate). Order matters: the point (x, y) is **not** the same as (y, x).

Origin The point (0, 0) on a coordinate plane. It is the point of intersection for the x-axis and the y-axis.

Outlier A value that is much greater or much less than the rest of the data. It is different in some way from the general pattern of data. It directly stands out from the rest of the data. Sometimes it is referred to as any data point more than 1.5 interquartile ranges greater than the upper (third) quartile or less than the lower (first) quartile.

Pattern (or Sequence) A set of numbers arranged in order (or in a sequence). The numbers and their arrangement are determined by a rule, including repetition and growth/decay rules. See arithmetic sequence and geometric sequence.

Perfect Square A number whose square root is a whole number (e.g., 25 is a perfect square since $\sqrt{25} = 5$). A perfect square can be found by raising a whole number to the second power (e.g., $5^2 = 25$).

Permutation An ordered arrangement of objects from a given set in which the order of the objects is significant (e.g., two-letter permutations of the three letters X, Y, and Z would be XY, YX, XZ, ZX, YZ, and ZY). A permutation is similar to, but not the same as, a combination.

Point-Slope Form (of a Linear Equation) An equation of a straight, non-vertical line written in the form $y - y_1 = m(x - x_1)$, where m is the slope of the line and (x_1, y_1) is a given point on the line.

Polynomial An algebraic expression that is a monomial or the sum or difference of two or more monomials (e.g., $6a$ or $5a^2 + 3a - 13$ where the exponents are natural numbers).

Polynomial Function A function of the form $f(x) = a_n x^n + a_{n-1}x^{n-1} + \ldots + a_1 x + a_0$, where $a_n \neq 0$ and natural number n is the degree of the polynomial.

Positive Exponent Indicates how many times a base number is multiplied by itself. In the expression x^n, n is the positive exponent, and x is the base number (e.g., $2^3 = 2 \bullet 2 \bullet 2$).

Power

The value of the exponent in a term. The expression a^n is read "*a* to the power of *n*." To raise a number, *a*, to the power of another whole number, *n*, is to multiply *a* by itself *n* times (e.g., the number 4^3 is read "four to the third power" and represents 4 • 4 • 4).

Power of a Power

An expression of the form $(a^m)^n$. It can be found by multiplying the exponents (e.g., $(2^3)^4 = 2^{3 \cdot 4} = 2^{12} = 4{,}096$).

Powers of Products

An expression of the form $a^m \cdot a^n$. It can be found by adding the exponents when multiplying powers that have the same base (e.g., $2^3 \cdot 2^4 = 2^{3+4} = 2^7 = 128$).

Prime Number

Any natural number with exactly two factors, 1 and itself (e.g., 3 is a prime number since it has only two factors: 1 and 3). [Note: Since 1 has only one factor, itself, it is not a prime number.] A prime number is not a composite number.

Probability

A number from 0 to 1 (or 0% to 100%) that indicates how likely an event is to happen. A very unlikely event has a probability near 0 (or 0%) while a very likely event has a probability near 1 (or 100%). It is written as a ratio (fraction, decimal, or equivalent percent). The number of ways an event could happen (favorable outcomes) is placed over the total number of events (total possible outcomes) that could happen. A probability of 0 means it is impossible, and a probability of 1 means it is certain.

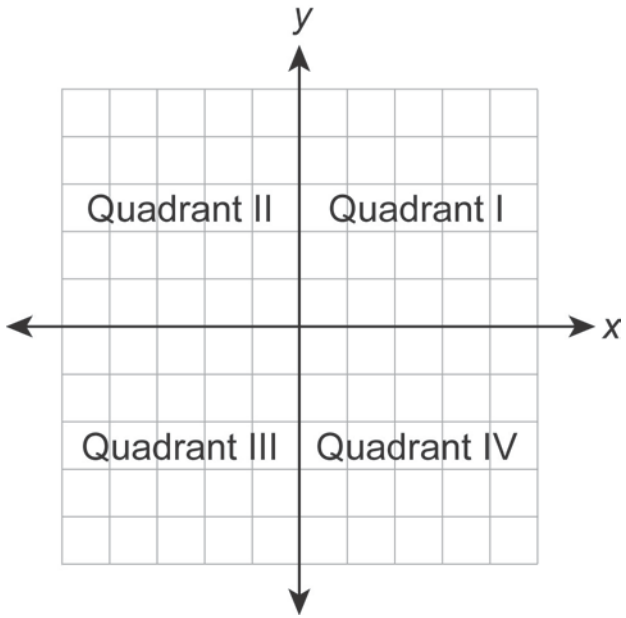
Probability of a Compound (or Combined) Event

There are two types:

1. The union of two events A and B, which is the probability of A *or* B occurring. This is represented as $P(A \cup B) = P(A) + P(B) - P(A) \cdot P(B)$.
2. The intersection of two events A and B, which is the probability of A *and* B occurring. This is represented as $P(A \cap B) = P(A) \cdot P(B)$.

Quadrants

The four regions of a coordinate plane that are separated by the *x*-axis and the *y*-axis, as shown below.



(1) The first quadrant (Quadrant I) contains all the points with positive *x* and positive *y* coordinates (e.g., (3, 4)).
(2) The second quadrant (Quadrant II) contains all the points with negative *x* and positive *y* coordinates (e.g., ($^{-}$3, 4)).
(3) The third quadrant (Quadrant III) contains all the points with negative *x* and negative *y* coordinates (e.g., ($^{-}$3, $^{-}$4)).
(4) The fourth quadrant (Quadrant IV) contains all the points with positive *x* and negative *y* coordinates (e.g., (3, $^{-}$4)).

Quadratic Equation

An equation that can be written in the standard form $ax^2 + bx + c = 0$, where *a*, *b*, and *c* are real numbers and *a* does not equal zero. The highest power of the variable is 2. It has, at most, two solutions. The graph is a parabola.

Quadratic Formula

The solutions or roots of a quadratic equation in the form $ax^2 + bx + c = 0$, where $a \neq 0$, are given by the formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

Quadratic Function

A function that can be expressed in the form $f(x) = ax^2 + bx + c$, where $a \neq 0$ and the highest power of the variable is 2. The graph is a parabola.

Quartile

One of three values that divides a set of data into four equal parts:

1. Median divides a set of data into two equal parts.
2. Lower quartile (25th percentile) is the median of the lower half of the data.
3. Upper quartile (75th percentile) is the median of the upper half of the data.

Radical Expression

An expression containing a radical symbol ($\sqrt[n]{a}$). The expression or number inside the radical (a) is called the radicand, and the number appearing above the radical (n) is the degree. The degree is always a positive integer. When a radical is written without a degree, it is understood to be a degree of 2 and is read as "the square root of a." When the degree is 3, it is read as "the cube root of a." For any other degree, the expression $\sqrt[n]{a}$ is read as "the nth root of a." When the degree is an even number, the radical expression is assumed to be the principal (positive) root (e.g., although $(^{-}7)^2 = 49$, $\sqrt{49} = 7$).

Range (of a Relation or Function)

The set of all possible values for the output (dependent variable) of a function or relation; the set of second numbers in the ordered pairs of a function or relation; the values of the y-coordinates in (x, y).

Range (of Data) In statistics, a measure of dispersion that is the difference between the greatest value (maximum value) and the least value (minimum value) in a set of data.

Rate A ratio that compares two quantities having different units (e.g., $\frac{168 \text{ miles}}{3.5 \text{ hours}}$ or $\frac{122.5 \text{ calories}}{5 \text{ cups}}$). When the rate is simplified so that the second (independent) quantity is 1, it is called a unit rate (e.g., 48 miles per hour or 24.5 calories per cup).

Rate (of Change) The amount a quantity changes over time (e.g., 3.2 cm per year). Also the amount a function's output changes (increases or decreases) for each unit of change in the input. See slope.

Rate (of Interest) The percent by which a monetary account accrues interest. It is most common for the rate of interest to be measured on an annual basis (e.g., 4.5% per year), even if the interest is compounded periodically (i.e., more frequently than once per year).

Ratio A comparison of two numbers, quantities or expressions by division. It is often written as a fraction, but not always (e.g., $\frac{2}{3}$, 2:3, 2 to 3, 2 ÷ 3 are all the same ratios).

Rational Expression An expression that can be written as a polynomial divided by a polynomial, defined only when the latter is not equal to zero.

Rational Number

Any number that can be written in the form $\frac{a}{b}$ where *a* is any integer and *b* is any integer except zero.

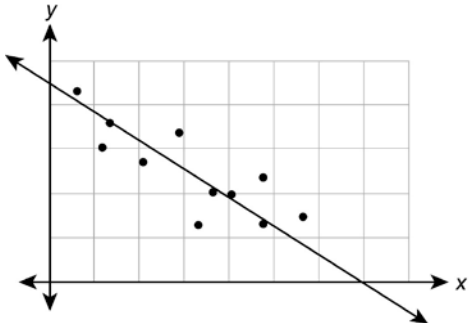
All repeating decimal and terminating decimal numbers are rational numbers.

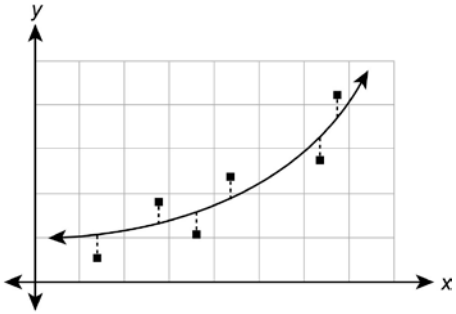
Real Number

The combined set of rational and irrational numbers. All numbers on the number line. Not an imaginary number.

Regression Curve

The line or curve of best fit that represents the least deviation from the points in a scatter plot of data. Most commonly it is linear and uses a "least squares" method. Examples of regression curves:





Relation

A set of pairs of values (e.g., {(1, 2), (2, 3) (3, 2)}). The first value in each pair is the input (independent value), and the second value in the pair is the output (dependent value). In a relation, neither the input values nor the output values need to be unique.

Repeating Decimal

A decimal with one or more digits that repeats endlessly (e.g., 0.666…, 0.727272…, 0.08333…). To indicate the repetition, a bar may be written above the repeated digits (e.g., 0.666… = $0.\overline{6}$, 0.727272… = $0.\overline{72}$, 0.08333… = $0.08\overline{3}$). A decimal that has either a 0 or a 9 repeating endlessly is equivalent to a terminating decimal (e.g., 0.375000… = 0.375, 0.1999… = 0.2). All repeating decimals are rational numbers.

Rise

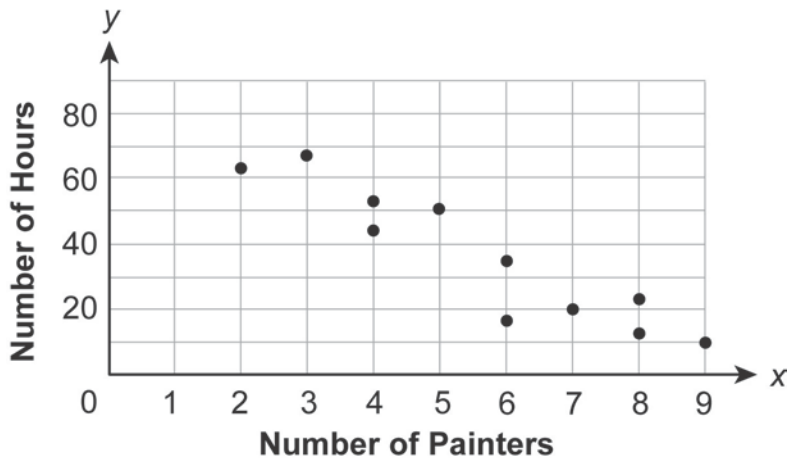
The vertical (up and down) change or difference between any two points on a line on a coordinate plane (i.e., for points (x_1, y_1) and (x_2, y_2), the rise is $y_2 - y_1$). See slope.

Run

The horizontal (left and right) change or difference between any two points on a line on a coordinate plane (i.e., for points (x_1, y_1) and (x_2, y_2), the run is $x_2 - x_1$). See slope.

Scatter Plot

A graph that shows the "general" relationship between two sets of data. For each point that is being plotted there are two separate pieces of data. It shows how one variable is affected by another. Example of a scatter plot:

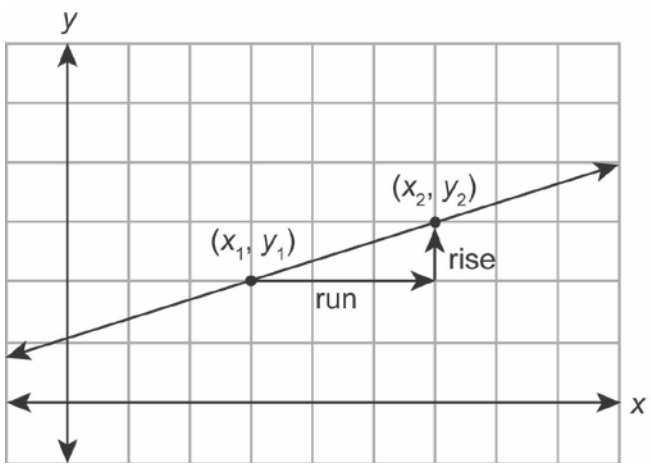


Simple Event When an event consists of a single outcome (e.g., rolling a number cube).

Simplest Form (of an Expression) When all like terms are combined (e.g., $8x + 2(6x - 22)$ becomes $20x - 44$ when in simplest form). The form which no longer contains any like terms, parentheses, or reducible fractions.

Simplify To write an expression in its simplest form (i.e., remove any unnecessary terms, usually by combining several or many terms into fewer terms or by cancelling terms).

Slope (of a Line) A rate of change. The measurement of the steepness, incline, or grade of a line from left to right. It is the ratio of vertical change to horizontal change. More specifically, it is the ratio of the change in the *y*-coordinates (rise) to the corresponding change in the *x*- coordinates (run) when moving from one point to another along a line. It also indicates whether a line is tilted upward (positive slope) or downward (negative slope) and is written as the letter *m* where $m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$. Example of slope:



rise = up 1 unit
run = right 3 units

$$\text{slope} = \frac{+1 \text{ unit}}{+3 \text{ units}} = \frac{1}{3}$$

Slope-Intercept Form

An equation of a straight, non-vertical line written in the form $y = mx + b$, where m is the slope and b is the y-intercept.

Square Root

One of two equal factors (roots) of a number or expression; a radical expression ($\sqrt{a}$) with an understood degree of 2. The square root of a number or expression is assumed to be the principal (positive) root (e.g., $\sqrt{49x^4} = 7x^2$). The square root of a negative number results in an imaginary number (e.g., $\sqrt{-49} = 7i$).

Standard Form (of a Linear Equation)

An equation of a straight line written in the form $Ax + By = C$, where A, B, and C are real numbers and where A and B are not both zero. It includes variables on one side of the equation and a constant on the other side.

Stem-and-Leaf Plot

A visual way to display the shape of a distribution that shows groups of data arranged by place value; a way to show the frequency with which certain classes of data occur. The stem consists of a column of the larger place value(s); these numbers are not repeated. The leaves consist of the smallest place value (usually the ones place) of every piece of data; these numbers are arranged in numerical order in the row of the appropriate stem (e.g., the number 36 would be indicated by a leaf of 6 appearing in the same row as the stem of 3). Example of a stem-and-leaf plot:

Number of Sit-ups

Each tens digit is called a *stem*.

3	4	6	8	8
4	0	3	6	7
5	0	0	1	2

Each ones digit is called a *leaf*.

Key
3 | 6 = 36

Substitution The replacement of a term or variable in an expression or equation by another that has the same value in order to simplify or evaluate the expression or equation.

System of Linear Equations A set of two or more linear equations with the same variables. The solution to a system of linear equations may be found by linear combination, substitution, or graphing. A system of two linear equations will either have one solution, infinitely many solutions, or no solutions.

System of Linear Inequalities Two or more linear inequalities with the same variables. Some systems of inequalities may include equations as well as inequalities. The solution region may be closed or bounded because there are lines on all sides, while other solutions may be open or unbounded.

Systems of Equations A set of two or more equations containing a set of common variables.

Term A part of an algebraic expression. Terms are separated by either an addition symbol (+) or a subtraction symbol (–). It can be a number, a variable, or a product of a number and one or more variables (e.g., in the expression $4x^2 + 6y$, $4x^2$ and $6y$ are both terms).

Terminating Decimal A decimal with a finite number of digits. A decimal for which the division operation results in either repeating zeroes or repeating nines (e.g., 0.375000… = 0.375, 0.1999… = 0.2). It is generally written to the last non-zero place value, but can also be written with additional zeroes in smaller place values as needed (e.g., 0.25 can also be written as 0.2500). All terminating decimals are rational numbers.

Trinomial A polynomial with three unlike terms (e.g., $7a + 4b + 9c$). Each term is a monomial, and the monomials are joined by an addition symbol (+) or a subtraction symbol (–). It is considered an algebraic expression.

Unit Rate A rate in which the second (independent) quantity of the ratio is 1 (e.g., 60 words per minute, $4.50 per pound, 21 students per class).

Variable A letter or symbol used to represent any one of a given set of numbers or other objects (e.g., in the equation $y = x + 5$, the y and x are variables). Since it can take on different values, it is the opposite of a constant.

Whole Number A natural number or zero. Any number from the set of numbers represented by {0, 1, 2, 3, …}. Sometimes it is referred to as a "non-negative integer".

***x*-Axis** The horizontal number line on a coordinate plane that intersects with a vertical number line, the *y*-axis; the line whose equation is $y = 0$. The x-axis contains all the points with a zero y-coordinate (e.g., (5, 0)).

***x*-Intercept(s)** The x-coordinate(s) of the point(s) at which the graph of an equation crosses the *x*-axis (i.e., the value(s) of the x-coordinate when $y = 0$). The solution(s) or root(s) of an equation that is set equal to 0.

***y*-Axis** The vertical number line on a coordinate plane that intersects with a horizontal number line, the *x*-axis; the line whose equation is $x = 0$. The y-axis contains all the points with a zero x-coordinate (e.g., (0, 7)).

***y*-Intercept(s)** The y-coordinate(s) of the point(s) at which the graph of an equation crosses the *y*- axis (i.e., the value(s) of the y-coordinate when $x = 0$). For a linear equation in slope-intercept form ($y = mx + b$), it is indicated by b.

Keystone Exams: Algebra II

Assessment Anchors and Eligible Content with Sample Questions and Glossary

January 2013

Keystone Exams: Geometry

Glossary to the Assessment Anchor & Eligible Content

The Keystone Glossary includes terms and definitions associated with the Keystone Assessment Anchors and Eligible Content. The terms and definitions included in the glossary are intended to assist Pennsylvania educators in better understanding the Keystone Assessment Anchors and Eligible Content. The glossary does not define all possible terms included on an actual Keystone Exam, and it is not intended to define terms for use in classroom instruction for a particular grade level or course.

Pennsylvania Department of Education

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January 2013

Acute Angle

An angle that measures greater than 0° but less than 90°. An angle larger than a zero angle but smaller than a right angle.

Acute Triangle

A triangle in which each angle measures less than 90° (i.e., there are three acute angles).

Altitude (of a Solid)

The shortest line segment between the base and the opposite vertex of a pyramid or cone, with one endpoint at the vertex. The shortest line segment between two bases of a prism or cylinder. The line segment is perpendicular to the base(s) of the solid. The altitude may extend from either the base of the solid or from the plane extending through the base. In a right solid, the altitude can be formed at the center of the base(s).

Altitude (of a Triangle)

A line segment with one endpoint at a vertex of the triangle that is perpendicular to the side opposite the vertex. The other endpoint of the altitude may either be on the side of the triangle or on the line extending through the side.

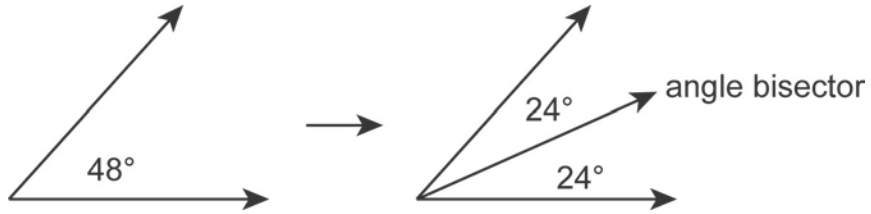
Analytic Geometry

The study of geometry using algebra (i.e., points, lines, and shapes are described in terms of their coordinates, then algebra is used to prove things about these points, lines, and shapes). The description of geometric figures and their relationships with algebraic equations or vice-versa.

Angle

The inclination between intersecting lines, line segments, and/or rays measured in degrees (e.g., a 90° inclination is a right angle). The figure is often represented by two rays that have a common endpoint.

Angle Bisector A line, line segment, or ray which cuts a given angle in half creating two congruent angles. Example:



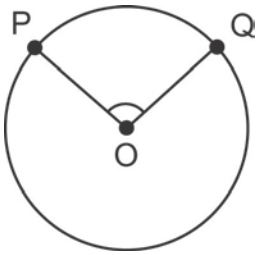
Arc (of a Circle) Any continuous part of a circle between two points on the circle.

Area The measure, in square units or units^2, of the surface of a plane figure (i.e., the number of square units it takes to cover the figure).

Base (Three Dimensions) In a cone or pyramid, the face of the figure which is opposite the vertex. In a cylinder or prism, either of the two faces of the figure which are parallel and congruent.

Base (Two Dimensions) In an isosceles triangle, the side of the figure which is adjacent to the congruent angles. In a trapezoid, either of the parallel sides of the figure.

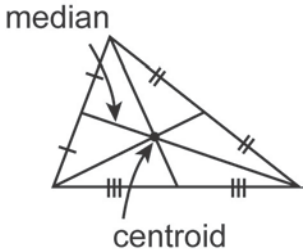
Central Angle (of a Circle) An angle whose vertex is at the center of a circle and whose sides are radii of that circle. Example:



$\angle$ POQ with vertex O

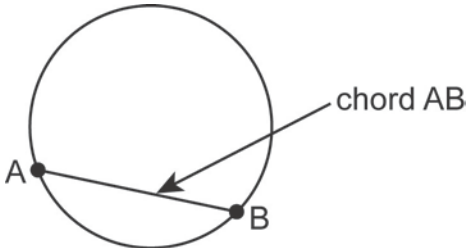
Central Angle (of a Regular Polygon) An angle whose vertex is at the center of the polygon and whose sides intersect the regular polygon at adjacent vertices.

Centroid A point of concurrency for a triangle that can be found at the intersection of the three medians of the triangle. This point is also the center of balance of a triangle with uniform mass. It is sometimes referred to as the "center of gravity." Example:



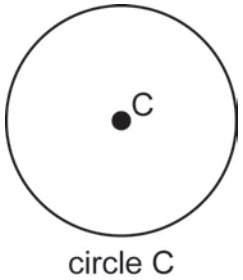
Chord

A line segment whose two endpoints are on the perimeter of a circle. A particular type of chord that passes through the center of the circle is called a diameter. A chord is part of a secant of the circle. Example:



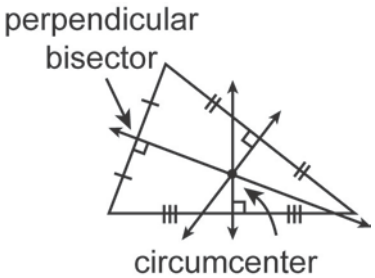
Circle

A two-dimensional figure for which all points are the same distance from its center. Informally, a perfectly round shape. The circle is named for its center point. Example:



Circumcenter

A point of concurrency for a triangle that can be found at the intersection of the three perpendicular bisectors of the triangle. This point is also the center of a circle that can be circumscribed about the triangle. Example:



Circumference (of a Circle)

The total measured distance around the outside of a circle. The circle's perimeter. More formally, a complete circular arc.

Circumscribed Circle

A circle around a polygon such that each vertex of the polygon is a point on the circle.

Colinear

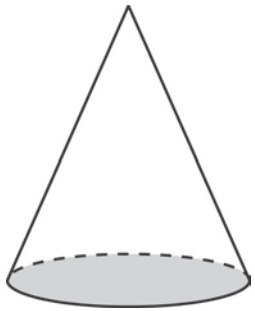
Two or more points that lie on the same line.

Composite (Compound) Figure (Shape)

A figure made from two or more geometric figures (i.e., from "simpler" figures).

Cone

A three-dimensional figure with a single circular base and one vertex. A curved surface connects the base and the vertex. The shortest distance from the base to the vertex is called the altitude. If the altitude goes through the center of the base, the cone is called a "right cone"; otherwise, it is called an "oblique cone." Unless otherwise specified, it may be assumed all cones are right cones. Example:



cone

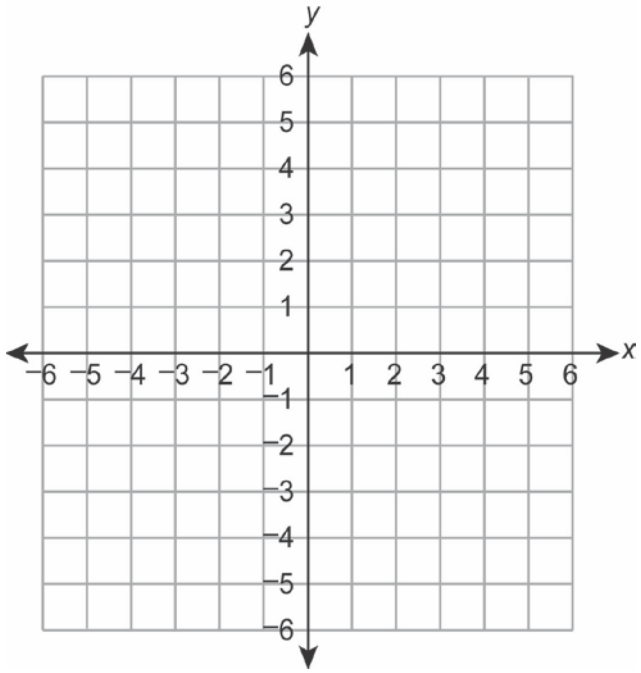
Congruent Figures

Two or more figures having the same shape and size (i.e., measure). Angles are congruent if they have the same measure. Line segments are congruent if they have the same length. Two or more shapes or solids are said to be congruent if they are "identical" in every way except for possibly their position. When congruent figures are named, their corresponding vertices are listed in the same order (e.g., if triangle ABC is congruent to triangle XYZ, then vertex C corresponds to vertex Z).

Conversion

The process of changing the form of a measurement, but not its value (e.g., 4 inches converts to $\frac{1}{3}$ foot; 4 square meters converts to 0.000004 square kilometers; 4 cubic feet converts to 6,912 cubic inches).

Coordinate Plane A plane formed by perpendicular number lines. The horizontal number line is the *x*-axis, and the vertical number line is the *y*-axis. The point where the axes meet is called the origin. Example:



coordinate plane

Coordinates The ordered pair of numbers giving the location or position of a point on a coordinate plane. The ordered pairs are written in parentheses (e.g., (*x*, *y*) where the *x*-coordinate is the first number in an ordered pair and represents the horizontal position of an object in a coordinate plane and the *y*-coordinate is the second number in an ordered pair and represents the vertical position of an object in a coordinate plane).

Coplanar Two or more figures that lie in the same plane.

Corresponding Angles Pairs of angles having the same relative position in geometric figures (i.e., angles on the same side of a transversal formed when two parallel lines are intersected by the transversal; four such pairs are formed, and the angles within the pairs are equal to each other). Corresponding angles are equal in measure.

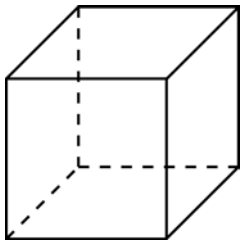
Corresponding Parts Two parts (angles, sides, or vertices) having the same relative position in congruent or similar figures. When congruent or similar figures are named, their corresponding vertices are listed in the same order (e.g., if triangle ABC is similar to triangle XYZ, then vertex C corresponds to vertex Z). See also corresponding angles and corresponding sides.

Corresponding Sides Two sides having the same relative position in two different figures. If the figures are congruent or similar, the sides may be, respectively, equal in length or proportional.

Cosine (of an Angle) A trigonometric ratio within a right triangle. The ratio is the length of the leg adjacent to the angle to the length of the hypotenuse of the triangle.

$$\text{cosine of an angle} = \frac{\text{length of adjacent leg}}{\text{length of hypotenuse}}$$

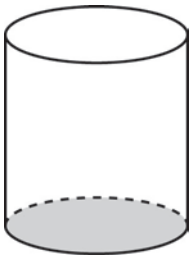
Cube A three-dimensional figure (e.g., a rectangular solid or prism) having six congruent square faces. Example:



cube

Cylinder

A three-dimensional figure with two circular bases that are parallel and congruent and joined by straight lines creating a lateral surface that is curved. The distance between the bases is called an altitude. If the altitude goes through the center of the bases, the cylinder is called a "right cylinder"; otherwise, it is called an "oblique cylinder." Unless otherwise specified, it may be assumed all cylinders are right cylinders. Example:



cylinder

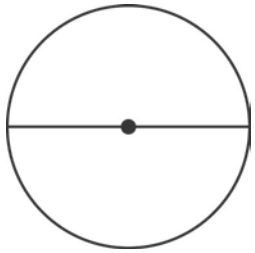
Degree

A unit of angle measure equal to $\frac{1}{360}$ of a complete revolution. There are 360 degrees in a circle. The symbol for degree is ° (e.g., 45° is read "45 degrees").

Diagonal

Any line segment, other than a side or edge, within a polygon or polyhedron that connects one vertex with another vertex.

Diameter (of a Circle) A line segment that has endpoints on a circle and passes through the center of the circle. It is the longest chord in a circle. It divides the circle in half. Example:



diameter

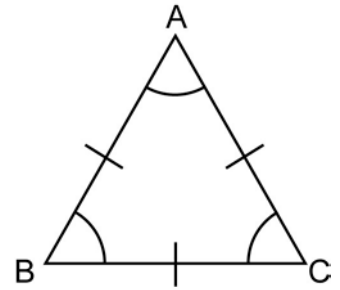
Direct Proof The truth or validity of a given statement shown by a straightforward combination of established facts (e.g., existing axioms, definitions, theorems), without making any further assumptions (i.e., a sequence of statements showing that if one thing is true, then something following from it is also true).

Distance between Two Points The space showing how far apart two points are (i.e., the shortest length between them).

Edge The line segment where two faces of a polyhedron meet (e.g., a rectangular prism has 12 edges). The endpoints of an edge are vertices of the polyhedron.

Endpoint A point that marks the beginning or the end of a line segment; a point that marks the beginning of a ray.

Equilateral Triangle A triangle where all sides are the same length (i.e., the sides are congruent). Each of the angles in an equilateral triangle is 60°. Thus, the triangle is also "equiangular." Example:



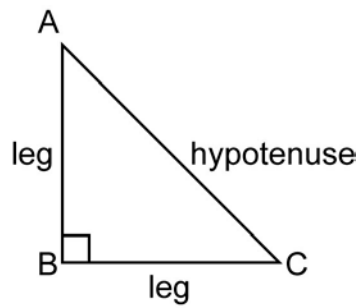
equilateral triangle ABC

Exterior Angle An angle formed by a side of a polygon and an extension of an adjacent side. The measure of the exterior angle is supplementary to the measure of the interior angle at that vertex.

Face A plane figure or flat surface that makes up one side of a three-dimensional figure or solid figure. Two faces meet at an edge, three or more faces meet at a vertex (e.g., a cube has 6 faces). See also lateral face.

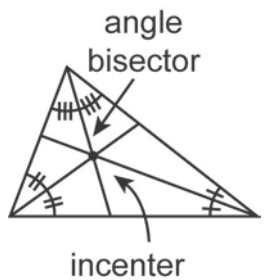
Figure Any combination of points, lines, rays, line segments, angles, planes, or curves in two or three dimensions. Formally, it is any set of points on a plane or in space.

Hypotenuse The longest side of a right triangle (i.e., the side always opposite the right angle). Example:



right triangle ABC, with hypotenuse AC

Incenter A point of concurrency for a triangle that can be found at the intersection of the three angle bisectors of the triangle. This point is also the center of a circle that can be inscribed within the triangle. Example:



Indirect Proof A set of statements in which a false assumption is made. Using true or valid arguments, a statement is arrived at, but it is clearly wrong, so the original assumption must have been wrong. See also proof by contradiction.

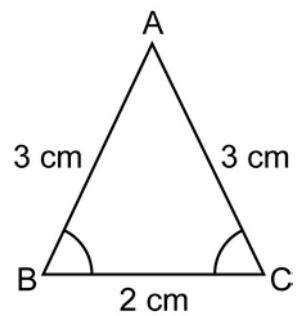
Inscribed Circle A circle within a polygon such that each side of the polygon is tangent to the circle.

Interior Angle An angle formed by two adjacent sides of a polygon. The common endpoint of the sides form the vertex of the angle, with the inclination of measure being on the inside of the polygon.

Intersecting Lines Two lines that cross or meet each other. They are coplanar, have only one point in common, have slopes that are not equal, are not parallel, and form angles at the point of intersection.

Irregular Figure A figure that is not regular; not all sides and/or angles are congruent.

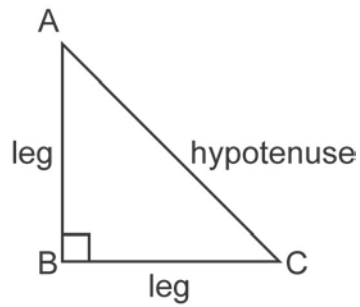
Isosceles Triangle A triangle that has at least two congruent sides. The third side is called the base. The angles opposite the equal sides are also congruent. Example:



isosceles triangle ABC, with base BC

Lateral Face Any face or surface of a three-dimensional figure or solid that is not a base.

Leg (of a Right Triangle) Either of the two sides that form a right angle in a right triangle. It is one of the two shorter sides of the triangle and always opposite an acute angle. It is not the hypotenuse. Example:



right triangle ABC, with legs AB and BC

Line A figure with only one dimension—length (no width or height). A straight path extending in both directions with no endpoints. It is considered "never ending." Formally, it is an infinite set of connected points (i.e., a set of points so closely set down there are no gaps or spaces between them). The line AB is written $\overleftrightarrow{AB}$, where *A* and *B* are two points through which the line passes. Example:

line AB ($\overleftrightarrow{AB}$)

Line Segment A part or piece of a line or ray with two fixed endpoints. Formally, it is the two endpoints and all points between them. The line segment AB is written $\overline{AB}$, where *A* and *B* are the endpoints of the line segment. Example:

line segment AB ($\overline{AB}$)

Linear Measurement A measurement taken in a straight line.

Logic Statement (Proposition) A statement examined for its truthfulness (i.e., proved true or false).

Median (of a Triangle) A line segment with one endpoint at the vertex of a triangle and the other endpoint at the midpoint of the side opposite the vertex.

Midpoint The point half-way between two given points (i.e., it divides or splits a line segment into two congruent line segments).

Obtuse Angle An angle that measures more than 90° but less than 180°. An angle larger than a right angle but smaller than a straight angle.

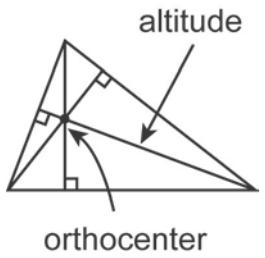
Obtuse Triangle A triangle with one angle that measures more than 90° (i.e., it has one obtuse angle and two acute angles).

Ordered Pair A pair of numbers, (x, y), written in a particular order that indicates the position of a point on a coordinate plane. The first number, x, represents the x-coordinate and is the number of units left or right from the origin; the second number, y, represents the y-coordinate and is the number of units up or down from the origin.

Origin The point (0, 0) on a coordinate plane. It is the point of intersection for the x-axis and the y-axis.

Orthocenter

A point of concurrency for a triangle that can be found at the intersection of the three altitudes of the triangle. Example:



Parallel (Bases)

Two bases of a three-dimensional figure that lie in parallel planes. All altitudes between the bases are congruent.

Parallel (Lines or Line Segments)

Two distinct lines that are in the same plane and never intersect. On a coordinate grid, the lines have the same slope but different *y*-intercepts. They are always the same distance apart from each other. Parallel line segments are segments of parallel lines. The symbol for parallel is || (e.g., $\overline{AB} \parallel \overline{CD}$ is read "line segment AB is parallel to line segment CD").

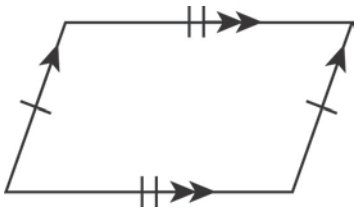
Parallel (Planes)

Two distinct planes that never intersect and are always the same distance apart.

Parallel (Sides)

Two sides of a two-dimensional figure that lie on parallel lines.

Parallelogram A quadrilateral whose opposite sides are parallel and congruent (i.e., there are two pairs of parallel sides). Often one pair of these opposite sides is longer than the other pair. Opposite angles are also congruent, and the diagonals bisect each other. Example:



parallelogram

Perimeter The total distance around a closed figure. For a polygon, it is the sum of the lengths of its sides.

Perpendicular Two lines, segments, or rays that intersect, cross, or meet to form a 90° or right angle. The product of their slopes is ¯1 (i.e., their slopes are "negative reciprocals" of each other). The symbol for perpendicular is $\perp$ (e.g., $\overline{AB} \perp \overline{CD}$ is read "line segment AB is perpendicular to line segment CD"). By definition, the two legs of a right triangle are perpendicular to each other.

Perpendicular Bisector A line that intersects a line segment at its midpoint and at a right angle.

π (Pi) The ratio of the circumference of a circle to its diameter. It is 3.14159265… to 1 or simply the value 3.14159265…. It can also be used to relate the radius of a circle to the circle's area. It is often approximated using either 3.14 or $\frac{22}{7}$.

Plane A set of points that forms a flat surface that extends infinitely in all directions. It has no height.

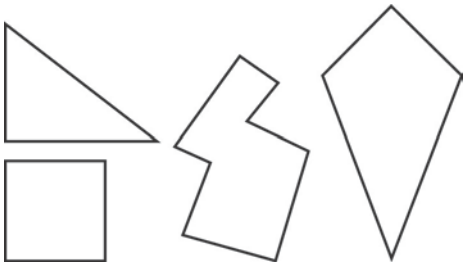
Plotting Points To place points on a coordinate plane using the *x*-coordinates and *y*-coordinates of the given points.

Point A figure with no dimensions—it has no length, width, or height. It is generally indicated with a single dot and is labeled with a single letter or an ordered pair on a coordinate plane. Example:

•P

point P

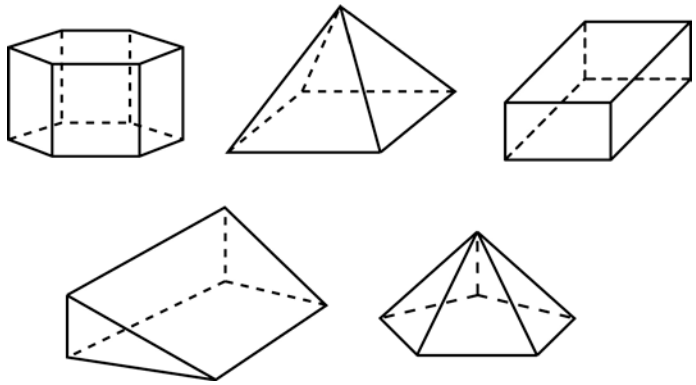
Polygon A closed plane figure made up of three or more line segments (i.e., a union of line segments connected end to end such that each segment intersects exactly two others at its endpoints); less formally, a flat shape with straight sides. The name of a polygon describes the number of sides/angles (e.g., triangle has three sides/angles, a quadrilateral has four, a pentagon has five, etc.). Examples:



polygons

Polyhedron

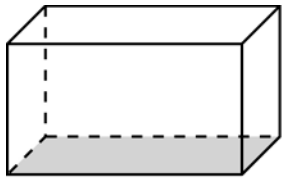
A three-dimensional figure or solid whose flat faces are all polygons where all edges are line segments. It has no curved surfaces or edges. The plural is "polyhedra." Examples:



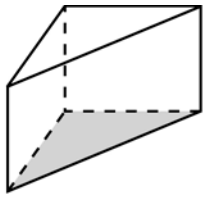
polyhedra

Prism

A three-dimensional figure or polyhedron that has two congruent and parallel faces that are polygons called bases. The remaining faces, called lateral faces, are parallelograms (often rectangles). If the lateral faces are rectangles, the prism is called a "right prism"; otherwise, it is called an "oblique prism." Unless otherwise specified, it may be assumed all prisms are right prisms. Prisms are named by the shape of their bases. Examples:



rectangular prism

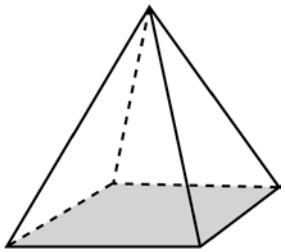


triangular prism

Proof by Contradiction A set of statements used to determine the truth of a proposition by showing that the proposition being untrue would imply a contradiction (i.e., one assumes that what is true is not true, then, eventually one discovers something that is clearly not true; when something is not not-true, then it is true). It is sometimes called the "law of double negation."

Proportional Relationship A relationship between two equal ratios. It is often used in problem solving situations involving similar figures.

Pyramid A three-dimensional figure or polyhedron with a single polygon base and triangular faces that meet at a single point or vertex. The faces that meet at the vertex are called lateral faces. There is the same number of lateral faces as there are sides of the base. The shortest distance from the base to the vertex is called the altitude. If the altitude goes through the center of the base, the pyramid is called a "right pyramid"; otherwise, it is called an "oblique pyramid." Unless otherwise specified, it may be assumed all pyramids are right pyramids. A pyramid is named for the shape of its base (e.g., triangular pyramid or square pyramid). Example:

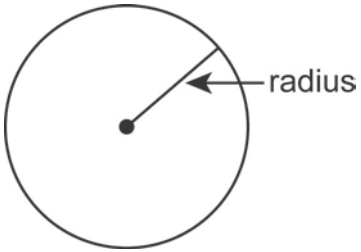


square pyramid

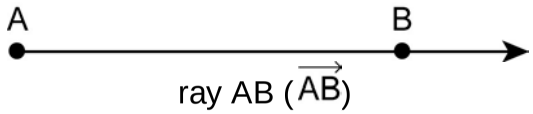
Pythagorean Theorem A formula for finding the length of a side of a right triangle when the lengths of two sides are given. It is $a^2 + b^2 = c^2$, where a and b are the lengths of the legs of a right triangle and c is the length of the hypotenuse.

Quadrilateral A four-sided polygon. It can be regular or irregular. The measures of its four interior angles always add up to 360°.

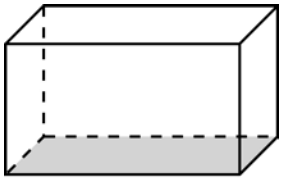
Radius (of a Circle) A line segment that has one endpoint at the center of the circle and the other endpoint on the circle. It is the shortest distance from the center of a circle to any point on the circle. It is half the length of the diameter. The plural is "radii." Example:



Ray A part or piece of a line with one fixed endpoint. Formally, it is the endpoint and all points in one direction. The ray AB is written $\overrightarrow{AB}$, where A is an endpoint of the ray that passes through point B. Example:

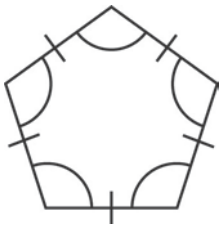


Rectangular Prism A three-dimensional figure or polyhedron which has two congruent and parallel rectangular bases. Informally, it is a "box shape" in three dimensions. Example:



rectangular prism

Regular Polygon A polygon with sides all the same length and angles all the same size (i.e., all sides are congruent or equilateral, and all angles are congruent or equiangular). Example:

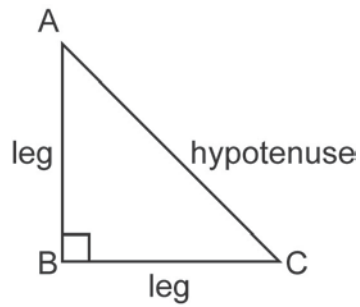


regular polygon

Right Angle An angle that measures exactly 90°.

Right Triangle

A triangle with one angle that measures 90° (i.e., it has one right angle and two acute angles). The side opposite the right angle is called the hypotenuse and the two other sides are called the legs.



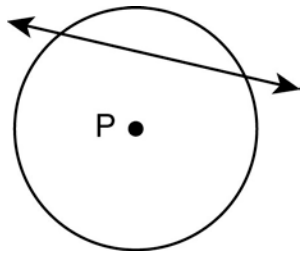
right triangle ABC

Scalene Triangle

A triangle that has no congruent sides (i.e., the three sides all have different lengths). The triangle also has no congruent angles (i.e., the three angles all have different measures).

Secant (of a Circle)

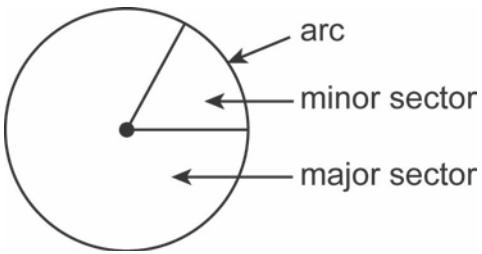
A line, line segment, or ray that passes through a circle at exactly two points. The segment of the secant connecting the points of intersection is a chord of the circle. Example:



secant

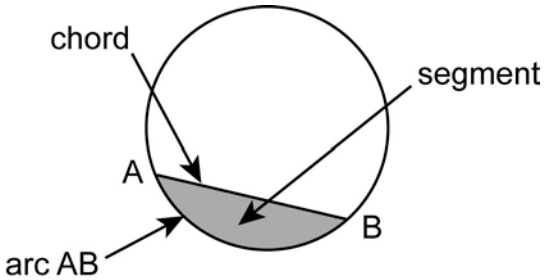
Sector (of a Circle)

The area or region between an arc and two radii at either end of that arc. The two radii divide or split the circle into two sectors called a "major sector" and a "minor sector." The major sector has a central angle of more than 180°, whereas the minor sector has a central angle of less than 180°. It is shaped like a slice of pie. Example:



Segment (of a Circle)

The area or region between an arc and a chord of a circle. Informally, the area of a circle "cut off" from the rest by a secant or chord. Example:



Semicircle

A half of a circle. A 180° arc. Formally, an arc whose endpoints lie on the diameter of the circle.

Shape

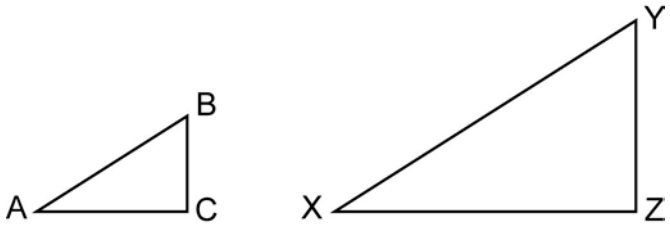
See figure.

Side

One of the line segments which make a polygon (e.g., a pentagon has five sides). The endpoints of a side are vertices of the polygon.

Similar Figures

Figures having the same shape, but not necessarily the same size. Often, one figure is the dilation ("enlargement") of the other. Formally, their corresponding sides are in proportion and their corresponding angles are congruent. When similar figures are named, their corresponding vertices are listed in the same order (e.g., if triangle ABC is similar to triangle XYZ, then vertex C corresponds to vertex Z). Example:



ΔABC is similar to ΔXYZ

Sine (of an Angle)

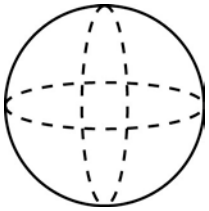
A trigonometric ratio within a right triangle. The ratio is the length of the leg opposite the angle to the length of the hypotenuse of the triangle.

$$\text{sine of an angle} = \frac{\text{length of opposite leg}}{\text{length of hypotenuse}}$$

Skew Lines

Two lines that are not parallel and never intersect. Skew lines do not lie in the same plane.

Sphere A three-dimensional figure or solid that has all points the same distance from the center. Informally, a perfectly round ball shape. Any cross-section of a sphere is circle. Example:

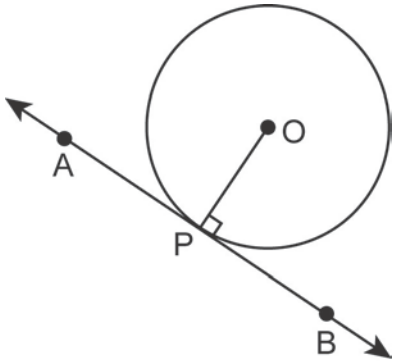


sphere

Straight Angle An angle that measures exactly 180°.

Surface Area The total area of the surface of a three-dimensional figure. In a polyhedron, it is the sum of the areas of all the faces (i.e., two-dimensional surfaces).

Tangent (of a Circle) A line, line segment, or ray that touches a circle at exactly one point. It is perpendicular to the radius at that point. Example:

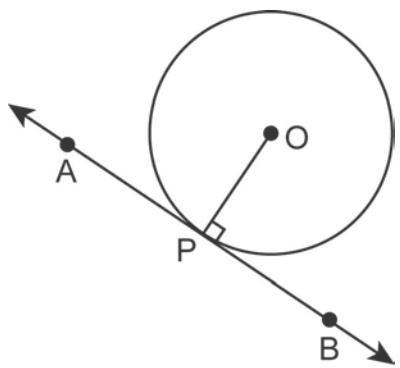


$\overleftrightarrow{AB}$ is a tangent of circle O

Tangent (of an Angle) A trigonometric ratio within a right triangle. The ratio is the length of the leg opposite the angle to the length of the leg adjacent to the angle.

$$\text{tangent of an angle} = \frac{\text{length of opposite leg}}{\text{length of adjacent leg}}$$

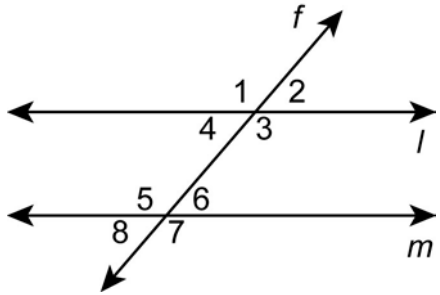
Tangent (to a Circle) A property of a line, line segment, or ray that it touches a circle at exactly one point. It is perpendicular to the radius at that point. Example:



$\overleftrightarrow{AB}$ is tangent to circle O at point P

Three-Dimensional Figure A figure that has three dimensions: length, width, and height. Three mutually perpendicular directions exist.

Transversal A line that crosses two or more lines intersecting each line at only one point to form eight or more angles. The lines that are crossed may or may not be parallel. Example:



line *f* is a transversal through parallel lines *l* and *m*

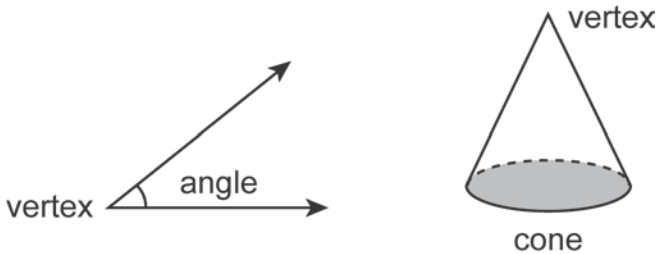
Trapezoid A quadrilateral with one pair of parallel sides, which are called the bases.

Triangle A three-sided polygon. The measures of its three interior angles add up to 180°. Triangles can be categorized by their angles, as acute, obtuse, right, or equiangular; or by their sides, as scalene, isosceles, or equilateral. A point where two of the three sides intersect is called a vertex. The symbol for a triangle is Δ (e.g., ΔABC is read "triangle ABC").

Trigonometric Ratio A ratio that compares the lengths of two sides of a right triangle and is relative to the measure of one of the angles in the triangle. The common ratios are sine, cosine, and tangent.

Two-Dimensional Figure A figure that has only two dimensions: length and width (no height). Two mutually perpendicular directions exist. Informally, it is "flat looking." The figure has area, but no volume.

Vertex A point where two or more rays meet, where two sides of a polygon meet, or where three (or more) edges of a polyhedron meet; the single point or apex of a cone. The plural is "vertices." Examples:



Volume The measure, in cubic units or units^3, of the amount of space contained by a three-dimensional figure or solid (i.e., the number of cubic units it takes to fill the figure).

Zero Angle An angle that measures exactly 0°.

Keystone Exams: Geometry

Assessment Anchors and Eligible Content with Sample Questions and Glossary

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