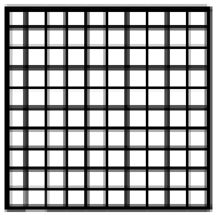
100% block
A block used to represent one whole or 100%.



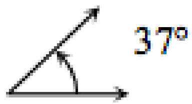
5-D Process
An organized method to solve problems. The 5 D's stand for Describe/Draw, Define, Do, Decide, and Declare. This is a problem-solving strategy for which solving begins by making a prediction about the answer or one element of it (a trial), and then confirming whether the result of the trial is correct. If not, information is gained about how close the trial is to the correct value, so that adjustments to the trial value may be made. Being organized is extremely important to the success of this method, as well as writing a usable table. The 5-D Process leads to writing equations to represent word problems.

AA ~ (Triangle Similarity)
If two angles of one triangle are congruent to the two corresponding angles of another triangle, then the triangles are similar. For example, given ΔABC and $\Delta A'B'C'$ with $\angle A \cong \angle A'$ and $\angle B \cong \angle B'$, then $\Delta ABC \sim \Delta A'B'C'$. You can also show that two triangles are similar by showing that *three* pairs of corresponding angles are congruent (which would be called AAA~), but two pairs are sufficient to demonstrate similarity.

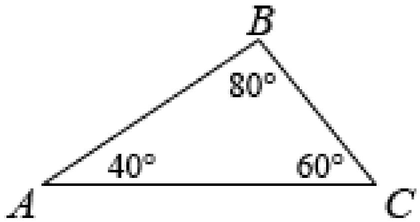
Absolute Value
The absolute value of a number is the distance of the number from zero. Since the absolute value represents a distance, without regard to direction, absolute value is always non-negative. Thus, the absolute value of a negative number is its opposite, while the absolute value of a non-negative number is just the number itself. The absolute value of x is usually written "$|x|$." For example, $|-5| = 5$ and $|22| = 22$.

Acute Angle

An angle with a measure greater than 0º and less than 90º.
An example is shown below.



Acute Triangle
A triangle with all three angle measures less than 90º.



Addition
(+) An operation that tells how many objects there are when two sets are combined. The result is the number of objects in the two sets together which is called a sum. In arithmetic, the word "object" usually means "number."

Additive Identity
The number 0 is called the additive identity because adding 0 to any number does not change the number. For example, $7 + 0 = 7$.

Additive Identity Property
The additive Identity Property states that adding zero to any expression leaves the expression unchanged. That is, $a + 0 = a$. For example, For example, $-2 + 0 = -2$.

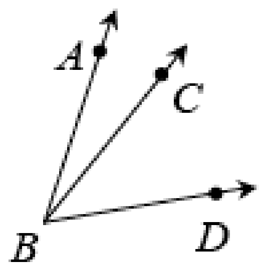
Additive Inverse
The number you need to add to a given number to get a sum of 0. For example, the additive inverse of -3 is 3. It is also called the opposite.

Additive Inverse Property
The additive inverse property states that for every number a there is a number $-a$ such that $a + (-a) = 0$. For example, the number 5 has an additive inverse of -5; $5 + (-5) = 0$. The additive inverse of a number is often called its opposite. For example, 5 and -5 are opposites.

Adjacent Angles
For two angles to be adjacent, the angles must satisfy these three conditions:

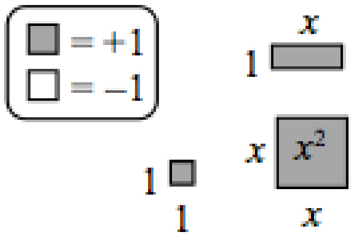
(1) the two angles must have a common side;
(2) the two angles must have a common vertex; and
(3) the two angles may have no interior points in common.

Meeting these three conditions means that the common side must be between the two angles. No overlap between the angles is permitted. In the example at below, $\measuredangle ABC$ and $\measuredangle CBD$ are adjacent angles.



Algebra
A branch of mathematics that uses variables to generalize the rules of numbers and numerical operations.

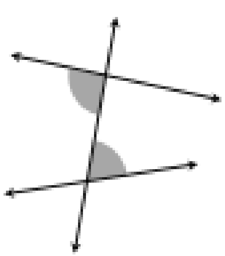
Algebra Tiles
An algebra tile is a manipulative whose area represents a constant or variable quantity. The algebra tiles used in this course consist of large squares with dimensions x-by-$x$and y-by-y; rectangles with dimensions x-by-1, y-by-1, and x-by-y; and small squares with dimensions 1-by-1. These tiles are named by their areas: x^2, x, and 1, respectively. The smallest squares are called "unit tiles." In this text, shaded tiles will represent positive quantities while unshaded tiles will represent negative quantities.



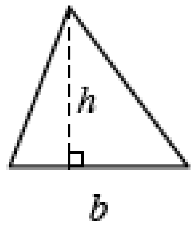
Algebraic Expression
An expression is a combination of individual terms separated by plus or minus signs. For example, if each of the following terms, $6xy^2$, 24, and $\frac{y-3}{4+x}$, are combined into an expression, the result may be $6xy^2 + 24 - \frac{y-3}{4+x}$. An expression does not have an "equals" sign.

Algorithm
A fixed rule for carrying out a mathematical procedure. For example, to find the average of a set of values, find the sum of the values and divide by the number of values.

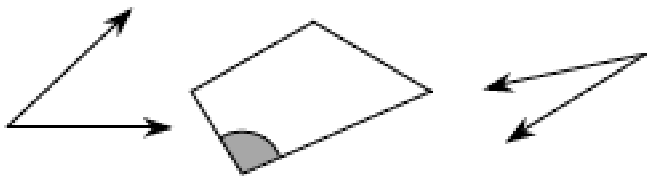
Alternate Interior Angles
Angles between a pair of lines that switch sides of a third intersecting line (called a transversal). For example, in the diagram below the shaded angles are alternate interior angles. If the lines intersected by the transversal are parallel, the alternate interior angles are congruent. Conversely, if the alternate interior angles are congruent, then the two lines intersected by the transversal are parallel.



Altitude of a Triangle
The length of a segment that connects a vertex of the triangle to a line containing the opposite base (side) and is perpendicular to that line.

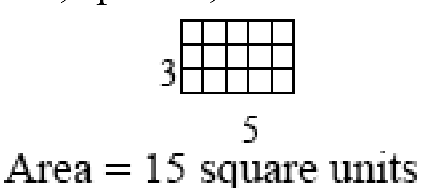


Angle
Generally, an angle is formed by two rays that are joined at a common endpoint. Angles in geometric figures are usually formed by two segments that have a common endpoint (such as the angle shaded in the figure below). Also see ***acute angle***, ***obtuse angle***, and ***right angle***.



Annual
Occuring once every year.

Area
For this course, area is the number of square units needed to fill up a region on a flat surface. In later courses, the idea will be extended to cones, spheres, and more complex surfaces. Also see **surface area**.

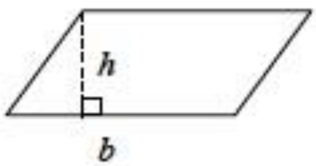


Area Model
An area model or diagram is one way to represent the probabilities of the outcomes for a sequence of two events. The total area is 1, and the probabilities are represented by proportional parts. In the example, P(S) and P(not S) are the dimensions of the right side of the rectangle. The probabilities that A will occur or not occur are the dimensions of the top of the rectangle. The area of each part is the probability of each possible sequence of two events.

		A 0.8	Not A 0.2
S	0.4	0.32	0.08
Not S	0.6	0.48	0.12

Area of a Parallelogram

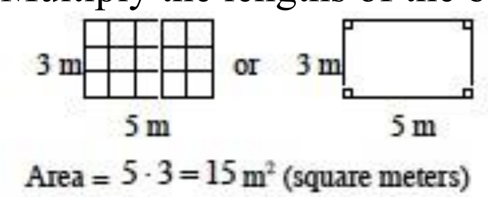
If the base of the parallelogram is length b and the height is length h, then the area of the parallelogram is:



$$A = b \cdot h$$

Area of a Rectangle

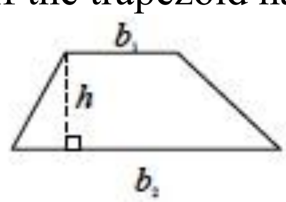
Multiply the lengths of the base and height. See the examples at right.



$$A = b \cdot h$$

Area of a Trapezoid

If the trapezoid has bases b_1 and b_2 and height h, then the area is:



$$A = \frac{1}{2}(b_1 + b_2)h$$

Area of a Triangle

To find the area of a triangle, multiply the length of the base b by the height h and divide by two: $A = \frac{1}{2}bh$.

Association
A relationship between two (or more) variables. An association between numerical variables can be displayed on a scatterplot, and described by its form, direction, strength, and outliers. Possible association between two categorical variables can be studied in a relative frequency table. Also see ***scatterplot***.

Associative Property
(for addition) The associative property of addition states that if a sum contains terms that are grouped, then the sum may be grouped differently with no effect on the total, that is, $a + (b + c) = (a + b) + c$. For example, $3 + (4 + 5) = (3 + 4) + 5$.

(for multiplication) The associative property of multiplication states that if a product contains terms that are grouped, then the product may be grouped differently with no effect on the result, that is, $a(bc) = (ab)c$. For example, $2 \cdot (3 \cdot 4) = (2 \cdot 3) \cdot 4$.

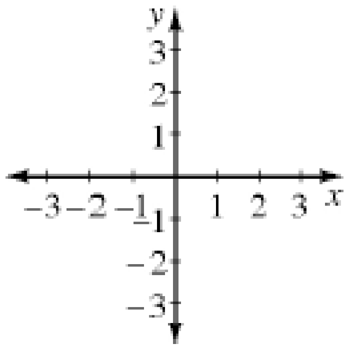
Associative Property of Addition
The associative property of addition states that if a sum contains terms that are grouped, then the sum may be grouped differently with no effect on the total, that is, $a + (b + c) = (a + b) + c$. For example, $3 + (4 + 5) = (3 + 4) + 5$.

Associative Property of Multiplication
The associative property of multiplication states that if a product contains terms that are grouped, then the product may be grouped differently with no effect on the result, that is, $a(bc) = (ab)c$. For example, $2 \cdot (3 \cdot 4) = (2 \cdot 3) \cdot 4$.

Average
The sum of given values divided by the number of values used in computing the sum.
For example, the average of 1, 4, and 10 is $(1+4+10) / 3$. See ***mean***.

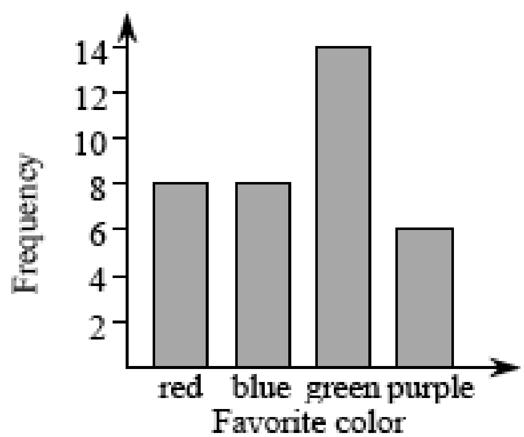
Axis
In a coordinate plane, two number lines that meet at right angles at the

origin (0, 0).
The x-axis runs horizontally and the y-axis runs vertically.



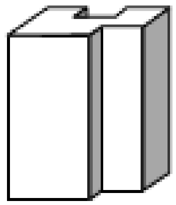
b
When the equation of a line is expressed in $y = mx + b$ form, the constant b gives the y-intercept of the line. For example, the y-intercept of the line $y = -\frac{1}{3}x + 7$ is 7

Bar Graph
A bar graph is a set of rectangular bars that have height proportional to the number of data elements in each category. Each bar stands for all of the elements in a single distinguishable category (such as "red"). Usually all of the bars are the same width and separated from each other. Also see **histogram**.



Base (of a prism)
A three-dimensional figure that consists of two parallel congruent polygons (called *bases*) and a vertical surface containing segments connecting each point on each side of one base to the corresponding point on the other base. The lateral surface of a prism consists of

parallelograms.

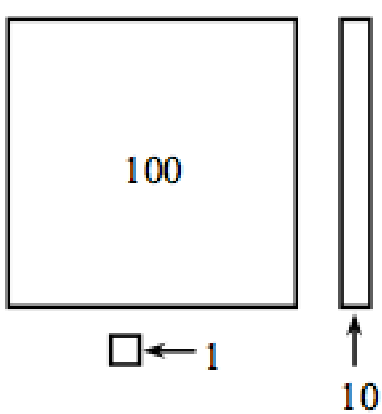


Base of a Geometric Figure
(a) The base of a triangle: any side of a triangle to which a height is drawn. There are three possible bases in each triangle.
(b) The base of a trapezoid: either of the two parallel sides.
(c) The base of a parallelogram (including rectangle, rhombus, and square): any side to which a height is drawn. There are four possible bases.
(d) The base of a 3-dimensional figure.

Also see ***prism***, and ***pyramid***.

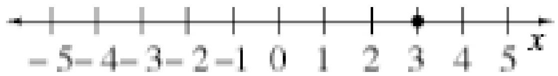
Base of an Exponent
When working with an exponential expression in the form b^a, b is called the base. For example, 2 is the base in 2^5. (5 is the exponent, and 32 is the value.) Also see ***exponent***.

Base Ten Blocks
Blocks used to represent numbers. The blocks used in this course are the 1-block, the 10-block, and the 100-block.

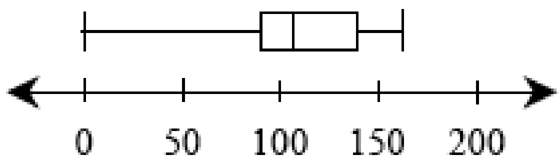


Bin
An interval on a histogram.

Boundary Point
The endpoint or endpoints of a ray or segment on a number line where an inequality is true. For strict inequalities (that is, inequalities involving < or >), the point is not part of the solution, and is marked with an open dot. Boundary points may be found by solving the equality associated with the given inequality. For example, the solution to the equation $2x = 6$ is $x = 3$, so the inequality $2x \geq 6$ has a boundary point at 3. A boundary point is also sometimes called a "dividing point."



Box Plot
A graphic way of showing a summary of data using the median, quartiles, and extremes of the data.



Categorical Data
Data that can be put into categories (like what color you prefer, your gender, or the state you were born in), as opposed to numerical data that can be placed on a number line.

Center of a Circle
On a flat surface, the fixed point from which all points on the circle are equidistant. *See* **circle**.

Center of a Data Distribution
Numbers that locate or approximate the center of a data set. Two of the ways to measure the center of a data set are the mean and the median. When dealing with measures of center, it is often useful to consider the distribution of the data. For symmetric distributions with no outliers, the mean can represent the middle, or "typical" value, of the data well. However, in the presence of outliers or non-symmetrical data distributions, the median may be a better measure. *Also see* **mean** and **median**.

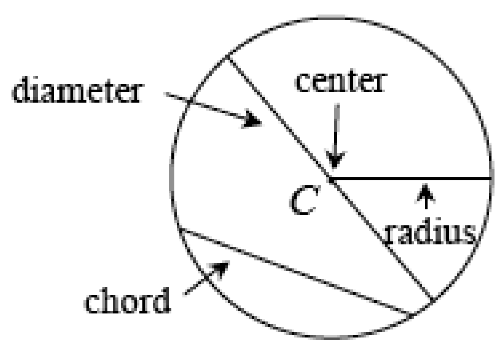
Centimeter
A metric unit one hundredth of a meter in length.

Central angle
An angle with its vertex at the center of a circle.

Certainty
When an event will definitely happen. The probability of a certain event is 1.

Chord
A line segment with its endpoints on a circle. A chord that passes through the center of a circle is called a "diameter." Also see ***circle***.

Circle
The set of all points on a flat surface that are the same distance from a fixed point. If the fixed point (center) is O, then the symbol $\odot O$ represents a circle with center O. If r is the length of the radius of a circle and d is the length of its diameter, then the circumference of the circle is $C = 2\pi r$ or $C = \pi d$.



Circle Graph
A way of displaying data that can be put into categories (like what color you prefer, your gender, or the state you were born in). A circle graph shows the proportion each category is of the whole.

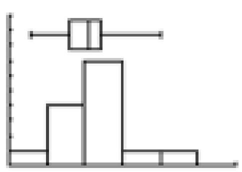
Circumference
The perimeter (distance around) of a circle.

Cluster Sample
A subgroup of the population that has the similar characteristic of interest as that of the whole population. A cluster sample is one way to obtain a representative sample.

Coefficient
(numerical) A number multiplying a variable or product of variables. For example, –7 is the coefficient of $-7x$.

Coincide
Two graphs coincide if they have all their points in common. For example, the graphs of $y = 2x + 4$ and $3y = 6x + 12$ coincide; both graphs are lines with a slope of 2 and a y-intercept of 4. When the graphs of two equations coincide, those equations share all the same solutions and have an infinite number of intersection points.

Combination Histogram and Box Plot
A way to visually represent a distribution of data. The box plot is drawn with the same x- axis as the histogram.



Combining Like Terms
Combining two or more like terms simplifies an expression by summing constants and summing those variable terms in which the same variables are raised to the same power. For example, combining like terms in the expression $3x + 7 + 5x - 3 + 2x^2 + 3y^2$ gives $8x + 4 + 2x^2 + 3y^2$. When working with algebra tiles, combining like terms involves putting together tiles with the same dimensions.

Common
Shared.

Common Factor
A common factor is a factor that is the same for two or more terms. For

example, x^2 is a common factor for $3x^2$ and $-5x^2y$.

Common Multiple
A number that is a multiple of the two or more numbers. For example, 24 and 48 are common multiples of 3 and 8.

Commutative Property
(for addition)The Commutative Property of Addition states that if two terms are added, then the order may be reversed with no effect on the total. That is, $a + b = b + a$. For example, 7 + 12 = 12 + 7.

(for multiplication) The Commutative Property of Multiplication states that if two expressions are multiplied, then the order may be reversed with no effect on the result. That is, $ab = ba$. For example, $5 \cdot 8 = 8 \cdot 5$.

Commutative Property of Addition
The Commutative Property of Addition states that if two terms are added, then the order may be reversed with no effect on the total. That is, $a + b = b + a$. For example, 7 + 12 = 12 + 7.

Commutative Property of Multiplication
The Commutative Property of Multiplication states that if two expressions are multiplied, then the order may be reversed with no effect on the result. That is, $ab = ba$. For example, $5 \cdot 8 = 8 \cdot 5$.

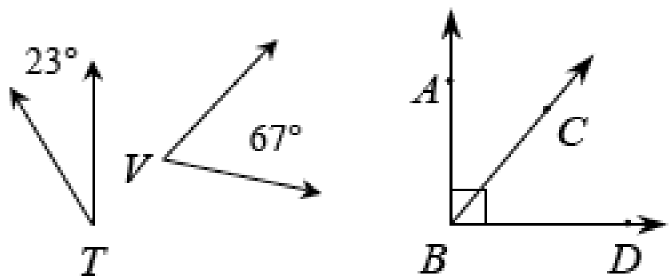
Comparison Symbol
The symbol ≤ read from left to right means "less than or equal to," the symbol ≥ read from left to right means "greater than or equal to," and the symbols < and > mean "less than" and "greater than," respectively. For example, " $7 < 13$ " means that 7 is less than 13.

Compass
In this course, a compass is tool used to draw circles.

Complement
The complement of an event is the set of all outcomes in the sample

space that are not included in the event.

Complementary Angles
Two angles whose measures add up to 90º. Angles T and V are complementary because $m\measuredangle T + m\measuredangle V = 90°$. Complementary angles may also be adjacent, like $\measuredangle ABC$ and $\measuredangle CBD$ in the diagram below.



Complete Graph
A complete graph is one that includes everything that is important about the graph (such as intercepts and other key points, asymptotes, or limitations on the domain or range), and that makes the rest of the graph predictable based on what is shown.

Complex Fraction
A fraction with a fraction in the numerator and/or denominator.

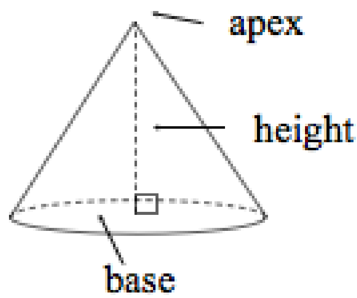
Composite Number
A number with more than two factors.

Compound Event
A compound event in probability is an outcome that depends on two or more other events. For example, finding the probability that both a red ball and also a blue block are drawn from a bag in two draws.

Compound Interest
Interest that is paid on both the principal and the previously accrued interest.

Cone

A three-dimensional figure that consists of a circular face, called the "base," a point called the "apex," that is not in the flat surface (plane) of the base, and the lateral surface that connects the apex to each point on the circular boundary of the base.



Congruent
Two shapes are congruent if they have exactly the same shape and size. Congruent shapes are similar and have a scale factor of 1.

Conjecture
An educated guess that often results from noticing a pattern.

Consecutive Integers
Integers that are in order without skipping any integers. For example, 8, 9, and 10 are consecutive integers.

Conservation of Area
The principle that the area of a shape does not change when it is cut apart and its pieces are put together in a different arrangement.

Constant of Proportionality
(k) In a proportional relationship, equations are of the form $y = kx$, where k is the constant of proportionality.

Constant Term
A number that is not multiplied by a variable. In the expression $2x + 3(5 - 2x) + 8$, the number 8 is a constant term. The number 3 is not a constant term, because it is multiplied by a variable inside the parentheses.

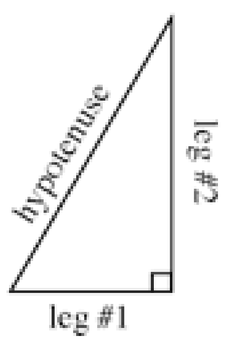
Construction
(geometric) In mathematics, it is the process of using a straightedge and compass to create geometric diagrams.

Continuous Graph
For this course, when the points on a graph are connected and it makes sense to connect them, then the graph is continuous. Such a graph will have no holes or breaks in it. This term will be more completely defined in a later course.

Convenience Sample
A subgroup of the population for which it was easy to collect data. A convenience sample is not a random sample.

Converse
The converse of a conditional statement can be found by switching the hypothesis (the "if" part) and the conclusion (the "then" part). For example, the converse of "*If P, then Q*" is "*If Q, then P.*"

Converse of the Pythagorean Theorem
The converse of the Pythagorean Theorem can be used to determine if a triangle is a right triangle. If *(leg #1)*^{2} + *(leg #2)*^{2} = *hypotenuse*^{2} then the triangle is a right triangle.

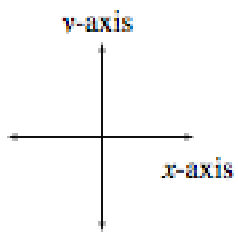


Coordinate
The number corresponding to a point on the number line or an ordered pair (x, y) that corresponds to a point in a two-dimensional coordinate system. In an ordered pair, the x- coordinate appears first and the y-coordinate appears second. For example, the point $(3, 5)$ has

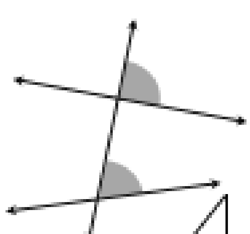
an x- coordinate of 3. See ***ordered pair***.

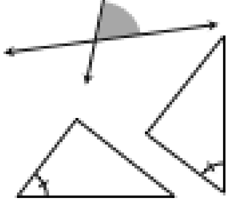
Coordinate Graph
(system) A system of graphing ordered pairs of numbers on a coordinate plane. An ordered pair represents a point, with the first number giving the horizontal position relative to the x-axis and the second number giving the vertical position relative to the y-axis. Also see ***ordered pair***.

Coordinate Plane
A flat surface defined by two number lines meeting at right angles at their zero points. A coordinate plane is also sometimes called a "Cartesian Plane".



Corresponding Angles
When two lines are intersected by a third line (called a transversal), angles on the same side of the two lines and on the same side of the transversal are called corresponding angles. For example, the shaded angles in the diagram below are corresponding angles. Note that if the two lines cut by the transversal are parallel, the corresponding angles are congruent. Conversely, if the corresponding angles are congruent, then the two lines intersected by the transversal are parallel.





Corresponding Parts
Points, sides, edges, or angles in two or more figures that are images of

each other with respect to a transformation. If two figures are congruent, then the corresponding parts of the figures are congruent to each other. See ***ratio of similarity*** *and* ***congruent***.

Counterexample
An example showing that a statement has at least one exception; that is, a situation in which the statement is false. For example, the number 4 is a counterexample to the statement that all even numbers are greater than 7.

Counting Numbers
The counting numbers beginning with 1. For example, 1, 2, 3….

Cross Section
The intersection of a three-dimensional solid and a plane.

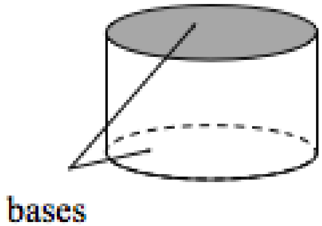
Cube
A polyhedron of six faces, each of which is a square.

Cube (of a number)
To cube a number means to multiply it by itself 3 times, or raise it to the third power. For example, 7 cubed is 7^3 or 7· 7· 7which is 343.

Cube root
in the equation $a = b^3$, the value b that is multiplied by itself three times to give the value a. For example, the cube root of 8 is 2 because 8 = 2· 2· 2 = 2^3. this is written $\sqrt[3]{8}$

Cube Unit
A cube, each of whose edges measure 1 unit in length. Volume is measured in cubic units.

Cylinder
A three-dimensional figure that consists of two parallel congruent circular regions (called *bases*) and a lateral surface containing segments connecting each point on the circular boundary of one base to the corresponding point on the circular boundary of the other.



Data Display
A visual way for organizing information. Data displays used in this course are bar graphs, box plots, dot plots, histograms, scatter plots, stem-and-leaf plots, and Venn diagrams.

Decimal Point
The dot separating the whole number from the decimal portion, that is, the ones and tenths places in a decimal number.

Degree
A unit for measuring angles. Usually denoted by º (the degree symbol). There are 360º in one full rotation.

Denominator
The lower part of a fraction, which expresses into how many equal parts the whole is divided.

Dependent
Two events are dependent if the outcome of one event affects the probability of the other event. For example, if one card is drawn out of a deck of cards, then the probability that the first card is red is $\frac{26}{52} = \frac{1}{2}$ because 26 of the 52 cards are red. However, the probability of the second card now depends on the result of the first selection. If the first card was red, then there are now 25 red cards remaining in a deck of 51 cards, and the probability that the second card is red is $\frac{25}{51}$. The second event (selecting the second card) is dependent on the first event (selecting the first card).

Dependent Events

Two events are dependent if the outcome of one event affects the probability of the other event. For example, if one card is drawn out of a deck of cards, then the probability that the first card is red is $\frac{26}{52} = \frac{1}{2}$ because 26 of the 52 cards are red. However, the probability of the second card now depends on the result of the first selection. If the first card was red, then there are now 25 red cards remaining in a deck of 51 cards, and the probability that the second card is red is $\frac{25}{51}$. The second event (selecting the second card) is dependent on the first event (selecting the first card).

Dependent Variable
When one quantity depends for its value on one or more others, it is called the dependent variable. For example, we might relate the speed of a car to the amount of force you apply to the gas pedal. Here, the speed of the car is the dependent variable; it depends on how hard you push the pedal. The dependent variable appears as the output value in an $x \rightarrow y$ table, and is usually placed relative to the vertical axis of a graph. We often use the letter y and the vertical y-axis for the dependent variable. When working with functions or relations, the dependent variable represents the output value. In Statistics, the dependent variable is often called the response variable. Also see ***independent variable***.

Desired Outcome
In the context of probability, "successful" usually means a desired or specified outcome (event), such as rolling a 2 on a number cube (probability of $\frac{1}{6}$).

Diameter
A line segment drawn through the center of a circle with both endpoints on the circle. The length of a diameter is usually denoted d. Note that the length of the diameter of a circle is twice the length of its radius. Also see ***circle***.

Difference

The result of subtraction.

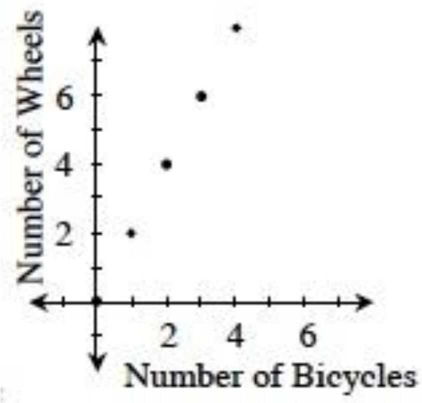
Digit
One of the ten numerals: 0, 1, 2, 3, 4, 5, 6, 7, 8, or 9.

Dilation
A transformation which produces a figure similar to the original by proportionally shrinking or stretching the figure. In a dilation, a shape is stretched (or compressed) proportionally from a point, called the point of dilation.

Dimensions
The dimensions of a figure that is a flat region or space tell how far that the figure extends in each direction. For example, the dimensions of a rectangle might be 16 cm wide by 7 cm high.

Direction (of an association)
If one variable in a relationship increases as the other variable increases, the direction is said to be a positive association. If one variable decreases as the other variable increases, there is said to be a negative association. If there is no apparent pattern in the scatterplot, then the variables have no association. When describing a linear association, you can use the slope, and its numerical interpretation in context, to describe the direction of the association.

Discrete Graph
A graph that consists entirely of separated points is called a discrete graph. For example, the graph shown below is discrete. Also see ***continuous graph***.



Distance
Equals the product of the rate (or speed(r)) and the time(t). This is usually written as d = r · t.

Distributive Property
For any *a*, *b*, and *c*, $a(b + c) = ab + ac$. For example, 10(7 + 2) = 10 · 7 + 10 · 2.

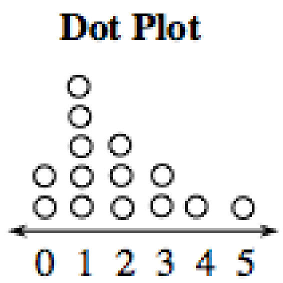
Dividend
A quantity to be divided. See ***divisor***.

Divisible
A number is divisible by another if the remainder of the division is zero.

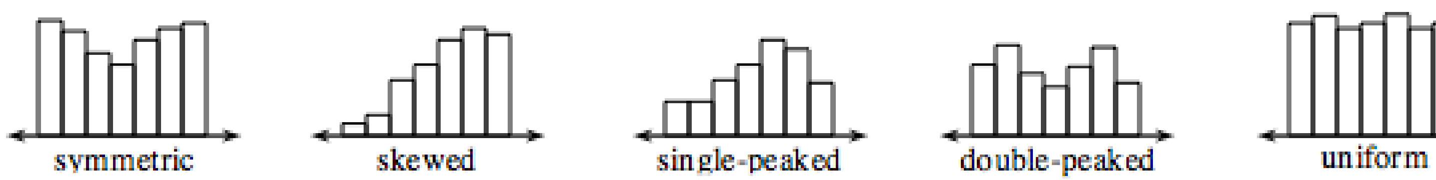
Division
(÷) The inverse operation to multiplication, or the operation that creates equal groups.

Divisor
The quantity by which another quantity is to be divided. dividend/divisor = quotient + remainder (if there is any).

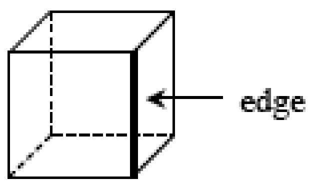
Dot Plot
A way of displaying data that has an order and can be placed on a number line. Dot plots are generally used when the data is discrete (separate and distinct) and numerous pieces of data fall on most values.



Double-peaked
Double-peaked refers to one of the shapes of a data display. Statisticians use the following words to describe the overall shape of a data distribution: symmetric, skewed, single-peaked, double-peaked, and uniform. Examples are shown below.



Edge
In three dimensions, a line segment formed by the intersection of two faces of a polyhedron.



Endpoint
Either of the two points that mark the ends of a line segment. Also see ***line segment***.

Enlarge
To make larger.

Enlargement ratio
The ratio of similarity comparing a figure to a similar larger figure is often called the enlargement ratio. This ratio shows by what factor the first figure is enlarged to get the second figure.

Equal
(=) Two quantities are equal when they have the same value. For example, when $x = 4$, the expression $x + 8$ is equal to the expression $3x$ because the values of the expressions are the same.

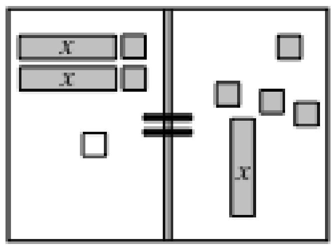
Equal Values Method
A method for solving a system of equations. To use the Equal Values Method, take two expressions that are each equal to the same variable and set those expressions equal to each other. For example, in the system of equations below, $-2x + 5$ and $x - 1$ each equal y. So we write $-2x + 5 = x - 1$, then solve that equation to find x. Once we have x, we substitute that value back into either of the original equations to find the value of y.

$$\begin{aligned} y &= -2x + 5 \\ y &= x - 1 \end{aligned}$$

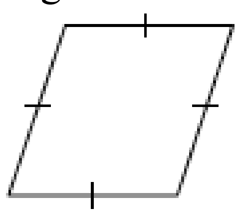
Equally Likely
Outcomes or events are considered to be equally likely when they have the same probability.

Equation
A mathematical sentence in which two expressions appear on either side of an "equals" sign (=), stating that the two expressions are equivalent. For example, the equation $7x + 4.2 = -8$ states that the expression $7x + 4.2$ has the value -8. In this course, an equation is often used to represent a rule relating two quantities. For example, a rule for finding the area y of a tile pattern with figure number x might be written $y = 4x - 3$.

Equation Mat
An Equation Mat puts two Expression Mats side-by-side to find the value(s) which make the expressions equal. Legal moves are used to find the value(s) that makes the expressions equal. For example, the Equation Mat below represents the equation $2(x + 1) - 1 = x + 4$. The two sides of the mat are equal when $x = 3$. Also see *"legal" moves*.



Equilateral
A polygon is equilateral if all of its sides have equal length. The word "equilateral" comes from "equi" (meaning "equal") and "lateral" (meaning "side"). Equilateral triangles not only have sides of equal length, but also angles of equal measure. However, a polygon with more than three sides may be equilateral without having congruent angles. For example, see the rhombus below.



Equivalent
Having the same value.

Equivalent expressions
Two expressions are equivalent if they have the same value. For example, $2 + 3$ is equivalent to $1 + 4$.

Equivalent fractions
Two fractions are equivalent if they have the same numerical value. For example, 3/6 and 5/10 are equivalent fractions.

Equivalent ratios
Two ratios are equivalent if they have the same value when simplified.

Evaluate
(an expression) To find the numerical value of. To evaluate an expression, substitute the value(s) given for the variable(s) and perform the operations according to the order of operations. For example,

evaluating $2x + y - 10$ when $x = 4$ and $y = 3$ gives the value 1. Also see ***expression***.

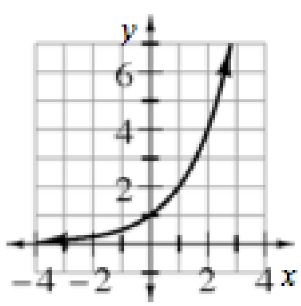
Even Number
A whole number that is divisible by two with no remainder.

Event
One or more results of an experiment.

Experimental probability
The probability based on data collected in experiments. The experimental probability of an event is defined to be $\frac{\text{number of successful outcomes in the experiment}}{\text{total number of outcomes in the experiment}}$.

Exponent
In an expression of the form ba, a is called the exponent. For example, in the expression 2^5, 5 is called the exponent (2 is the base, and 32 is the value). The exponent indicates how many times to use the base as a multiplier. For example, in 2^5, 2 is used 5 times: $2^5 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 32$. For exponents of zero, the rule is: for any number $x \neq 0$, $x0 = 1$.

Exponential function
An exponential function in this course has an equation of the form $y = ab^x + c$, where a is the initial value, b is positive and is the multiplier, and $y = c$ is the equation of the horizontal asymptote. An example of an exponential function is graphed below.

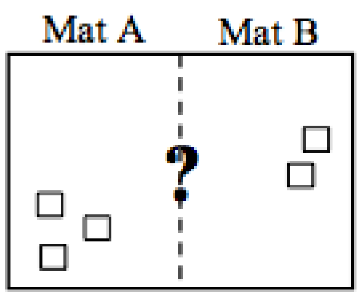


Exponential growth
Compound interest is an example of exponential growth.

Expression
An expression is a combination of individual terms separated by plus or minus signs.

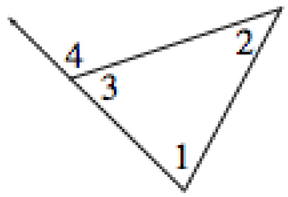
Numerical expressions combine numbers and operation symbols; algebraic (variable) expressions include variables. For example, $4 + (5 - 3)$ is a numerical expression. Algebraic (variable) expressions include variables. If each of the following terms, $6xy^2$, 24, and $\frac{y-3}{4+x}$, are combined, the result may be $6xy^2 + 24 - \frac{y-3}{4+x}$. An expression does not have an "equals" sign.

Expression Comparison Mat
An Expression Comparison Mat puts two Expression Mats side-by-side so they can be compared to see which represents the greater value. For example, in the Expression Comparison Mat below, Mat A represents –3, while Mat B represents –2. Since $-2 > -3$ Mat B is greater.



Expression Mat
An organizing tool used to visually represent an expression with algebra tiles.

Exterior angle (of a triangle)
When a side of a triangle is extended to form an angle outside of the triangle, that angle is called an exterior angle. The exterior angle is adjacent to the angle inside the triangle. For example, $\angle 4$ in the diagram belowis an exterior angle of the triangle.



Exterior Angle Theorem
The measure of an exterior angle of a triangle is equal to the sum of the measures of the two remote (non-adjacent) interior angles of the triangle. In the diagram above, $m\angle 1 + m\angle 2 = m\angle 4$.

Face
One of the flat surfaces of a polyhedron, including the base(s).

Factor
(1) In arithmetic: when two or more integers are multiplied, each of the integers is a factor of the product. For example, 4 is a factor of 24, because $4 \cdot 6 = 24$.

(2) In algebra: when two or more algebraic expressions are multiplied together, each of the expressions is a factor of the product. For example, x^2 is a factor of $-17x^2y^3$, because $(x^2)(-17y^3) = -17x^2y^3$.

(3) To factor an expression is to write the expression as a product. For example, the factored form of $3x - 18$ is $3(x - 6)$.

Factoring
The process of rewriting an expression written as a sum into an equivalent expression written as a product.

Fair Game
A game in which each player has an equally likely chance of winning.

Family of Fractions
All fractions that are equivalent to each other form a family of fractions. See ***equivalent fractions***.

Fibonacci Numbers
The sequence of numbers 1, 1, 2, 3, 5, 8, 13, …. Each term of the Fibonacci sequence (after the first two terms) is the sum of the two preceding terms.

First Quartile
The median of the lower half of an ordered set of data is the lower quartile.

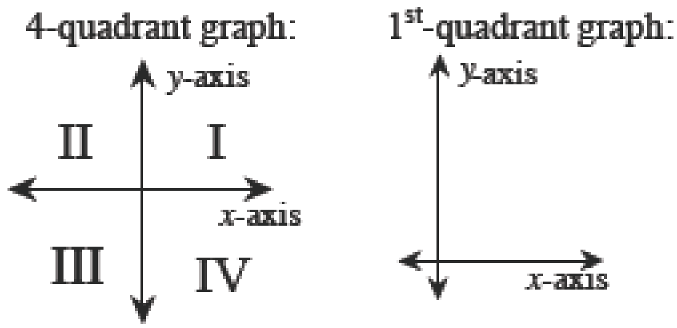
Flip
See ***reflection***.

Form
(of an association) The form of an association can be linear or non-linear. The form can contain cluster of data. A residual plot can help determine if a particular form is appropriate for modeling the relationship.

Form (of an association)
The form of an association can be linear or non-linear. The form can contain clusters of data. A residual plot can help determine if a particular form is appropriate for modeling the relationship.

Formula
An equation that shows a mathematical relationship.

Four-Quadrant Graph
The coordinate plane is divided by its axes into four quadrants. The quadrants are numbered as shown in the first diagram below. When graphing data that has no negative values, sometimes a graph that shows only the first quadrant is used.



fraction

The quotient of two quantities in the form $\frac{a}{b}$ where b is not equal to 0.

Fraction Busters

"Fraction Busting" is a method of simplifying equations involving fractions that uses the Multiplicative Property of Equality to rearrange the equation so that no fractions remain. To use this method, multiply both sides of an equation by the common denominator of all the fractions in the equation. The result will be an equivalent equation with no fractions. For example, when given the equation $\frac{x}{7}+2=\frac{x}{3}$, we can multiply both sides by the "Fraction Buster" 21. The resulting equation, $3x + 42 = 7x$, is equivalent to the original but contains no fractions.

fraction greater than one

A fraction in which the numerator is greater than the denominator.

frequency

The number of times that something occurs within an interval or data set.

frequency table

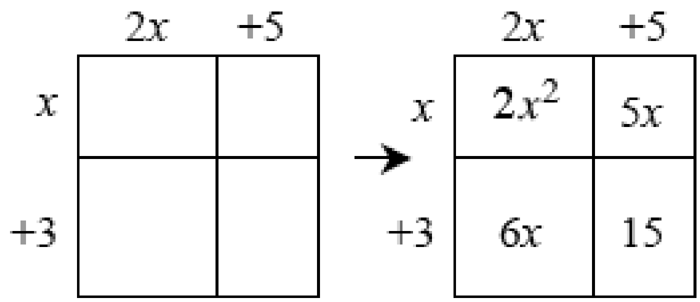
A table that displays counts, or frequencies, of data.

function

A relation in which for each input value there is one and only one output value. For example, the relation $f(x) = x + 4$ is a function; for each input value (x) there is exactly one output value. In terms of ordered pairs (x, y), no two ordered pairs of a function have the same first member (x).

generic rectangle

A type of diagram used to visualize multiplying expressions without algebra tiles. Each expression to be multiplied forms a side length of the rectangle, and the product is the sum of the areas of the sections of the rectangle. For example, the generic rectangle below may be used to multiply $(2x + 5)$ by $(x + 3)$.

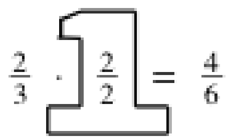


$$(2x+5)(x+3) = 2x^2 + 11x + 15$$

area as a product area as a sum

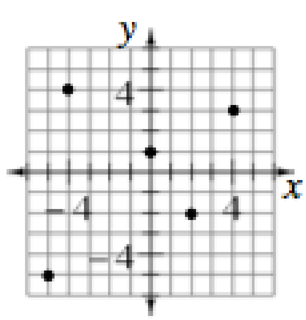
Giant One

A fraction that is equal to 1. Multiplying any fraction by a Giant One will create a new fraction equivalent to the original fraction.



graph

A graph represents numerical information in a visual form. The numbers may come from a table, situation (pattern), or rule (equation or inequality). Most of the graphs in this course show points, lines, and/or curves on a two-dimensional coordinate system like the one below or on a single axis called a number line (see diagram below).



graphic organizer

(GO) A visual representation of concepts or ideas you have learned. It helps with brainstormingand/or organizing information. It can make connections between ideas more clear. Examples are concept maps, charts, and Venn diagrams.

greater than

One expression is greater than another if its value is larger. We indicate this relationship with the greater than symbol "$>$". For example, $4 + 5$ is greater than $1 + 1$. We write $4 + 5 > 1 + 1$.

greatest common factor

For integers, the greatest positive integer that is a common factor of two or more integers. For example, the greatest common factor of 28 and 42 is 14.

growth

One useful way to analyze a mathematical relationship is to examine how the output value grows as the input value increases. You can see this growth on a graph of a linear relationship by looking at the slope of the graph.

growth factor

When two quantities are in a linear relationship, the growth factor describes how much the output value changes when the input value increases by 1. For example, the $x \rightarrow y$ table below shows a linear relationship with a growth factor of 6. The growth factor is equal to the slope of the line representing a linear relationship. The growth factor is also equal to the value of m when the relationship is represented with an equation in $y = mx + b$ form.

x	y
1	7
2	13
3	19
4	25

height

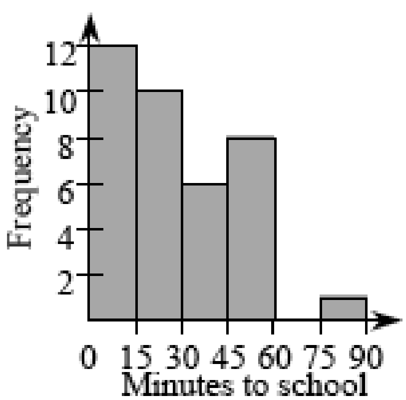
(a) Triangle: the length of a segment that connects a vertex of the triangle to a line containing the opposite base (side) and is perpendicular to that line.

(b) Trapezoid: the length of any segment that connects a point on one

base of the trapezoid to the line containing the opposite base and is perpendicular to that line.
(c) Parallelogram (includes rectangle, rhombus, and square): the length of any segment that connects a point on one base of the parallelogram to the line containing the opposite base and is perpendicular to that line.
(d) Pyramid and cone: the length of the segment that connects the apex to a point in the plane containing the base of a figure and is perpendicular to that plane.
(e) Prism or cylinder: the length of a segment that connects one base of the figure to the plane containing the other base and is perpendicular to that plane.

hexagon
A polygon with six sides.

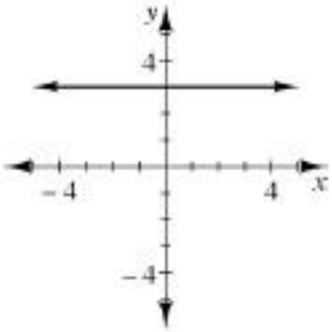
histogram
A way of displaying data that is much like a bar graph in that the height of the bars is proportional to the number of elements. The difference is that each bar of a histogram represents the number of data elements in a range of values, such as the number of people who weigh from 100 pounds up to, but not including, 120 pounds. Each range of values should have the same width. See ***bar graph***.



horizontal
Parallel to the horizon. The x-axis of a coordinate grid is the horizontal axis.

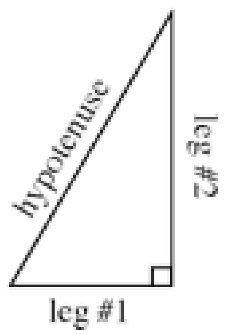
horizontal lines
Horizontal lines are "flat" and run left to right in the same direction as the x-axis. Horizontal lines have equations of the form $y = b$, where b can be any number. For example, the graph at right shows the horizontal line $y = 3$. The slope of any horizontal line is 0. The x-axis has the

equation $y = 0$ because $y = 0$ everywhere on the x- axis.



hypotenuse

The longest side of a right triangle (the side opposite the right angle).



Identity Property of Addition

The Identity Property of Addition states that adding zero to any expression leaves the expression unchanged. That is, $a + 0 = a$. For example, $-2y + 0 = -2y$.

Identity Property of Multiplication

The Identity Property of Multiplication states that multiplying any expression by 1 leaves the expression unchanged. That is, $a(1) = a$. For example, $437x \cdot 1 = 437x$.

impossibility

An event with a probability of zero.

improper fraction

A fraction in which the numerator is greater than the denominator.

inch

A unit of length equal to one twelfth of a foot.

independent

If the outcome of a probabilistic event does not affect the probability of another event, then the events are independent. For example, assume that a normal six-sided die is being rolled twice to determine the probability of rolling a 1 twice. The result of the first roll does not affect the probability of rolling a 1 on the second roll. Since the probability of rolling a 1 on the first roll is $\frac{1}{6}$ and the probability of rolling a 1 on the second roll is also $\frac{1}{6}$, then the probability of rolling two 1s in a row is $\frac{1}{6} \cdot \frac{1}{6} = \frac{1}{36}$.

independent events

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independent variable

When one quantity changes in a way that does not depend on the value of another quantity, the value that changes independently is represented with the independent variable. For example, we might relate the speed of a car to the amount of force you apply to the gas pedal. Here, the amount of force applied may be whatever the driver chooses, so it represents the independent variable. The independent variable appears as the input value in an x → y table, and is usually placed relative to the horizontal axis of a graph. We often use the letter x for the independent variable. When working with functions or relations, the independent variable represents the input value. Also see ***dependent variable***.

indirect measurement

A technique that uses proportionality to determine a measurement when directly measuring the object is not possible.

inequality

An inequality consists of two expressions on either side of an inequality symbol. For example, the inequality $7x + 4.2 < -8$ states that the expression $7x + 4.2$ has a value less than –8.

inequality symbols

The symbol ≤ read from left to right means "less than or equal to," the symbol ≥ read from left to right means "greater than or equal to," and the symbols < and > mean "less than" and "greater than," respectively. For example, " 7 < 13" means that 7 is less than 13.

inference

A statistical prediction.

input value

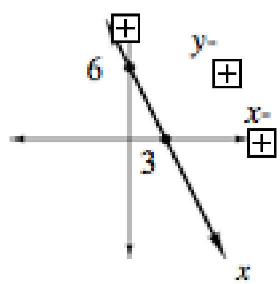
The input value is the independent variable in a relation. Substitute the input value into our rule (equation) to determine the output value. For example, if you have a rule for how much your phone bill will be if you talk a certain number of minutes, the number of minutes you talk is the input value. The input value appears first in an $x \rightarrow y$ table, and is represented by the variable *x*. When working with functions, the input value is the value put into the function.

integers

The set of numbers {…, –3, –2, –1, 0, 1, 2, 3, …}.

intercepts

Points where a graph crosses the axes. *x*-intercepts are points at which the graph crosses the *x* axis and *y*-intercepts are points at which the graph crosses the *y* axis. On the graph below the *x*-intercept is (3, 0) and the *y*-intercept is (0, 6).



interest

An amount paid which is a percentage of an initial value (principal). For example, a savings account may offer 4% annual interest rate, which means they will pay $4.00 in interest for a principal of $100 kept in the account for one year.

interquartile range

(IQR) A way to measure the spread of data. It is calculated by subtracting the first quartile from the third quartile.

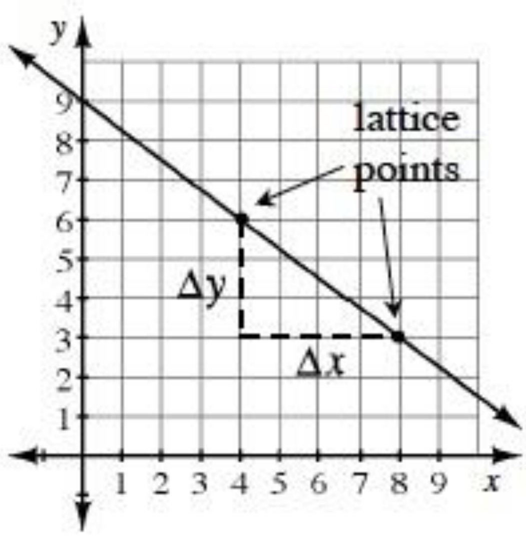
interval

A set of numbers between two given numbers.

inverse operation
An operation that undoes another operation. For example, multiplication is the inverse operation for division.
irrational numbers

The set of numbers that cannot be expressed in the form $\frac{a}{b}$,

where a and b are integers and $b \neq 0$. For example, π and $\sqrt{2}$ are irrational numbers.
isosceles trapezoid
A trapezoid with two (non-parallel) sides of equal length.
isosceles triangle
A triangle with two sides of equal length.
lateral face
The (flat) side of a polyhedron. It is always a polygon.
lattice points
The points on a coordinate grid where the grid lines intersect. The diagram below shows two lattice points. The coordinates of lattice points are integers.



laws of exponents
The laws of exponents we study in this course are:

Law	Examples	
$x^m x^n = x^{m+n}$ for all x	$x^3 x^4 = x^{3+4} = x^7$	$2^5 \cdot 2^{-1} = 2^4$

$\frac{x^m}{x^n} = x^{m-n}$ for $x \neq 0$	$x^{10} \div x^4 = x^{10-4} = x^6$	$\frac{5^4}{5^7} = 5^{-3}$
$(x^m)^n = x^{mn}$ for all x	$(x^4)^3 = x^{4\cdot 3} = x^{12}$	$(10^5)^6 = 10^{30}$
$x^0 = 1$ for $x \neq 0$	$\frac{y^2}{y^2} = y^0 = 1$	$9^0 = 1$
$x^{-1} = \frac{1}{x}$ for $x \neq 0$	$\frac{1}{x^2} = (\frac{1}{x})^2 = (x^{-1})^2 = x^{-2}$	$3^{-1} = \frac{1}{3}$
$x^{m/n} = \sqrt[n]{x^m}$ for $x \geq 0$	$\sqrt{k} = k^{1/2}$	$y^{2/3} = \sqrt[3]{y^2}$

least common multiple
(LCM) The smallest common multiple of a set of two or more integers. For example, the least common multiple of 4, 6, and 8 is 24.
legal moves
When working with an Equation Mat or Expression Comparison Mat, there are certain "legal" moves you can make with the algebra tiles that keep the relationship between the two sides of the mat intact. For example, removing an *x* tile from the positive region of each side of an equation mat is a legal move; it keeps the expressions on each side of the mat equal. The legal moves are those justified by the properties of the real numbers.
legs
The two sides of a right triangle that form the right angle. Note that legs of a right triangle are always shorter than its hypotenuse.
legs (of a right triangle)
The two sides of a right triangle that form the right angle. Note that legs of a right triangle are always shorter than its hypotenuse.
length
The distance from one end of an object to the opposite end.
less than
(1) One expression is less than another if its value is not as large. This relationship is indicated with the less than symbol "<." For example, 1 + 1 is less than 4 + 5 , so the comparison is written as $1 + 1 < 4 + 5$. (2) Sometimes the comparison is made that one amount is a certain quantity less than another amount. For example, a student movie ticket might cost two dollars *less than* an adult ticket.
let statement

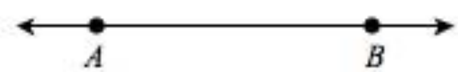
A "let" statement is written at the beginning of our work to identify the variable that will represent a certain quantity. For example, in solving a problem about grilled cheese sandwiches, we might begin by writing "Let s = the number of sandwiches eaten." It is particularly important to use "let" statements when writing mathematical expressions, so that your readers will know what the variables in the expression represent.

like terms

Two or more terms that contain the same variable(s), with corresponding variables raised to the same power. For example, $5x^2$ and $2x^2$ are like terms. See ***combining like terms***.

line

A line is an undefined term in geometry. A line is one-dimensional and continues without end in two directions. A line is made up of points and has no thickness. A line may be named with a letter (such as l), but also may be labeled using two points on the line, such as $\overleftrightarrow{AB}$ shown below.



line of best fit

A line of best fit shows a trend in the data representing where the data falls. This line does not need to touch any of the actual data points. Instead, it shows where the data generally falls. The line is a mathematical model of the data.

line segment

The portion of a line between two points. A line segment is named using its endpoints. For example, the line segment below may be named either $\overline{AB}$ or $\overline{BA}$.

linear association

See ***association***.

linear equation

An equation in two variables whose graph is a line. For example, $y = 2.1x - 8$ is a linear equation. The standard form for a linear equation is $ax + by = c$, where a, b, and c are constants and a and b are not both zero. Most linear equations can be written in $y = mx + b$ form, which is more useful for determining the line's slope and y-intercept.

linear function
A function where the data points line up in a straight line.
linear growth
Growth that creates a straight line showing constant change is called linear growth. Simple interest is an example of linear growth.
lowest common denominator
The smallest common multiple of the denominators of two or more fractions. For example, the LCD of $\frac{5}{12}$ and $\frac{3}{8}$ is 24.
lowest terms of a fraction
A fraction for which the numerator and the denominator have no common factor greater than one.
m
When the equation of a line is expressed in $y = mx + b$ form, the constant m gives the slope of the line. For example, the slope of the line $y = -\frac{1}{3}x + 7$ is $-\frac{1}{3}$.
maximum
The largest value.
maximum
The largest value.
mean
The mean, or average, of several numbers is one way of defining the "middle" of the numbers. To find the average of a group of numbers, add the numbers together then divide by the number of numbers in the set. For example, the average of the numbers 1, 5, and 6 is (1 + 5 + 6) ÷ 3 = 4. The mean is generally the best measure of central tendency when there are not outliers in the data set. See ***average***.

mean absolute deviation
A method for measuring the spread (variability) in a set of data by calculating the average distance each data point is from the mean. Since the calculation is based on the mean, it is best to use this measure of spread when the distribution is symmetric.
measure
The act or process of finding a measurement. For the purposes of this course, a measurement is an indication of the size or magnitude of a

geometric figure. For example, an appropriate measurement of a line segment would be its length. Appropriate measurements of a square would include not only the length of a side, but also its area and perimeter. The measure of an angle represents the number of degrees of rotation from one ray to the other about the vertex.

measure of central tendency

Mean, median, and mode are all measures of central tendency, reflecting special statistical information about a set of data. See ***center of a data distribution***.

measurement

For the purposes of this course, a measurement is an indication of the size or magnitude of a geometric figure. For example, an appropriate measurement of a line segment would be its length. Appropriate measurements of a square would include not only the length of a side, but also its area and perimeter. The measure of an angle represents the number of degrees of rotation from one ray to the other about the vertex.

median

The middle number of an ordered set of data. If there is no distinct middle, then the average of the two middle numbers is the median. The median is generally more accurate than the mean as a measure of central tendency when there are outliers in the data set.

minimum

The smallest value.

mixed number

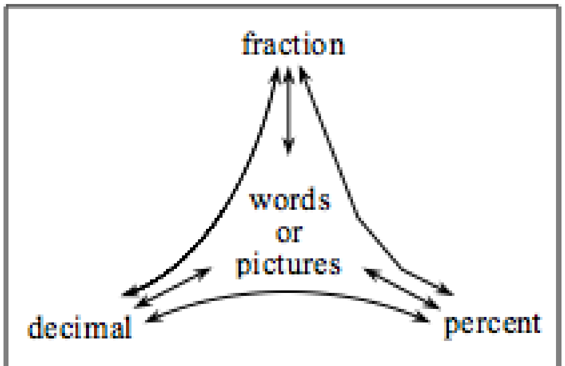
(fraction) A number that consists of an integer and a fraction. For example, $3\frac{3}{8}$.

model

A mathematical summary (often an equation) of a trend in data, after making assumptions and approximations to simplify a complicated situation. Models allow us to describe data to others, compare data more easily to other data, and allow us to make predictions. For example, mathematical models of weather patterns allow us to predict the weather. No model is perfect, but some models are better at describing trends than other models.

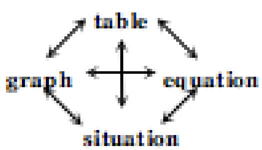
multiple

The product of a whole number and any other (nonzero) whole number. For example, 15 is a multiple of 5.
multiple representations of a portion
The web diagram below illustrates that fractions, decimals, and percents are different ways to represent a portion of a number. Portions may also be represented in words, such as "four-fifths" or "seven-fourths," or as diagrams.



Representations of a Portion

multiple representations web
An organizational tool used to keep track of connections between the four representations of relationships between quantities emphasized in this course. In this course, four different ways of representing a numerical relationship are emphasized: with a graph, table, situation (pattern), or rule (equation or inequality).



multiplication
(·) An operation that reflects repeated addition. For example, $3 \cdot 4 = 4 + 4 + 4$.

multiplicative identity
The multiplicative identity property states that multiplying any expression by 1 leaves the expression unchanged. That is, $a(1) = a$. For example, $437x \cdot 1 = 437x$.
Multiplicative Identity Property
The multiplicative identity property states that multiplying any expression by 1 leaves the expression unchanged. That is, $a(1) = a$. For

example, 437 x · 1 = 437x.

multiplicative inverse

The multiplicative inverse for a non-zero number is the number we can multiply by to get the multiplicative identity, For example, for the number 5, the multiplicative inverse is $\frac{1}{5}$; for the number $\frac{2}{3}$ the multiplicative inverse is $\frac{3}{2}$.

Multiplicative Inverse Property

The Multiplicative Inverse Property states that for every nonzero number *a* there is a number $\frac{1}{a}$ such that $a \cdot \frac{1}{a} = 1$. A common name used for the multiplicative inverse is the reciprocal. That is, $\frac{1}{a}$ is the reciprocal of *a*. For example, $6 \cdot \frac{1}{6} = 1$.

multiplier

The number you can multiply by in order to increase or decrease an amount. See ***scale factor***.

mutually exclusive

Two events are mutually exclusive if they have no outcomes in common.

natural numbers

The counting numbers beginning with 1. For example, 1, 2, 3….

negative association

If one variable decreases as the other variable increases, there is said to be a negative association.

negative number

A negative number is a number less than zero. Negative numbers are graphed on the negative side of a number line, which is to the left of the origin.

negative slope

A line has negative slope if it slopes downward from left to right on a graph.

net

A drawing of each of the faces of a prism or pyramid, as if it were cut along its edges and flattened out.

non-commensurate
Two measurements are called non-commensurate if no whole number multiple of one measurement can ever equal a whole number multiple of the other. For example, measures of 1 cm and $\sqrt{2}$ cm are non-commensurate, because no combination of items 1 cm long will ever have exactly the same length as a combination of items $\sqrt{2}$ cm long.

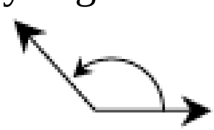
number line
A diagram representing all real numbers as points on a line. All real numbers are assigned to points. The numbers are called the coordinates of the points and the point for which the number 0 is assigned is called the origin. Also see ***boundary point***.

numeral
A symbol that names a number. For example, each item of the following list is a numeral: 22.6, –19, 0.

numerator
The number above the bar in a fraction that tells the numbers of parts in relationship to the number of parts in the whole.

numerical term
Each group of + tiles is represented by a different part of the expression, also called a **numerical term**. Numerical terms are single numbers or products of numbers. It is often useful to circle terms in an expression to keep track of separate calculations. For example, each term circled in the expression below represents a separate part of the collection of + tiles above.

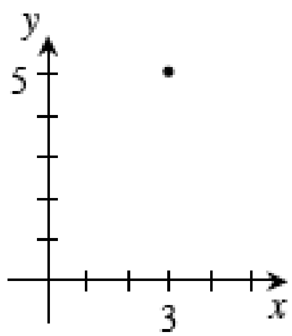
obtuse angle
Any angle that measures between (but not including) 90º and 180º.



obtuse triangle
A triangle with one obtuse angle.

octagon
A polygon with eight sides.

odd number
An integer that cannot be evenly divided by two.
one-dimensional
Something that does not have any width or depth. Lines and curves are one-dimensional.
operation
A mathematical process such as addition, subtraction, multiplication, division, raising to a power, or taking a root.
opposite
(of a number) The same number but with the opposite sign (+ or –). The additive inverse.
order of operations
The specific order in which certain operations are to be carried out to evaluate or simplify expressions: parentheses (or other grouping symbols), exponents (powers or roots), multiplication and division (from left to right), and addition and subtraction (from left to right).
ordered pair
Two numbers written in order as follows: (x, y). The primary use of ordered pairs in this course is to represent points in an *xy*- coordinate system. The first coordinate (x) represents the horizontal distance from the origin. The second coordinate (y) represents the vertical distance from the origin. For example, the ordered pair $(3, 5)$ represents the point shown in bold below.

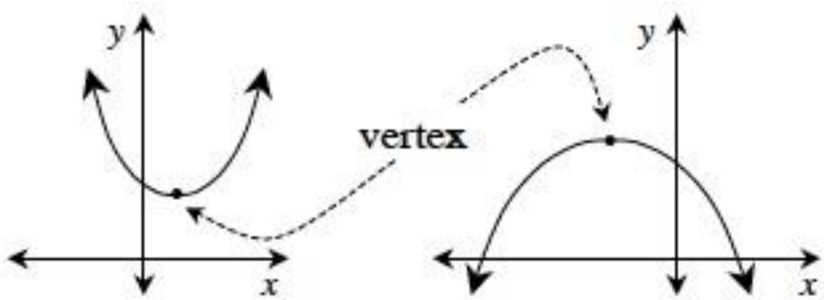


origin
The point on a coordinate plane where the x-axis and y-axis intersect is called the origin. This point has coordinates $(0, 0)$. The point assigned to zero on a number line is also called the origin. See ***axis***.
outcome
Possible result in an experiment or consequence of an action.

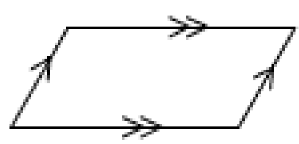
outlier
A number in a set of data that is much larger or much smaller than the other numbers in the set.

output value
The output value is the dependent variable in a relation. When you substitute the input value into our rule (equation), the result is the output value. For example, if you have a rule for how much your phone bill will be if you talk a certain number of minutes, the amount of your phone bill is the output value. The output value appears second in an $x \rightarrow y$ table, and is represented by the variable y. When working with functions, the output value is the value that results from applying the rule for the function to an input value.

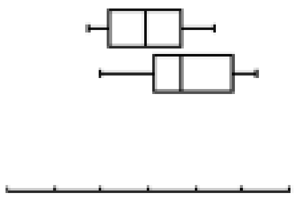
parabola
A parabola is a particular kind of mathematical curve. In this course, a parabola is always the graph of a quadratic function $y = ax^2 + bx + c$ where a does not equal 0. The diagram below shows some examples of parabolas. The highest or lowest point on the graph is called the vertex.



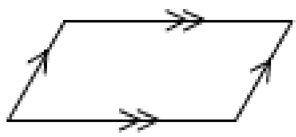
parallel
Two or more straight lines on a flat surface that do not intersect (no matter how far they are extended) are parallel. If two lines have the same slope and do not coincide, then they are parallel. The matching arrows on the parallelogram below indicate that those segments are parallel.



parallel box plot
A way to visually compare multiple data distributions by drawing each of their box plots on the same axis.



parallelogram
A quadrilateral with two pairs of parallel sides.



parameter
In general, equations where *x* and *y* represent the inputs and outputs of the function, variables such as *b* and *m* are often referred to as parameters, and they are often replaced with specific values. For example: in the equation representing all lines, the *b* and *m* are (variable) parameters that give the slope and yintercept, while *x* and *y* are the independent and dependent variables.
partition
Divide into equal parts.
pattern
A pattern is a set of things in order that change in a regular way. For example, the numbers 1, 4, 7, 10, … form a pattern, because each number increases by 3. The numbers 1, 4, 9, 16, … form a pattern, because they are squares of consecutive integers. (p. 96) In this course, we often look at tile patterns, whose figure numbers and areas we represent with a table, a rule (equation), or a graph.

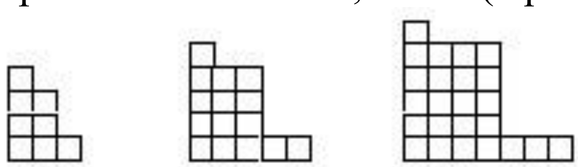


Figure 2 Figure 3 Figure 4

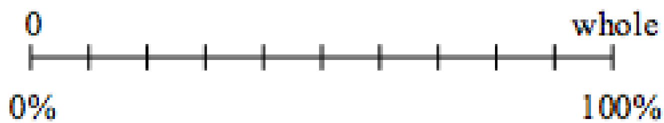
pentagon
A polygon with five sides.
percent
(%) A ratio that compares a number to 100. Percents are often written

using the “%” symbol. For example, 0.75 is equal to $\frac{75}{100}$ or 75%.

percent change
The amount that a quantity has increased represented as a percent of the original amount. A **percent decrease** is the amount that a quantity has decreased written as a percent of the original amount. You can write an equation to represent a percent change that is an increase or decrease using a scale factor or multiplier:

amount of increase or decrease = (% change)(original amount)

percent ruler
A diagram like the one shown below. It is used to visually aid in determining an amount that is a percent of a whole.

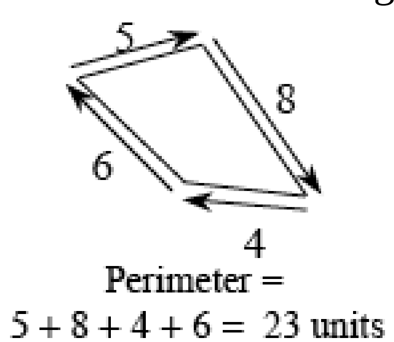


perfect cube
A number that is the product of an integer and itself and itself again. For example, 125 is a perfect cube because it is the product of 5 and 5 and 5.

perfect number
A positive integer that is equal to the sum of its proper positive divisors. For example, 6 is a perfect number because the proper divisors of 6 are 1, 2, and 3, and 1 + 2 + 3 = 6.

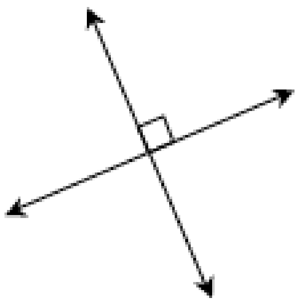
perfect square
A number that is the product of an integer and itself. For example, 25 is a perfect square because it is the product of 5 and 5.

perimeter
The distance around a figure on a flat surface.



perpendicular

Two rays, line segments, or lines that meet (intersect) to form a right angle (90°) are called perpendicular. A line and a flat surface may also be perpendicular if the line does not lie on the flat surface but intersects the surface and forms a right angle with every line on the flat surface passing through the point of intersection. A small square at the point of intersection of two lines or segments indicates that the lines form a right angle and are therefore perpendicular.



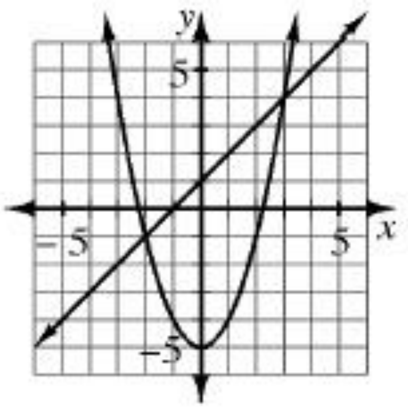
pi
π is the symbol for pi. The ratio of the circumference (C) of the circle to its diameter (d). For ever circle, $\pi = \frac{\text{circumference}}{\text{diameter}} = \frac{C}{d}$. Numbers such as 3.14, 3.14159, or $\frac{22}{7}$ are approximations of π.

place value
The number assigned to each place that a digit occupies.

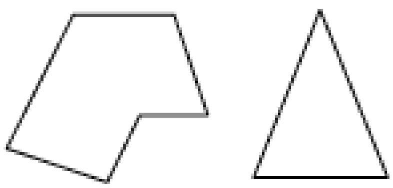
plane
A plane is a two-dimensional flat surface that extends without end. It is made up of points and has no thickness.

point
An exact location in space. In two dimensions, an ordered pair specifies a point on a coordinate plane. See ***ordered pair***.

point of intersection
A point of intersection is a point that the graphs of two equations have in common. For example, (3, 4) is a point of intersection of the two graphs shown below. Two graphs may have one point of intersection, several points of intersection, or no points of intersection. The ordered pair representing a point of intersection gives a solution to the equations of each of the graphs.



polygon
A two-dimensional closed figure of three or more line segments (sides) connected end to end. Each segment is a side and only intersects the endpoints of its two adjacent sides. Each point of intersection is a vertex. Below are two examples of polygons.

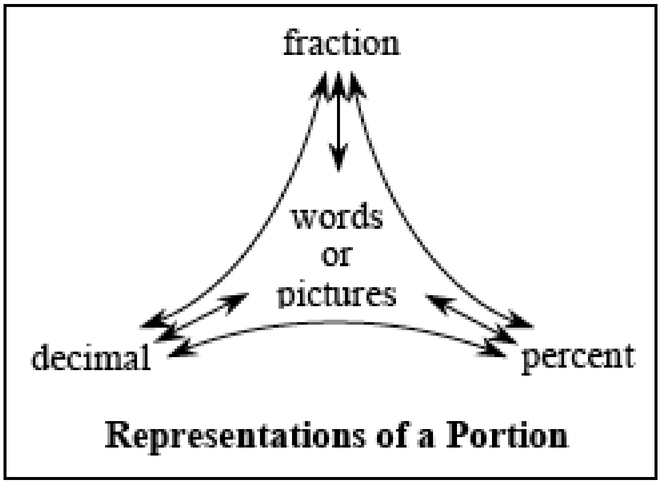


polyhedron
A three-dimensional figure with no holes for which all faces are polygons.

population
A collection of objects or group of people about whom information is gathered.

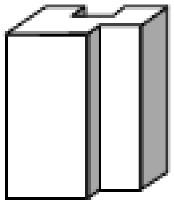
portion
A part of something; a part of a whole.

portions web
The web diagram below illustrates that fractions, decimals, and percents are different ways to represent a portion of a number. Portions may also be represented in words, such as “four-fifths” or “seven-fourths,” or as diagrams.



positive numbers
Numbers that are greater than zero.
positive slope
Lines are said to have positive slope if they slant upwards from left to right. That is, as the *x*-value increases, the *y*-value also increases.
possible outcomes
In the context of probability, outcomes with any chance of happening.
power
A number or variable raised to an exponent in the form x^n. See ***exponent***.
predicted value (of an association)
The dependent (*y*-value) that is predicted for an independent (*x*-value) by the best-fit model for an association.
prime factor
A factor that is a prime number.
prime factorization
The expression of a number as the product of prime factors.
prime number
A positive integer with exactly two factors. The only factors of a prime number are 1 and itself. For example, the numbers 2, 3, 17, and 31 are all prime.
principal
Initial investment or capital. An initial value.
prism
A three-dimensional figure that consists of two parallel congruent polygons (called *bases*) and a vertical surface containing segments

connecting each point on each side of one base to the corresponding point on the other base. The lateral surface of a prism consists of parallelograms.



probability

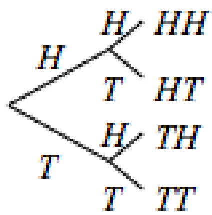
A number that represents how likely an event is to happen. When a event has a finite number of equally-likely outcomes, the probability that one of those outcomes, called *A*, will occur is expressed as a ratio and written as: $P(A)=\frac{\text{number of successful outcomes}}{\text{total number of possible outcomes}}$. For example, when flipping a coin, the probability of getting tails, *P*(tails), is 1/2 because there is only one tail (successful outcome) out of the two possible equally likely outcomes (a head and a tail). Probability may be written as a ratio, decimal, or percent. A probability of 0 (or 0%) indicates that the occurrence of that outcome is impossible, while a probability of 1 (or 100%) indicates that the event must occur. Events that "might happen" will have values somewhere between 0 and 1 (or between 0% and 100%).

probability table

An area model or diagram is one way to represent the probabilities of the outcomes for a sequence of two events. The total area is 1, and the probabilities are represented by proportional parts. In the example, P(S) and P(not S) are the dimensions of the right side of the rectangle. The probabilities that A will occur or not occur are the dimensions of the top of the rectangle. The area of each part is the probability of each possible sequence of two events.

	A 0.8	Not A 0.2
S 0.4	0.32	0.08
Not S 0.6	0.48	0.12

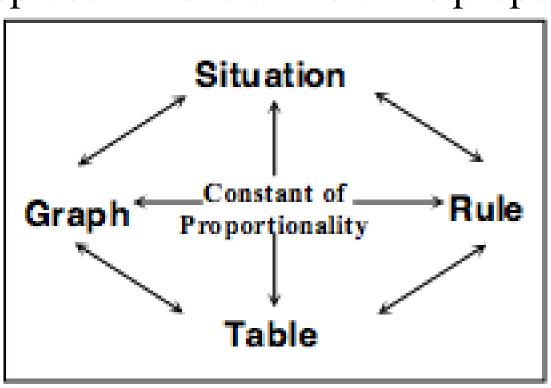
probability tree
Tree diagrams are useful for representing possible outcomes of probability experiments. For example, the tree diagram below represents the possible outcomes when a coin is flipped twice.



product
The result of multiplying. For example, the product of 4 and 5 is 20.
proportion
An equation stating that two ratios (fractions) are equal. For example, the equation below is a proportion. A proportion is a useful type of equation to set up when solving problems involving proportional relationships.

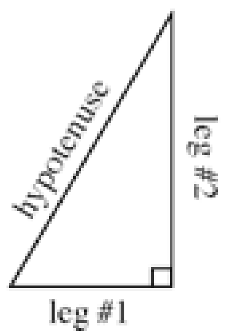
$$\frac{68 \text{ votes for Mr. Mears}}{100 \text{ people surveyed}} = \frac{34 \text{ votes for Mr. Mears}}{50 \text{ people surveyed}}$$

proportional equation
An equation stating that two ratios (fractions) are equal.
proportional relationship
Two values are in a proportional relationship if a proportion may be set up that relates the values.
proportions web
The web diagram below illustrates the connections between different representations of the same proportional relationship.

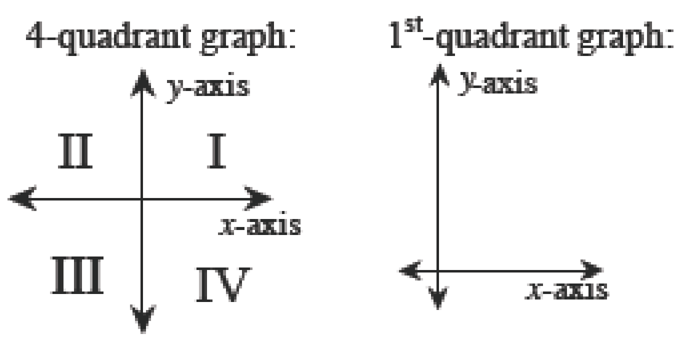


protractor
A geometric tool used for physically measuring the number of degrees in an angle.
pyramid
A three-dimensional figure with a base that is a polygon. The lateral faces are formed by connecting each vertex of the base to a single point (the vertex of the pyramid) that is above or below the surface that contains the base.

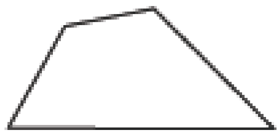
Pythagorean Theorem
The statement relating the lengths of the legs of a right triangle to the length of the hypotenuse: $(leg\ \#1)^2 + (leg\ \#2)^2 = hypotenuse^2$. The Pythagorean Theorem is powerful because if you know the lengths of any two sides of a right triangle, you can use this relationship to find the length of the third side.



quadrants
The coordinate plane is divided by its axes into four quadrants. The quadrants are numbered as shown in the first diagram below. When graphing data that has no negative values, sometimes a graph that shows only the first quadrant is used.



quadrilateral
A polygon with four sides. The shape below is a quadrilateral.

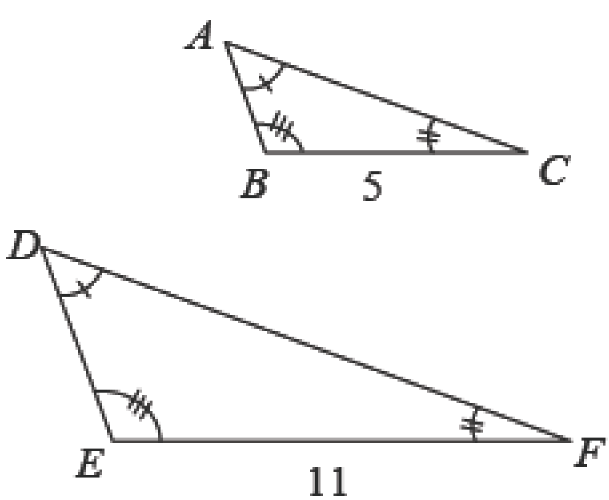


quartile
Along with the median, the quartiles divide a set of data into four groups of the same size. Also see ***box plot***.
quotient
The result of a division problem.
radical
An expression in the form $\sqrt{a}$, where $\sqrt{a}$ is the positive square root of a. For example, $\sqrt{49} = 7$. Also see ***square root***.
radical sign
$\sqrt{}$
radicand
The expression under a radical sign. For example, in the expression $3 + 2\sqrt{x - 7}$, the radicand is $x - 7$.
radius
Of a circle: The line segment drawn from the center of a circle to a point on the circle. Of a regular polygon: A line segment that connects the center of a regular polygon with a vertex. The length of a radius is usually denoted r.
random
An event is random if its result cannot be known (and can only be guessed) until the event is completed. For example, the flip of a fair coin is random because the coin can either land on heads or tails and the outcome cannot be known for certain until after the coin is flipped.
random number
A number generated by a process whose outcome does not follow any sort of pattern and thus the number cannot be predicted.
random number generator
A computational device designed to generate a set of numbers that lack any pattern.
random sample
A sample which was chosen as a result of a random process. A random sample can represent the whole population well.

range
The range of a set of data is the difference between the highest and lowest values.
rate
A ratio comparing two quantities, often a comparison of time. For example, miles per hour.
ratio
A ratio compares two quantities by division. A ratio may be written using a colon, but is more often written as a fraction. For example, the comparison may be made of the ratio of female students in a particular school to the total number of students in the school. This ratio could be written as 1521 : 2906 or as the fraction shown below.

$$\frac{1521 \text{ female students}}{2906 \text{ total students}}$$

ratio of similarity
The ratio of any pair of corresponding sides of two similar figures. This means that once it may be determined that two figures are similar, all of the pairs of corresponding sides of the figures have the same ratio. For example, for the similar triangles $\triangle ABC$ and $\triangle DEF$ below, the ratio of similarity is $\frac{5}{11}$. The ratio of similarity may also be called the linear scale factor.



rational number

Numbers that may be expressed in the form $\frac{a}{b}$, where *a* and *b* are integers and $b \neq 0$. For example, 0.75 is a rational number because 0.75 may be expressed in the form $\frac{3}{4}$.

ray

A ray is part of a line that starts at one point and extends without end in one direction. In the example below, ray $\overrightarrow{AB}$ is part of line $\overleftrightarrow{AB}$ that starts at *A* and contains all of the points of $\overleftrightarrow{AB}$ that are on the same side of *A* as point *B*, including *A*. Point *A* is the endpoint of $\overrightarrow{AB}$.

real numbers

Irrational numbers together with rational numbers form the set of the real numbers. For example, the following are all real numbers: $2.78, -13267, 0, \frac{3}{7}, \pi, \sqrt{2}$. All real numbers are represented on the number line.

reciprocals

The reciprocal of a nonzero number is its multiplicative inverse, that is, the reciprocal of *x* is $\frac{1}{x}$. For a number in the form $\frac{a}{b}$, where a and b are non-zero, the reciprocal is $\frac{b}{a}$. The product of a number and its reciprocal is 1. For example, the reciprocal of 12 is $\frac{1}{12}$, because $12 \cdot \frac{1}{12} = 1$.

rectangle

A quadrilateral with four right angles.

rectangular array

Objects arranged in rows and columns filling a rectangular shape.

rectangular prism

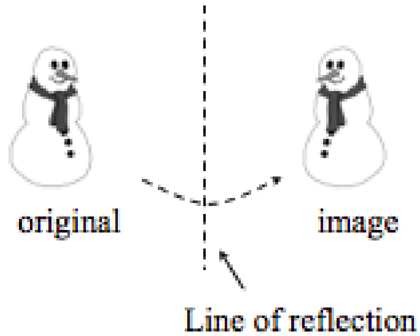
A prism with a base that is a rectangle.

reduce

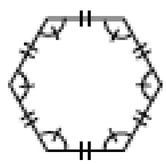
To put a fraction into simplest form.

reflection

A transformation across a line that produces a mirror image of the original (pre-image) shape. The reflection is called the “image” of the original figure. The line is called a “line of reflection.” See the example below. Note that a reflection is also sometimes referred to as a “flip.”



regular polygon
A polygon is regular if the polygon is a convex polygon with congruent angles and congruent sides. For example, the shape below is a regular hexagon.



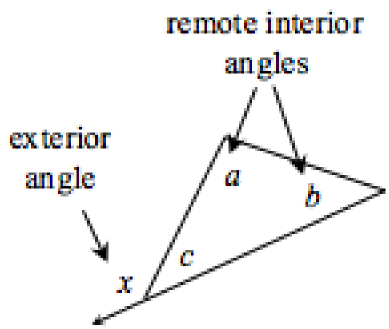
REGULAR HEXAGON

relative frequency
A ratio or percent. If 60 people are asked, and 15 people prefer “red,” the relative frequency of people preferring red is $\frac{15}{60}$ = 25 %.

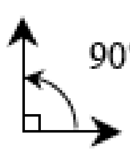
relative frequency table
A two-way table in which the percent of subjects in each combination of categories is displayed.

remainder
The amount left over when the divisor does not divide the dividend exactly. For example 63 ÷ 5 is 12 with a remainder of 3.

remote interior angles
If a triangle has an exterior angle, the remote interior angles are the two angles not adjacent to the exterior angle. Also called “non-adjacent interior angles.”

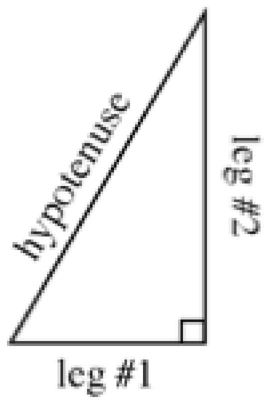


repeating decimal
A repeating decimal is a decimal that repeats the same sequence of digits forever from some point onward. For example, 4.56073073073… is a decimal for which the three digits 073 continue to repeat forever. Repeating decimals are always the decimal expansions of rational numbers.
representative sample
A subgroup of the population that has the similar characteristic of interest as that of the whole population. Representative samples are usually the result of random sampling.
rewrite
To rewrite an equation or expression is to write an equivalent equation or expression. Rewriting could involve using the Distributive Property, combining like terms, or using Fraction Busters. We usually rewrite in order to change expressions or equations into more useful forms or sometimes, just simpler forms.
rhombus
A quadrilateral with four congruent sides. Also see ***equilateral***.
right angle
An angle that measures 90°. A small square is used to note a right angle, as shown in the example below.



right rectangular prism
A prism with bases that are rectangles and the other faces are rectangles perpendicular to the bases. Typically, boxes are right rectangular prisms.
right triangle

A triangle that has one right angle. The side of a right triangle opposite the right angle is called the “hypotenuse,” and the two sides adjacent to the right angle are called “legs.”

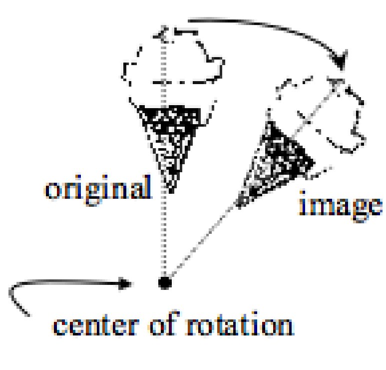


rigid transformations

Movements of figures that preserve their shape and size. Also called “rigid transformations.” Examples of rigid motions are reflections, rotations, and translations.

rotation

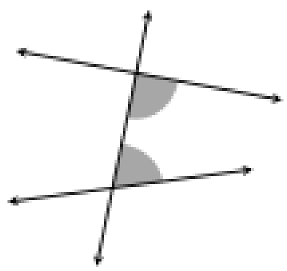
A transformation that turns all of the points in the original (pre-image) figure the same number of degrees around a fixed center point (such as the origin on a graph). The result is called the “image” of the original figure. The point that the shape is rotated about is called the “center of rotation.” To define a rotation, you need to state the measure of turn (in degrees), the direction the shape is turned (such as clockwise or counter-clockwise), and the center of rotation. See the example at right. Note that a rotation is also sometimes referred to as a “turn.”



round

(a number) To express an approximate value of a number that is exact to a given decimal place. For example, if the number 1234.56 is 1235 when rounded to the nearest whole number and is 1200 when rounded to the nearest 100.

rule
A rule is an equation or inequality that represents the relationship between two numerical quantities. A rule is often used to represent the relationship between quantities in a table, a pattern, a real-world situation, or a graph.
same side interior angles
Two angles between two lines and on the same side of a third line that intersects them (called a transversal). The shaded angles in the diagram below are an example of a pair of same-side interior angles. Note that if the two lines that are cut by the transversal are parallel, then the two angles are supplementary (add up to 180°).



sample
A subset (group) of a given population with the same characteristics as the whole population.
sample space
The collection of all possible outcomes of an event.
scale
(scaling) The ratio between a length of the representation (such as a map, model, or diagram) and the corresponding length of the actual object. For example, the map of a city may use one inch to represent one mile.
scale drawing
A drawing that shows a real object with accurate sizes except they have all been reduced or enlarged by a certain amount called the **scale factor**.
scale factor
A ratio that compares the sizes of the parts of one figure or object to the sizes of the corresponding parts of a similar figure or object. In this course it is also referred to as the multiplier.
scale on axes
The scale on an axis tells you what number each successive tick mark on

the axis represents. A complete graph has the scale marked with numbers on each axis. Each axis should be scaled so that each interval represents the same amount.

scalene triangle

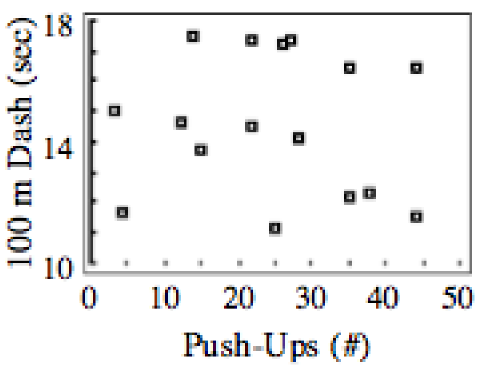
A triangle with no congruent sides.

scaling

(scale) The ratio between a length of the representation (such as a map, model, or diagram) and the corresponding length of the actual object. For example, the map of a city may use one inch to represent one mile.

scatterplot

A way of displaying two-variable numerical data where two measurements are taken for each subject (like height and forearm length, or surface area of cardboard and volume of cereal held in a cereal box). To create a scatterplot, the two values for each subject are written as coordinate pairs and graphed on a pair of coordinate axes (each axis representing a variable). Also see ***association***.



scientific notation

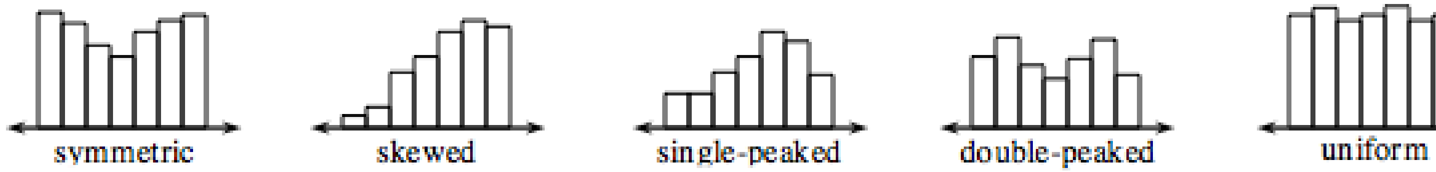
A number is expressed in scientific notation when it is in the form $a \cdot 10^n$, where $1 \leq a < 10$ and n is an integer. For example, the number 31,000 can be expressed in scientific notation as $3.1 \cdot 10^4$.

set

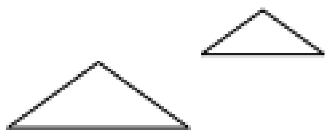
A collection of items.

shape

(of a data display) Statisticians use the following words to describe the overall shape of a data distribution: symmetric, skewed, single-peaked, double-peaked, and uniform. Examples are shown below.



side of an angle
One of the two rays that form an angle.
similar
Similar figures have the same shape but are not necessarily the same size. For example, the two triangles below are similar. In similar figures, the measures of corresponding angles are equal and the ratio of the corresponding sides lengths are equal.



similar figures
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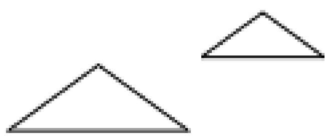
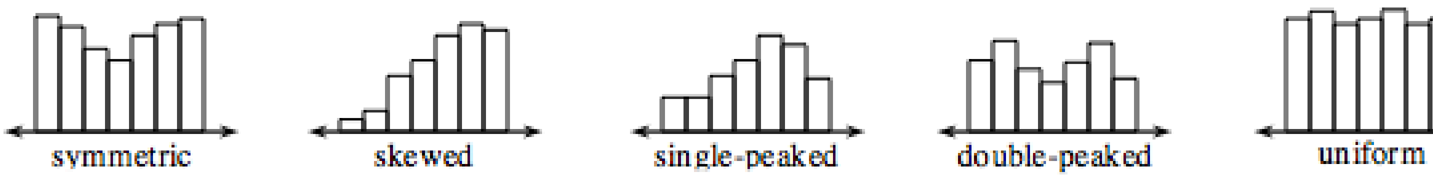


simple interest
Interest paid only on the principal alone.
simplify
To simplify an expression is to write a less complicated expression with the same value. A simplified expression has no parentheses and no like terms. For example, the expression $3 - (2x + 7) - 4x$ may be simplified to $-4 - 6x$. When working with algebra tiles, a simplified expression uses the fewest possible tiles to represent the original expression.
simulation
(probability) When conducting an experiment with an event that is unrealistic to perform, a simulation can be used. A simulation is a similar experiment that has the same probabilities as the original experiment.
single event
(probabilities) The probability of one event occurring such as one draw

of a card, or picking one cube from a bag.

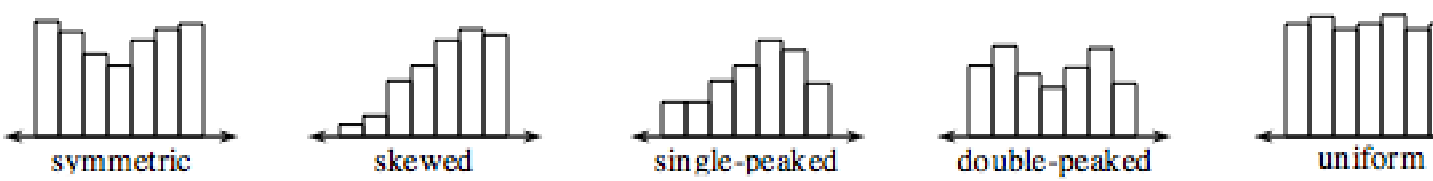
single-peaked

Single-peaked refers to one of the shapes of a data display. Statisticians use the following words to describe the overall shape of a data distribution: symmetric, skewed, single-peaked, double-peaked, and uniform. Examples are shown below.



skewed

Skewed refers to one of the shapes of a data display. Statisticians use the following words to describe the overall shape of a data distribution: symmetric, skewed, single-peaked, double-peaked, and uniform. Examples are shown below.

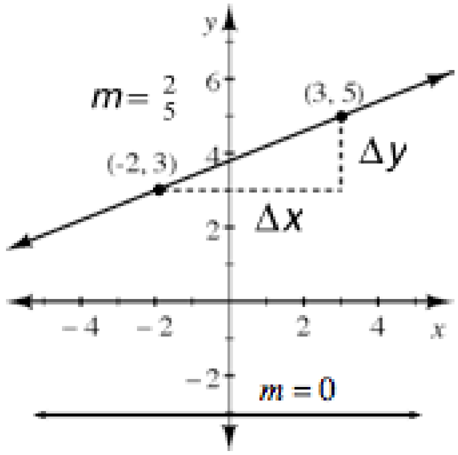


slide

See ***translation***.

slope

A ratio that describes how steep (or flat) a line is. Slope can be positive, negative, or even zero, but a straight line has only one slope. Slope is the ratio $\frac{\text{vertical change}}{\text{horizontal change}}$ or $\frac{\text{change in } y \text{ value}}{\text{change in } x \text{ value}}$, sometimes written $\frac{\Delta y}{\Delta x}$. When the equation of a line is written in $y = mx + b$ form, m is the slope of the line. Some texts refer to slope as the ratio of the "rise over the run." A line has positive slope if it slopes upward from left to right on a graph, negative slope if it slopes downward from left to right, zero slope if it is horizontal, and undefined slope if it is vertical. lope is interpreted in context as the amount of change in the y-variable for an increase of one unit in the x-variable.



slope-intercept form

A form of a linear equation: $y = mx + b$. In this form, m is the slope and the point (0, b) is the y-intercept. See ***y* = *mx* + *b***.

solid

A closed three-dimensional shape and all of its interior points. Examples include regions bounded by pyramids, cylinders, and spheres.

solution

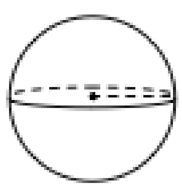
The number or numbers that when substituted into an equation or inequality make the equation or inequality true. For example, is a solution to the equation 3x = 12 because 3x equals 12 when x = 4.

solve

To find all the solutions to an equation or an inequality. The solution(s) may be number(s), variable(s), or an expression.

sphere

The set of all points in space that are the same distance from a fixed point. The fixed point is the center of the sphere and the distance is its radius.



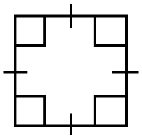
Sphere

spread

(data display) A measure of the amount of variability in a data set. Three ways to measure spread are the range, the mean absolute deviation, and the interquartile range.

square

A quadrilateral with four right angles and four congruent sides.



square

square (a number)
To square a number means to multiply it by itself, or raise it to the second power. For example, 7 squared is 7^2 or $7 \cdot 7$ which is 49.

square root
A number *a* is a square root of *b* if $a^2 = b$. For example, the number 9 has two square roots, 3 and −3. A negative number has no real square roots; a positive number has two; and zero has just one square root, namely, itself. Other roots, such as cube root, will be studied in other courses. Also see ***radical***.

square units
The units used to describe the measure of an area in the form of 1 x 1 unit squares.

standard form
The standard form for a linear equation is $ax + by = c$, where *a*, *b*, and *c* are real numbers and *a* and *b* are not both zero. For example, the equation $2.5x - 3y = 12$ is in standard form. When you are given the equation of a line in standard form, it is often useful to write an equivalent equation in $y = mx + b$ form to find the line's slope and *y*-intercept.

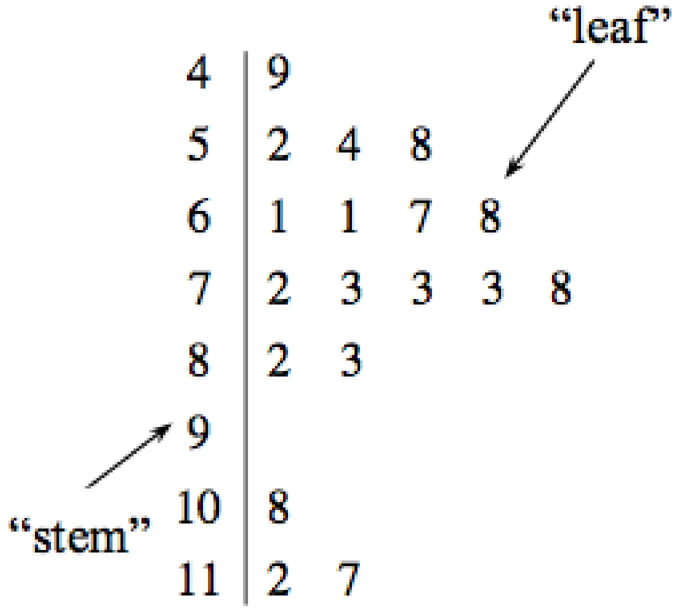
standard form of a linear equation
The standard form for a linear equation is $ax + by = c$, where *a*, *b*, and *c* are real numbers and *a* and *b* are not both zero. For example, the equation $2.5x - 3y = 12$ is in standard form. When you are given the equation of a line in standard form, it is often useful to write an equivalent equation in $y = mx + b$ form to find the line's slope and *y*-intercept.

statistical questions
Questions that anticipate variability in the answers. For example, " *How tall are you?"* is **not** a statistical question because you would not give various answers. But "*How tall are the students in your class?*" is a statistical question because you would get various answers from the

students in your class.

stem-and-leaf plot

A frequency distribution that arranges data so that all digits except the last digit in each piece of data are in the stem, the last digit of each piece of data are the leaves, and both stems and leaves are arranged in order from least to greatest. The example below displays the data: 49, 52, 54, 58, 61, 61, 67, 68, 72, 73, 73, 73, 78, 82, 83, 108, 112, and 117.

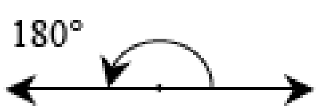


stoplight icon

The icon (shown at right) will appear periodically throughout the text. Problems that display this icon contain errors of some type.

straight angle

An angle that measures 180º. This occurs when the rays of the angle point in opposite directions, forming a line.



straightedge

A tool used as a guide to draw lines, rays, and segments.

strength (of an association)

A description of how much scatter there is in the data away from the line or curve of best fit.

subproblems

A problem solving strategy which breaks a problem into smaller parts which must be solved in order to solve the original, more complex problem.

substitution

Replacing one symbol with a number, a variable, or another algebraic expression of the same value. Substitution does not change the value of the overall expression. For example, suppose that the expression $13x - 6$ must be evaluated for $x = 4$. Since x has the value 4, 4 may be substituted into the expression wherever x appears, giving the equivalent expression $13(4) - 6$.

subtraction

An operation that gives the difference between two numbers.

sum

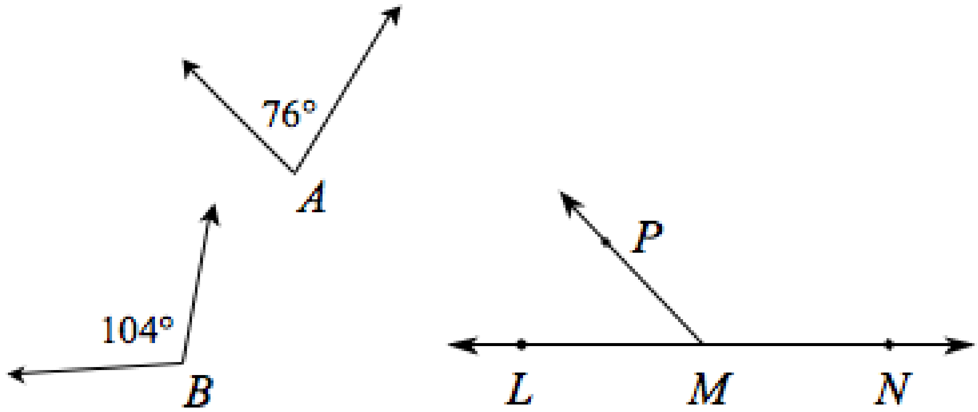
The result of adding two or more numbers. For example, the sum of 4 and 5 is 9.

Super Giant One

A Giant One in which either or both the numerator and denominator are fractions.

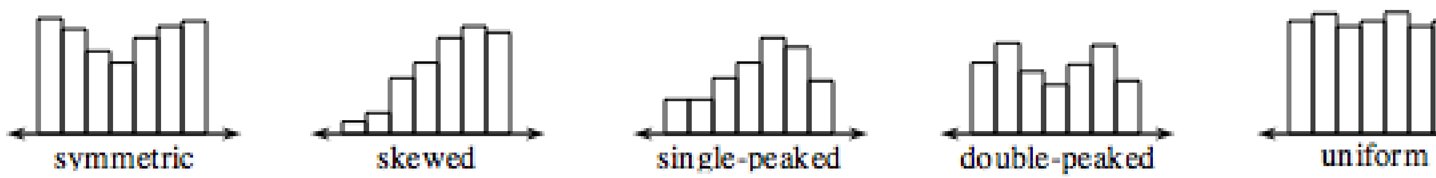
supplementary angles

Two angles A and B for which $A + B = 180°$. Each angle is called the supplement of the other. In the example below, angles A and $B$are supplementary. Supplementary angles are often adjacent. For example, since $\measuredangle LMN$ is a straight angle, then $\measuredangle LMP$ and $\measuredangle PMN$ are supplementary angles because $m\measuredangle LMP + m\measuredangle PMN = 180°$.



surface area
The sum of all the area(s) of the surface(s) of a three-dimensional solid. For example, the surface area of a prism is the sum of the areas of its top and bottom bases, and its vertical surfaces (lateral faces).

symmetric
Symmetric refers to one of the shapes of a data display. Statisticians use the following words to describe the overall shape of a data distribution: symmetric, skewed, single-peaked, double-peaked, and uniform. Examples are shown below.



system of equations
A system of equations is a set of equations with the same variables. Solving a system of equations means finding one or more solutions that make each of the equations in the system true. A solution to a system of equations gives a point of intersection of the graphs of the equations in the system. There may be zero, one, or several solutions to a system of equations. For example, (1.5, −3) is a solution to the system of equations below; setting $x = 1.5$, $y = -3$ makes both of the equations true. Also, (1.5, −3) is a point of intersection of the graphs of these two equations.

$$y = 2x - 6$$
$$y = -2x$$

systematic list

A list created by following a system (organized process). When finding probabilities, a systematic list helps to find all outcomes of a sample space or event.

table

The tables used in this course represent numerical information by organizing it into columns and rows. The numbers may come from a graph, situation (pattern), or rule (equation). Many of the tables in this course are *x*-*y* tables like the one shown below.

IN (x)	–2	4	1	6	–5
OUT (y)	–6	–2	–3	2	–9

term

A term is a single number, variable, or the product of numbers and variables, such as –45, $1.2x$, and $3xy^2$.

terminating decimal

A terminating decimal is a decimal that has only a finite number of non-zero digits, such as 4.067. Terminating decimals are a particular kind of repeating decimal for which the repeating portion is zeros, so the example could be written 4.0670000000… but it is not necessary to write the zeros at the end.

theoretical probability

A calculated probability based on the possible outcomes when each outcome has the same chance of occurring: (number of successful outcomes)/(total number of possible outcomes).

third quartile

The median of the upper half of an ordered set of data.

three-dimensional

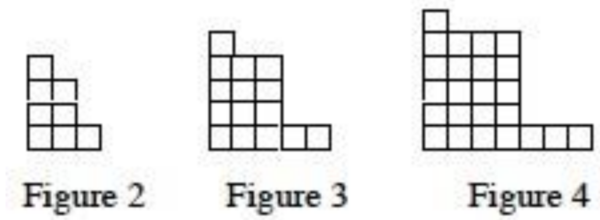
An object that has height, width, and depth.

tick mark

A symbol that shows that a number line has been divided into intervals of equal length. See ***number line***.

tile pattern

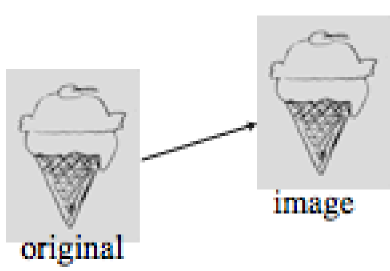
A pattern is a set of things in order that change in a regular way. For example, the numbers 1, 4, 7, 10, … form a pattern, because each number increases by 3. The numbers 1, 4, 9, 16, … form a pattern, because they are squares of consecutive integers. (p. 96) In this course, we often look at tile patterns, whose figure numbers and areas we represent with a table, a rule (equation), or a graph.



time
a. 60 seconds = 1 minute
b. 60 minutes = 1 hour
c. 24 hours = 1 day
d. 7 days = 1 week
e. 365 days ≈ 1 year
f. 52 weeks ≈ 1 year

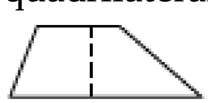
transformation
This course studies four transformations: reflection, rotation, translation, and dilation. All of them preserve shape, and the first three preserve size. *See each term for its own definition.*

translation
A transformation that preserves the size, shape, and orientation of a figure while sliding (moving) it to a new location. The result is called the "image" of the original figure. Note that a translation is sometimes referred to as a "slide."



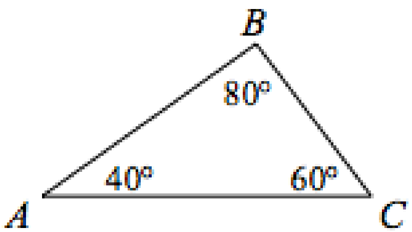
transversal
A line that intersects two or more other lines on a flat surface (plane). In this course, you often work with a transversal that intersects two parallel lines.

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

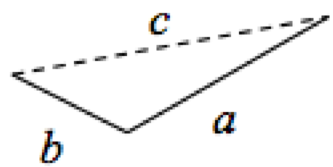


triangle
A polygon with three sides.
Triangle Angle Sum Theorem
The sum of the measures of the interior angles in any triangle is 180°.

For example, in ΔABC at right, $m\angle A + m\angle B + m\angle C = 180°$.



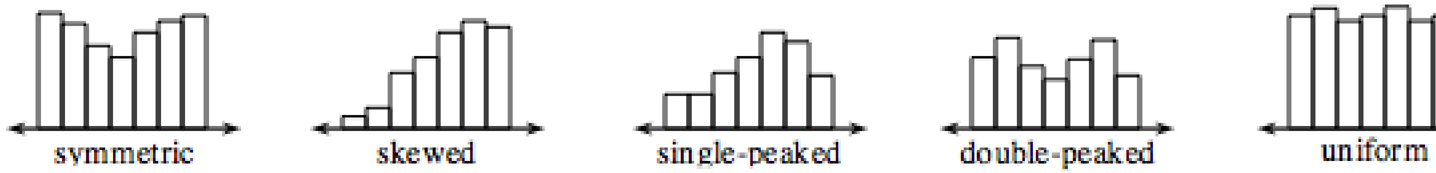
triangle inequality
In a trianlge with side lengths *a*, *b*, and *c*, *c* must be less than the sum of *a* and *b* and greater than the difference of *a* and *b*. In the example below, *a* is greater than *b* (that is, $a > b$), so the possible values for *c* are all numbers such that $c > a - b$ and $c < a + b$.



turn
See ***rotation***.
two-dimensional
An object having length and width.
undefined slope
The slope of a vertical line is undefined.
undoing
In this course, "undoing" refers to a method of solving one-variable equations. In "undoing," we undo the last operation that was applied to an expression by applying its inverse operation. We then solve the resulting equation using various solution methods, including perhaps undoing again. For example, in the equation $4(x + 2) = 36$, the last operation that was applied to the left-hand side was a *multiplication* by 4. So to use "undoing," we *divide* both sides of the equation by 4, giving us $x + 2 = 9$. We then solve the equation $x + 2 = 9$ (perhaps by "undoing" again and subtracting 2 from both sides) to find that $x = 7$.

uniform

Uniform refers to one of the shapes of a data display. Statisticians use the following words to describe the overall shape of a data distribution: symmetric, skewed, single-peaked, double-peaked, and uniform. Examples are shown below.



unit of measure

A standard quantity (such as a centimeter, second, square foot, or gallon) that is used to measure and describe an object. A single object may be measured using different units of measure. For example, a pencil may be 80 mm long, meaning that the pencil is 80 times as long as a unit of 1 mm. However, the same pencil is 8 cm long, so that the pencil is the same length as 8 cm laid end-to-end. This is because 1 cm is the same length as 10 mm.

unit rate

A rate with a denominator of one when simplified.

units digit

The numeral in the ones place.

variability

(data display) A measure of the amount of spread in a data set. Three ways to measure spread are the range, the mean absolute deviation, and the interquartile range.

variable

A symbol used to represent one or more numbers. In this course, letters of the English alphabet are used as variables. For example, in the expression $3x - (8.6xy + z)$, the variables are x, y, and z.

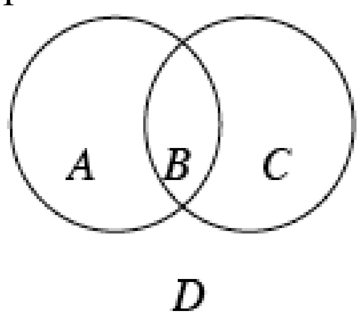
variable expression

An expression is a combination of individual terms separated by plus or minus signs.

Numerical expressions combine numbers and operation symbols; algebraic (variable) expressions include variables.   For example, $4 + (5 - 3)$ is a numerical expression. Algebraic (variable) expressions include variables. If each of the following terms, $6xy^2$, 24, and $\frac{y-3}{4+x}$, are combined, the result may be $6xy^2 + 24 - \frac{y-3}{4+x}$. An expression does not have an "equals" sign.

Venn diagram

A type of diagram used to classify objects that is usually composed of two or more overlapping circles representing different condition. An item is placed or represented in the Venn diagram in the appropriate position based on the conditions that the item meets. In the example of the Venn diagram below, if an object meets one of two conditions, then the object is placed in region *A* or *C* but outside region *B*. If an object meets both conditions, then the object is placed in the intersection (*B*) of both circles. If an object does not meet either condition, then the object is placed outside of both circles (region *D*).

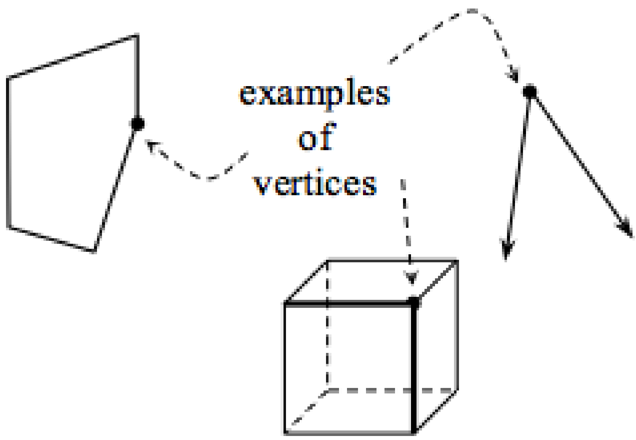


vertex

(plural: vertices)

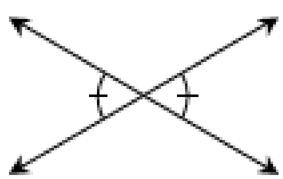
(1) For a two-dimensional geometric shape, a vertex is a point where two or more line segments or rays meet to form a "corner," such as in a polygon or angle.

(2) For a three-dimensional polyhedron, a vertex is a point where the edges of the solid meet.

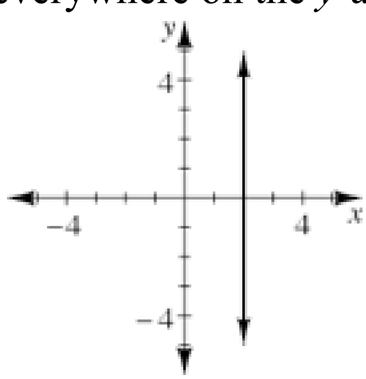


vertical
At right angles to the horizon. In a coordinate grid, the *y*-axis runs vertically.

vertical angles
The two opposite (that is, non-adjacent) angles formed by two intersecting lines. "Vertical" is a relationship between pairs of angles, so one angle cannot be called vertical. Angles that form a vertical pair are always congruent.



vertical lines
Vertical lines run up and down in the same direction as the *y*-axis and are parallel to it. All vertical lines have equations of the form $x = a$, where a can be any number. For example, the graph below shows the vertical line $x = 2$. The y-axis has the equation $x = 0$ because $x = 0$ everywhere on the *y*-axis. Vertical lines have undefined slope.



volume

A measurement of the size of the three-dimensional region enclosed within an object. Volume is expressed as the number of 1x1x1 unit cubes (or parts of cubes) that fit inside a solid.

voluntary response sample

A subgroup of the population that chose to respond to a survey. A voluntary response sample is not a random sample.

whole numbers

The natural numbers and zero.

x -> y table

An $x \rightarrow y$ table, like the one below, represents pairs of values of two related quantities. The input value (x) appears first, and the output value (y) appears second. For example, the $x \rightarrow y$ table below tells us that the input value 10 is paired with the output value 18 for some rule.

IN (x)	OUT (y)
0	−2
−4	−10
10	18

x-axis

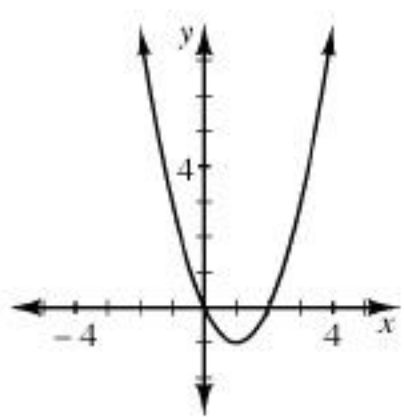
The horizontal number line on a coordinate grid. See ***axis***.

x-coordinate

In an ordered pair, (x, y), that represents a point in the coordinate plane, x is the value of the x-coordinate of the point. That is, the horizontal distance from the y-axis that is needed to plot the point.

x-intercept

The point(s) where a graph intersects the x-axis. A graph may have several x-intercepts, no x-intercepts, or just one. You sometimes report the x-intercepts of a graph with coordinate pairs, but since the y-coordinate is always zero, you often just give the x-coordinates of x-intercepts. For example, you might say that the x-intercepts of the graph below are (0, 0) and (2, 0), or you might just say that the x-intercepts are 0 and 2.



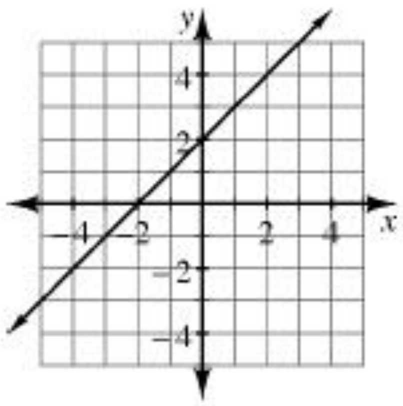
xy table
An $x \rightarrow y$ table, like the one below, represents pairs of values of two related quantities. The input value (x) appears first, and the output value (y) appears second. For example, the $x \rightarrow y$ table below tells us that the input value 10 is paired with the output value 18 for some rule.

IN (x)	OUT (y)
0	–2
– 4	–10
10	18

y = mx + b
When two quantities x and y have a linear relationship, that relationship can be represented with an equation in $y = mx + b$ form. The constant m is the slope, and $b$is the y-intercept of the graph. For example, the graph below shows the line represented by the equation $y = 2x + 3$, which has a slope of 2 and a y-intercept of 3. This form of a linear equation is also called the slope-intercept form.
y-axis
The vertical number line on a coordinate graph. See ***axis***.
y-coordinate
In an ordered pair, (x, y) , that represents a point in the coordinate plane, y is the value of the y- coordinate of the point. That is, the vertical distance from the x-axis that is needed to plot the point.

y-intercept
The point(s) where a graph intersects the y-axis. A function has at most one y-intercept; a relation may have several. The y-intercept of a graph is important because it often represents the starting value of a quantity in

a real-world situation. For example, on the graph of a tile pattern the *y*-intercept represents the number of tiles in Figure 0. We sometimes report the *y*-intercept of a graph with a coordinate pair, but since the *x*-coordinate is always zero, we often just give the *y*-coordinate of the *y*-intercept. For example, we might say that the *y*-intercept of the graph below is (0, 2), or we might just say that the *y*-intercept is 2. When a linear equation is written in $y = mx + b$ form, b tells us the *y*-intercept of the graph. For example, the equation of the graph below is $y = x + 2$ and its *y*-intercept is 2.



zero

A number often used to represent "having none of a quantity." Zero is neither negative nor positive. Zero is the additive identity.

zero pair

Two quantities whose sum is zero. A number and its opposite make a zero pair because their sum is 0.