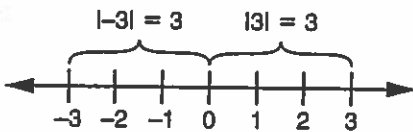


Home Connection Handbook

Glossary for Grades 4–6

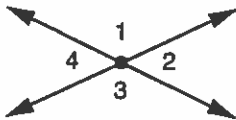
absolute value The distance between a number and 0 on the number line. The absolute value of a positive number is the number itself. The absolute value of a negative number is the *opposite* of the number. For example, the absolute value of 3 is 3, and the absolute value of -6 is 6. The absolute value of 0 is 0. The notation for the absolute value of a number n is $|n|$.



account balance An amount of money that you have or that you owe.

addend One of two or more numbers that are added. For example, in $5 + 3 + 1$, the addends are 5, 3, and 1.

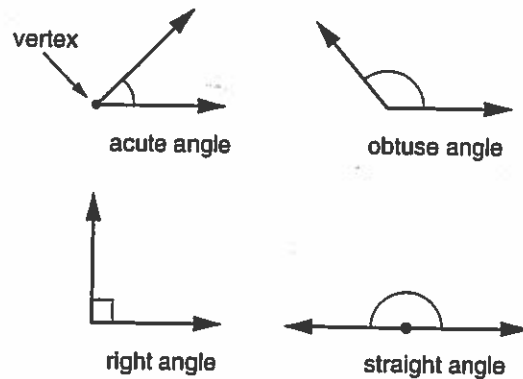
adjacent angles Angles that are next to each other; adjacent angles have a common side but no other overlap. In the diagram, Angles 1 and 2 are adjacent angles. So are Angles 2 and 3, Angles 3 and 4, and Angles 4 and 1.



algebraic expression An expression that contains a variable. For example, if Maria is 2 inches taller than Joe and if the variable M represents Maria's height, then the algebraic expression $M - 2$ represents Joe's height. See also *expression*.

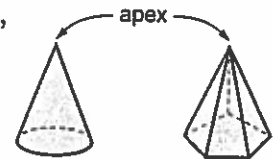
algorithm A set of step-by-step instructions for doing something, such as carrying out a computation or solving a problem.

angle A figure that is formed by two rays or two line segments with a common endpoint. The common endpoint is called the *vertex* of the angle. An *acute angle* has a measure greater than 0° and less than 90° . An *obtuse angle* has a measure greater than 90° and less than 180° . A *right angle* measures 90° . A *straight angle* measures 180° . See also *endpoint*, *ray*, and *vertex*. A *reflex angle* has a measure greater than 180° and less than 360° .



angle of separation A measure of how far fingers can be spread apart.

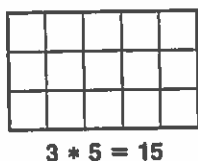
apex In a pyramid or a cone, the vertex opposite the base.



arc Part of a circle, from one point on the circle to another. For example, a *semicircle* is an arc whose endpoints are the endpoints of a diameter of the circle.

area The amount of surface inside a closed boundary. Area is measured in square units, such as square inches or square centimeters.

area model A model for multiplication problems in which the length and width of a rectangle represent the factors and the area of the rectangle represents the product. Also, a model for showing fractions as parts of circles, rectangles, or other geometric figures.



array An arrangement of objects in a regular pattern, usually rows and columns. Arrays can be used to model multiplication. For example, the array below is a model for $3 * 5 = 15$.



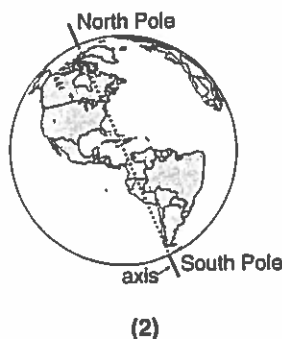
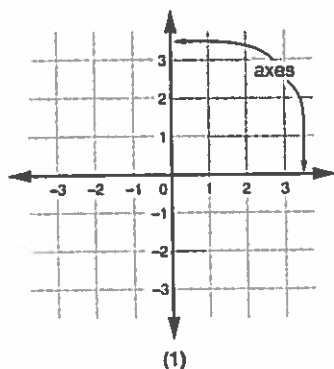
associative property A property of addition and multiplication (but not of subtraction or division) that says when you add or multiply three numbers, it doesn't matter which two are added or multiplied first. For example:

$$(4 + 3) + 7 = 4 + (3 + 7) \text{ and}$$

$$(5 * 8) * 9 = 5 * (8 * 9).$$

average A typical value for a set of numbers. The word *average* usually refers to the *mean* of a set of numbers, but there are other averages. See also *mean*, *median*, and *mode*.

axis (1) Either of the two number lines that intersect to form a *coordinate grid*. (2) A line about which a solid figure rotates.

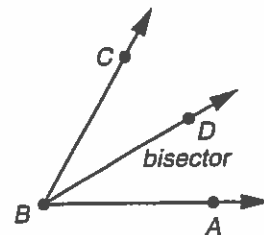


base (in exponential notation) The number that is raised to some power. For example, in 5^3 , the base is 5. See also *exponential notation*.

base-ten The feature of our number system that results in each place having a value 10 times the place to its right. See also *place value*.

billion 1,000,000,000, or 10^9 .

bisect To divide a segment, an angle, or a figure into two equal parts.



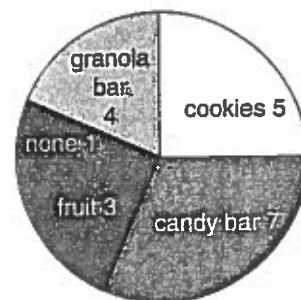
Ray BD bisects Angle ABC .

cell In a spreadsheet, a box formed where a column and a row intersect. A column is a section of cells lined up vertically. A row is a section of cells lined up horizontally.

centimeter (cm) In the metric system, a unit of length equivalent to $\frac{1}{100}$ of a meter; 10 millimeters; $\frac{1}{10}$ of a decimeter.

circle The set of all points in a plane that are a given distance from a given point in the plane. The given point is the *center* of the circle, and the given distance is the *radius*.

circle graph A graph in which a circle and its interior are divided into parts to show the parts of a set of data. The whole circle represents the whole set of data. Same as *pie graph*.



circumference The distance around a circle or a sphere; the perimeter of a circle.

column-addition method A method for adding numbers in which the addends' digits are first added in each place-value column separately and then 10-for-1 trades are made until each column has only one digit. Lines are drawn to separate the place-value columns.

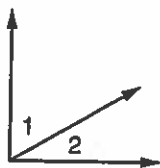
column-division method A division procedure in which vertical lines are drawn between the digits of the dividend. The lines make the procedure easier to carry out.

common denominator Any number, except zero, that is a multiple of the denominators of two or more fractions. For example, the fractions $\frac{1}{2}$ and $\frac{2}{3}$ have the common denominators 6, 12, 18, and so on. See also *denominator*.

common factor Any number that is a factor of two or more numbers. For example, 4 is a common factor of 8 and 12.

commutative property A property of addition and multiplication (but not of subtraction or division) that says that changing the order of the numbers being added or multiplied doesn't change the answer. For example: $5 + 10 = 10 + 5$ and $3 * 8 = 8 * 3$.

complementary angles Two angles whose measures total 90° .



Angles 1 and 2 are complementary angles.

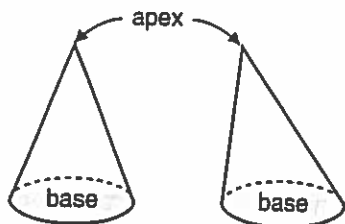
composite number A whole number that has more than two factors. For example, 4 is a composite number because it has three factors: 1, 2, and 4.

concave polygon A polygon in which at least one vertex is "pushed in." Not every line segment with endpoints on a concave polygon is entirely inside the polygon. Same as *nonconvex polygon*.



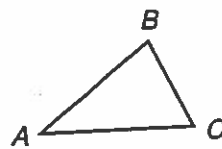
concentric circles Circles that have the same center but radii of different lengths.

cone A 3-dimensional shape that has a circular *base*, a curved surface, and one vertex, which is called the *apex*. The points on the curved surface of a cone are on straight lines connecting the apex and the circumference of the base.



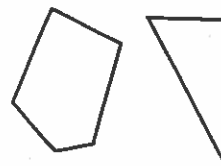
congruent Having exactly the same shape and size.

consecutive angles Two angles in a polygon that share a common side.

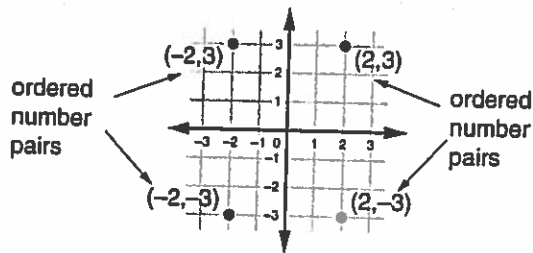


Angles A and B, B and C, and C and A are pairs of consecutive angles.

convex polygon A polygon in which all vertices are "pushed outward." Any line segment with endpoints on a convex polygon lies entirely inside the polygon.

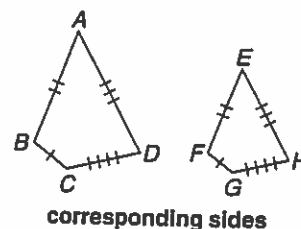


coordinate grid A device for locating points in a plane using *ordered numbered pairs*, or coordinates. A *rectangular coordinate grid* is formed by two number lines that intersect at right angles at their zero points. See also *ordered number pair*.



rectangular coordinate grid

corresponding Having the same relative position in *similar* or *congruent figures*. In the diagram, pairs of corresponding sides are marked with the same number of slash marks.



corresponding sides

cross multiplication The process of finding the cross products of two fractions. Cross multiplication can be used in solving proportions.

$$\frac{3}{4} = \frac{z}{20}$$

$$4 * z = 4z$$

$$3 * 20 = 60$$

cube A polyhedron with 6 square faces. A cube has 8 vertices and 12 edges.

cubic centimeter A metric unit of volume equal to the volume of a cube that is 1 cm on each side. 1 cubic centimeter is equal to 1 milliliter.

cubic unit A unit used in measuring volume, such as cubic centimeters or cubic feet.

cylinder A 3-dimensional shape that has two circular or elliptical bases that are parallel and congruent and are connected by a curved surface. The points on the curved surface of a cylinder are on straight lines connecting corresponding points on the bases. A can is shaped like a cylinder.

decennial Occurring or being done every 10 years.

decimal A number that contains a decimal point, such as 2.54. See also *standard notation*.

decimal point A dot used to separate the ones and tenths places in decimal numbers.

decimeter (dm) In the metric system, a unit of length equivalent to $\frac{1}{10}$ of a meter; 10 centimeters.

deficient number A number whose proper factors add up to less than the number itself. For example, 10 is a deficient number because the sum of its proper factors is $1 + 2 + 5 = 8$, and 8 is less than 10. See also *proper factor* and *perfect number*.

degree (°) A unit of measure for angles based on dividing a circle into 360 equal parts. Also, a unit of measure for temperature. A small raised circle (°) is used to show degrees.

denominator The number below the line in a fraction. In a fraction where a whole is divided into equal parts, the denominator represents the number of equal parts into which the whole (the ONE or unit) is divided. In the fraction $\frac{a}{b}$, b is the denominator.

density A rate that compares the *mass* of an object with its *volume*. For example, suppose a ball has a mass of 20 grams and a volume of 10 cubic centimeters. To find its density, divide its mass by its volume: $20 \text{ g}/10 \text{ cm}^3 = 2 \text{ g/cm}^3$, or 2 grams per cubic centimeter.

diameter A line segment that passes through the center of a circle or sphere and has endpoints on the circle or sphere; also, the length of this line segment. The diameter of a circle or sphere is twice the length of its radius.

difference The result of subtracting one number from another.

digit One of the number symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.

distributive property A property that relates multiplication and addition or subtraction. This property gets its name because it “distributes” a factor over terms inside parentheses.

Distributive property of multiplication over addition:

$$a * (b + c) = (a * b) + (a * c), \text{ so}$$

$$2 * (5 + 3) = (2 * 5) + (2 * 3) = 10 + 6 = 16$$

Distributive property of multiplication over subtraction:

$$a * (b - c) = (a * b) - (a * c)$$

$$2 * (5 - 3) = (2 * 5) - (2 * 3) = 10 - 6 = 4$$

dividend The number in division that is being divided. For example, in $35 \div 5 = 7$, the dividend is 35.

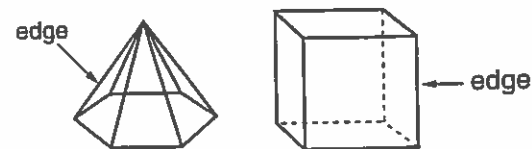
divisibility test A test to find out whether a whole number is *divisible by* another whole number without actually doing the division. A divisibility test for 5, for example, is to check the last digit: if the last digit is 0 or 5, then the number is divisible by 5.

divisible by One whole number is divisible by another whole number if there is no remainder when you divide. For example, 28 is divisible by 7 because 28 divided by 7 is 4 with a remainder of 0.

Division of Fractions Property The principle that says that division by a fraction is equivalent to multiplication by that fraction’s *reciprocal*. For example, since the *reciprocal* of $\frac{1}{2}$ is 2, the division problem $4 \div \frac{1}{2}$ is equivalent to the multiplication problem $4 * 2$.

divisor In division, the number that divides another number. For example, in $35 \div 5 = 7$, the divisor is 5.

edge A line segment where two faces of a polyhedron meet.



endpoint A point at the end of a line segment or ray. A line segment is normally named using the letter labels of its endpoints. See *line segment* and *ray*.

equation A number sentence that contains an equal sign. For example, $15 = 10 + 5$ is an equation.

equilateral triangle A triangle with all three sides equal in length and all three angles having the same measure.

equivalent Equal in value but possibly in a different form. For example, $\frac{1}{2}$, 0.5, and 50% are all equivalent.

equivalent equations Equations that have the same solution. For example, $2 + x = 4$ and $6 + x = 8$ are equivalent equations because the solution to both is $x = 2$.

equivalent fractions Fractions that have different denominators but name the same amount. For example, $\frac{1}{2}$ and $\frac{4}{8}$ are equivalent fractions.

equivalent rates Rates that make the same comparison. For example, the rates $\frac{60 \text{ miles}}{1 \text{ hour}}$ and $\frac{1 \text{ mile}}{1 \text{ minute}}$ are equivalent.

equivalent ratios Ratios that make the same comparison. Equivalent ratios can be expressed by *equivalent fractions*. For example, the ratios 12 to 20, 6 to 10, and 3 to 5 are equivalent ratios because $\frac{12}{20} = \frac{6}{10} = \frac{3}{5}$.

exponent A small raised number in *exponential notation* that tells how many times the base is to be multiplied by itself. For example, in 5^3 , the exponent is 3. See also *base* and *exponential notation*.

exponential notation A way to show repeated multiplication by the same factor. For example, 2^3 is exponential notation for $2 * 2 * 2$. The small raised 3 is the exponent. It tells how many times the number 2, called the base, is used as a factor.

expression A group of mathematical symbols that represents a number—or can represent a number if values are assigned to any variables in the expression.

extended multiplication fact A multiplication fact involving multiples of 10, 100, and so on. In an extended multiplication fact, each factor has only one digit that is not 0. For example, $6 * 70$, $60 * 7$, and $60 * 70$ are extended multiplication facts.

face A flat surface on a 3-dimensional shape.

fact family A set of related addition and subtraction facts or related multiplication and division facts. For example, $5 + 6 = 11$, $6 + 5 = 11$, $11 - 5 = 6$, and $11 - 6 = 5$ are a fact family. $5 * 7 = 35$, $7 * 5 = 35$, $35 \div 5 = 7$, and $35 \div 7 = 5$ are another fact family.

factor One of two or more numbers that are multiplied to give a product. The numbers that are multiplied are called *factors* of the product. For example, 4 and 3 are factors of 12 because $4 * 3 = 12$. As a verb, *to factor* means to find two (or more) smaller numbers whose product equals a given number. 15, for example, can be factored as $5 * 3$.

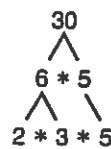
factor pair Two whole-number factors of a number whose product is the number. A number may have more than one factor pair. For example, the factor pairs for 18 are 1 and 18, 2 and 9, and 3 and 6.

factor rainbow A way to show factor pairs in a list of all the factors of a number. A factor rainbow can be used to check whether a list of factors is correct.



factor string A number written as a product of at least two whole-number factors. For example, a factor string for the number 24 is $2 * 3 * 4$. This factor string has three factors, so its length is 3. The number 1 is never part of a factor string.

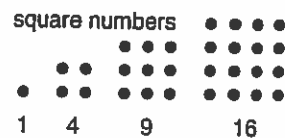
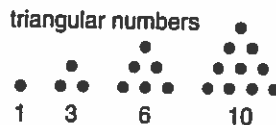
factor tree A way to get the *prime factorization* of a number. The original number is written as a product of factors; then each of these factors is written as a product



of factors, and so on, until the factors are all prime numbers. A factor tree looks like an upside down tree, with the root (the original number) at the top and the leaves (the factors) beneath it. See *prime factorization*.

factorial A product of a whole number and all the smaller whole numbers except 0. An exclamation point, !, is used to write factorials. For example, "three factorial" is written as $3!$ and is equal to $3 * 2 * 1 = 6$. $10! = 10 * 9 * 8 * 7 * 6 * 5 * 4 * 3 * 2 * 1 = 3,628,800$.

figurate numbers Numbers that can be shown by specific geometric patterns. Square numbers and triangular numbers are examples of figurate numbers.



flip See *reflection*.

formula A general rule for finding the value of something. A formula is often written using letters, called variables, that stand for the quantities involved. For example, the formula for the area of a rectangle may be written as $A = l * w$, where A represents the area of the rectangle, l represents its length, and w represents its width.

fraction stick A diagram used in *Everyday Mathematics* to represent simple fractions.



fulcrum A point on a mobile at which a rod is suspended. In general, the point or place around which a lever pivots.

general pattern A model or plan by which elements can be arranged so that what comes next can be predicted.

geometric solid A 3-dimensional shape, such as a prism, pyramid, cylinder, cone, or sphere. Despite its name, a geometric solid is hollow; it does not contain the points in its interior.

Golden Rectangle A rectangle in which the ratio of the length of the longer side to the length of the shorter side is the Golden Ratio, or about 1.618 to 1. A 5-inch by 3-inch index card is nearly a Golden Rectangle.

greatest common factor The largest factor that two or more numbers have in common. For example, the common factors of 24 and 36 are 1, 2, 3, 4, 6, and 12; the greatest common factor of 24 and 36 is 12.

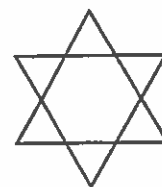
grouping symbols Symbols such as parentheses (), brackets [], and braces { } that tell the order in which operations in an expression are to be done. For example, in the expression $(3 + 4) * 5$, you should do the operation in the parentheses first. The expression then becomes $7 * 5 = 35$.

hemisphere Half of Earth's surface. Also, half of a sphere.

heptagon A polygon with seven sides.

hexagon A polygon with six sides.

hexagram A 6-pointed star formed by extending the sides of a regular hexagon.

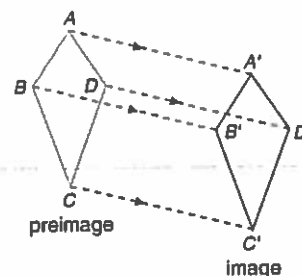


horizon Where the earth and sky appear to meet; if nothing is in the way, as when looking out to sea, the horizon looks like a line.

hundredths The place-value position in which a digit has a value equal to $\frac{1}{100}$ of itself; the second digit to the right of the decimal point.

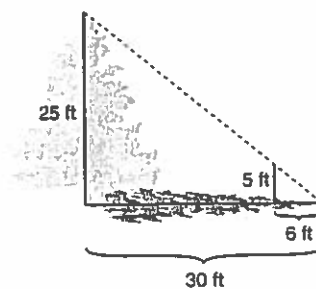
hypotenuse In a right triangle, the side opposite the right angle.

image The reflection of an object that you see when you look in a mirror. Also, a figure that is produced by a transformation (a reflection, translation, or rotation, for example) of another figure. See also *preimage*.



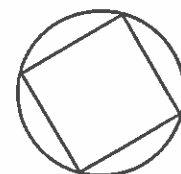
improper fraction A fraction whose numerator is greater than or equal to its denominator. For example, $\frac{4}{3}$, $\frac{5}{2}$, $\frac{4}{4}$, and $\frac{24}{12}$ are improper fractions. In *Everyday Mathematics*, improper fractions are sometimes called "top-heavy" fractions.

indirect measurement Methods for determining heights, distances, and other quantities that cannot be measured directly.



inequality A number sentence with $>$, $<$, \geq , \leq , or \neq . For example, the sentence $8 < 15$ is an inequality.

inscribed polygon A polygon whose vertices are all on the same circle.



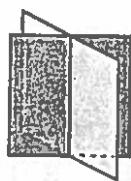
inscribed square

integer A number in the set {..., -4, -3, -2, -1, 0, 1, 2, 3, 4, ...}; a *whole number* or the *opposite* of a whole number.

intersecting Meeting or crossing one another. Lines, segments, rays, and planes can intersect.



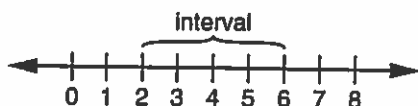
Intersecting lines



Intersecting planes

interval (1) The set of numbers between two numbers a and b , which may include a or b or both.

(2) A part of a line, including all points between two specific points.



irrational number A number that cannot be written as a fraction where both the numerator and denominator are *integers* and the denominator is not zero. For example, π is an irrational number.

isometry transformation A transformation such as a *translation* (slide), *reflection* (flip), or *rotation* (turn) that changes the position or orientation of a figure but does not change its size or shape.



slide



flip

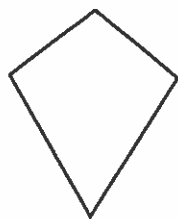


turn

isosceles triangle A triangle with at least two sides that are the same length. In an isosceles triangle, at least two angles have the same measure.



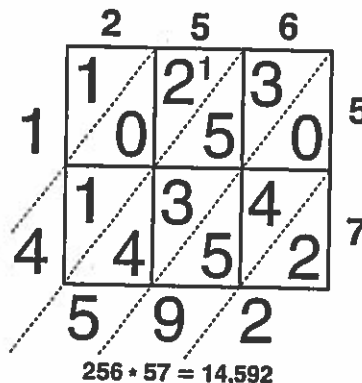
kite A quadrilateral with two pairs of adjacent equal sides. The four sides cannot all have the same length, so a rhombus is not a kite.



landmark A notable feature of a data set.

Landmarks include the *mean*, *median*, *mode*, *maximum*, *minimum*, and *range*.

lattice method A very old way to multiply multidigit numbers.



least common denominator The *least common multiple* of the denominators of every fraction in a given collection. For example, the least common denominator of $\frac{1}{2}$, $\frac{4}{5}$, and $\frac{3}{8}$ is 40. See also *least common multiple*.

least common multiple The smallest number that is a multiple of two or more numbers. For example, while some common multiples of 6 and 8 are 24, 48, and 72, the least common multiple of 6 and 8 is 24.

left-to-right subtraction A subtraction method in which you start at the left and subtract column by column.

leg of a right triangle A side of a right triangle that is not the *hypotenuse*. See also *hypotenuse*.

like terms In an *algebraic expression*, either the constant terms or any terms that contain the same variable(s) raised to the same power(s). For example, $4y$ and $7y$ are like terms in the expression $4y + 7y - z$.

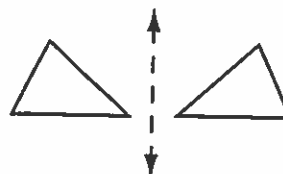
line A straight path that extends infinitely in opposite directions.



line PR

line graph A graph in which data points are connected by line segments.

line of reflection (mirror line) A line halfway between a figure (preimage) and its reflected image. In a reflection, a figure is "flipped over" the line of reflection. See also *reflection*.

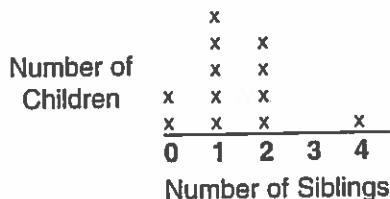


line of symmetry A line drawn through a figure that divides it into two parts that look exactly alike but are facing in opposite directions. See also *line symmetry*.



line of symmetry

line plot A sketch of data in which check marks, Xs, or other marks above a labeled line show the frequency of each value.



line segment A straight path joining two points. The two points are called the *endpoints* of the segment.



line segment AB

line symmetry A figure has line symmetry if a line can be drawn through it so that it is divided into two parts with both parts looking exactly alike but facing in opposite directions. See also *line of symmetry*.

lowest terms See *simplest form*.

magnitude estimate A very rough estimate. A magnitude estimate tells whether an answer should be in the tens, hundreds, thousands, millions, and so on.

mean The sum of a set of numbers divided by the number of numbers in the set. The mean is often referred to simply as the *average*.

median The middle value in a set of data when the data are listed in order from smallest to largest. If there is an even number of data points, the median is the *mean* of the two middle values.

meter (m) In the metric system, the fundamental unit of length from which other units of length are derived. One meter is the distance light will travel in a vacuum (empty space) in $\frac{1}{299,792,458}$ second.

metric system of measurement A measurement system based on the base-ten numeration system. It is used in most countries around the world.

millimeter (mm) In the metric system, a unit of length equivalent to $\frac{1}{1,000}$ of a meter; $\frac{1}{10}$ of a centimeter.

million 1,000,000, or 10^6 .

minuend The number that is reduced in subtraction. For example, in $19 - 5 = 14$, the minuend is 19.

mixed number A number that is written using both a whole number and a fraction. For example, $2\frac{1}{4}$ is a mixed number equal to $2 + \frac{1}{4}$.

mode The value or values that occur most often in a set of data.

multiple of a number n (1) A product of n and a counting number. The multiples of 7, for example, are 7, 14, 21, 28, ... (2) A product of n and an integer. The multiples of 7, for example, are ..., -21, -14, -7, 0, 7, 14, 21, ...

multiplication diagram A diagram used for problems in which there are several equal groups. The diagram has three parts: a number of groups, a number in each group, and a total number. Also called *multiplication/division diagram*.

multiplication property of -1 A property of multiplication that says that for any number a , $(-1) * a = (\text{op}) a$, or $-a$. For example, for $a = 5$: $5 * (-1) = (\text{op}) 5 = -5$. For $a = -3$: $-3 * (-1) = (\text{op}) -3 = -(-3) = 3$.

multiplicative inverses Two numbers whose product is 1. For example, the multiplicative inverse of 5 is $\frac{1}{5}$, and the multiplicative inverse of $\frac{3}{5}$ is $\frac{5}{3}$. Multiplicative inverses are also called *reciprocals* of each other.

name-collection box A diagram that is used for writing equivalent names for a number.

negative number A number that is less than zero; a number to the left of zero on a horizontal number line or below zero on a vertical number line.

nested parentheses Parentheses inside parentheses. For example, $((6 * 4) - 2) \div 2 = (24 - 2) \div 2 = 22 \div 2 = 11$

n -gon A polygon with n sides. For example, a 5-gon is a pentagon, and an 8-gon is an octagon.

n -to-1 ratio A ratio of a number to 1. Every ratio can be converted to an n -to-1 ratio. For example, convert the ratio of 3 girls to 2 boys to an n -to-1 ratio, divide 3 by 2. The n -to-1 ratio is 1.5 to 1.

nonconvex polygon See *concave polygon*.

number-and-word notation A way of writing a large number using a combination of numbers and words. For example, 27 billion is number-and-word notation for 27,000,000,000.

number sentence At least two numbers or expressions separated by a relation symbol ($=$, $>$, $<$, \geq , \leq , \neq). Most number sentences contain at least one operation symbol ($+$, $-$, \times , $*$, \cdot , \div , $/$). Number sentences may also have grouping symbols, such as parentheses.

numerator The number above the line in a fraction. In a fraction where a whole is divided into equal parts, the numerator represents the number of equal parts being considered. In the fraction $\frac{a}{b}$, a is the numerator.

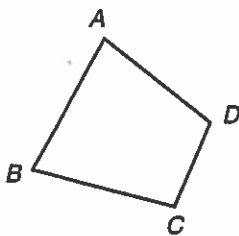
100% box The entire object, the entire collection of objects, or the entire quantity being considered.

ones The place-value position in which a digit has a value equal to the digit itself.

open sentence A *number sentence* in which one or more *variables* hold the places of missing numbers. An open sentence is neither true nor false. For example, $5 + x = 13$ is an open sentence. See also *number sentence* and *variable*.

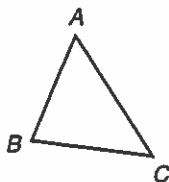
operation symbol A symbol used to stand for a particular mathematical operation. The most widely used operation symbols are $+$, $-$, \times , $*$, \cdot , \div , and $/$.

opposite angles (1) of a *quadrilateral*: Angles that do not share a common side.



Angles A and C and Angles B and D are pairs of opposite angles.

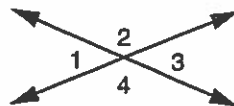
(2) of a *triangle*: An angle is opposite the side of a triangle that is not one of the sides of the angle.



Angle C is opposite side AB.

(3) of two lines that *intersect*: The angles that do not share a common

side are opposite angles. Opposite angles have equal measures. See also *vertical angles*.



Angles 2 and 4 and Angles 1 and 3 are pairs of opposite, or vertical, angles.

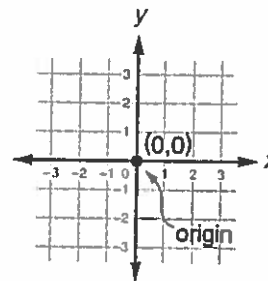
opposite of a number A number that is the same distance from 0 on the number line as a given number but on the opposite side of 0. For example, the opposite of $+3$ is -3 , and the opposite of -5 is $+5$.

order of operations Rules that tell in what order to perform operations in arithmetic and algebra.

1. Do the operations in parentheses first. (Use rules 2–4 inside the parentheses.)
2. Calculate all the expressions with exponents.
3. Multiply and divide in order from left to right.
4. Add and subtract in order from left to right.

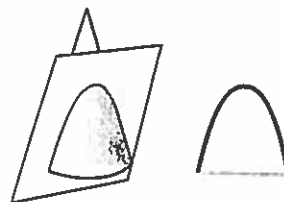
ordered number pair Two numbers that are used to locate a point on a *coordinate grid*. The first number gives the position along the horizontal axis, and the second number gives the position along the vertical axis. The numbers in an ordered pair are called coordinates. Ordered pairs are usually written inside parentheses: $(5,3)$. See also *coordinate grid*.

origin The 0 point on a number line or in a coordinate grid.

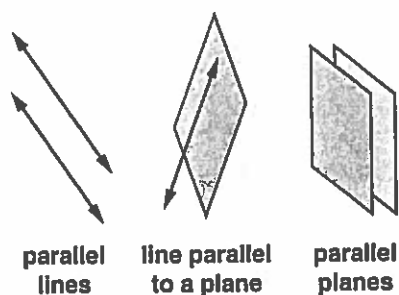


outcome A possible result of a random process. For example, heads and tails are the two possible outcomes of tossing a coin.

parabola The curve formed by the intersection of a right circular cone with a plane that is parallel to a line on the cone.



parallel Never meeting and always the same distance apart. Lines, line segments, rays, and planes are parallel if they never meet, no matter how far they are extended. The symbol \parallel means "is parallel to."



parallelogram A quadrilateral with two pairs of parallel sides. Opposite sides of a parallelogram are congruent.



parentheses Grouping symbols, $()$, used to tell which parts of an expression should be calculated first.

partial-differences method A way to subtract in which differences are computed for each place (one, tens, hundreds, and so on) separately. The partial differences are then added to give the final answer.

	932
	- 356
1. Subtract 100s: $900 - 300$.	600
2. Subtract 10s: $30 - 50$.	- 20
3. Subtract 1s: $2 - 6$.	- 4
4. Add the partial differences. ($600 - 20 - 4$, done mentally)	576

partial-products method A way to multiply in which the value of each digit in one factor is multiplied by the value of each digit in the other factor. The final product is the sum of the several partial products.

	67
	$\times 53$
50×60	3,000
50×7	350
3×60	180
3×7	+ 21
	3,551

partial-quotients method A way to divide in which the dividend is divided in a series of steps and the quotients for each step (called partial quotients) are added to give the final answer.

partial-sums method A way to add in which sums are computed for each place (ones, tens, hundreds, and so on) separately and are then added to give the final answer.

	268
	+ 483
1. Add 100s.	600
2. Add 10s.	140
3. Add 1s.	+ 11
4. Add the partial sums.	751

part-to-part ratio A ratio that compares a part of a whole to another part of the same whole. For example, the statement "There are 8 boys for every 12 girls" expresses a part-to-part ratio. See also *ratio* and *part-to-whole ratio*.

part-to-whole ratio A *ratio* that compares a part of a whole to the whole. For example, the statements "8 out of 20 students are boys" and "12 out of 20 students are girls" both express part-to-whole ratios. See also *ratio* and *part-to-part ratio*.

per-unit rate A *rate* with 1 in the denominator.

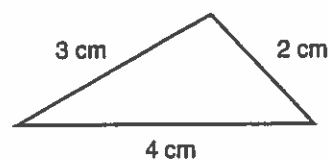
percent (%) Per hundred or out of a hundred. For example, "48% of the students in the school are boys" means that 48 out of every 100 students in the school are boys.

Percent Circle A tool on the *Geometry Template* that is used to measure and draw figures that involve percents (such as circle graphs).

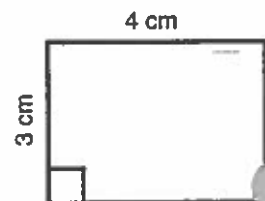
percent or fraction of a discount The percent or fraction that tells what part of the regular price you save.

perfect number A number whose *proper factors* add up to the number itself. For example, 6 is a perfect number because the sum of its proper factors is $1 + 2 + 3 = 6$. See also *proper factor* and *deficient number*.

perimeter The distance around a closed 2-dimensional shape. A formula for the perimeter of a rectangle is $P = 2 * (l + w)$, where l represents the length and w represents the width of the rectangle.



$$P = 4 \text{ cm} + 3 \text{ cm} + 2 \text{ cm} = 9 \text{ cm}$$



$$P = 2 * (4 \text{ cm} + 3 \text{ cm})$$

perpendicular Meeting at right angles. Lines, rays, line segments, and planes that meet at right angles are perpendicular. The symbol \perp means “is perpendicular to.”

personal measurement reference A convenient approximation for a standard unit of measurement. For example, many people have thumbs that are 1 inch wide.

perspective drawing A method of drawing that realistically represents a 3-dimensional object on a 2-dimensional surface.

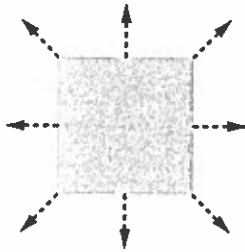
per-unit rate A *rate* with 1 in the denominator. Per-unit rates tell how many of one thing there are for one of another thing. For example, “2 dollars per gallon” is a per-gallon rate. “12 miles per hour” and “4 words per minute” are also examples of per-unit rates.

pi (π) The ratio of the *circumference* of a circle to its *diameter*. Pi is also the ratio of the area of a circle to the square of its radius. Pi is the same for every circle and is an irrational number that is approximately equal to 3.14.

pie graph See *circle graph*.

place value A system that values a digit according to its position in a number. In our number system, each place has a value that is ten times that of the place to its right and one-tenth the value of the place to its left. For example, in the number 456, the 4 is in the hundreds place and has a value of 400.

plane A flat surface that extends forever.



point symmetry The property of balance in a figure that can be rotated 180° about a point in such a way that the resulting figure (the *image*) exactly matches the original figure (the *preimage*). Point symmetry is *rotation symmetry* in which the turn is 180° . See also *rotation symmetry*.



rotational
symmetry

polygon A closed 2-dimensional figure that is made up of line segments joined end to end. The line segments of a polygon may not cross.

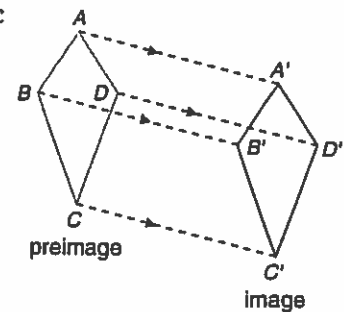
polyhedron A closed 3-dimensional figure whose surfaces, or faces, are all formed by polygons and their interiors.

power of 10 A whole number that can be written using only 10s as factors. For example, 100 is equal to 10×10 , or 10^2 . 100 can be called the second power of 10 or 10 to the second power. Negative powers of 10 are numbers that can be written using only $\frac{1}{10}$ as a factor.

precision A measure of how exactly a count or measurement was determined and how reliable or repeatable the result is; a measure of the uncertainty of a result. For example, if several people counted the same things or measured the same object, to what extent would their results agree? The precision of a measurement may be improved by using measuring instruments with smaller units.

predict To tell what will happen ahead of time; to make an educated guess about what might happen.

preimage A geometric figure that is somehow changed (by a *reflection*, *rotation*, or *translation*, for example) to produce another figure. See also *image*.



prime factorization A whole number expressed as a product of prime factors. Every composite number has a unique prime factorization. For example, the prime factorization of 24 is $2 \times 2 \times 2 \times 3$.

prime number A whole number that has exactly two *factors*: itself and 1. For example, 5 is a prime number because its only factors are 5 and 1.

prism A solid with two parallel *faces*, called *bases*, that are congruent polygons and its other *faces* that are all parallelograms. The points on the lateral faces of a prism are all on lines connecting corresponding points on the bases. Prisms get their names from the shape of their bases.



triangular
prism



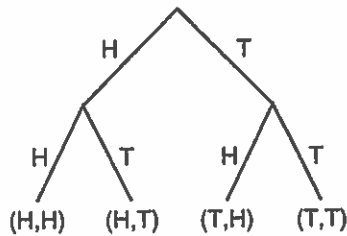
rectangular
prism



hexagonal
prism

probability A number from 0 to 1 that tells the chance that an event will happen. The closer a probability is to 1, the more likely the event is to happen.

probability tree diagram A drawing used to analyze the possible outcomes in a random situation. For example, the “leaves” of the probability tree diagram below represent the four equally likely outcomes when one coin is flipped two times.



product The result of multiplying two numbers called *factors*. For example, in $4 \times 3 = 12$, the product is 12.

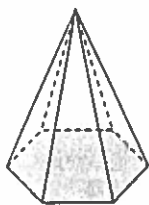
proper factor Any whole-number *factor* of a number except the number itself. For example, the *factors* of 10 are 1, 2, 5, and 10, but the *proper factors* of 10 are 1, 2, and 5.

proper fraction A fraction in which the numerator is less than the denominator; a proper fraction names a number that is less than 1. For example, $\frac{3}{4}$, $\frac{2}{5}$, and $\frac{12}{24}$ are proper fractions.

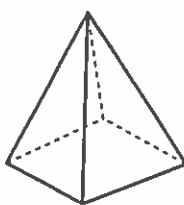
proportion A number model that states that two fractions are equal. Often the fractions in a proportion represent rates or ratios. For example, the problem *Alan’s speed is 12 miles per hour. At the same speed, how far can he travel in 3 hours?* can be modeled by the proportion $\frac{12 \text{ miles}}{1 \text{ hour}} = \frac{n \text{ miles}}{3 \text{ hours}}$.

protractor A tool for measuring and drawing angles. A half-circle protractor can be used to measure and draw angles up to 180° ; a full-circle protractor, to measure and draw angles up to 360° .

pyramid A solid in which one face, the *base*, is any polygon and all the other *faces* are triangles that come together at a point called the *vertex*, or *apex*. Pyramids get their names from the shape of their bases.



hexagonal pyramid



rectangular pyramid

Pythagorean theorem The following famous theorem: If the *legs* of a right triangle have lengths a and b and the hypotenuse has length c , then $a^2 + b^2 = c^2$.

quick common denominator The product of the denominators of two or more fractions. For example, the quick common denominator of $\frac{1}{4}$ and $\frac{3}{6}$ is 4×6 , or 24. As the name suggests, this is a quick way to get a *common denominator* for a collection of fractions, but it does not necessarily give the *least common denominator*.

quotient The result of dividing one number by another number. For example, in $35 \div 5 = 7$, the quotient is 7.

radius A line segment from the center of a circle (or sphere) to any point on the circle (or sphere); also, the length of such a line segment.

random number A number that has the same chance of appearing as any other number. Rolling a fair die will produce random numbers.

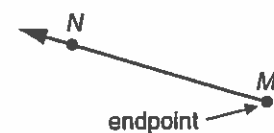
range The difference between the maximum and the minimum in a set of data.

rate A comparison by division of two quantities with unlike units. For example, a speed such as 55 miles per hour is a rate that compares distance with time. See also *ratio*.

ratio A comparison by division of two quantities with like units. Ratios can be expressed with fractions, decimals, percents, or words. Sometimes they are written with a colon between the two numbers that are being compared. For example, if a team wins 3 games out of 5 games played, the ratio of wins to total games can be written as $\frac{3}{5}$, 0.6, 60%, 3 to 5, or 3:5. See also *rate*.

rational number A number that can be written as a fraction using only whole numbers and their opposites.

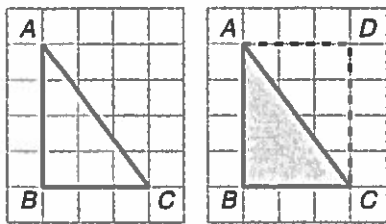
ray A straight path that extends infinitely from a point called its *endpoint*.



real number Any *rational* or *irrational* number.

reciprocal Same as *multiplicative inverse*.

rectangular method A method for finding area in which rectangles are drawn around a figure or parts of a figure. The rectangles form regions that are rectangles or triangular halves of rectangles. The area of the original figure can be found by adding or subtracting the areas of these regions.

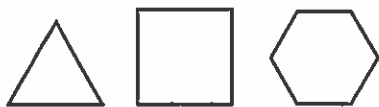


rectangular prism A *prism* with rectangular bases. See also *prism*.

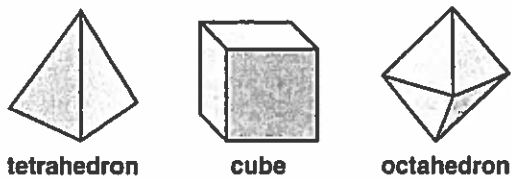
reflection The “flipping” of a figure over a line (the *line of reflection*) so that its image is the mirror image of the original. A reflection of a solid figure is a “flip” over a plane. Same as *flip*.



regular polygon A polygon whose sides are all the same length and whose angles are all equal.



regular polyhedron A polyhedron whose faces are formed by a single kind of congruent *regular polygon* and in which every vertex looks exactly the same as every other vertex. There are five regular polyhedrons:



tetrahedron

cube

octahedron



dodecahedron



icosahedron

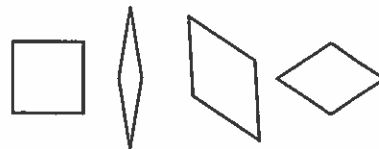
relation symbol A symbol used to express a relationship between two quantities.

- = for “is equal to” \neq for “is not equal to”
- > for “is greater than” < for “is less than”
- \geq for “is greater than or equal to”
- \leq for “is less than or equal to”

remainder An amount left over when one number is divided by another number. For example, if you divide 38 by 5, you get 7 equal groups with a remainder of 3. We may write $38 \div 5 \rightarrow 7 R3$, where R3 stands for the remainder.

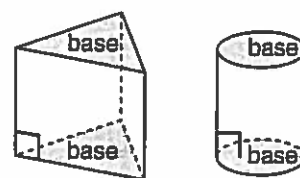
repeating decimal A *decimal* in which one digit or a group of digits is repeated without end. For example, 0.3333... and 0.147 are repeating decimals. See also *decimal* and *terminating decimal*.

rhombus A quadrilateral whose sides are all the same length.



right prism or cylinder

A prism or cylinder whose bases are perpendicular to its other faces or surfaces.



right pyramid or cone A pyramid or cone whose apex is directly above the center of its base.

right triangle A triangle that has a right angle.

rotation A movement of a figure around a fixed point, or axis; a “turn.”

rotation symmetry A figure has rotation symmetry if it can be rotated less than a full turn around a point or an axis so that the resulting figure (the *image*) exactly matches the original figure (the *preimage*).

round To adjust a number to make it easier to work with or to make it better reflect the level of precision of the data. Often numbers are rounded to the nearest multiple of 10, 100, 1,000, and so on. For example, 12,964 rounded to the nearest thousand is 13,000.

scale The *ratio* of a distance on a map, globe, drawing, or model to an actual distance.

scale drawing A drawing of an object or a region in which all parts are drawn to the same *scale*. Architects and builders often use scale drawings.

scale factor The *ratio* between the size of an object and the size of a drawing or model of that object (such as a *scale drawing* or a *scale model*).

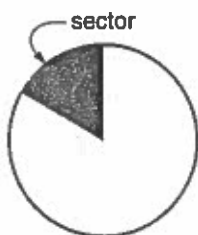
scale model A model of an object in which all parts are in the same proportions as in the actual object. For example, many model trains and airplanes are scale models of actual vehicles.

scalene triangle A triangle with sides of three different lengths. In a scalene triangle, all three angles have different measures.



scientific notation A system for writing numbers in which a number is written as the product of a *power of 10* and a number that is at least 1 and less than 10. Scientific notation allows you to write big and small numbers with only a few symbols. For example, 4×10^{12} is scientific notation for 4,000,000,000,000.

sector A region bounded by an arc and two radii of a circle. A sector resembles a slice of pizza. The word *wedge* is sometimes used instead of sector.



side One of the line segments that make up a polygon.

significant digits The *digits* in a number that convey useful and reliable information. A number with more significant digits is more *precise* than a number with fewer significant digits.

similar Exactly the same shape but not necessarily the same size.



similar figures

simpler form A fraction can be put in simpler form by dividing its numerator and denominator by a whole number that is greater than 1. For example, $\frac{18}{24}$ can be put in simpler form by dividing the numerator and denominator by 2. The result, $\frac{9}{12}$, is in simpler form than $\frac{18}{24}$.

simplest form A fraction less than 1 is in simplest form if there is no number other than 1 that divides its numerator and denominator evenly. A *mixed number* is in simplest form if its fractional part is in simplest form.

simplify (1) of a fraction: To express in *simpler form*. (2) of an equation or expression: To rewrite by removing parentheses and combining like terms and constants. For example, $7y + 4 + 5 + 3y$ can be simplified as $10y + 9$, and $2(a + 4) = 4a + 1 + 3$ can be simplified as $2a + 8 = 4a + 4$.

simulation A model of a real situation. For example, a fair coin can be used to simulate a series of games between two equally matched teams.

size-change factor A number that tells the amount of enlargement or reduction.

skew lines Lines in space that do not lie in the same plane. Skew lines do not *intersect* and are not *parallel*. For example, an east-west line on the floor and a north-south line on the ceiling are skew.

slanted prism or cylinder A prism or cylinder whose bases are not perpendicular to all of its other faces or surfaces.

slanted pyramid or cone A pyramid or cone whose apex is not directly above the center of its base.

slide See *translation*.

solution set The set of all solutions of an equation or inequality. For example, the solution set of $x^2 = 25$ is $\{5, -5\}$ since substitution of either 5 or -5 for x makes the sentence true.

special case (of a pattern) An instance when values replace the words or variables in a general pattern. For example, $6 + 6 = 12$ is a special case of the pattern $Y + Y = 2Y$.

speed A rate that compares a distance traveled with the time taken to travel that distance. For example, if you went 100 miles in 2 hours, your speed was $100 \text{ mi} / 2 \text{ hr}$, or 50 miles per hour.

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

square A rectangle with all sides equal.

square number A number that is the product of a whole number multiplied by itself. For example, 25 is a square number because $25 = 5 \times 5$. The square numbers are 1, 4, 9, 16, 25, and so on.

square of a number The product of a number multiplied by itself. For example, 81 is the square of 9 because $81 = 9 \times 9$.

square root of a number The square root of a number n is a number that, when multiplied by itself, gives the number n . For example, 4 is the square root of 16 because $4 \times 4 = 16$.

square unit A unit used in measuring area, such as square centimeters or square feet.

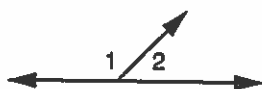
standard notation The most familiar way of representing whole numbers, integers, and decimals. In standard notation, the value of each digit depends on where the digit is. For example, standard notation for three hundred fifty-six is 356. See also *place value*.

stem-and-leaf plot A display of data in which digits with larger *place values* are “stems” and digits with smaller *place values* are “leaves.”

subtrahend In subtraction, the number that is being taken away from another number. For example, in $19 - 5 = 14$, the subtrahend is 5.

sum The result of adding two or more numbers. For example, in $5 + 3 = 8$, the sum is 8.

supplementary angles Two angles whose measures total 180° .



Angles 1 and 2 are supplementary angles.

surface (1) The outside boundary of an object; the part of an object that is next to the air. Common surfaces include the top of a body of water, the outermost part of a ball, and the topmost layer of ground that covers Earth. (2) Any 2-dimensional layer, such as a plane or the faces of a polyhedron.

surface area A measure of the surface of a 3-dimensional figure.

symmetric Having the same size and shape on either side of a line or looking the same when turned by some amount less than 360° . See also *line symmetry*, *point symmetry*, and *rotation symmetry*.

tens The place-value position in which a digit has a value equal to ten times itself.

tenths The place-value position in which a digit has a value equal to $\frac{1}{10}$ of itself; the first digit to the right of the decimal point.

term In an *algebraic expression*, a number or a product of a number and one or more variables. For example, in the expression $5y + 3k - 8$, the terms are $5y$, $3k$, and 8.

terminating decimal A decimal that ends. For example, 0.5 and 0.125 are terminating decimals. See also *decimal* and *repeating decimal*.

tessellation An arrangement of shapes that covers surface completely without overlaps or gaps. Also called a *tiling*.

test number A number used to replace a variable when solving an equation using the *trial-and-error method*. Test numbers are useful for “closing in” on an exact solution. See also *trial-and-error method*.

tetrahedron A triangular pyramid.

theorem A mathematical statement that can be proved to be true. Or sometimes a statement that is proposed and needs to be proved.

thousandths The place-value position in which a digit has a value equal to $\frac{1}{1,000}$ of itself; the third digit to the right of the decimal point.

3-dimensional (3-D) Solid objects that take up volume. 3-dimensional objects have length, width, and thickness.

time graph A graph that is constructed from a story that takes place over time. A time graph shows what has happened through a progression of time.

topologically equivalent In *topology*, a term for shapes that can be transformed into each other by a topological transformation. See also *topology*.

topology The study of the properties of shapes that are unchanged by shrinking, stretching, twisting, bending, and similar transformations. (Tearing, breaking, and sticking together, however, are not allowed.)

trade-first subtraction A subtraction method in which all trades are done before any subtractions are carried out.

transformation Something done to a geometric figure that produces a new figure. The most common transformations are *translations* (slides), *reflections* (flips), and *rotations* (turns). See also *isometry transformation*.

translation A movement of a figure along a straight line; a “slide.”



transversal A line that intersects two or more other lines.

trapezoid A quadrilateral that has exactly one pair of parallel sides.

trial-and-error method A method for finding the solution of an equation by trying several *test numbers*. See also *test number*.

triangular prism A prism whose bases are triangles.

triangular pyramid

A pyramid in which all faces are triangles, any one of which can be called the base; also called a *tetrahedron*. If all of the faces are equilateral triangles, the pyramid is a regular tetrahedron.



truncate (1) To replace all of the digits to the right of a particular place with 0s. For example, 3,654 can be truncated to 3,650 or 3,600 or 3,000. Truncation is similar to rounding but is easier and always makes the number smaller (unless all the truncated digits are 0s). (2) To cut off a vertex of a solid figure.

turn See *rotation*.

turn-around facts A pair of multiplication (or addition) facts in which the order of the factors (or addends) is reversed. For example, $3 \times 9 = 27$ and $9 \times 3 = 27$ are turn-around multiplication facts, and $4 + 5 = 9$ and $5 + 4 = 9$ are turn-around addition facts. There are no turn-around facts for subtraction or division.

turn-around rule A rule for solving addition and multiplication problems based on the *commutative property*. For example, if you know that $6 \times 8 = 48$, then, by the turn-around rule, you also know that $8 \times 6 = 48$. See *commutative property*.

twin primes Two *prime numbers* that are separated by just one *composite number*. For example, 3 and 5 are twin primes; 11 and 13 are also twin primes.

2-dimensional (2-D) Having length and width but not thickness. 2-dimensional shapes have area but not volume. Circles and polygons are 2-dimensional.

unit A label used to put a number in context. In measuring length, for example, inches and centimeters are units. In "5 apples," the word *apples* is the unit. See also *whole*.

unit fraction A fraction whose numerator is 1. For example, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{8}$, and $\frac{1}{20}$ are unit fractions.

unit percent One percent (1%).

unit rate A *rate* with 1 in the numerator.

unlike denominators Denominators that are different, as in $\frac{1}{2}$ and $\frac{1}{3}$.

"unsquaring" a number Finding the *square root* of a number.

U.S. customary system of measurement

The measuring system most frequently used in the United States.

vanishing line A line connecting a point on a figure in a *perspective drawing* with the *vanishing point*. See also *perspective drawing* and *vanishing point*.

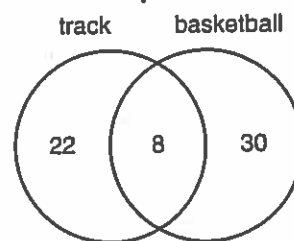
vanishing point In a *perspective drawing*, the point at which parallel lines moving away from the viewer seem to converge. It is located on the *horizon line*. See also *perspective drawing* and *vanishing line*.

variable A letter or other symbol that represents a number. A variable can represent one specific number, or it can stand for many different numbers.

variable term A *term* that contains at least one variable.

Venn diagram A picture that uses circles or rings to show relationships between sets.

Girls on Sports Teams

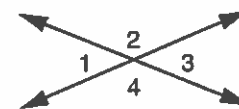


vertex The point where the rays of an angle, the sides of a polygon, or the edges of a polyhedron meet.

vertex point A point where corners of shapes in a *tessellation* meet. See also *tessellation*.

vertical Upright; perpendicular to the horizon.

vertical (or opposite) angles When two lines intersect, the angles that do not share a common side. Vertical angles have equal measures.



Angles 1 and 3 and Angles 2 and 4 are pairs of vertical angles.

volume The amount of space inside a 3-dimensional object. Volume is usually measured in cubic units, such as cubic centimeters or cubic inches. Sometimes volume is measured in units of capacity, such as gallons or liters.

whole (or ONE or unit) The entire object, collection of objects, or quantity being considered—the ONE, the unit, 100%.

whole number Any of the numbers 0, 1, 2, 3, 4, and so on.