NYS Next Generation LEARNING STANDARDS

Disclaimers and Notices

New York State Next Generation Mathematics Learning Standards GLOSSARY
Grades PreK - 8

Mathematical language provides a common platform for students to explore complex topics and ideas from many perspectives and to construct viable mathematical arguments. This Glossary is intended to provide definitions of some mathematical terms used in PreK – grade 8 level instruction and includes terms found in the New York State Next Generation Mathematics Learning Standards. This non-exhaustive glossary clarifies for students and teachers what is meant by various terms when the New York State Education Department uses them for mathematics. At times, there are alternative definitions for some glossary terms within the mathematical community and some terms/definitions contained within this glossary can be used in different standard areas. However, it is important to use these terms as they are used within the Next Generation Mathematics Learning Standards. After numerous reviews in consultation with NYS educators, we have adopted the mathematics definitions contained in this glossary. We therefore encourage all teachers to become familiar with these definitions and use them consistently throughout a student's educational program.

A	F	L	Q	V
B	G	M	R	W
C	H	N	S	X
D	I	O	T	Y
E	K	P	U	Z

A

absolute value $|n|$ The magnitude that represents the distance from 0 to a real number *n* on a number line.

Examples: $|-3|=3,\ |3|=3,\ \left|-\frac{2}{3}\right|=\frac{2}{3},\ |0|=0$

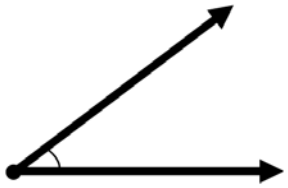
account A record or statement of transactions relating to a period or purpose and the resulting balance; usually pertaining to money.

Example: bank account

accuracy A measure of how close a numerical measure is to its actual value.

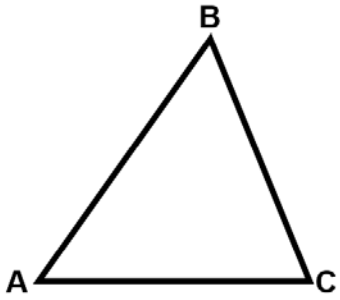
acute angle An angle whose measure is greater than 0° and less than 90°.

Example:



acute triangle A triangle in which all three angle measures are acute.

Example: In $\Delta ABC,\ 0° < m\angle A < 90°,\ 0° < m\angle B < 90°,\ 0° < m\angle C < 90°.$



addend One of the quantities combined with one or more other quantities to create a sum.

Example: In $3+5+1=9$; 3, 5, and 1 are addends.

addition The mathematical operation of combining two or more quantities to find one quantity called a sum.

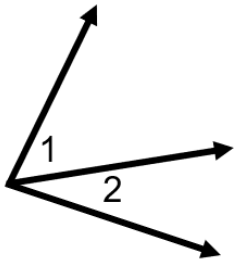
addition sentence A mathematical sentence using addition as the only operation between two or more addends.

additive identity (see "**identity element for addition**")

additive inverse A number that when added to a given number results in the additive identity (zero); i.e., the opposite of a number.

adjacent angles Two angles in a plane that share a common ray and a common vertex, but have no interior points in common (the angles do not overlap).

Example: In the figure below, angles 1 and 2 are adjacent angles.



algebra The branch of mathematics that uses letters, symbols, and/or characters to represent numbers and express mathematical relationships.

algebraic equation Two expressions connected by an equal sign, where at least one of the expressions is algebraic. (also see "**expression**")

algebraic expression A mathematical representation comprised of both numbers and variables.

algebraic inequality A mathematical sentence that is written using two expressions, at least one of which is algebraic, and one or more relation symbols: $<$, $>$, $\leq$, $\geq$, $\neq$.

Example: $3x + 7 > 22$

algebraic relationship A relationship between two or more quantities using an algebraic expression.

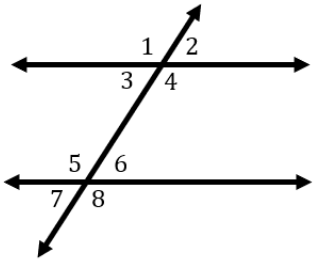
Examples: The algebraic relationship which represents 2, 4, 6, 8, … is $2n$ where $n = 1,\ 2,\ 3,\ 4,\ \ldots$ and the algebraic relationship which represents 4, 7, 10, 13, … is $3n + 1$ where $n = 1,\ 2,\ 3,\ 4,\ \ldots$.

algebraic solution A complete process, using the properties of algebra, that produces a result when solving a mathematical problem.

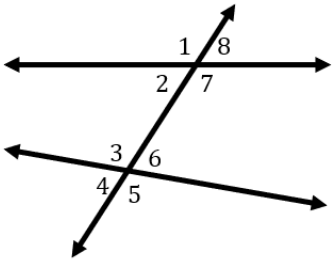
algorithm An explicit step-by-step procedure for performing a mathematical computation or for solving a mathematical problem.

alternate exterior angles A pair of angles on opposite sides of a transversal, but outside the lines the transversal intersects.

Examples:



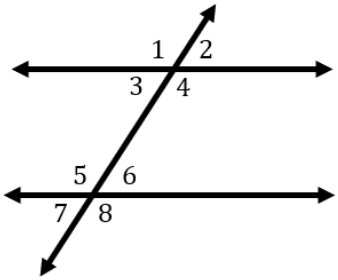
alternate exterior angles:
$\angle 1$ and $\angle 8$; $\angle 2$ and $\angle 7$



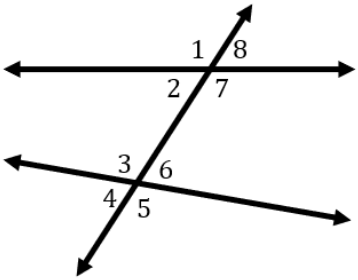
alternate exterior angles:
$\angle 1$ and $\angle 5$; $\angle 4$ and $\angle 8$

alternate interior angles A pair of angles on opposite sides of a transversal, but inside the lines the transversal intersects.

Examples:



alternate interior angles:
$\angle 3$ and $\angle 6$; $\angle 4$ and $\angle 5$



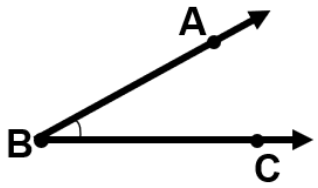
alternate interior angles:
$\angle 2$ and $\angle 6$; $\angle 3$ and $\angle 7$

analog clock A clock that displays the time by the position of the hands (60-minute and 12-hour) on a dial.

Example:

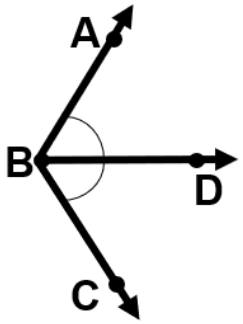
angle $(\angle)$ A geometric figure formed by two rays that have a common endpoint called a vertex.

Example: $\angle ABC$ is created by intersecting rays BA and BC with the vertex at point *B*.



angle bisector A line, line segment, ray, or plane that divides an angle into two congruent angles.

Example: $\angle ABC$ is bisected by ray BD therefore $\angle ABD \cong \angle CBD$.



angle measure $(\mathrm{m}\angle)$ The number of degrees contained within the angle being measured.

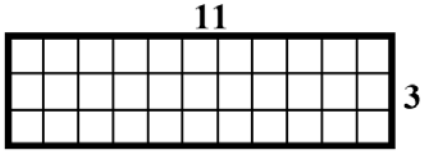
angle pairs Two angles with a special relationship.

Examples: supplementary angles, complementary angles, vertical angles, adjacent angles, alternate interior angles, alternate exterior angles, corresponding angles, and same side interior angles

ante meridiem (a.m.) Before noon; the time between 12 midnight and 12 noon; 12 midnight is 12 a.m. .

area An attribute of a two-dimensional closed figure that involves completely packing the figure, without gaps or overlap, with unit squares. A closed figure that can be packed with *n* unit squares is said to have an area of *n* square units.

Example: The area of the rectangle is 33 square units.



arithmetic expression (see "**expression**")

arithmetic mean (see "**mean (arithmetic)**")

arithmetic solution A complete process that produces a result when solving a mathematical problem using numbers.

array An arrangement of objects into rows and/or columns.

ascending order An arrangement in order from least to greatest or smallest to largest.

association A relationship.

associative property of addition A property of real numbers that states that the sum of a set of numbers is the same, regardless of how the numbers are grouped.
Example: $2+(3.5+1.3)=(2+3.5)+1.3$

associative property of multiplication A property of real numbers that states that the product of a set of numbers is the same, regardless of how the numbers are grouped.
Example: $-6\times(18\times 7)=(-6\times 18)\times 7$

attribute A characteristic that identifies an object or shape.
Example: A quadrilateral has four sides.

attribute data (see "**categorical data**")

average The arithmetic mean of univariate data.

average speed The distance traveled by an object divided by the elapsed time to cover that distance.

axis A line, used as a reference, to determine position, symmetry, or a three-dimensional rotation.

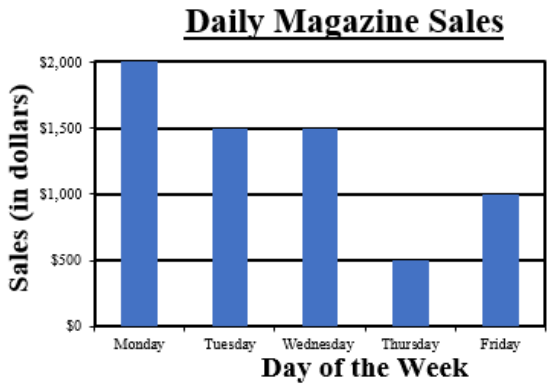
axes The plural form of axis. (also see "**coordinate axes**")

B

balance The value of the amount remaining or saved in an account.
Examples: money, items of value, time

bar graph A graph that uses horizontal or vertical bars to display frequency of data.

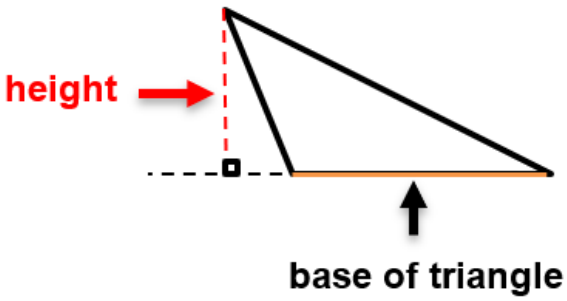
Example:



bar model (see **"tape diagram**")

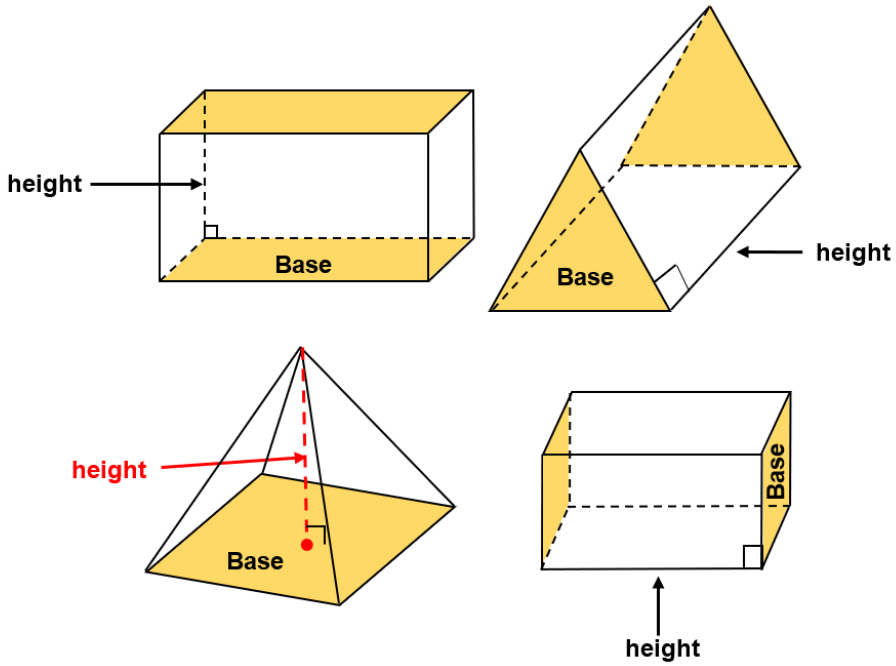
base (1) A quantity that is raised to an exponent, (e.g., 2^3 or b^a , where 2 and b are the bases, respectively); (2) a designated side of a two-dimensional figure (a height and the line containing this base must always be perpendicular);

Example:



Base (3) a designated face of a three-dimensional figure (a height and the plane containing this base must always be perpendicular).

Examples:



base ten number system A place value number system in which ten digits, 0 through 9, are used to represent a number and the value of each place is 10 times the value of the place to its right; the value represented by of any digit in the number is the product of that digit and its place value.

Example:

Hundred billions	Ten billions	Billions	Hundred millions	Ten millions	Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones	and	Tenths	Hundredths	Thousandths	Ten-thousandths	Hundred-thousandths	Millionths	Ten-millionths	Hundred-millionths
												•								

10 ones = 1 ten
10 tens = 1 hundred
10 hundreds =1 thousand
10 thousands = 1 ten thousand
10 ten thousands = 1 hundred thousand
10 hundred thousands = 1 million

10 tenths = 1 one
10 hundredths = 1 tenth
10 thousandths = 1 hundredth
10 ten-thousandths = 1 thousandth
10 hundred-thousandths = 1 ten-thousandth
10 millionths = 1 hundred-thousandth

benchmark A standard or point of reference against which things may be compared.
Example: multiples of ten

between (two numbers) Given two numbers, another number is said to be between those two numbers if it is greater than the smaller number but less than the larger number.

between (two points) Given three distinct collinear points A, B, and C, point B is said to be "between" A and C provided AB + BC = AC.

biased data Data gathered from a sample that is not representative of the entire population that is being sampled. If the sample is representative of the entire population being sampled, that data is unbiased. It is important to note that bias, or the lack thereof in a set of data, results from how the data was collected, and not from the data itself.

binomial An expression that combines two unlike monomial terms using the operations of addition and/or subtraction.

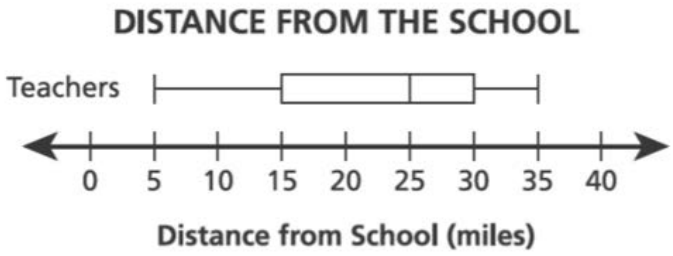
bisect (see "**bisector of an angle**" and/or "**bisector of a segment**")

bisector of an angle A line, line segment, ray, or plane that divides an angle into two congruent angles.

bisector of a segment A line, line segment, ray, or plane that divides a line segment into two congruent segments by passing through the segment's midpoint.

bivariate data Pairs of linked numerical observations.
Example: A list of heights and weights for each player on a football team.

box plot A graphical display using a five-number summary, which includes the maximum and minimum values, the 25th percentile (first quartile), 50th percentile (median), and 75th percentile (third quartile).
Example:



C

calculate To compute; to perform the indicated operation(s) to determine an answer.

capacity The measure of an object's potential ability to hold a substance, such as a solid, a liquid, or a gas.

cardinal number A number that denotes how many objects are in a set.

carry (as opposed to "map" in transformational geometry) To transform a geometric figure in a plane onto itself such that the vertices are in a one to many relationship**.**

Cartesian plane The plane formed by a horizontal axis and a vertical axis, often labeled the *x*-axis and *y*-axis respectively. (also see "**coordinate plane**")

categorical data Data collected to show a quality or feature regarded as a characteristic or inherent part of someone or something; also referred to as **attribute data**.

Celsius A metric temperature measurement scale where $0°$ represents the freezing point of water and $100°$ represents the boiling point of water; also known as **centigrade**.

census An official count (record) of specific details about the members of the population.

center of a circle The point inside the circle from which all points on the circle are equidistant; a circle is named using this point.

center of rotation The point about which a rotation is performed.

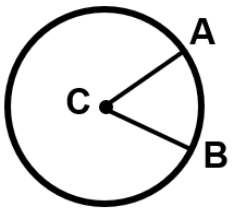
centigrade (see "**Celsius**")

centigram [cg] A metric unit of mass.

centimeter [cm] A metric unit of length.

central angle An angle whose vertex is at the center of a circle and whose sides are radii of the circle.

Example: $\angle ACB$ is a central angle of circle C.



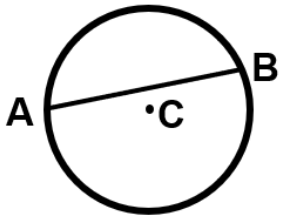
certain event An event that will always happen in a probability experiment.

Example: Drawing an odd number when selecting one number from a bag containing 6 slips of paper with the numbers 1, 3, 5, 7, 9, and 11 on them.

chance event Anything that happens without an apparent cause.

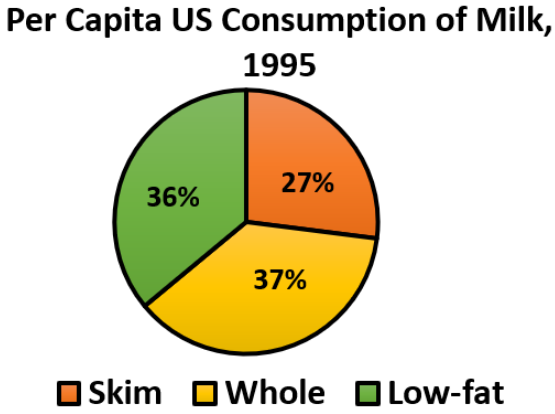
chart A diagram that illustrates information in the form of a table, graph, or picture.

chord A line segment connecting any two points on a circle.
Example: In circle C, $\overline{AB}$ is a chord.



circle All points in the same plane that are equidistant from a fixed point called its center.

circle graph A graph in which the data is represented by sectors of a circle; the total of all the sectors should be 100% of the data.
Example:



circumference The distance around a circle, calculated by multiplying the length of the diameter of the circle by pi; i.e., $C = \pi d$.

classify To sort into categories or to arrange into groups by attribute(s).

classify triangles To categorize a triangle according to its angles measures (acute, equiangular, obtuse, or right) or the lengths of its sides (equilateral, isosceles, or scalene).

closed figure A two-dimensional geometric figure that starts and ends at the same point and encloses an area.

closed mathematical sentence A mathematical sentence that has no unknown quantity or variable and it can be determined conclusively to be true or false; a closed sentence is also referred to as a **mathematical statement**.

clustering Grouping within a set of data such that the items in each group are similar to or the same as each other.

coefficient A constant that multiplies a variable.

Example: In $3x+4y=14$, 3 is the coefficient of *x* and 4 is the coefficient of *y*.

coinciding lines Two or more lines that have all points in common and no distance between the lines.

collection An accumulation of objects gathered for study or comparison.

collinear Three or more points that lie on the same straight line.

combine like terms Condensing 2 or more "like" terms in an expression using addition or subtraction to reduce the total number of terms. (also see "**term**")

Example: In the expression $4x+5+3x+9x^2$ the $4x$ and $3x$ are "like" terms and can be added to simplify the expression to $7x+5+9x^2$.

commission A fee paid/earned for services, usually a percent of the total sales.

common denominator A natural number that is a common multiple of each denominator in two or more fractions.

Example: The common denominators for $\frac{1}{6}$ and $\frac{3}{8}$ are 24, 48, 72, … .

common factor A quantity that evenly divides into two or more quantities.

Examples: 5 is a common factor of 15 and 30; 2*x* is a common factor of 4*xy* and 6x^2.

common multiple A natural number that is a multiple of two or more given natural numbers.

Example: The common multiples of 2, 3, and 4 are 12, 24, 36, 48, … .

commutative property of addition A property of real numbers that states that the sum of two terms is unaffected by the order in which the terms are added; i.e., the sum remains the same.

Example: $-2+3.5=3.5+-2$

commutative property of multiplication A property of real numbers that states that the product of two factors is unaffected by the order in which the factors are multiplied, i.e., the product remains the same.

Examples: $3\times5=5\times3$ and $5\cdot x=x\cdot5$

comparison statement A statement in which a relationship between two quantities is shown. (also see "**inequality**")

compass A mathematical tool used to establish points equidistant from a fixed point in a construction.

compensation A strategy that can be used for addition which usually involves increasing one addend while decreasing the other by the same amount.

Example: When adding 46 + 38, add 2 to 38 to make 40 and take two away from 46, resulting in 44; then add 40 + 44 to get 84.

complementary angles Two angles whose measures have a sum of $90°$.

Example: $50°$ and $40°$ are complementary angles.

complex fraction A fraction $\frac{a}{b}$ where a and/or b are fractions $(b \neq 0)$.

composite number A whole number greater than 1 that has more than two factors.

Example: 9 is a composite number because it has three factors: 1, 3, and 9.

composite shapes Shapes composed of two or more shapes.

compound event An event in a probability experiment that consists of two or more simple events.

Example: Tossing a coin in the air and rolling a 6 sided number cube, the probability of landing on heads and rolling a 3.

computation The act of carrying out one or more arithmetic operations.

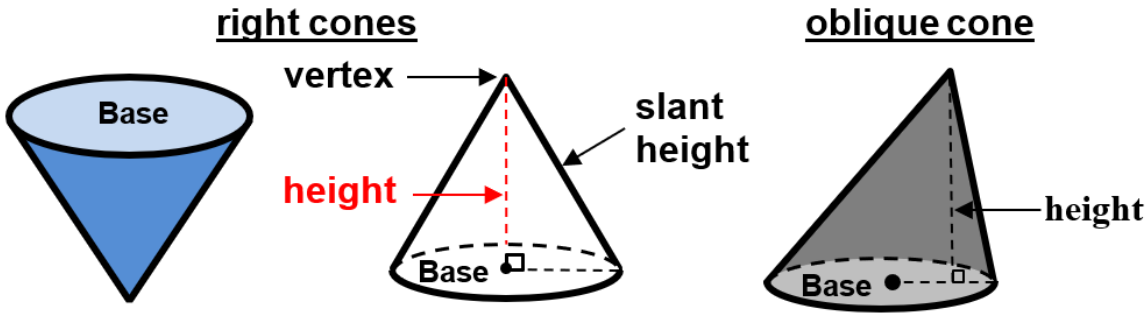
compute To find the numerical result by applying arithmetic operations.

conclusion A statement, answer, or solution arrived at through logical or mathematical reasoning.

condition A requirement necessary for a given statement or theorem to hold.

cone A three-dimensional figure bounded by a planar region, called its base (usually a circle), and the lateral surface, which is formed by straight line segments that join points on the boundary of the base to a fixed point called its vertex; the vertex is not in the plane containing the base.

Examples:



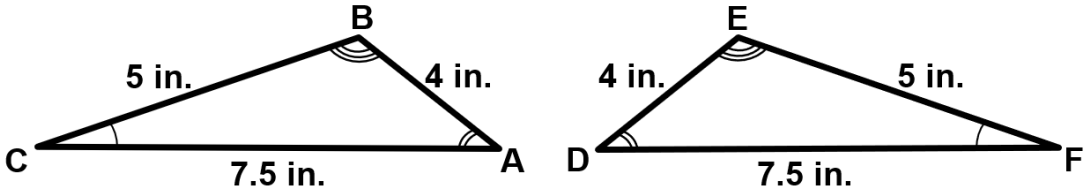
congruence A condition in which a finite, sequence of rigid motions (rotations, reflections, translations) exists that maps one figure completely on to another figure.

congruent ($\cong$) Term used to describe angles or sides that have the same measure.

congruent figures Two or more figures where all corresponding angle measures and corresponding side lengths are equal.

congruent triangles Two or more triangles where all corresponding angle measures and corresponding side lengths are equal.

Example: Triangle *ABC* is congruent to triangle *DEF*.



conjecture A statement, thought to be true, which has neither been proven nor refuted by counterexample.

consecutive Following one right after the other in order.

Example: $1, 2, 3, \ldots$ are consecutive positive integers and $\{\ldots, -2, 0, 2, 4, \ldots\}$ are consecutive even integers.

conservation of number An understanding that rearranging a group of objects does not affect its number.

constant A fixed value; a quantity that does not change its value.

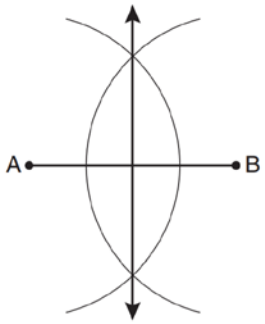
Example: In the expression $3s+4$, 4 is a constant.

constant of proportionality (unit rate) The value of the ratio of two proportional quantities.

constraint A limiting condition.

construction A precise method of drawing using only a straightedge and/or compass.

Example: The construction of the perpendicular bisector of segment AB.



context Specific constraints of a given situation.

converse A statement formed by reversing the hypothesis and conclusion of a conditional statement.

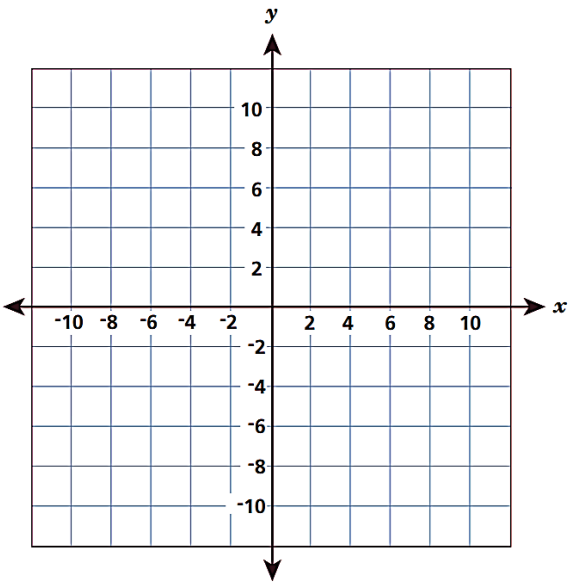
conversion factor The ratio (factor) that shows the equivalent relationship between two different units of measure; used to change between units of measure.

convert To change the form, but not the value of a particular number or quantity.

Examples: The improper fraction $\frac{8}{3}$ converts to $2\frac{2}{3}$ as a mixed number.
32 inches converts to 2 feet 8 inches.
The unit rate \$0.08/oz. converts to \$1.28/pound.

coordinate axes The two intersecting perpendicular number lines in a plane that form four quadrants for locating points given the ordered pair of points; the individual axes are typically referred to as the *x*-axis and the *y*-axis.

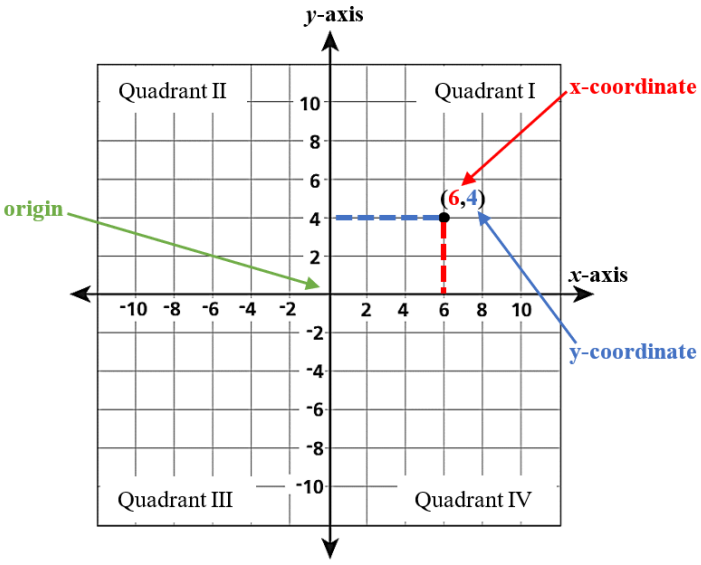
Example: The figure below illustrates the horizontal axis (*x*) and the vertical axis (*y*).



coordinate geometry A system of geometry where the position of points are described by using an ordered pair of numbers and lines are described using equations.

coordinate plane A plane containing a set of coordinate axes in which each point is located by a set of coordinates (*x*,*y*); the point of intersection of the axes is called the origin and has coordinates (0,0).

Example: The coordinates of the point on the graph are (6,4).



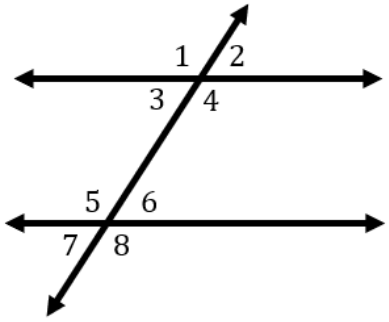
coordinates An ordered pair of numbers that identifies a point on a grid, coordinate plane, or map written as (*x*,*y*).

coplanar Two or more distinct geometric objects that lie in the same plane.

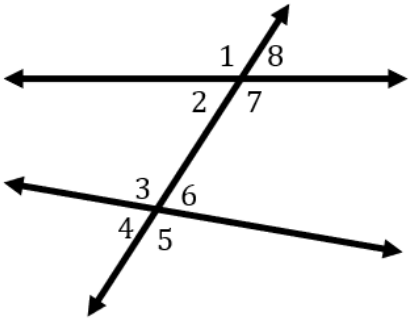
correlation A measure of the strength of the relationship between two variables.

corresponding angles Any pair of non-adjacent angles on the same side of the transversal, one interior and one exterior, formed when two lines are intersected by a transversal.

Examples:



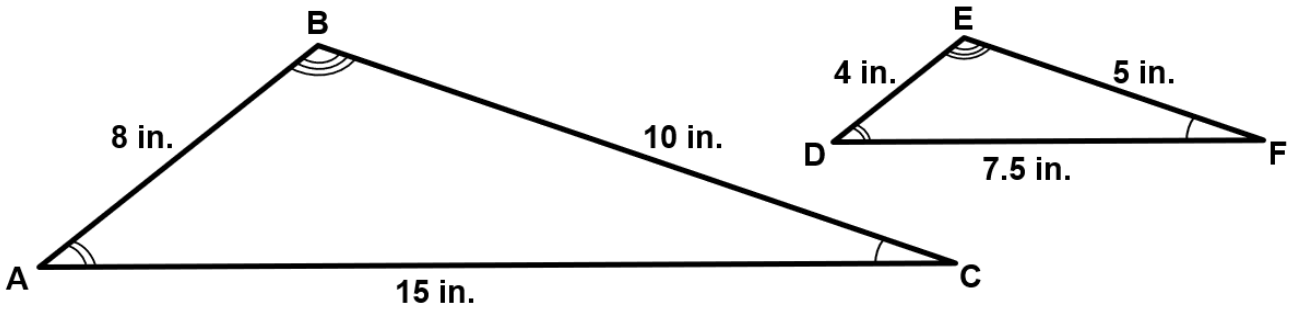
corresponding angles:
∠1 and ∠5; ∠2 and ∠6
∠3 and ∠7; ∠4 and ∠8



corresponding angles:
∠1 and ∠3; ∠2 and ∠4
∠5 and ∠7; ∠6 and ∠8

corresponding parts (sides or **angles)** Sides or angles in the same relative position on two or more congruent or similar figures. When a statement of congruence is written, the letters of the corresponding vertices are written in an order that shows the correspondences.

Example: If triangle *ABC* is similar to triangle *DEF*, then
side $\overline{AB}$ corresponds with side $\overline{DE}$,
side $\overline{BC}$ corresponds with side $\overline{EF}$,
side $\overline{CA}$ corresponds with side $\overline{FD}$,
$\angle A$ corresponds with $\angle D$,
$\angle B$ corresponds with $\angle E$, and
$\angle C$ corresponds with $\angle F$.



cost The amount paid or charged for something; a fee or expense incurred.

count To name the numbers in order up to and including a given number (e.g., count to ten); to determine the total number or amount.

count back A subtraction strategy of starting with the minuend and counting backward an amount equal to the amount of the subtrahend to arrive at the difference.

count on An addition strategy of starting with one addend (usually the larger) and counting forward an amount equal to the other addend to arrive at the sum.

counterexample An example to show that a claim is not always true.

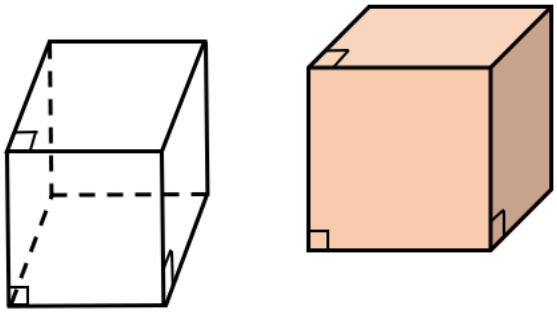
Example: An example of a counterexample showing the commutative property does not work for subtraction: $4-5 \neq 5-4$

counting numbers The set of numbers $\{1,\ 2,\ 3,\ 4,\ ...\}$, also referred to as **natural numbers**.

credit An amount paid into an account.

cross section (see "**plane section**")

cube A three-dimensional figure with 6 congruent square faces.
Examples:



cube of a number The result of a number being multiplied by itself three times.
Example: $2^3 = 2 \times 2 \times 2 = 8$

cube root of a number A number (factor) that when cubed yields the original number.
Example: The cube root of 8 is 2.

cubic unit A unit for measuring volume.

cumulative frequency histogram A type of histogram in which each bar is the sum of the frequencies at and below a given value.

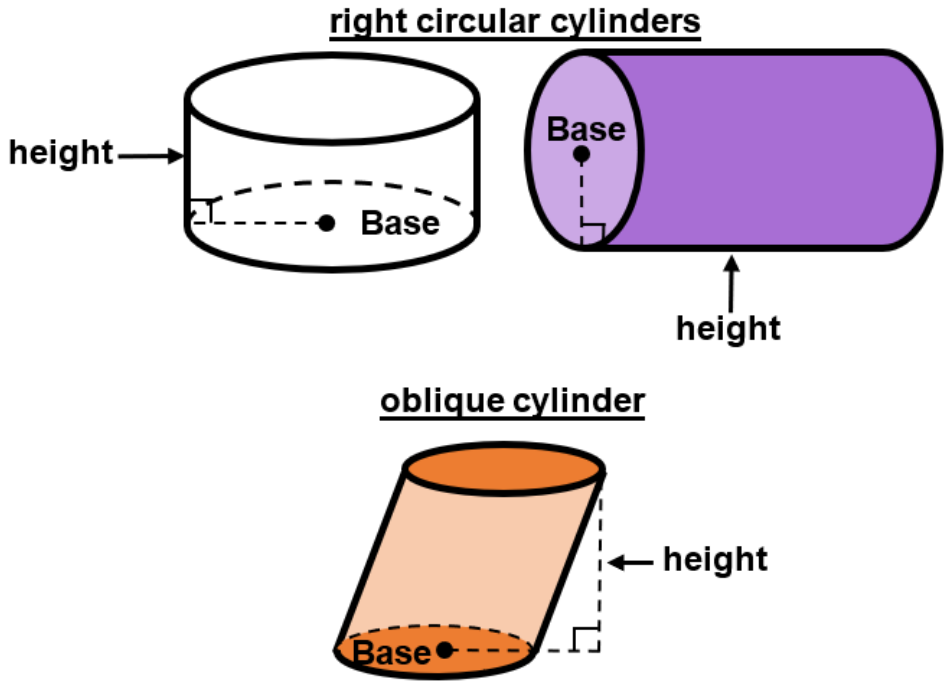
cup [c] A customary unit of capacity.

customary measurement system The system of measurement used mainly in the United States to measure length, weight and capacity(usually liquid).

cylinder (circular cylinder) A three-dimensional geometric figure bounded by two parallel congruent circles called its bases, and the curved lateral surface formed by connecting all the line segments that join all corresponding pairs of points on the circumferences of the bases. Every plane section taken parallel to the bases of a cylinder must be congruent to the bases of the cylinder.

right circular cylinder A cylinder where all the line segments that join the corresponding pairs of points on the circumference of the bases are perpendicular to the bases.

Examples:



D

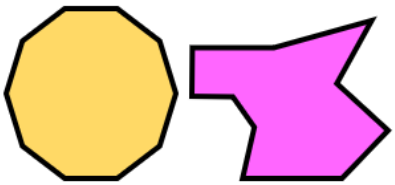
data Information collected and used to analyze a specific concept or situation.

data distribution The frequency pattern for a set of data.

data set A collection of data.

decagon A polygon with ten sides and ten angles.

Examples:



decimal expansion A number where each decimal place consists of a digit multiplied by a power of 10. The powers of 10 decrease in order from left to right.

Example: $213.46 = 2\times10^{2} + 1\times10^{1} + 3\times10^{0} + 4\times10^{-1} + 6\times10^{-2}$

decimal fraction A fraction using a denominator of 10 or a power of 10 to represent a decimal number.

decimal number (1) A proper fraction written using the base ten number system; a mixed decimal number has a whole number part as well (e.g., 0.32 is a decimal number and 3.5 is a mixed decimal number); (2) a linear array of digits that represents a real number with every decimal place indicating a multiple of a negative power of 10 (e.g., the decimals $0.1 = \frac{1}{10}$, $0.12 = \frac{12}{100}$, $0.003 = \frac{3}{1000}$; these are also called decimal fractions).

decimal point A symbol (period/separator) used to mark the distinction between the integral part and the fractional part of a decimal number.

decimeter [dm] A metric unit of length.

decomposition The result of breaking a quantity into smaller quantities/units in order to assist computation.

decreasing function A function where the dependent variable decreases in value as the value of the independent variable increases.

deduct To subtract or take away from a total.

deductive reasoning Using logic to arrive at a conclusion from a given premise.

degree (1) A unit of measurement for angles; a one-degree angle is an angle that turns through $\frac{1}{360}$ of a circle; (2) a unit of measurement for temperature.

degree of a monomial The sum of the exponents of the variables contained in the term.

Example: The degree of $3x^{2}y^{3}$ is 5.

degree of a polynomial A classification for a polynomial based upon the highest degree of a monomial with non-zero coefficients within that polynomial.

Example: Given the polynomial: $3x^{2} - 5x + 8x^{4} - 0x^{5} + 6$, the degree is 4.

denominator The total number of equal parts into which a whole is divided; a divisor.

density The mass per unit of volume.

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

Example: Drawing two marbles from a bag of red, green, and blue marbles without replacement.

dependent variable A variable whose value depends on the value of another variable, called an independent variable.

deposit To increase the value in an account when the account owner adds to the account.

descending order An arrangement in order from greatest to least or largest to smallest.

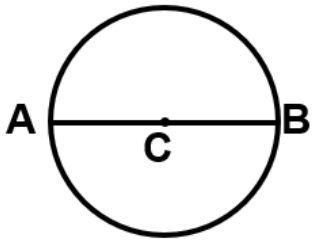
deviation The measure of the difference from a specified value.

diagonal (1) A line segment joining two non-consecutive vertices in a polygon; (2) a line segment joining two non-consecutive vertices in a three-dimensional figure in three dimensions.

diagram A drawing or graphical representation used to illustrate mathematical relationships.

diameter A chord of a circle which passes through the center of the circle; the longest chord of a circle.

Example: $\overline{AB}$ is the diameter of circle C.



difference The resulting quantity when one quantity(subtrahend) is subtracted from another quantity(minuend).

digit Any one of the ten numerical symbols: 0, 1, 2, 3, 4, 5, 6, 7, 8, or 9.

digital clock A clock on which the time is displayed numerically.

Example: The time is displayed as 12:22.

dilation A transformation in the plane centered at point O that maps the point O to itself, and maps each remaining point P in the plane to its image P' on the ray OP such that $OP' = k \cdot OP$, where k is the scale factor and $k > 0$. Informally, a transformation that enlarges or shrinks the figure both horizontally and vertically by the same scale factor with respect to a center point.

dimension A measurement of a figure in one direction.
Example: The length, width, or height of a prism.

directed line segment A line segment with an associated direction. (also see "**vector**")

distance A numerical measurement of how far apart two geometric figures are.

distance-time graph The graphic representation of a distance-time equation.

distribution (statistical) The frequency pattern for a set of data.

distributive property A property of real numbers that states that the product of a number and the sum(difference) of two numbers is the same as multiplying each addend(minuend and subtrahend) by the number and then adding(subtracting) the products.

Example: Multiplication over addition: $2(15+4)=2\times15+2\times4$
Symbolically, given a, b and c: $a(b+c)=ab+ac$
Multiplication over subtraction: $4(12-8)=4\times12-4\times8$
Symbolically, given a, b and c: $a(b-c)=ab-ac$

dividend A quantity to be divided by another quantity known as the divisor.

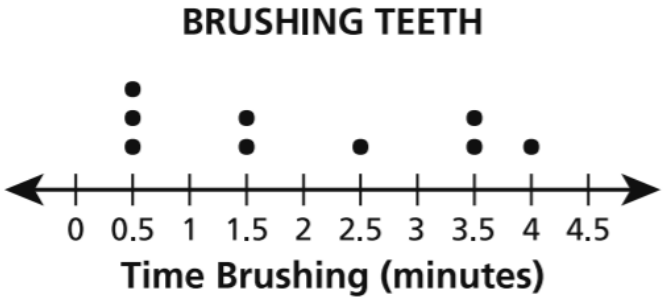
divisible To divide a quantity by a quantity that yields an integer result with no remainder.
Example: 15 is divisible by 3 because, $15\div3=5$, but 17 is not divisible by 3 because $17\div3=5$ with a remainder of 2.

division The mathematical operation of determining group size given a quantity of equal groups or determining the quantity of equal groups given a group size. (also see "**remainder**")

divisor The quantity by which the dividend is divided.

domain The set of input values for which a function is defined.

dot (line) plot A method of visually displaying a distribution of data values where each data value is shown as a dot or mark above a number line.
Example:

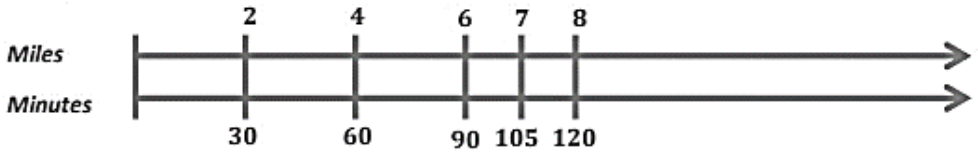


double-bar graph A graph that uses pairs of horizontal or vertical bars to compare and show the relationship between frequency of data.

double-line graph A graph comprised of two distinct line graphs that show change over time to represent and compare data.

double-number line A diagram that helps to make pairs of numbers in the same ratio more visible.

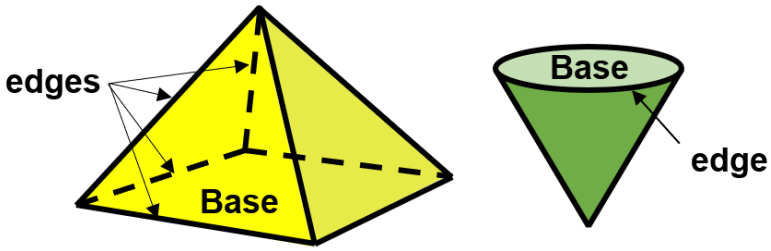
Example:



E

edge The boundary where a base and a lateral face, a base and lateral surface(s), two lateral faces, or two lateral surfaces of a three-dimensional figure intersect.

Examples:



elevation Height above a specified level.

endpoint A point at either end of a line segment or the initial point of a ray.

equal to (=) A symbol that means two things have the same amount, size, number, or value.

equality Relationship between two quantities that have the same value.

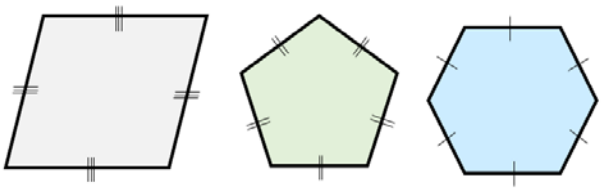
equally likely outcomes Two or more events in a sample space that have the same chance of occurrence.

equation Two expressions written horizontally and joined together by an equal sign.

equidistant Having equal distances.

equilateral Having all sides congruent.

Examples:



equilateral triangle A triangle with all sides congruent.

Example:

equivalent Equal in value.

Examples: 3 + 3 is equivalent to 2×3 (equivalent numerical expressions)
2.9 is equivalent to 2.90 (equivalent decimals)
1 yard is equivalent to 3 feet (equivalent lengths)
$\frac{2}{3}$ is equivalent to $\frac{8}{12}$ (equivalent fractions)

equivalent expressions Expressions that are identical when simplified using mathematical and algebraic methods.

equivalent fractions Two or more fractions that represent the same quotient (part of a set), the same size, or are represented by the same position on a number line.

Example: $\frac{1}{3} = \frac{3}{9}$

equivalent ratios Two ratios that express the same relationship (between numbers). (also see "**equivalent fractions**")

estimate An approximate answer.

evaluate To find the value of a mathematical expression.

Example: Evaluate the expression $2y - 7$ when $y = 5$

$$2(5) - 7 = 10 - 7 = 3$$

even number An integer that is a multiple of 2.

event A subset of outcomes of the sample space for a probability experiment.

Example: Given a number cube with the numbers 1 to 6 on the faces, the rolling of an even number is an event.

expanded form of a numeral A numerical expression used to show the base-ten value of each digit within that number.

Examples: $4576 = 4000 + 500 + 70 + 6$

$$47.392 = 4 \times 10 + 7 \times 1 + 3 \times \frac{1}{10} + 9 \times \frac{1}{100} + 2 \times \frac{1}{1000}$$

$$47.392 = (4 \times 10) + (7 \times 1) + \left(3 \times \frac{1}{10}\right) + \left(9 \times \frac{1}{100}\right) + \left(2 \times \frac{1}{1000}\right)$$

$$47.392 = (4 \times 10) + (7 \times 1) + (3 \times 0.1) + (9 \times 0.01) + (2 \times 0.001)$$

experiment An action or process carried out under controlled conditions in order to discover an unknown effect or law, to test or establish a hypothesis, or to illustrate a known law.

experimental probability The ratio of the total number of times the favorable outcome happens compared to the total number of times the experiment is done (number of trials); given by the formula $P(E) = \dfrac{\text{number of successful outcomes}}{\text{total number of outcomes}}$.

exponent A number that tells how many times the base is used as a factor; in an expression of the form b^a, a is called the exponent, b is the base, and b^a is a power of b.

exponential form A number written using exponents.

Example: $32 = 2^5$

expression A mathematical representation containing numbers, variables or a combination of both, and sometimes operation symbols; an expression does not include an equality or inequality symbol.

Examples: **numeric/arithmetic expression**: $(5 + 2) - 27 \div 3$

algebraic expression: $2a + 3b$

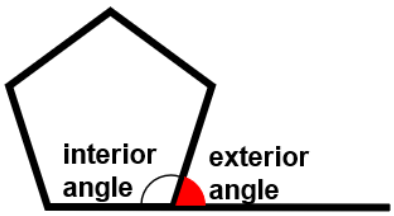
extend a pattern To continue a pattern through several cycles.

extended ratio A ratio that compares more than two numbers.

Example: The measures of the angles of a triangle are in the ratio $1:2:3$.

exterior angle of a polygon An angle formed by one side of a polygon and the line containing the extension of the adjacent side; the vertex of the exterior angle is a vertex of the polygon.

Example:



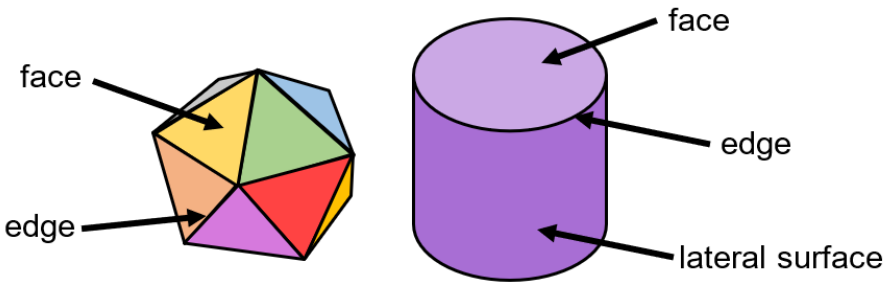
extremes of a proportion The first and last terms in the ratios of a proportion (the numerator of the first fraction and the denominator of the second fraction).

Example: $\frac{4}{10}=\frac{16}{40}$ or $4:10=16:40$ The numbers 4 and 40 are the extremes.

F

face A closed plane figure that is a bound of the surface of a three-dimensional figure.

Examples:



fact family A set of facts, each of which relates the same three numbers through addition and subtraction or through multiplication and division; sometimes referred to as "related facts".

Example 1: $3+4=7,\ 4+3=7,\ 7-4=3,$ and $7-3=4$

Example 2: $2\times5=10,\ 5\times2=10,\ 10\div5=2,$ and $10\div2=5$

factor (1) [noun] A quantity that is multiplied by another quantity to yield a product (e.g., a factor of 32 is 8 because $8\times4=32$ and a factor of $5x^3$ is $5x$ because $5x(x^2)=5x^3$); (2) [verb] to express as a product of two or more factors.

factor pair Two integers that are multiplied together to yield a given product.

Example:

Factor Pairs of 28	
1 and 28	–1 and –28
2 and 14	–2 and –14
4 and 7	–4 and –7

Fahrenheit A customary temperature scale based on $32°$ as the freezing point of water and $212°$ as the normal boiling point of water.

fair share The amount that each person receives when something is divided equally.

fee (see "**cost**")

figure (see "**geometric figure**")

finite decimal A rational number that when written as a fraction has a denominator equal to a power of 10. (also see "**decimal number"**)

finite set A set whose elements can be numbered from 1 to n, for some positive integer n. (also see "**cardinal number**")

first quadrant The quadrant located in the upper right portion of the coordinate plane. In the first quadrant, both the x- and y-coordinates are positive numbers. (also see "**quadrant**")

first quartile For a data set with median M, the first quartile is the median of the data values less than M; the point at which 25% of the data lies below it.

Example: For the data set $\{1,3,6,7,10,12,14,15,22,120\}$, the first quartile is 6.

fluid ounce [fl oz] A customary unit of liquid capacity.

foot [ft] A customary unit of length.

fourth quadrant The quadrant located in the lower right portion of the coordinate plane. In the fourth quadrant, the x-coordinates are positive numbers and the y-coordinates are negative numbers. (also see "**quadrant**")

formula A statement, equation, or rule that shows a relationship between two or more quantities.

Examples:	$P = 3s$	(perimeter of an equilateral triangle)
	$A = b \times h$	(area of a parallelogram)
	$d = rt$	(distance = rate $\times$ time)

fraction A number that represents part of a whole, part of a set, or a quotient in the form $\frac{a}{b}$ where $b \neq 0$, which can be read as a divided by b, where a is called the numerator and b is called the denominator.

frequency The number of times an event occurs.

frequency histogram (see "**histogram**")

frequency table A table that shows how often each item, number, or range of numbers occurs in a set of data.

function A mathematical relationship between two variables, an independent variable and a dependent variable, where every value of the independent variable corresponds to exactly one value of the dependent value.

fundamental counting principle The principle that states that all possible outcomes in a sample space for a compound event can be found by multiplying the number of ways each simple event can occur.

G

gallon [gal] A customary unit of liquid capacity.

geometric figure Any combination of points, lines, planes, or curves in two- or three-dimensions.

geometry The branch of mathematics that deals with the measurement, properties, and relationships of points, lines, angles, planes, and two- and three-dimensional figures.

gram [g] A metric unit of mass.

graph A visual representation used to show a numerical relationship.

graphically To solve a problem or demonstrate a relationship using a number line or coordinate graph.

gratuity (tip) A fee added onto a cost, usually a percent of the cost.

greater than $(>)$ A relationship showing that one quantity is larger than another quantity.
Example: $5+3>5-2$

greatest common factor (GCF) The greatest quantity that is a factor of two or more quantities; sometimes referred to as greatest common divisor (GCD).
Example: The greatest common factor of 12 and 18 is 6.

grid A network of uniformly spaced horizontal and vertical lines.

gross The total amount before any deductions.

group A number of individuals or objects that are assembled together or that have some unifying relationship.

grouping symbol A notation used to prioritize operations in an expression such as $( )$, $[ ]$, $\{ \}$.

H

halving Dividing or separating into two equal parts; reducing to one half of a value or object.

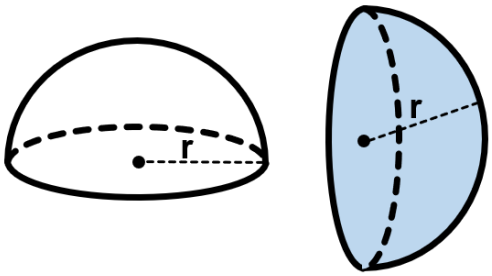
height of a cone or pyramid A line segment (or its length) drawn from the vertex of the cone or pyramid perpendicular to the plane containing the base.

height of a cylinder or prism A line segment (or its length) drawn from any point on one base perpendicular to the plane containing the other base.

height of a triangle or quadrilateral A line segment (or its length) drawn from a vertex perpendicular to the line containing the opposite side.

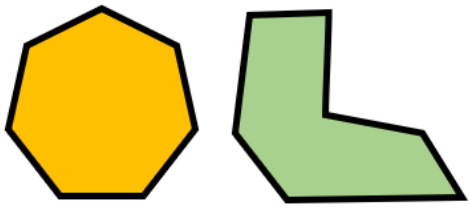
hemisphere A half of a sphere, produced by cutting a sphere with a plane through the center of the sphere.

Examples:



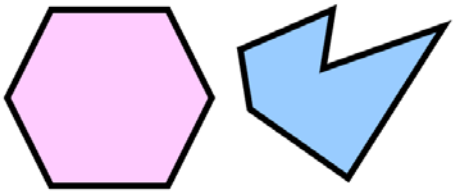
heptagon A polygon with seven sides and seven angles.

Examples:



hexagon A polygon with six sides and six angles.

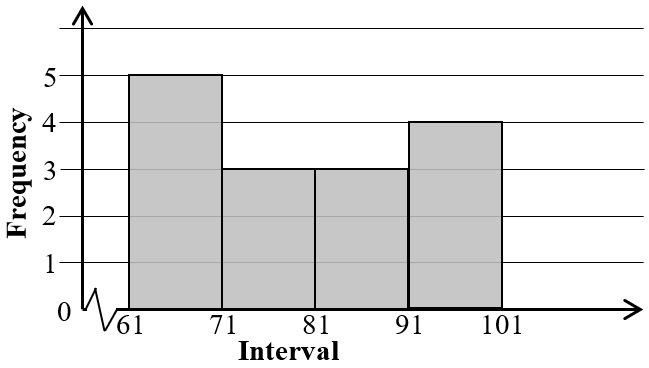
Examples:



hierarchy A ranking system.

histogram A special style of graph that displays the frequency of data that has been organized into equal intervals; the intervals cover all possible values of data, therefore there are no spaces between the bars of the graph; the horizontal axis is divided into continuous intervals. The boundaries for the bars are interpreted as $a \le x < b$, where a is included in the bar for the data values, b is not. The data value of b would be represented in the next bar.

Example: Given the data set: $\{65, 70, 70, 70, 70, 80, 80, 80, 85, 90, 90, 95, 95, 95, 100\}$



horizontal Parallel to or in the plane of the horizon.

hour hand The shorter hand on an analog clock.

hundred A group, or unit, consisting of ten tens or one hundred ones.

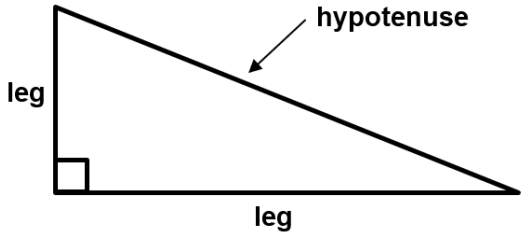
hundred chart A 10×10 grid representing the numbers from 1 to 100 in rows and columns of ten.

hundreds place The place value located three places to the left of the decimal point in a number; a digit in the hundreds place represents a value that is 100 times the actual digit.

hundredths place The place value located two places to the right of the decimal point in a number; one out of a hundred equal parts of a whole.

hypotenuse The side of a right triangle opposite the right angle; the longest side of a right triangle.

Example:



I

identity element for addition The identity element for addition is 0 because $n+0=n$ and $0+n=n$, for all n where n is a real number.

identity element for multiplication The identity element for multiplication is 1 because $n\times 1=n$ and $1\times n=n$, for all n where n is a real number.

identity property for addition The property that states that the sum of a number and 0 is that same number; i.e., $n+0=n$ for all n.

identity property for multiplication The property that states that the product of a number and 1 is that same number; i.e., $n\cdot 1=n$ for all n.

image In transformational geometry, the figure created when another figure, called the pre-image, undergoes a transformation.

impossible event An event that cannot occur in a probability experiment; The probability is equal to zero.

Example: Rolling the number 7 when tossing a six-sided number cube labeled 1 to 6.

improper fraction A fraction whose absolute value is greater than or equal to 1.

inch [in] A customary unit of length.

income The money earned from working.

increasing function A function where the dependent variable increases in value as the value of the independent variable increases.

independent events Two or more events in which the outcome of any one event has no effect on the outcome of the other event or events.

independent variable A variable which can be assigned any permissible value.

inductive reasoning Making a generalization from specific cases; used to formulate a general rule after examining a pattern.

inequality A sentence containing one of the symbols: $>,<,\geq,\leq,$ or $\neq$ to indicate the relationship between two quantities.

Examples: $6-2>4\div 2,\ 5z\leq 25,\ 7\neq 2+2$

inference (statistical) Deriving logical conclusions about a statistical population based on samples.

infinite set A set that continues without end; cannot be determined by measuring or counting.

Example: The set of rational numbers.

informal argument A claim without formal rules; a deduction that does not follow prescribed rules.

initial value of a function The beginning output value or the *y*-value when $x = 0$.

input value A value assigned to a variable in a given formula or expression that allows the formula or expression to be evaluated.

Example: Evaluate the perimeter of a rectangle given the following input values: $L = 12$, $W = 5$ and the formula $P = 2L + 2W$

$$P = 2L + 2W$$
$$P = 2(12) + 2(5)$$
$$P = 24 + 10$$
$$P = 34$$

integers The set of numbers $\{..., -3, -2, -1, 0, 1, 2, 3, ...\}$.

integral solution A solution such that all the unknown variables take only integer values.

integral exponent An exponent that is an integer.

Example: In the expression 2^{-1}, -1 is the integral exponent of the base number 2.

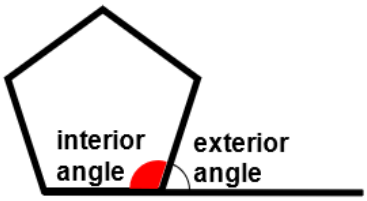
intercept The point at which a line or curve crosses or touches an axis.

interest The fee for borrowing money or the profit earned on money invested.

interest rate The percent of interest charged on money borrowed or earned on money invested.

interior angle of a polygon An angle on the inside of a polygon formed by two adjacent sides of the polygon, the vertex of the interior angle is a vertex of the polygon.

Example:



interquartile range A measure of variation in a set of numerical data, the interquartile range is the distance between the first and third quartiles of the data set (the middle 50% of a set of data).

Example: For the data set $\{1, 3, 6, 7, 10, 12, 14, 15, 22, 120\}$, the interquartile range is $15 - 6 = 9$.

intersecting lines Lines that share one common point.

intersection of sets The set of elements that are common to each of two or more sets.
Example: If set *A* = the set of all parallelograms and set *B* = the set of all equilateral polygons, then the intersection of sets *A* and *B* is the set consisting of all rhombuses and all squares).

interval A set containing all of the numbers between two given numbers (endpoints); this set may contain one of the endpoints, both endpoints, or neither endpoint depending on the notation used for the endpoints.

invalid An approach or example that is basically flawed and does not lead to the correct solution of the problem.

inverse operation An operation that is the opposite of, or undoes, another operation.
Examples: Addition and subtraction are inverse operations; multiplication and division are inverse operations.

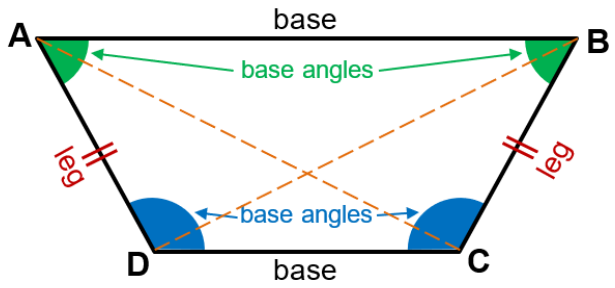
inverse property of addition A property of real numbers that states when two real numbers are added the result is the identity element, 0.
Example: $8 + -8 = 0$

inverse property of multiplication A property of real numbers that states when two real numbers are multiplied the result is the identity element 1.
Example: $8 \times \frac{1}{8} = 1$

irrational number A real number that cannot be represented as an exact ratio of two integers; the decimal form of the number never terminates and never repeats.
Examples: $\pi,\ \sqrt{2},\ \sqrt{10},\ 0.010010001...$

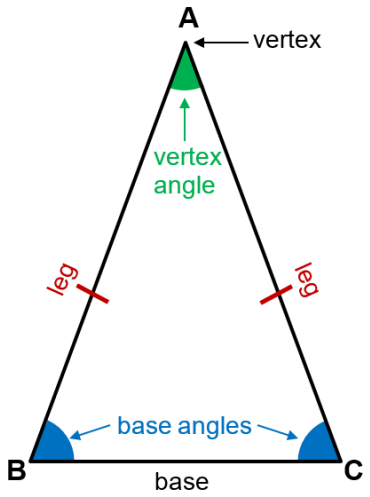
irregular polygon A polygon whose sides and angles are not all congruent.

isosceles trapezoid A trapezoid in which the diagonals are congruent.
Example: In trapezoid ABCD shown below, $\overline{AB} \parallel \overline{CD}$ and $\overline{AC} \cong \overline{DB}$ therefore ABCD is an isosceles trapezoid.



isosceles triangle A triangle with at least two congruent sides. (Note: An equilateral triangle is also an isosceles triangle.)

Example: Isosceles triangle ABC is shown below where $\overline{AB} \cong \overline{AC}$, therefore $\angle B \cong \angle C$.



K

key A table for decoding or interpreting; a notation that explains something such as the value of each symbol or picture on a pictograph.

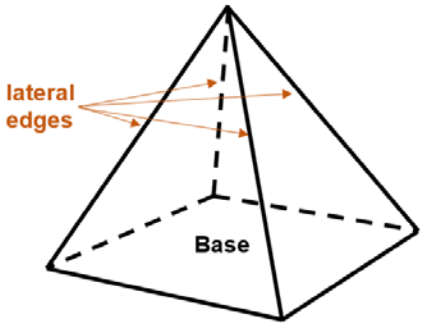
kilogram [kg] A metric unit of mass.

kilometer [km] A metric unit of length.

L

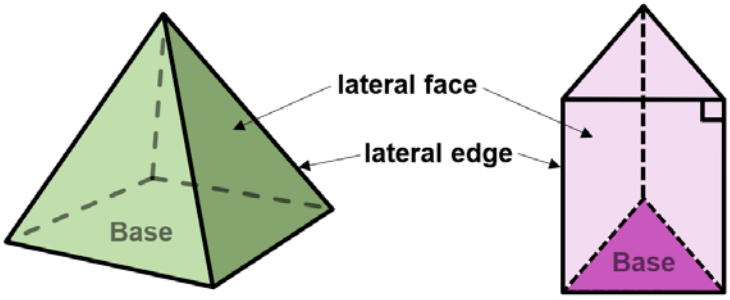
lateral edge Intersection of two lateral faces.

Example:



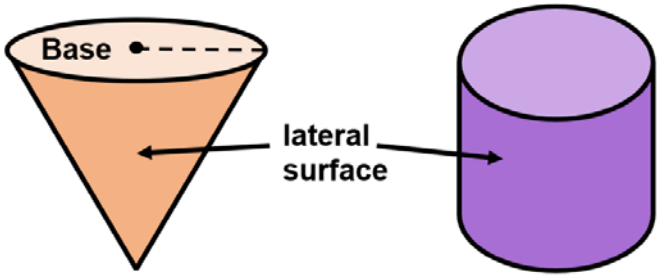
lateral face The faces of a three-dimensional figure that are not designated as the base(s).

Examples:



lateral surface The bounds of the surface of a three-dimensional figure that are not designated as the base(s) or face(s).

Examples:



law of exponents for division The quotient of two numbers in exponential form with the same base is equal to that base with a power equal to the difference of the powers of each number; i.e., subtract their exponents: $\frac{a^b}{a^c} = a^{(b-c)}$.

Example: $\frac{3^5}{3^2} = 3^{(5-2)} = 3^3$

law of exponents for multiplication The product of two or more numbers in exponential form with the same base is equal to that base raised to the power equal to the sum of the powers of each number; i.e., add their exponents: $a^b \cdot a^c = a^{b+c}$.

Example: $a^3 \cdot a^4 = a^{3+4} = a^7$

least common denominator (LCD) The smallest common multiple of two given denominators.

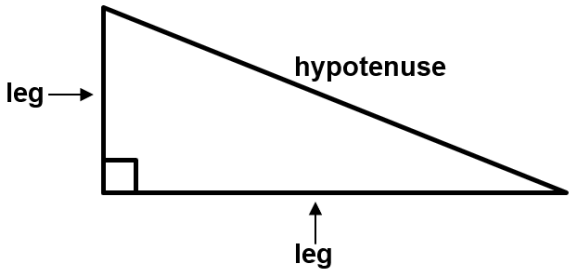
Example: The least common denominator of $\frac{1}{3}$ and $\frac{1}{8}$ is 24.

least common multiple (LCM) The smallest expression, greater than zero, that is a multiple of two or more quantities.

Examples: The least common multiple of 20 and 25 is 100; the least common multiple of $5x^2$ and $3xy$ is $15x^2y$.

leg of a right triangle One of the two sides of a right triangle that form the right angle; the sides that are not the hypotenuse. (also see "**hypotenuse**")

Example:



length The distance from one end of an object to the other end.

length unit The equal-sized units used when measuring the length of an object.

less than $(<)$ A relationship showing that one value is smaller than a second value.

Examples: $2<3$, $-5<-1$

like denominators Two or more fractions that have been broken up into the same number of equal parts.

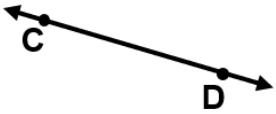
Example: The fractions $\frac{2}{7}$ and $\frac{3}{7}$ have like denominators; i.e., the same denominator.

like terms (see "**term**")

likely event A chance event with a probability between 0.5 and 1; the closer the probability is to being 1, the more likely the event is to occur.

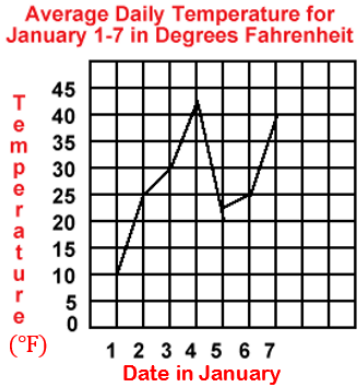
line $\overleftrightarrow{CD}$ A straight one-dimensional figure having no thickness and extending infinitely in both directions.

Example:



line graph A graph that uses line segments to show changes in data; the data usually represents a quantity changing over time.

Example:



line of best fit The line that most closely approximates the relationship between bivariate data.

line of reflection The line over which a reflection is performed.

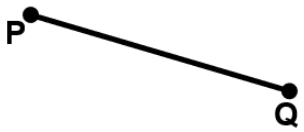
line of symmetry A line that divides a figure into two congruent halves that are mirror images of each other. Informally, to determine if a figure has line symmetry, fold the figure along the proposed line of symmetry and see if the two halves of the figure coincide with one another.

line plot (see "**dot plot**")

line reflection A transformation in the plane over given line ℓ that maps each point on the line ℓ to itself, and maps each point P in the plane to its image point P' such that line ℓ is the perpendicular bisector of the segment PP'. Informally, a rigid motion that produces a mirror image across line ℓ.

line segment $(\overline{PQ})$ The set of points on a line consisting of two fixed distinct points and all the points between those two fixed points; the fixed points are referred to as the endpoints of the segment.

Example: Line segment PQ is shown below.



line symmetry A property of a figure where the figure can be divided by a line into two congruent parts.

linear association Two variables are linearly associated if a change in one is associated with a proportional change in the other, with the same constant of proportionality throughout the range of measurement ($y = kx$ where k is the constant of proportionality).

linear equation An equation that contains one or more variables in which the highest power of all variables used in the equation is 1; a linear equation with one or two variables yields a straight line when represented graphically.

Examples: $3x - 1 = -7$, $x + 2y = 12$

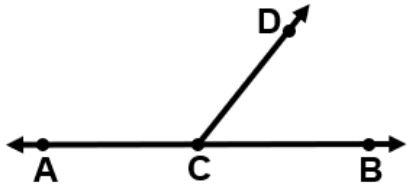
linear function A function whose graphic representation is a straight line. Linear functions have a constant rate of change and are frequently written in the form: $y = mx + b$.

linear inequality An inequality that contains one or more variables in which the highest power of all variables used in the equation is 1.

Examples: $3x > 2$, $y \leq 2x - 1$

linear pair of angles A pair of adjacent angles formed by intersecting lines. Linear pairs of angles are always supplementary.

Example: $\angle ACD$ and $\angle DCB$ form a linear pair of angles.



liter [L] A metric unit of liquid capacity/volume.

loan A thing, such as money, that is borrowed.

locus A set of points satisfying certain given conditions.

logic The formal structure for reasoning.

logical equivalence A statement that two mathematical sentence forms are completely interchangeable: if one is true, so is the other; if one is false, so is the other.

logical reasoning The process of using a rational, systematic series of steps based on sound mathematical procedures to arrive at a conclusion; the drawing of conclusions from given facts and mathematical principles; often used as a problem solving strategy.

long division A standard algorithm suitable for dividing multi-digit numbers.

lowest terms The form of a fraction in which the numerator and denominator have no common factor except 1.

M

magnitude The relative size or amount of a quantity.

manipulatives Physical and digital objects that can be used to help solve mathematical problems.

Examples: tangrams, base ten blocks, number cubes, cards, rulers, counters, pattern blocks, cubes.

map $(\rightarrow)$ **(as opposed to "carry" in transformational geometry)** Transforming a geometric figure such that each point on the pre-image has a corresponding point on the image.

map scale A key that provides an equivalence between a distance on a map and the associated real-world distance.

markdown A reduction in the cost of an item.

markup An increase in the cost of an item.

mass The amount of matter or substance in an object; commonly taken as a measure of the amount of material it contains and causes it to have weight in a gravitational field. [This should not be confused with weight, which is a measure of the force of gravity on an object. An apple weighs more on Jupiter than it does on Earth because Jupiter's gravity is stronger. However, the apple always has the same mass, no matter where it is.]

mathematical relationship The connection between two quantities, properties, or concepts.

Example: The diameter of a circle is twice its radius.

mathematical sentence A claim or arrangement of expressions and mathematical symbols that states a complete thought. A mathematical sentence can be either closed or open. (also see "**closed mathematical sentence**" and/or "**open mathematical sentence**")

mathematical solution(s) The statement(s) or value(s) that correctly answers a mathematical question or completes an open mathematical sentence.

mathematical statement (see "**closed mathematical sentence**")

mean (arithmetic) A measure of central tendency; the quotient obtained when the sum of the numbers in a set is divided by the number of addends.

means of a proportion The two middle terms in the ratios of a proportion (the denominator of the first fraction and the numerator of the second fraction).

Example: $\frac{3}{4}=\frac{6}{8}$ or $3:4=6:8$ The numbers 4 and 6 are the means.

measure (1) [noun] A standard unit used to express the size, amount, or degree of something; (2) [verb] the process of ascertaining the size, amount, or degree of something by using an instrument or device marked in standard units or by comparing it with an object of known size.

measure of an angle (see "**angle measure**")

measure of center (see "**measure of central tendency**")

measure of central tendency A single number that represents a typical value for a set of numbers; the three most common measures of central tendency are the mean, median, and mode.

measure of variability A number that indicates how dispersed scores are around the mean of the distribution.

Examples: standard deviation, range

median A measure of central tendency, the middle number of a set of numbers arranged in increasing or decreasing order; if there is no middle number, the median is the average of the two middle numbers. It is the point at which 50% of the data lies below.

Examples: The median of the numbers 1, 1, 2, 4, 5, 6, and 7 is 4.
The median of the numbers 1, 1, 2, 4, 5, 6, 7, and 7 is 4.5.

meter [m] A metric unit of length.

metric system A standard system of measurement based on the decimal system; the standard unit of length is a meter, of liquid capacity is a liter, and of mass is a gram.

metric units Units used in the metric system:

mile [mi] A customary unit of length.

milligram [mg] A metric unit of mass.

milliliter [mL] A metric unit of liquid capacity/volume.

millimeter [mm] A metric unit of length.

minuend In subtraction, the quantity from which another quantity (subtrahend) is to be subtracted.

Example: The "5" in the expression "$5-3$".

minute A unit of time.

minute hand The longer hand on an analog clock.

mirror image (see "**line reflection**")

missing value A value omitted from an equation that is needed to make the equation true.

Example: $(2\times3)\times5=2\times(3\times(?))$

mixed number A number composed of an integer and a proper fraction.

Example: $3\frac{2}{9}$

mode A measure of central tendency, the number(s) or member(s) of a data set that occurs most frequently in the set; a data set does not need to have a mode.

model (1) [noun] A visual representation that illustrates or further explains a mathematical principle or concept; (2) [verb] to make or act out a representation of something, usually on a smaller scale or in a simpler way; to use pictures, diagrams, or physical objects to further demonstrate or clarify a problem.

monomial An expression comprised of a single algebraic term where any variable is raised to a non-negative integral power.

Examples: $-\frac{1}{4}, x^2, 4a^2b, -1.2, m^2n^3p^4$

multiple The product of a given quantity and an integer.

multiple representations Various ways to present, interpret, communicate, and connect mathematical information and relationships.

multiplicand The quantity being multiplied in a multiplication problem.

multiplication The mathematical operation of adding one quantity to itself a specified number of times to find one quantity called a product.

multiplicative identity (see "**identity element for multiplication**")

multiplicative inverse In the set of real numbers, the number a given non-zero number needs to be multiplied by to yield the multiplicative identity 1; $n\times n\text{-inverse}=1$ for all n where $n\neq0$; commonly known as the reciprocal of a number.

Examples: $7\times\frac{1}{7}=1, \frac{2}{3}\times\frac{3}{2}=1$

N

natural numbers The set of numbers $\{1,2,3,4,...\}$, also known as counting numbers.

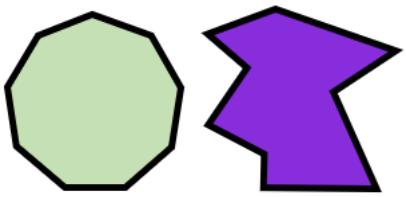
negative number A number that is less than zero; located to the left of zero on a number line.

net (geometric) A two-dimensional plane figure that can be folded to make a three-dimensional figure.

no solution The statement made when the process of solving an equation results in a false statement or when solving a system of equations has no point of intersection.

nonagon A polygon with nine sides and nine angles.

Examples:



noncollinear Three or more points that do not lie on the same line.

nonlinear equation or inequality An equation or inequality that, when represented graphically, results in a graph that is not a straight line.

Examples: A circle, $x^2 + y^2 = 25$; a parabola, $y = x^2 + x - 6$

nonlinear function A function whose graphic representation is not a straight line and doesn't have a constant rate of change.

nonnegative number A number that is zero or greater.

nonrepeating decimal A decimal number that does not repeat; it either terminates or continues in no discernible pattern.

nonstandard unit Any unit not part of a measurement system (customary or metric) that can be used to measure something. (also see "**length unit**")

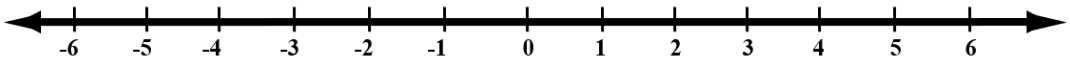
Examples: paperclips, crayons

nonterminating decimal A decimal number whose digits do not end. A nonterminating, repeating decimal is a rational number and a nonterminating decimal that continues in no discernible pattern is an irrational number.

number The concept of an amount, quantity, or how many items there are in a collection.

number line A line on which each point represents a real number.

Example:



number sense A conceptual understanding of numbers and number concepts.

number sentence A mathematical statement that has only numbers (no unknown quantities or variables), at least one operation symbol, and an equal or inequality symbol.

number sequence A set of numbers arranged in a specific order.

number system A system used to represent numbers. (see "**base ten number system**")

number words Numbers written in words.

numeral The written symbol that represents a number.

numeration The act or process of counting or numbering; a system of counting or numbering.

numerator The number of equal parts out of the total number of equal parts indicated by the denominator; a dividend.

numeric pattern An arrangement of numbers that repeat or that follow a specified rule.

numerically Expressed in or involving numbers or a number system.

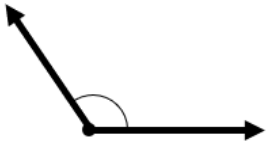
O

observation (in statistics) Something of interest to be measured or counted during a study or experiment.

observational study A study in which the researcher measures or surveys the members of a sample without applying a treatment.

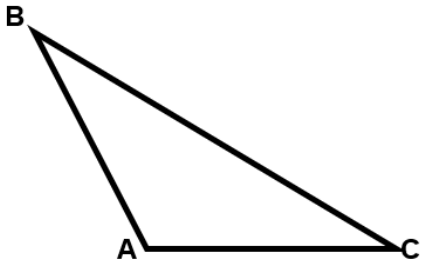
obtuse angle An angle whose measure is greater than $90°$ and less than $180°$.

Example:

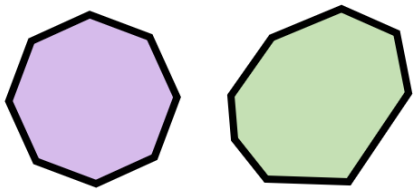


obtuse triangle A triangle containing one obtuse angle and two acute angles.

Example: In ΔABC, $90° < \text{m}\angle A < 180°$, $0° < \text{m}\angle B < 90°$, $0° < \text{m}\angle C < 90°$.



octagon A polygon with eight sides and eight angles.
Examples:



odd number An integer that is not a multiple of 2.

one-digit number A number consisting of just one digit; 0, 1, 2, 3, 4, 5, 6, 7, 8, or 9.

ones Individual units, 10 of which become a ten.

ones place The place value located one place to the left of the decimal point in a number; it represents how many ones are in a number.

one-step equation or inequality An equation or inequality that can be solved in one step.

one-variable equation An equation containing one variable, such as $2x+3=9$.

open figure A figure that is not closed; i.e., it does not start and end at the same point.
Example:

open mathematical sentence A mathematical sentence that contains an unknown quantity or a variable, and the value of that variable determines if the sentence is true or false. (also see "**mathematical sentence**")

operations Procedures used to combine numbers, expressions, or polynomials into a single result.
Examples: addition, subtraction, multiplication, division, exponents

opposite signs Indicating locations on opposite sides of zero on the number line.

order To place numbers or objects in a sequential arrangement.
Examples: least to greatest, heaviest to lightest

order of magnitude The size of something, specifically measured in powers of 10.

order of operations A specified sequence in which mathematical operations are expected to be performed; an arithmetic expression is evaluated by following these ordered steps: (1^{st}) simplify within grouping symbols such as parentheses or brackets, starting with the innermost and work outward; (2^{nd}) apply exponents – powers and roots; (3^{rd}) perform all multiplications and divisions in order from left to right; (4^{th}) perform all additions and subtractions in order from left to right.

ordered pair A set of two numbers named in an order that matters; represented by (*x,y)* such that the first number, *x*, represents the *x*-coordinate and the second number, *y*, represents the *y*-coordinate when the ordered pair is graphed on the coordinate plane; each point on the coordinate plane has a unique ordered pair associated with it.

ordinal numbers Numbers used to specify position in a sequence.
Examples: first, second, third, fourth, … or 1^{st}, 2^{nd}, 3^{rd}, 4^{th}, …

origin The point on the coordinate plane where the *x*- and *y*-axes intersect; has coordinates (0,0).

ounce [oz] A customary unit of weight.

outcome The result of an experiment; one of the possible events.
Example: When tossing a fair coin, there are two possible outcomes, heads or tails.

outlier An observation or data point that lies an unusual distance from other values in the data.

output value The value that results from the evaluation of a rule, formula or expression.

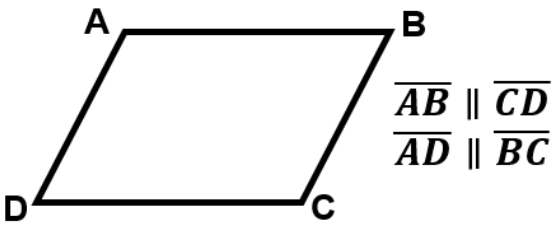
overall shape A description of a distribution by its number of maxima and minima, its symmetry, its tendency to skew or its uniformity.

P

parallel lines Two or more distinct lines in the same plane that never intersect, these lines are always equidistant. In the coordinate plane, non-vertical parallel lines have equal slopes.

parallel planes Two or more distinct planes that never intersect.

parallelogram A trapezoid with two pairs of parallel sides.
Example:



part A portion of a whole that is separate or distinct.

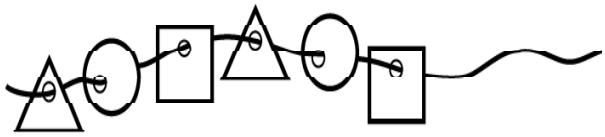
partition The result of a shape or quantity being divided into smaller shapes or quantities.

pattern A design (geometric) or sequence (numeric/algebraic or arithmetic) that is predictable because some aspect of it repeats.

Examples: Numeric pattern: $4, 7, 10, 13, \ldots$

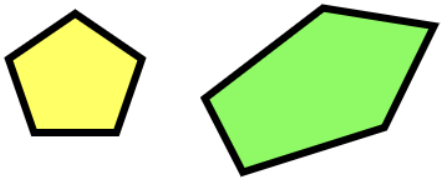
Algebraic pattern: $x, x^2, x^3, x^4, \ldots$

Geometric pattern:



pentagon A polygon with five sides and five angles.

Examples:



percent A number expressed in relation to 100; represented by the symbol %.

Example: 40 parts out of 100 is 40%.

percent decrease The magnitude of decrease expressed as a percent of the original quantity.

percent error The magnitude of the difference between the approximate value and exact value expressed as a percent of the exact value.

percent increase The magnitude of increase expressed as a percent of the original quantity.

perfect cube An integer resulting from multiplying an integer by itself three times; a is a perfect cube if $a = n \times n \times n$ and n is an integer.

Examples: $8 = 2 \times 2 \times 2,\ -27 = (-3)(-3)(-3)$

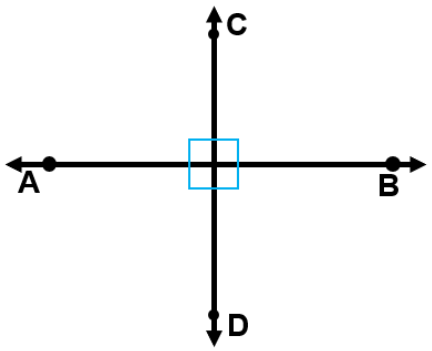
perfect square An integer resulting from multiplying an integer by itself; a is a perfect square if $a = n \times n$ and n is an integer.

Examples: $16 = 4 \times 4,\ 121 = (-11)(-11)$

perimeter The distance around a closed figure.

perpendicular ($\perp$) Intersecting lines/planes (or subset of lines/planes) to form right angles.

Example: $\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$



perpendicular bisector A line, segment, ray, or plane that intersects a line segment at a right angle, dividing the line segment into two equal parts.

physical model A representation of something using objects.

pi (π) The value of the ratio of the circumference of a circle to its diameter; pi is an irrational number.

picture graph A graph that uses symbols to represent data; an accompanying key indicates the value associated with each symbol; sometimes referred to as a pictograph.

Example:

Number of Cars Mr. Betz Sold in One Week

Key: **= 6 cars**

	Picture graph
Mon	
Tues	
Wed	
Thurs	
Fri	

pint [pt] A customary unit of liquid capacity.

place value The value of a digit in a number based on its position in the base ten number system.

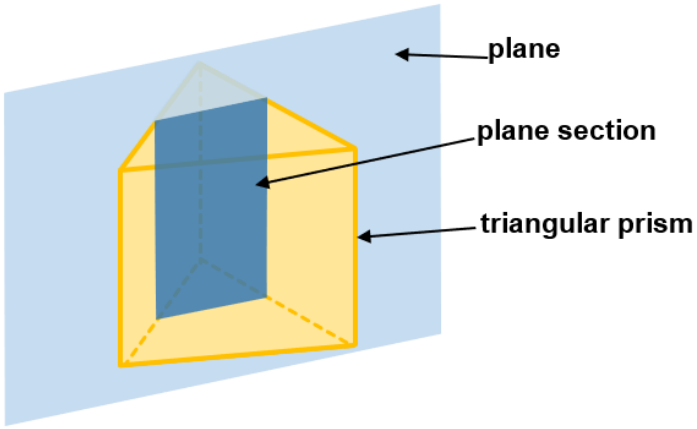
Example: In the number 28, the 2 is in the tens place and the 8 is in the ones place.

planar figure A figure that is contained within a flat surface.

plane A set of points forming a flat surface that extends without end in all directions.

plane section The two-dimensional geometric figure formed by the intersection of a solid figure and a plane.

Example:



plot To mark/draw a point on a coordinate plane.

point An exact location in space; a point has no dimension.

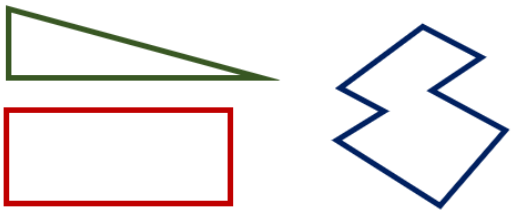
point reflection A transformation in the plane where given point O, maps the point O onto itself, and maps each remaining point P in the plane to its image point P' such that point O becomes the midpoint of the segment from point P to point P'. Formally, a rigid motion that turns a figure $180°$ about a point.

point-slope equation of a line The equation of a line 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 point on the line.

poll The results of a question or questions answered by a group of people.

polygon A closed plane figure formed by three or more line segments.

Examples:



polyhedron A three-dimensional figure that is bounded by four or more polygonal faces.

polynomial An expression that consists of many unlike monomial terms connected using only the operations of addition and/or subtraction.

population A group of people, objects, or events that fit a particular description; in statistics, the set from which a sample of data is selected.

positive number Any real number greater than zero.

post meridiem (p.m.) Afternoon; the times from 12 noon until 12 midnight; 12 noon is 12 p.m.

pound [lb] A customary unit of weight.

power An exponent.

Example: In the expression 3^8 **,** 8 is the power and 3 is the base.

precise Exact and accurate.

predict To determine the next step or value (to make an educated guess), based on evidence or a pattern.

prediction An educated guess about an outcome.

pre-image In transformational geometry, the figure before a transformation is applied.

Example: If the image of A is A', then A is the pre-image of A'.

preserve In transformational geometry, to keep or maintain a property or relationship.

Example: A translation maintains segment length and angle measure.

prime factorization A method of writing a composite number as a product of its prime factors.

Example: $12 = 2 \times 2 \times 3 = 2^2 \times 3$

prime number A number greater than 1 that has exactly two different positive factors, 1 and itself.

Examples:

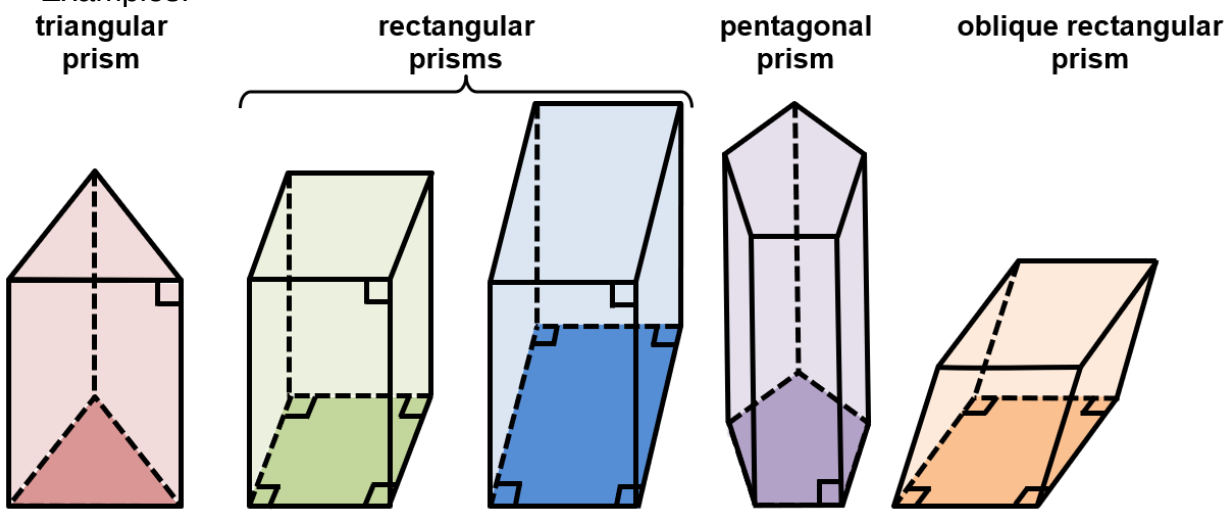
Prime Numbers	
Number	Factors
2	1, 2
7	1, 7
11	1, 11
17	1, 17

Non-Prime Numbers	
Number	Factors
6	1, 2, 3, 6
8	1, 2, 4, 8
15	1, 3, 5, 15
25	1, 5, 25

principal The original sum of money that is invested or lent.

prism A three-dimensional figure that has two congruent parallel faces that are polygons, these are called the bases; the remaining lateral faces are parallelograms.

Examples:



probability The chance of an event occurring; the ratio of the number of favorable outcomes to the total number of possible outcomes; the probability of an event must be greater than or equal to 0 and less than or equal to 1.

Example: $P(\text{rolling a three on a 6-sided number cube}) = \dfrac{\text{the number of threes on the faces}}{\text{the total number of faces}} = \dfrac{1}{6}$

probability model A mathematical representation of a random phenomenon. The set of all outcomes is called the sample space, and their probabilities sum to 1.

problem solving strategies Various methods used to solve word problems; strategies may include, but are not limited to: acting it out, drawing a picture or graph, using logical reasoning, looking for a pattern, using a process of elimination, creating an organized chart or list, solving a simpler but related problem, using trial and error (guess and check), working backwards, writing an equation.

product The resulting quantity when two or more quantities(factors) are multiplied.

profit The amount of money left after expenses have been subtracted from income.

proof A valid argument, expressed in written form, justified by axioms, definitions, and theorems.

proper fraction A fraction whose absolute value is less than 1.

properties of operations on real numbers Rules that apply to the operations with real numbers.

Examples: associative, commutative, distributive, identity, inverse, zero

proportion An equation which states that two ratios are equivalent.

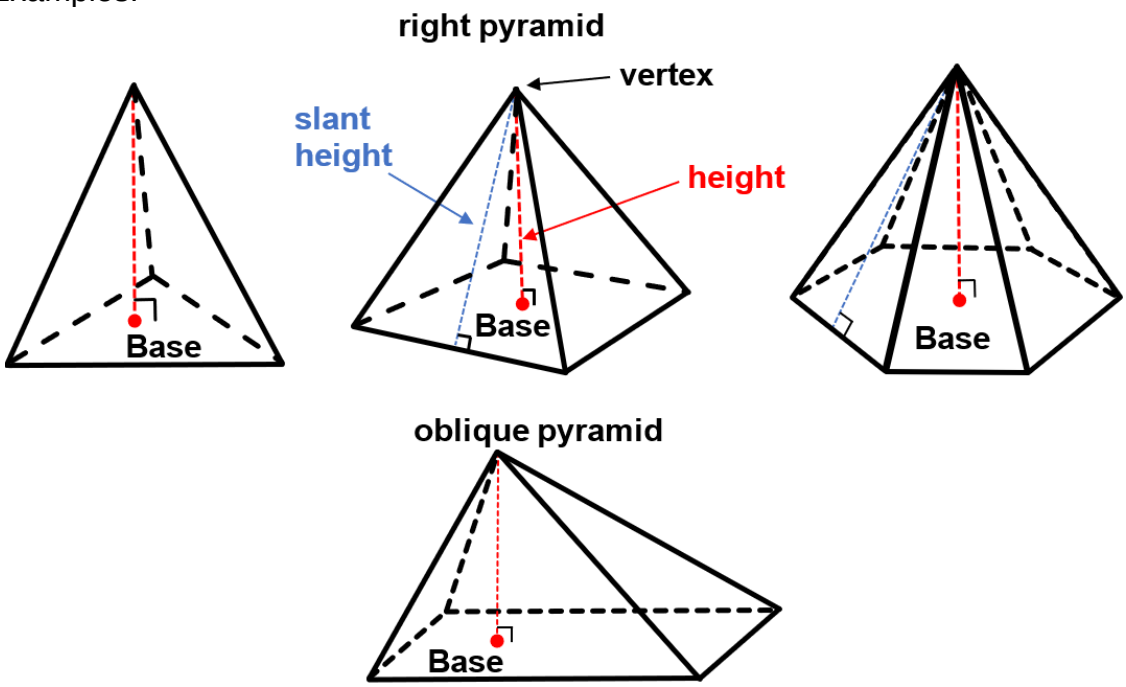
Example: $\frac{5}{10}=\frac{1}{2}$, $5:10=1:2$

proportional reasoning Using the concept of equivalent ratios when analyzing a mathematical situation.

proportionality Any comparison of two or more quantities that is always in the same ratio.

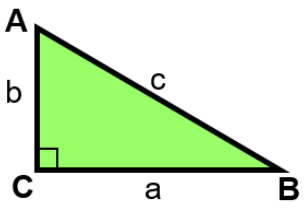
pyramid A three-dimensional figure whose base is a polygon and the lateral faces are triangles that share a common vertex.

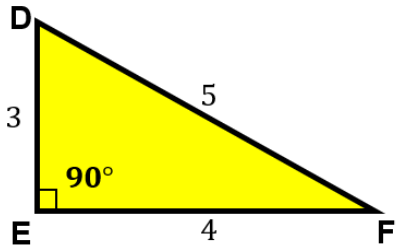
Examples:



Pythagorean Theorem The mathematical relationship stating that in any right triangle the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the two legs.

Example: If *c* is the length of the hypotenuse and *a* and *b* are the lengths of the legs, then $c^2=a^2+b^2$.





In ΔDEF, shown to the left, $\overline{DF}$ is the hypotenuse and $\overline{DE}$ and $\overline{EF}$ are the legs.

$c^2=a^2+b^2$

$5^2=3^2+4^2$

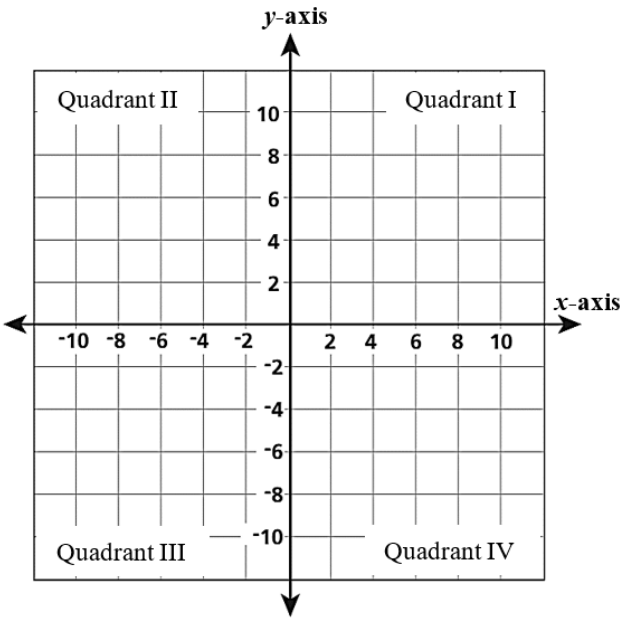
$25=9+16$

$25=25$

Q

quadrant One of the four sections of a coordinate plane separated by horizontal and vertical axes; they are numbered I, II, III, and IV, counterclockwise from the upper right.

Example:

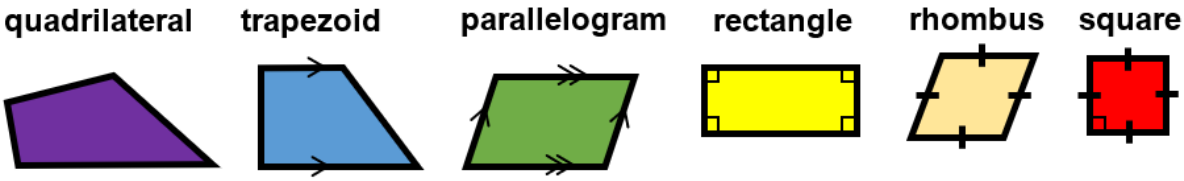


quadratic equation A polynomial equation of degree 2.

Example: $5x^2 - 3x = 2$

quadrilateral A polygon with four sides and four angles.

Examples:



qualitative data Data that are divided into categories rather than quantities.

Examples: favorite colors, kinds of fruit, leisure activities

quantitative data Data that can be either counted (discrete data) or measured (continuous data). Note: some data that appear in numerical form may not be quantitative (e.g., zip code, social security number, shoe size)

discrete data examples: students in a class, courses taken, jellybeans in a jar

continuous data examples: height, amount of rainfall, temperature.

quantitative relationship A numerical relationship associated with the magnitudes of data.

quantity An exact or specified amount or measure.

quart [qt] A customary unit of liquid capacity.

quartile One of the three points that divide a set of numerically ordered data into four equal parts.

quotient The resulting quantity when one quantity(dividend) is divided by another quantity(divisor, not equal to 0).

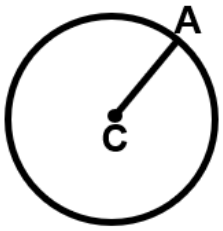
R

radical ($\sqrt[n]{\ }$) The symbol used to represent the root of a number, where n is a natural/counting number.

Examples: principal square root, cube root

radius A line segment with endpoints at the center of a circle and any point on the circle.

Example: $\overline{CA}$ is a radius of circle C.



random sample A sample obtained by a selection from a population, in which each element of the population has an equal chance of being selected.

range of a data set The difference between the greatest and the least values in a set of numbers; a measure of variation.

Example: Given the data: $2, 7, 3, 12, -1, 6, 34, -3$, the range is $34-(-3)=37$.

range of a function The set of output values of a function.

rate A ratio that relates quantities of different units.

Examples: miles per hour, price per pound, students per class, heartbeats per minute.

rate of change The ratio that describes how one quantity changes in relation to another quantity.

rate of interest (see "**interest rate**")

ratio A comparison of two numbers or two like quantities by division.

Example: The ratio of girls to boys is two to three, $\frac{2}{3}$, 2 to 3, or $2:3$.

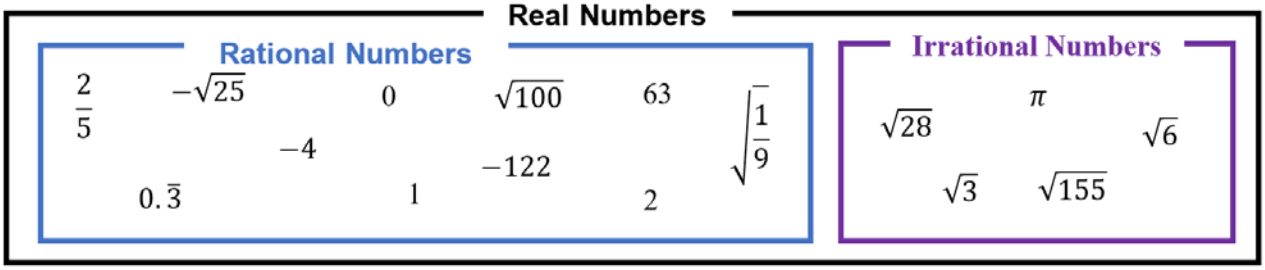
rational number A real number which can be written in the form $\frac{a}{b}$, where a and b are integers and $b \neq 0$. The set of rational numbers include the set of integers.

rationale An explanation using logical reasoning, mathematical principles, or arguments.

raw data Collected information before the application of statistical procedures.

ray $(\overrightarrow{AB})$ Part of a line that has one endpoint and extends infinitely in one direction.
Example:

real numbers The set of numbers that includes all rational and irrational numbers.
Example:



reasonable estimate An approximation of the result of a given problem or calculation using rational, logical procedures.

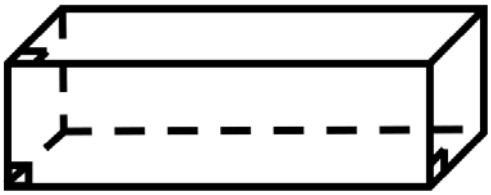
reasonableness The quality that a solution to a problem is within logical constraints.

reasoning Engaging in a process that leads to a conclusion or inference using known facts or assumptions.

reciprocal (see "**multiplicative inverse**")

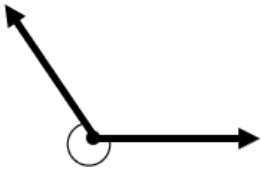
rectangle A quadrilateral with four right angles.
Example:

rectangular prism A three-dimensional figure whose six faces are rectangles.
Example:

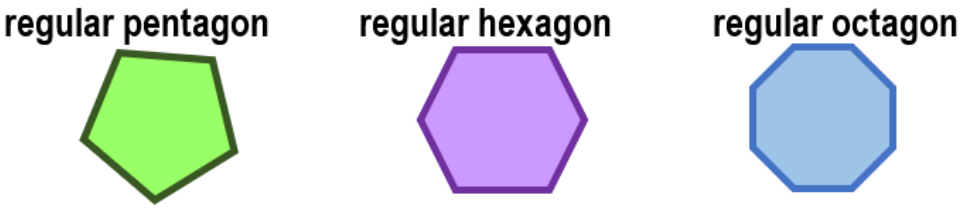


reflection (see "**line reflection**" and/or "**point reflection**")

reflex angle An angle whose measure is greater than $180°$ and less than $360°$.
Example:



regular polygon A polygon in which all sides and all interior angles are congruent.
Examples:



related facts (see "**fact family**")

relative frequency The ratio of the observed frequency of some outcome to the total frequency of the random experiment.

relevant information Information applicable to the problem; information necessary for the solution of a problem; data that is pertinent, applicable, and essential in the solution of a problem.

remainder The quantity in an incomplete group after dividing.
Example:

$$\begin{array}{r} 2 \text{ r } 4 \\ 7\overline{)18} \\ \underline{14} \\ 4 \end{array}$$

4 is the remainder.

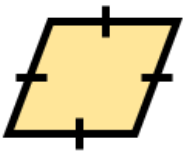
repeated addition Addition of equal groups; often used to model the concept of multiplication.
Example: $2+2+2$

repeated subtraction Subtraction of equal groups from a number; a model or alternative algorithm for division.

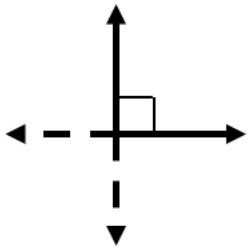
repeating decimal A rational number whose fractional part consists of a group of one or more digits that recurs infinitely.
Examples: $0.3333...$ or $0.\overline{3}$; $5.272727...$ or $5.\overline{27}$

representative sample A subset of a population that seeks to accurately reflect the characteristics of the population.

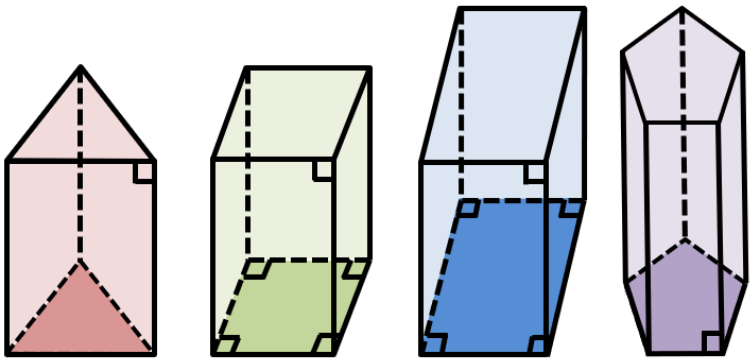
rhombus A quadrilateral with four congruent sides.
Example:



right angle An angle formed by two intersecting perpendicular lines and/or planes, the measure of which is $90°$.
Example:

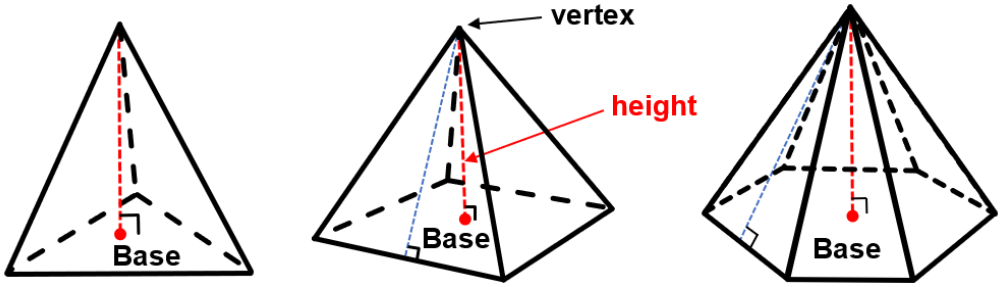


right prism A prism in which the lateral faces are each perpendicular to the plane containing the prism's base(s).
Examples:



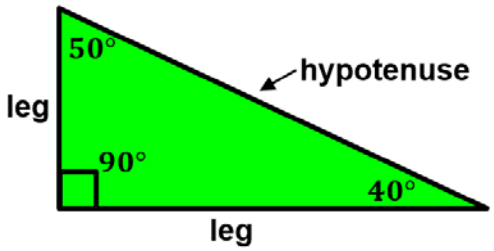
right pyramid A pyramid with a base that is a regular polygon and where the vertex formed by the intersection of the lateral faces is directly above the center of the base.

Examples:



right triangle A triangle with one right angle and two acute angles.

Example:



rigid motion The act of moving a set of points in the plane in such a way that preserves both distance and angle measure.

rotation A transformation in the plane of d degrees that maps the center point O to itself, and maps each remaining point P in the plane to its image point P' such that P and P' are the same distance away from O and the measure of $\angle P'OP$ is d degrees. All rotations where $d > 0°$, turn counterclockwise about point O unless stated otherwise. Informally, a rigid motion that turns a figure about a fixed center point.

rotational symmetry A property of a figure such that the figure can be rotated about a central point, or point of rotation, greater than $0°$ and less than $360°$ and carry onto itself.

round a number To approximate the value of a whole number or decimal to a specific place value.

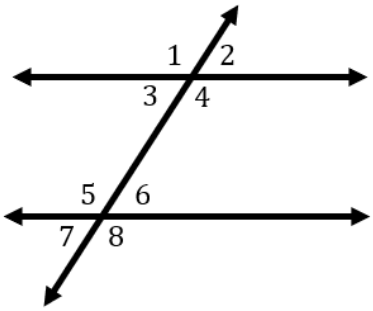
Examples:	Rounded to the nearest ten:	Rounded to the nearest tenth:
	125 rounds to 130	1.25 rounds to 1.3 (*not* 1.30)
	122 rounds to 120	1.22 rounds to 1.2 (*not* 1.20)

rule A description of the relationship between two variables.

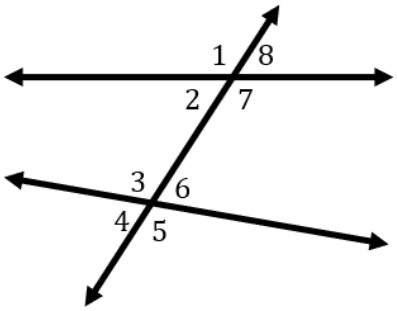
S

same side interior angles A pair of angles on the inside of two lines intersected by a transversal and on the same side of the transversal.

Examples:



same side interior angles:
∠3 and ∠5; ∠4 and ∠6



same side interior angles:
∠2 and ∠3; ∠6 and ∠7

sample A representative part or a single item from a larger whole or group; a finite part of a statistical population whose properties are studied to gain information about the whole.

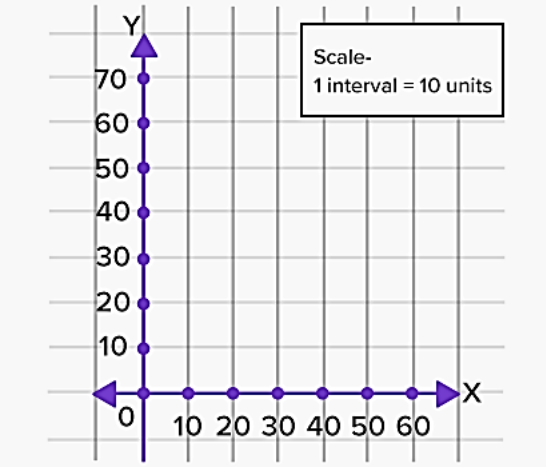
sample space The set of all possible outcomes in an experiment.

Example: The sample space for tossing two coins is: {(H,H), (H,T), (T,H), (T,T)}.

sampling Selecting a small group which would be representative of the entire population; used in taking a survey.

scale (1) The ratio of the size of an object in a representation (drawing) of the object to the actual size of the object; the ratio of the distance on a map to the actual distance (e.g., the scale on a map is 1 inch:10 miles); (2) an instrument used to measure an object's mass; (3) a number line used to indicate the various quantities represented in a graph.

Example of (3):

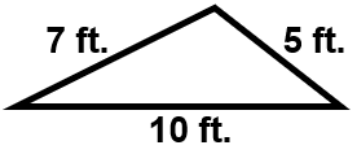


scale drawing A proportionally correct drawing (enlargement or reduction) of an object or area. A function of the plane that assigns points P and Q to the points P' and Q', respectively, of a figure such that the distance $P'Q' = kPQ$, where k is the scale factor and $k > 0$. When $k > 1$, the scale drawing is an enlargement of the preimage and when $0 < k < 1$, the scale drawing is a reduction of the preimage.

scale factor A number, greater than zero, by which a quantity is multiplied.

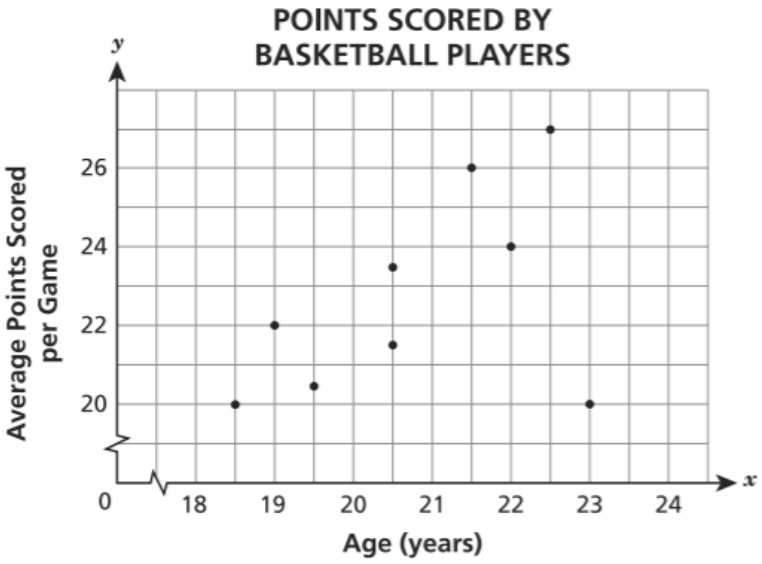
scalene triangle A triangle with no congruent sides.

Example:



scatter plot A graph in the coordinate plane representing a set of bivariate data.

Example: The average points scored per basketball game and the players ages could be displayed on a scatter plot.



scientific notation A form of writing a number as the product of a power of 10 and a decimal number such that the absolute value of the decimal number is greater than or equal to one and less than ten.

Examples: $2,400,000 = 2.4 \times 10^{6}$, $240.2 = 2.402 \times 10^{2}$, $0.0024 = 2.4 \times 10^{-3}$

sea level The conventional accepted base level for measuring elevation; usually associated with the integer zero.

second quadrant The quadrant located in the upper left portion of the coordinate plane. In the second quadrant, the x-coordinates are negative numbers and the y-coordinates are positive numbers. (also see "**quadrant**")

semicircle A half of a circle.

sequence of transformations One or more transformations performed one after the other.

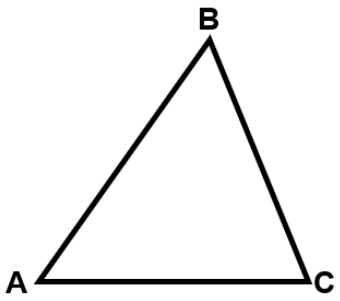
set A well-defined collection of items.

shape (see "**geometric shape**")

shape (of a statistical distribution) The shape of the graphic representation of a probability distribution.

side A line segment joining two adjacent vertices of a polygon.

Example: $\overline{AB}$ is a side of ΔABC.

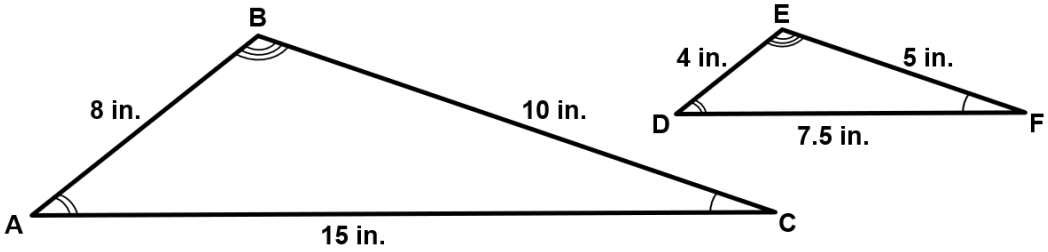


sign of a number A symbol that indicates if a number is positive or negative.

similar figures Two or more figures where the corresponding angles are congruent and the corresponding sides are in proportion.

similar triangles Two or more triangles where the corresponding angles are congruent and the corresponding sides are in proportion.

Example: Triangle *ABC* is similar to triangle *DEF*.



similarity transformations A transformation or sequence of transformations where one of the transformations must consist of a dilation.

simple event An event in a probability experiment with a single outcome. (also see "**single-event experiment**")

simple interest Interest computed on the original amount of a loan or on the amount of an account. It can be calculated by multiplying the principal by the rate by the time; $I = prt$.

simplify fractions To rename fractions to lowest terms by dividing the numerator and denominator by the greatest common factor of both.

simulation A probability experiment that imitates a real-life activity to find the probability of an event.

simultaneous equations A set of two or more linear equations, each containing two or more variables whose values can simultaneously satisfy both or all the equations in the set (infinitely many solutions).

single-event experiment A probability experiment in which only one event can occur each time the experiment is performed.

Examples: A number cube is rolled once, a coin is tossed once.

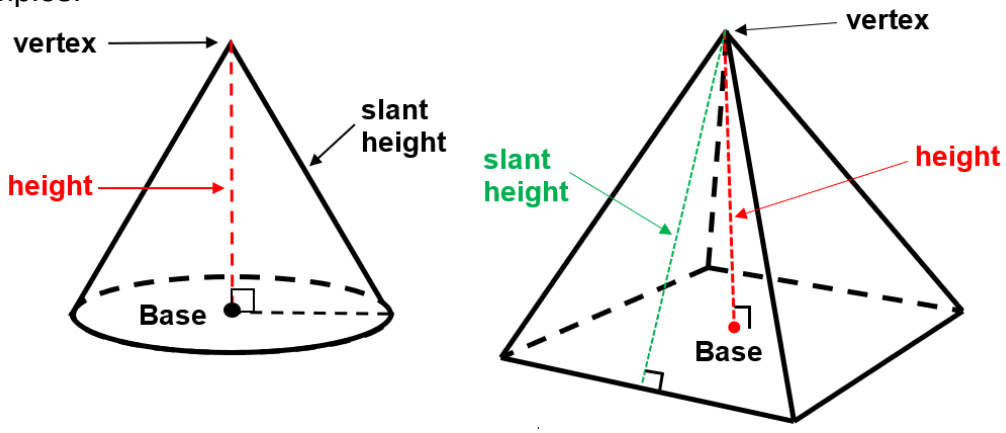
sketch A rough graph, model or drawing with major features clearly shown.

skip count To count by multiples of a given number.

Example: skip count by 2's: $2, 4, 6, 8, 10, ...$

slant height (1) The distance from the vertex of a right circular cone along the slanted surface to a point on the circumference of the base of the cone; (2) the height of a lateral face of a regular pyramid.

Examples:



slice The act of intersecting a plane with a three-dimensional figure which results in a two-dimensional plane section. A slice does not necessarily have to be taken parallel to the plane of the base.

slide (see "**translation**")

slope The constant rate of change for a linear function; the ratio of vertical change to horizontal change on a coordinate graph; the measure of the steepness of a line.

slope-intercept form The equation of a straight line in the form $y = mx + b$, where m is the slope and b is the *y*-coordinate of the point where the line intercepts the *y*-axis.

solid figure A three-dimensional geometric figure that encloses a volume of space.
Examples: prism, pyramid, cylinder, cone, sphere

solution(s) Any value(s) that make an equation, inequality, or open sentence true.

solution set The set of solutions that make an equation, inequality, or open sentence true.

solution to a system of equations The value for each of the variables in a system of equations (simultaneous equations) that satisfy all of the equations in the system.

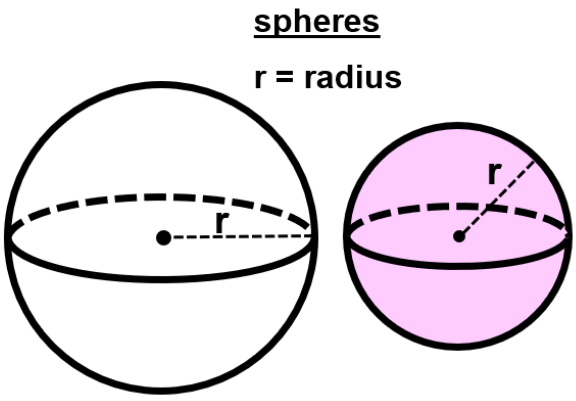
solve To find the answer to an equation or a problem.

sort To separate objects into groups according to properties or characteristics.

spatial reasoning Drawing inferences or conclusions by using visual images.

speed Distance moved per unit of time.

sphere A three-dimensional figure that consists of a set of points in space that are equidistant from a fixed point called the center.
Examples:



spread A measure of variation; the measure of how far the numbers in a data set are away from the mean or the median.
Examples: range, interquartile range

square A quadrilateral with four right angles and four sides congruent.

square a number To multiply a number by itself.

Example: $4 \times 4 = 16,\ 4^2 = 16$

square root of a number A number (factor) that when squared yields the original number.

square unit A unit for measuring area.

standard algorithm A specific mathematical approach used for computation or mathematical procedures.

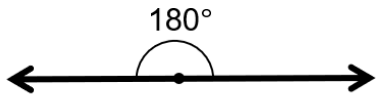
standard units of measure All customary and metric units of measure.

statistical question A question that can be answered by collecting and analyzing data and that anticipates variability in the data collected.

statistics The collection, organization, presentation, and analysis of data.

straight angle An angle that has a measure of $180°$; an angle formed by two rays in opposite directions from their common endpoint.

Example:



straightedge A mathematical tool that establishes collinearity (it does not have any standard units of measurement on it).

strategy A method or system of steps used to solve problems. (also see "**problem solving strategies**")

subset ($\subseteq$) A set consisting of elements that are contained inside another given set.

Example: Set A is a subset of another set B if all elements of set A are elements of set B.

substitute To replace variables in a given expression or equation with a designated value or expression in order to evaluate or simplify the expression or equation.

Example:

Solve the system of equations below for x and y:

$$\begin{cases} 3x - 4y = -15 \\ y = 2x + 5 \end{cases}$$

$$\begin{aligned} 3x - 4(\mathbf{2x} + \mathbf{5}) &= -15 \\ 3x - 8x - 20 &= -15 \\ -5x - 20 &= -15 \\ +20 \quad &+ 20 \\ \frac{-5x}{-5} &= \frac{5}{-5} \\ x &= -1 \end{aligned}$$

then

$$\begin{aligned} y &= 2(-1) + 5 \\ y &= -2 + 5 \\ y &= 3 \end{aligned}$$

Therefore, the solution is $(-1,3)$.

subtraction The mathematical operation of taking one quantity away from another quantity to find a third quantity called a difference.

subtraction sentence A mathematical sentence whose operation(s) is one or more subtractions only.

subtrahend In subtraction, the quantity being subtracted from a given quantity(minuend).

Example: The "3" in the expression "$5-3$".

sum The resulting quantity when two or more quantities(addends) are added.

supplementary angles Two angles whose measures have a sum of $180°$.

Example: $110°$ and $70°$ are supplementary angles.

surface area The sum of the areas of the base(s) and lateral face(s) or the base(s) and lateral surface(s) of a solid figure.

survey To ask either written or verbal questions for the purpose of acquiring information/data.

symbol A character used to represent something such as an operation, a mathematical relationship or a special quantity; it has a precise mathematical meaning.

Examples: Operations: $+, -, \times, \div$

Relationships: $=, <, >, \leq, \geq, \neq, \cong, \parallel, \perp$

Special quantity: π

symmetrical Made up of congruent parts facing each other or around an axis, showing symmetry.

symmetry A property of a figure when there is a transformation of the figure such that the image coincides with (carries onto) the preimage over a line of symmetry(**line reflection**) or about a center point(**rotation**).

system of equations A set of equations that may share one solution, no solution, or infinitely many solutions.

systematic random sample A random sampling method that requires selecting samples based on a system of intervals in a number population.

T

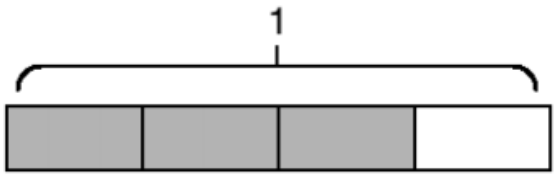
table A systematic or orderly list of values, usually in rows and columns.

table of values An organized list of values (input values and their corresponding output values) from a function/relation.

tally mark A mark used to keep track of data being counted.

tape diagram A rectangular model that looks like a segment of tape, used to illustrate number relationships. Also known as a strip diagram, bar model, fraction strip, or length model.

Example:



tax A charge, usually of money, imposed by authority on persons or property for public purposes.

technology Tools such as calculator or computer used to help represent/solve a problem.

temperature A system for measuring warmth or coldness; a thermometer is used to measure temperature in Fahrenheit or Celsius.

ten A group, or unit, consisting of ten ones.

tens place A place value located two places to the left of the decimal point; a digit in the tens place represents a value that is 10 times the value of the actual digit.

tenths place The place value located one place to the right of the decimal point; one out of ten equal parts of a whole.

term An expression that does not include the operation(s) of addition or subtraction.

like terms Two or more terms within an expression/equation that contain the same variables with each of those variables raised to the same power, the numerical coefficients may be different.

Example: In the expression: $3x^2 + 4x^2y + 5 + 2x^2y + 4x^3 + 5x^2$;

$3x^2$ and $5x^2$ are like terms and $4x^2y$ and $2x^2y$ are also like terms.

unlike terms Two or more terms within an expression/equation that are not like terms.

Example: In the expression: $7x^2 + 4xy^2 + 8 + 2x^2y + 4x^3 + 6x^2$;

$4xy^2$ and $2x^2y$ are unlike terms and $7x^2$ and $4x^3$ are also un-like terms.

terminating decimal A decimal number with a finite number of non-zero digits. All terminating decimals represent rational numbers.

Example: 0.7305

theoretical probability The fractional outcome in a sample space for which a single or compound event occurs.

third quadrant The quadrant located in the lower left portion of the coordinate plane. In the third quadrant, both the x- and y-coordinates are negative numbers. (also see "**quadrant**")

third quartile For a data set with median M, the third quartile is the median of the data values greater than M.

Example: For the data set $\{2, 3, 6, 7, 10, 12, 14, 15, 22, 120\}$, the third quartile is 15.

thousand A group, or unit, consisting of ten hundreds.

thousands place The place value located four places to the left of the decimal point in a number; a digit in the thousands place represents a value that is 1000 times the value of the actual digit.

three-digit number A whole number greater than 99 and less than 1000.

three-dimensional figure An object that has length, width, and height.

time A system of measuring duration or a specific portion of duration.

Examples: year, season, day, hour, minute, second

tip (see "**gratuity**")

ton A customary unit of weight.

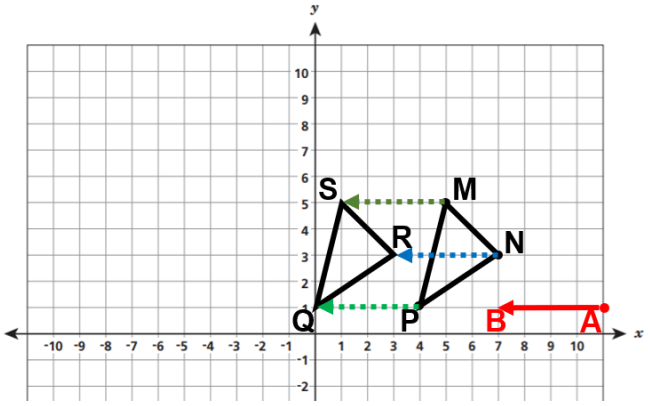
transform (an expression) To change an expression to an equivalent expression using mathematical properties.

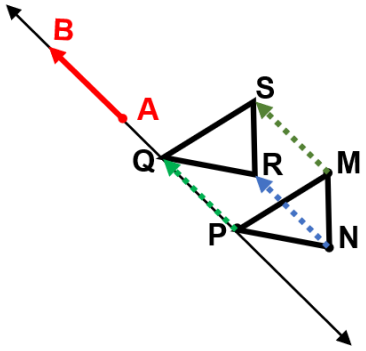
transformation A process that manipulates a two-dimensional geometric figure on a plane or coordinate system. The two-dimensional geometric figure before the transformation is called the preimage and the two-dimensional geometric figure after the transformation is called the image.

transitivity principle for indirect measurement If the length of an object A is greater than the length of object B, and the length of object B is greater than the length of object C, then the length of object A is greater than the length of object C. This principle applies to measurement of other quantities as well.

translation A transformation in the plane where given vector $\overrightarrow{AB}$, 1) the image of any point P on $\overleftrightarrow{AB}$ is point Q such that $AB = PQ$ and 2) the image of any point P *not* on $\overleftrightarrow{AB}$ is point Q such that $AB = PQ$ and $\overline{PQ}$ is on a line ℓ that is parallel to the $\overleftrightarrow{AB}$. Informally, a rigid motion that slides every point the same distance and direction within the plane.

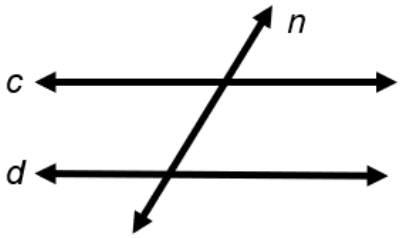
Examples:



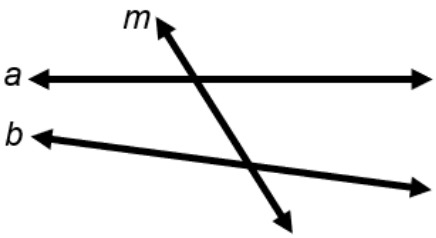


transversal A line that intersects two or more other lines.

Examples:



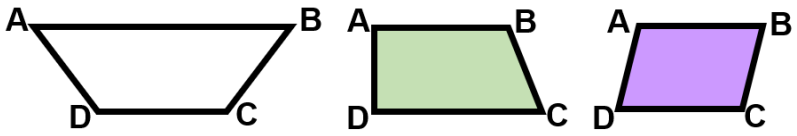
line *n* is a transversal to parallel lines *c* and *d*.



line *m* is a transversal to lines *a* and *b*.

trapezoid A quadrilateral with at least one pair of opposite sides parallel.

Examples: In each trapezoid shown below, $\overline{AB} \parallel \overline{CD}$.



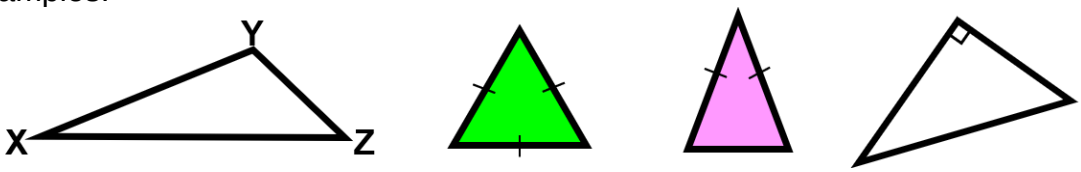
tree diagram A diagram that shows the possible outcomes of an event by means of a connected, branching graph.

trend An observed pattern.

trial and error (guess and check) A problem solving strategy whereby a reasonable estimate for an answer is made and checked in the problem. If the solution is not reached, the estimate is adjusted and checked again in the problem. This process continues until the correct answer is found.

triangle (Δ) A polygon with three sides and three angles.

Examples:



trinomial An expression that combines three unlike monomial terms using the operations of addition and/or subtraction.

turn (see "**rotation**")

two-digit number A whole number greater than 9 and less than 100.

two-dimensional figure A figure that has length and width but no height.

Examples: circle, square, triangle

two-step algebraic equation An algebraic equation that requires two different steps such as multiplication/division and addition/subtraction to solve.

two-way table A tabular method used to display frequencies and relative frequencies.

U

uniform probability model A probability model which assigns equal probability to all outcomes.

union of sets The set of elements that is a compilation of all of the elements of each of two or more sets.

Example: If set A = the set of all odd numbers and set B = the set of all even numbers, then the union of sets A and B is the set of all integers).

unit An individual uniform component of a larger or more complex whole comprised of uniform components.

unit form Each base-ten unit that makes up a number.

Example: 576 in unit form is 5 hundreds, 7 tens, and 6 ones.

unit fraction A fraction with a numerator of 1.

unit of capacity A unit used to measure the potential amount of something that can be contained in an object (usually liquid); customary units include cup, pint, quart, and gallon; metric units include liter, kiloliter, and milliliter.

unit price The price of one item or one unit.

Example: $0.15 per pound

unit rate The numeric part of the rate. (also see "**constant of proportionality**")

unit rate (slope) The steepness of the straight line when a proportional relationship is graphed.

unit square A square with side lengths of 1 unit, used to measure area.

univariate data A numerical observation for only one variable.

Example: A list of heights for each player on a football team.

unknown A value not known which is often represented with a variable.

unlike denominators Unequal denominators.

Example: $\frac{6}{17}$ and $\frac{3}{7}$ are fractions with unlike denominators.

unlike terms (see "**term**")

unlikely event A chance event with a probability between 0 and 0.5; the closer the probability is to being 0, the less likely the event is to occur.

V

valid Based on proper procedures, a valid approach will lead to the correct solution of a problem.

variability of data The extent to which data values differ from each other.

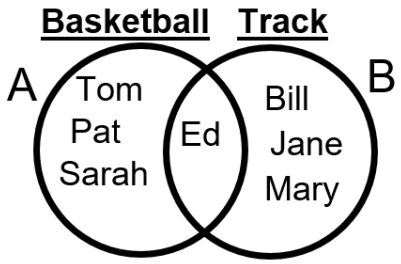
variable A symbol used to represent a number or set of numbers in an expression, equation or an inequality.

vector A directed line segment frequently represented by an "arrow". A vector's starting point is often called its initial point and a vector's end point is often called its terminal point. The magnitude(length) of a directed line segment (vector) AB is the length of the segment; i.e., AB.

Example:

Venn diagram A visual representation of sets showing their intersections and unions.

Example: The Venn diagram below shows the students who play basketball, who run track, and who play basketball and run track.



verbal description A phrase stating a relationship; can be translated into a mathematical/algebraic expression.

Example: Twice a number can be represented as $2n$.

verbal form A mathematical expression or relationship using words rather than symbols.

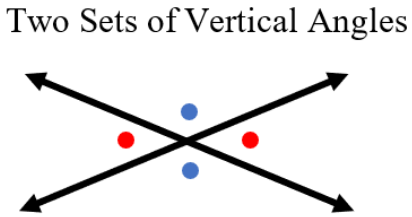
verbally Expressed in written form or spoken in words.

vertex The point of intersection of two or more rays, lines and/or line segments; see other uses in **cone**, **isosceles triangle**, and **pyramid**.

vertical Straight up and down; perpendicular to the horizon.

vertical angles Either of the two pairs of non-adjacent angles formed by the intersection of two lines.

Example:



vertices The plural form of vertex.

visual Any graphic representation such as a chart, picture, diagram, graph, etc.

visual fraction model A graphic representation of fractions, such as a tape diagram, number line diagram, or an area model.

volume An attribute of a three-dimensional figure that involves completely packing the figure, without gaps or overlap, with unit cubes; the amount of space matter occupies. A three-dimensional figure that can be packed with *n* unit cubes is said to have a volume of *n* cubic units.

W

weight The measure of the force of gravity on an object. Weight changes according to gravity while mass remains the same.

whole An agreed upon quantity representing one.

whole numbers The new set created by including zero with the set of counting/natural numbers; i.e., $\{0,1,2,3,4,...\}$.

width One dimension of a two- or three-dimensional figure.

withdrawal To decrease the value in an account when the account owner subtracts from the account.

word form of a number A number written using words.

Example: 534 is written in words as five hundred thirty-four.

X

***x*-axis** The horizontal axis; the line whose equation is $y = 0$.

x-coordinate The first number in an ordered pair representing the point's distance from the origin along the *x*-axis.

***x*-intercept** (1) A point where a graph of an equation intersects the *x*-axis; its *y*-coordinate is always 0 (zero); (2) the value of the *x*-coordinate where a graph of an equation intersects the *x*-axis.

Y

yard [yd] A customary unit of length.

***y*-axis** The vertical axis; the line whose equation is $x = 0$.

y-coordinate The second number in an ordered pair representing the point's distance from the origin along the y-axis.

year The time it takes the Earth to make a complete revolution around the sun; since it approximately takes $365\frac{1}{4}$ days, a year is accepted to have 365 days with an extra day added every four years to compensate.

***y*-intercept** (1) A point where a graph of an equation intersects the *y*-axis; its *x*-coordinate is always 0 (zero); (2) the value of the *y*-coordinate where a graph of an equation intersects the *y*-axis.

Z

zero (0) The number which indicates no quantity, size, or magnitude; zero is neither negative nor positive; zero is the additive identity in that if zero is added to or subtracted from any number, the number remains unchanged.

zero property of addition (see "**identity property for addition**")

zero property of multiplication The property that states the product of any number and 0 is always 0; i.e., $n \times 0 = 0$ for all n.