# Glossary

This glossary contains words and phrases from *Fourth* through *Sixth Grade Everyday Mathematics.* To place the definitions in broader mathematical contexts, most entries also refer to sections in this *Teacher's Reference Manual.* In a definition, terms in italics are defined elsewhere in the glossary.

A

absolute value The distance between a number and 0 on a *number line*. The absolute value of a positive number is the number itself, and the absolute value of a negative number is the *opposite* of the number. The absolute value of 0 is 0. The symbol for the absolute value of n is $|n|$.
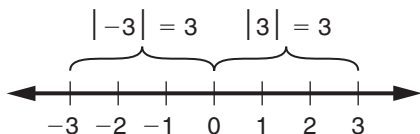
abundant number A *counting number* whose *proper factors* add to a number greater than itself. For example, 12 is an abundant number because $1 + 2 + 3 + 4 + 6 = 16$, and 16 is greater than 12. Compare to *deficient number* and *perfect number.* See Section 9.8.2: Perfect, Deficient, and Abundant Numbers.

account balance An amount of money that you have or that you owe. See "*in the black*" and "*in the red.*"

accurate As correct as possible according to an accepted standard. For example, an accurate measure or count is one with little or no error. See *precise* and Section 16.2: Approximation and Rounding.

acre A U.S. customary unit of *area* equal to 43,560 square feet. An acre is roughly the size of a football field. A square mile is 640 acres. See the Tables of Measures and Section 14.4: Area.

acute angle An *angle* with a measure less than 90°. See Section 13.4.1: Angles and Rotations.

Acute angles

acute triangle A *triangle* with three acute angles. See Section 13.4.2: Polygons (*n*-gons).

An acute triangle

addend Any one of a set of numbers that are added. For example, in $5 + 3 + 1$, the addends are 5, 3, and 1.

addition fact Two 1-digit numbers and their sum, such as $9 + 7 = 16$. See *arithmetic facts* and Section 16.3.3: Fact Practice.

addition/subtraction use class In *Everyday Mathematics,* situations in which addition or subtraction is used. These include *parts-and-total, change*, and *comparison* situations. See Section 10.3.1: Addition and Subtraction Use Classes.

additive inverses Two numbers whose sum is 0. Each number is called the additive inverse, or *opposite,* of the other. For example, 3 and -3 are additive inverses because $3 + (-3) = 0$.

address A letter-number pair used to locate a spreadsheet *cell.* For example, A5 is the fifth cell in column A.

address box A place where the address of a spreadsheet *cell* is shown when the cell is selected.

adjacent angles Two *angles* with a common *side* and *vertex* that do not otherwise overlap. See Section 13.6.3: Relations and Orientations of Angles.
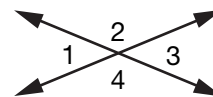
Angles 1 and 2, 2 and 3, 3 and 4, and 4 and 1 are pairs of adjacent angles.

adjacent sides Same as *consecutive sides.*

algebra (1) The use of letters of the alphabet to represent numbers in *equations, formulas,* and rules. (2) A set of rules and properties for a number system. (3) A school subject, usually first studied in eighth or ninth grade. See Section 17.2: Algebra and Uses of Variables.

$$4 + x = 10$$
$$4 + ? = 10$$
$$4 + \underline{\quad} = 10$$
$$4 + \boxed{} = 10$$

Area = length * width
$$A = l * w$$
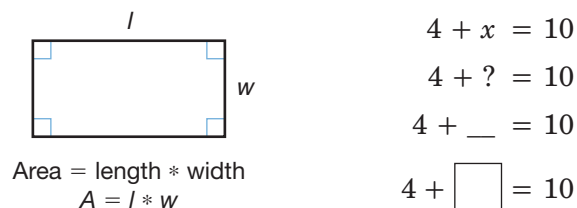
$$a + b = b + a$$
$$a(b + c) = ab + ac$$

Formulas, equations, and properties using algebra

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 *algebra* and Section 17.2: Algebra and Uses of Variables.

algebraic order of operations Same as *order of operations*.

algorithm A set of step-by-step instructions for doing something, such as carrying out a computation or solving a problem. The most common algorithms are those for basic arithmetic computation, but there are many others. Some mathematicians and many computer scientists spend a great deal of time trying to find more efficient algorithms for solving problems. See Chapter 11: Algorithms.

altitude (1) In *Everyday Mathematics,* same as *height* of a figure. (2) Distance above sea level. Same as *elevation*.

Altitudes of 2-D figures are shown in blue.
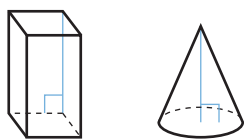

Altitudes of 3-D figures are shown in blue.

analog clock (1) A clock that shows the time by the positions of the hour and minute hands. (2) Any device that shows time passing in a continuous manner, such as a sundial. Compare to *digital clock*. See Section 15.2.1: Clocks.


An analog clock

-angle A suffix meaning *angle,* or corner.

angle A figure formed by two *rays* or two *line segments* with a common *endpoint* called the *vertex* of the angle. The rays or segments are called the *sides* of the angle. An angle is measured in degrees between 0 and 360. One side of an angle is the *rotation* image of the other side through a number of degrees. Angles are named after their vertex point alone as in $\angle A$ below; or by three points, one on each side and the vertex in the middle as in $\angle BCD$ below. See *acute angle, obtuse angle, reflex angle, right angle, straight angle,* and Section 13.4.1: Angles and Rotations.

Angles
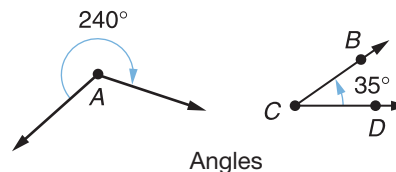
anthropometry The study of human body sizes and proportions.

apex In a *pyramid* or *cone,* the *vertex* opposite the *base.* In a pyramid, all the nonbase faces meet at the apex. See Section 13.5.2: Polyhedrons and Section 13.5.3: Solids with Curved Surfaces.


apex
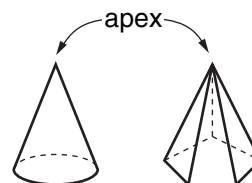
approximately equal to (≈) A symbol indicating an *estimate* or approximation to an exact value. For example, $\pi \approx 3.14$. See Section 16.2: Approximation and Rounding.

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arc of a circle A part of a *circle* between and including two *endpoints* on the circle. For example, the endpoints of the *diameter* of a circle define an arc called a *semicircle.* An arc is named by its endpoints.

Arcs

area The amount of *surface* inside a *2-dimensional figure.* The figure might be a triangle or rectangle in a plane, the curved surface of a cylinder, or a state or country on Earth's surface. Commonly, area is measured in *square units* such as square miles, square inches, or square centimeters. See Section 14.4: Area.
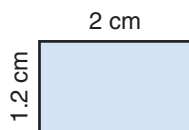
A rectangle with area
$1.2 \text{ cm} * 2 \text{ cm} = 2.4 \text{ cm}^2$
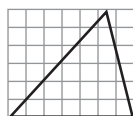
A triangle with area
21 square units

The area of the United States
is about 3,800,000 square miles.

area model (1) A model for multiplication in which the *length* and *width of a rectangle* represent the *factors,* and the *area* of the rectangle represents the *product.* See Section 10.3.2: Multiplication and Division Use Classes. (2) A model showing fractions as parts of a whole. The *whole* is a region, such as a circle or a rectangle, representing the *ONE,* or *unit whole.* See Section 9.3.2: Uses of Fractions.
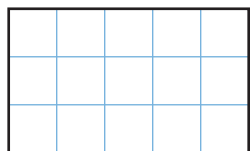
Area model for $3 * 5 = 15$
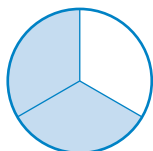
Area model for $\frac{2}{3}$

arithmetic facts The addition facts (whole-number *addends* 9 or less); their inverse subtraction facts; multiplication facts (whole-number *factors* 9 or less); and their inverse division facts, except there is no division by zero. There are:

100 addition facts: $0 + 0 = 0$ through $9 + 9 = 18$;
100 subtraction facts: $0 - 0 = 0$ through $18 - 9 = 9$;
100 multiplication facts: $0 * 0 = 0$ through $9 * 9 = 81$;
90 division facts: $0/1 = 0$ through $81/9 = 9$.

See *extended facts, fact extensions, fact power,* and Section 16.3.2: Basic Facts and Fact Power.

arm span Same as *fathom.*

array (1) An arrangement of objects in a regular *pattern,* usually rows and columns. (2) A *rectangular array.* In *Everyday Mathematics,* an array is a rectangular array unless specified otherwise. See Section 10.3.2: Multiplication and Division Use Classes and Section 14.4: Area.

Associative Property of Addition A property of addition that three numbers can be added in any order without changing the sum. For example, $(4 + 3) + 7 = 4 + (3 + 7)$ because $7 + 7 = 4 + 10.$

In symbols:
    For any numbers *a, b,* and *c,*
    $(a + b) + c = a + (b + c).$

Subtraction is not associative. For example, $(4 - 3) + 7 \neq 4 - (3 + 7)$ because $8 \neq -6.$

Associative Property of Multiplication A property of multiplication that three numbers can be multiplied in any order without changing the product. For example, $(4 * 3) * 7 = 4 * (3 * 7)$ because $12 * 7 = 4 * 21.$

In symbols:
    For any numbers *a, b,* and *c,*
    $(a * b) * c = a * (b * c).$

Division is not associative. For example, $(8/2)/4 \neq 8/(2/4)$ because $1 \neq 16.$

astronomical unit The *average* distance from Earth to the sun. Astronomical units measure distances in space. One astronomical unit is about 93 million miles or 150 million kilometers.

attribute A feature of an object or common feature of a set of objects. Examples of attributes include size, shape, color, and number of sides. Same as *property.*

autumnal equinox The first day of autumn, when the sun crosses the plane of Earth's equator and day and night are about 12 hours each. "Equinox" is from the Latin *aequi-* meaning "equal" and *nox* meaning "night." Compare to *vernal equinox.*

average A typical value for a set of numbers. In everyday life, average usually refers to the *mean* of the set, found by adding all the numbers and dividing by the number of numbers. In statistics, several different averages, or *landmarks,* are defined, including *mean, median,* and *mode.* See Section 12.2.4: Data Analysis.

axis of a coordinate grid
Either of the two *number lines* used to form a *coordinate grid.* Plural is axes. See Section 15.3: Coordinate Systems.
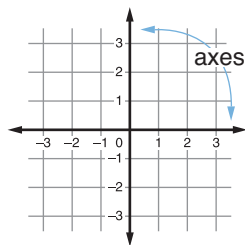
axis of rotation A line about which a solid figure rotates.
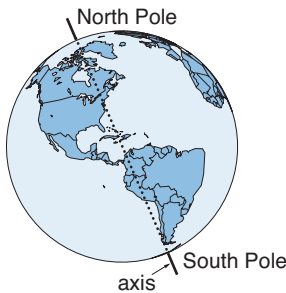

B

ballpark estimate A rough *estimate;* "in the ballpark." A ballpark estimate can serve as a check of the reasonableness of an answer obtained through some other procedure, or it can be made when an exact value is unnecessary or impossible to obtain. See Section 16.1: Estimation.

bank draft A written order for the exchange of money. For example, $1,000 bills are no longer printed so $1,000 bank drafts are issued. People can exchange $1,000 bank drafts for smaller bills, perhaps ten $100 bills.

bar graph A graph with horizontal or vertical bars that represent data. See Section 12.2.3: Organizing and Displaying Data.

Wasted Foods
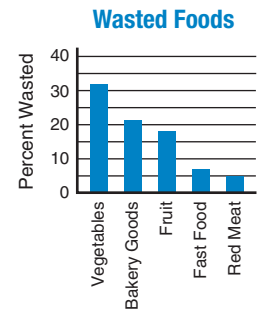
Source: The Garbage Product


Fat Content of Foods
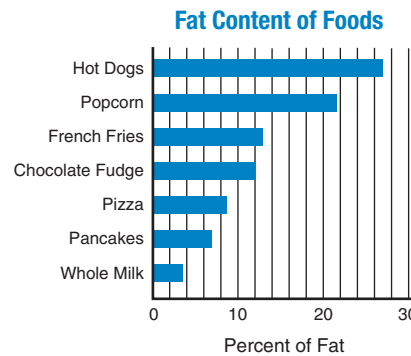
*Source:* The New York Public Library Desk Reference

base (in exponential notation) A number that is raised to a *power.* For example, the base in 5^3 is 5. See *exponential notation* and Section 10.1.2: Powers and Exponents.

base of a number system The foundation number for a *numeration system.* For example, our usual way of writing numbers uses a *base-ten place-value* system. In programming computers or other digital devices, bases of 2, 8, 16, or other powers of 2 are more common than base 10.
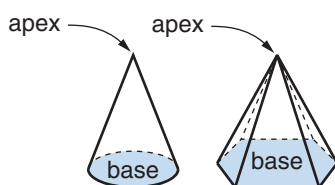
base of a parallelogram (1) The side of a *parallelogram* to which an *altitude* is drawn. (2) The length of this side. The area of a parallelogram is the base times the *altitude* or height perpendicular to it. See *height of a parallelogram* and Section 13.4.2: Polygons (*n*-gons).

Glossary
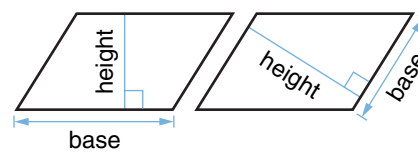
base of a prism or cylinder Either of the two parallel and congruent *faces* that define the shape of a *prism* or *cylinder.* In a cylinder, the base is a circle. See *height of a prism or cylinder,* Section 13.5.2: Polyhedrons, and Section 13.5.3: Solids with Curved Surfaces.
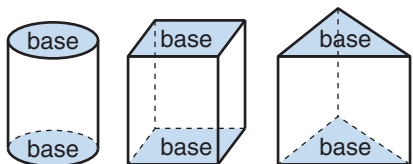

base of a pyramid or cone The *face* of a pyramid or cone that is opposite its *apex*. The base of a cone is a circle. See *height of a pyramid or cone,* Section 13.5.2: Polyhedrons, and Section 13.5.3: Solids with Curved Surfaces.

base of a rectangle (1) One of the sides of a *rectangle*. (2) The length of this side. The area of a rectangle is the base times the *altitude* or height. See *height of a rectangle* and Section 13.4.2: Polygons (*n*-gons).

base of a triangle (1) Any side of a *triangle* to which an *altitude* is drawn. (2) The length of this side. The area of a triangle is half the base times the altitude or height. See *height of a triangle* and Section 13.4.2: Polygons (*n*-gons).
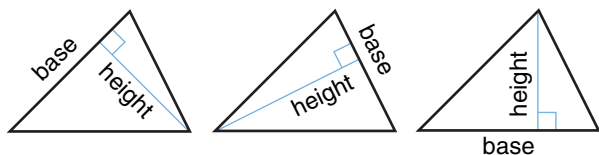
base ten Our system for writing numbers that uses only the 10 symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9, called *digits*. You can write any number using one or more of these 10 digits, and each digit has a value that depends on its place in the number (its *place value*). In the base-ten system, each place has a value 10 times that of the place to its right, and 1 tenth the value of the place to its left.

base-10 blocks A set of blocks to represent ones, tens, hundreds, and thousands in the *base-ten place-value* system. In *Everyday Mathematics,* the unit block, or *cube,* has 1-cm edges; the ten block, or *long,* is 10 unit blocks in length; the hundred block, or *flat,* is 10 longs in width; and the thousand block, or *big cube,* is 10 flats high. See *long, flat,* and *big cube* for photos of the blocks. See *base-10 shorthand* and Section 9.9.1: Base-10 Blocks.

base-10 shorthand In *Everyday Mathematics,* a written notation for *base-10 blocks*. See Section 9.9.1: Base-10 Blocks.

Base-10-Block Shorthand		
Name	**Block**	**Shorthand**
cube	⬓	▪
long		
flat		▢
big cube		

baseline A set of *data* used for comparison with subsequent data. Baseline data can be used to judge whether an experimental intervention is successful.

benchmark A count or measure that can be used to evaluate the reasonableness of other counts, measures, or estimates. A benchmark for land area is that a football field is about one acre. A benchmark for length is that the width of an adult's thumb is about one inch. See Section 14.1: Personal Measures.

biased sample A *sample* that does not fairly represent the total *population* from which it was selected. A sample is biased if every member of the population does not have the same chance of being selected for the sample. See *random sample* and Section 12.2.2: Collecting and Recording Data.

big cube In *Everyday Mathematics,* a *base-10 block* cube that measures 10-cm by 10-cm by 10-cm. A big cube consists of one thousand 1-cm cubes. See Section 9.9.1: Base-10 Blocks.
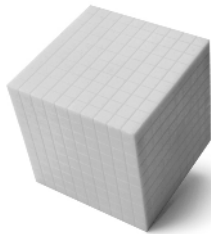
A big cube

billion By U.S. custom, 1 billion is 1,000,000,000 or 10^9. By British, French, and German custom, 1 billion is 1,000,000,000,000 or 10^{12}.

bisect To divide a segment, angle, or figure into two parts of equal measure. See *bisector.*
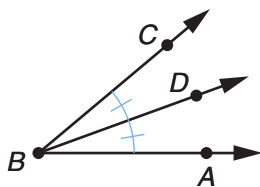
Ray *BD* bisects angle *ABC.*

bisector A *line, segment,* or *ray* that divides a segment, an angle, or a figure into two parts of equal measure. See *bisect.*

box-and-whiskers plot A plot displaying the spread, or distribution, of a data set using 5 *landmarks:* the *minimum, lower quartile, median, upper quartile,* and *maximum.* For example, the table above gives the landmarks for hair lengths, in inches, of a class of sixth graders. A box-and-whiskers plot using these landmarks is shown below. Also called a box plot. See Section 12.2.3: Organizing and Displaying Data.

Landmark	Hair length (inches)
Minimum	14
Lower quartile	16
Median	20
Upper quartile	25
Maximum	32
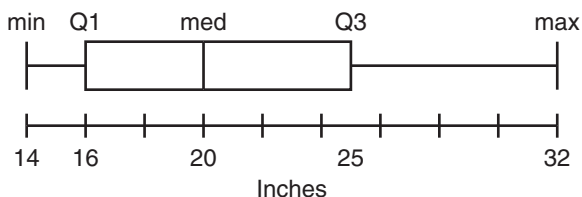
braces See *grouping symbols.*

brackets See *grouping symbols.*

broken-line graph Same as *line graph.*

C

calibrate (1) To divide or mark a measuring tool with gradations such as the degree marks on a thermometer. (2) To test and adjust the accuracy of a measuring tool.

calorie A unit for measuring the amount of energy a food will produce when it is digested by the body. One calorie is the amount of energy required to raise the temperature of 1 liter of water 1° Celsius. Technically, this is a "large calorie" or kilocalorie. A "small calorie" is 1 thousandth of the large calorie.

capacity (1) The amount of space occupied by a *3-dimensional figure.* Same as *volume.* (2) Less formally, the amount a container can hold. Capacity is often measured in units such as quarts, gallons, cups, or liters. See Section 14.5: Volume (Capacity). (3) The maximum weight a scale can measure. See Section 14.11.4: Scales and Balances.

cartographer A person who makes maps.

cell (1) In a *spreadsheet,* the box where a vertical *column* and a horizontal *row* intersect. The *address* of a cell is the column letter followed by the row number. For example, cell B3 in column B, row 3, is highlighted below. See Section 3.1.3: Spreadsheets. (2) The box where a column and row in a table intersect.

	A	B	C	D
1				
2				
3				
4				

Celsius A *temperature scale* on which pure water at sea level freezes at 0° and boils at 100°. The Celsius scale is used in the metric system. A less common name for this scale is centigrade because there are 100 units between the freezing and boiling points of water. Compare to *Fahrenheit.* See Section 15.1.1: Temperature Scales.

census An official count of population and the recording of other demographic data such as age, gender, income, and education.

cent A penny; $\frac{1}{100}$ of a dollar. From the Latin word *centesimus,* which means "a hundredth part." See Section 14.9: Money.

Glossary

center of a circle The point in the plane of a *circle* equally distant from all points on the circle. See Section 13.4.3: Circles and Pi (π).
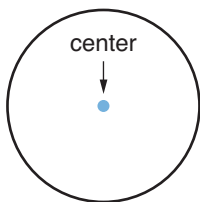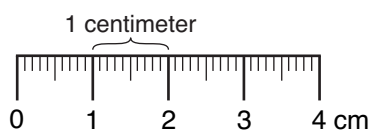

center of a sphere The point equally distant from all points on a *sphere.* See Section 13.5.3: Solids with Curved Surfaces.
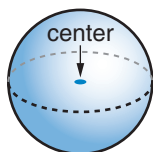

centi- A prefix meaning 1 hundredth.

centimeter (cm) A metric unit of *length* equivalent to 10 millimeters, $\frac{1}{10}$ of a decimeter, and $\frac{1}{100}$ of a meter. See the Tables of Measures and Section 14.2.2: Metric System.

chance The possibility that an *outcome* will occur in an uncertain *event*. For example, in flipping a coin there is an equal chance of getting HEADS or TAILS. See Section 12.1.2: The Language of Chance.

change diagram A diagram used in *Everyday Mathematics* to model situations in which quantities are either increased or decreased by addition or subtraction. The diagram includes a starting quantity, an ending quantity, and an amount of change. See *situation diagram* and Section 10.3.1: Addition and Subtraction Use Classes.
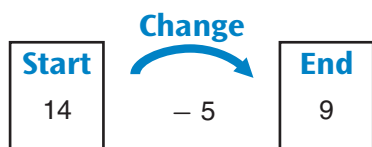

A change diagram for $14 - 5 = 9$

change-to-less story A *number story* about a change situation in which the ending quantity is less than the starting quantity. For example, a story about spending money is a change-to-less story. Compare to *change-to-more story*. See Section 10.3.1: Addition and Subtraction Use Classes.

change-to-more story A *number story* about a change situation in which the ending quantity is more than the starting quantity. For example, a story about earning money is a change-to-more story. Compare to *change-to-less story*. See Section 10.3.1: Addition and Subtraction Use Classes.

circle The set of all points in a *plane* that are equally distant from a fixed point in the plane called the *center* of the circle. The distance from the center to the circle is the *radius* of the circle. The *diameter* of a circle is twice its radius. Points inside a circle are not part of the circle. A circle together with its interior is called a *disk* or a circular region. See Section 13.4.3: Circles and Pi (π).

A disk
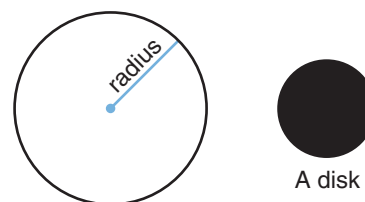
circle graph A graph in which a *circle* and its interior are divided into *sectors* corresponding to parts of a set of data. The whole circle represents the whole set of data. Same as *pie graph* and sometimes called a pie chart. See Section 12.2.3: Organizing and Displaying Data.
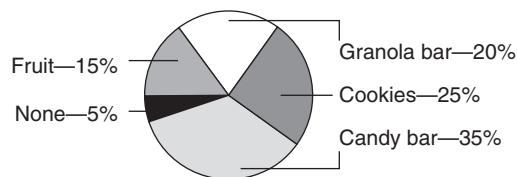
circumference The distance around a circle; its *perimeter*. The circumference of a sphere is the circumference of a circle on the sphere with the same center as the sphere. See Section 13.4.3: Circles and Pi (π) and Section 13.5.3: Solids with Curved Surfaces.
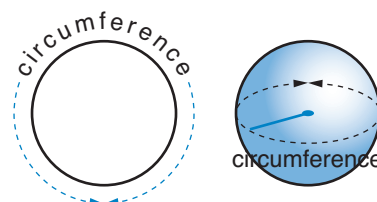
Class Data Pad In *Everyday Mathematics,* a large pad of paper used to store and recall data collected throughout the year. The data can be used for analysis, graphing, and generating number stories. See Section 5.2: Class Data Pad.

clockwise rotation The direction in which the hands move on a typical *analog clock;* a turn to the right.

coefficient The number, or *constant,* factor in a *variable term* in an expression. For example, in $3c + 8d$, 3 and 8 are coefficients. See Section 17.2.2: Reading and Writing Open Sentences.

column (1) A vertical arrangement of objects or numbers in an *array* or a table.

(2) A vertical section of *cells* in a spreadsheet.

column addition An addition *algorithm* 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 may be drawn to separate the place-value columns. See Section 11.2.1: Addition Algorithms.

column division A division *algorithm* in which vertical lines are drawn between the digits of the dividend. As needed, trades are made from one column into the next column at the right. The lines make the procedure easier to carry out. See Section 11.2.4: Division Algorithms.

combine like terms To rewrite the sum or difference of *like terms* as a single term. For example, $5a + 6a$ can be rewritten as $11a$, because $5a + 6a = (5 + 6)a = 11a$. Similarly, $16t - 3t = 13t$. See Section 17.2.3: Simplifying Expressions.

common denominator A nonzero number that is a multiple of the *denominators* of two or more fractions. For example, the fractions $\frac{1}{2}$ and $\frac{2}{3}$ have common denominators 6, 12, 18, and other multiples of 6. Fractions with the same denominator already have a common denominator. See Section 11.3.1: Common Denominators.

common factor A *factor* of each of two or more counting numbers. For example, 4 is a common factor of 8 and 12. See *factor of a counting number* and Section 9.8.1: Prime and Composite Numbers: Divisibility.

common fraction A *fraction* in which the *numerator* and the nonzero *denominator* are both *integers*.

Commutative Property of Addition A property of addition that two numbers can be added in either order without changing the sum. For example, $5 + 10 = 10 + 5$. In *Everyday Mathematics,* this is called a *turn-around fact,* and the two Commutative Properties are called *turn-around rules.*

In symbols:
    For any numbers a and b, $a + b = b + a$.

Subtraction is not commutative. For example, $8 - 5 \neq 5 - 8$ because $3 \neq -3$. See Section 16.3.3: Fact Practice.

Commutative Property of Multiplication A property of multiplication that two numbers can be multiplied in either order without changing the product. For example, $5 * 10 = 10 * 5$. In *Everyday Mathematics,* this is called a *turn-around fact,* and the two Commutative Properties are called *turn-around rules.*

In symbols:
    For any numbers a and b, $a * b = b * a$.

Division is not commutative. For example, $10/5 \neq 5/10$ because $2 \neq \frac{1}{2}$. See Section 16.3.3: Fact Practice.

comparison diagram A diagram used in *Everyday Mathematics* to model situations in which two quantities are compared by addition or subtraction. The diagram contains two quantities and their difference. See *situation diagram* and Section 10.3.1: Addition and Subtraction Use Classes.
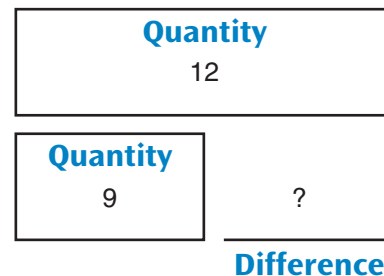
A comparison diagram for $12 = 9 + ?$

comparison story A *number story* about the difference between two quantities. Comparison situations can lead to either addition or subtraction depending on whether one of the compared quantities or the difference between them is unknown. See Section 10.3.1: Addition and Subtraction Use Classes.

Glossary

compass (1) A tool used to draw *circles* and *arcs* and copy *line segments.* Certain geometric figures can be drawn with *compass-and-straightedge construction.* See Section 13.13.1: Compass-and-Straightedge Constructions. (2) A tool used to determine geographic direction.
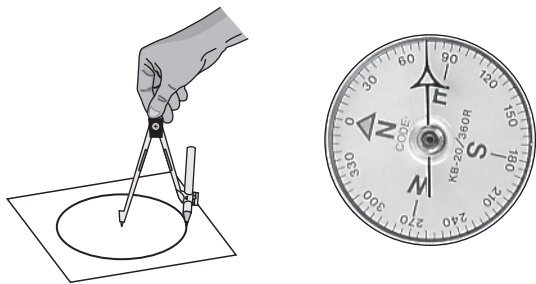

compass-and-straightedge construction A drawing of a geometric figure made using only a *compass* and a *straightedge* with no measurement allowed. See Section 13.13.1: Compass-and-Straightedge Constructions.

compass rose Same as *map direction symbol.*

complement of a number n (1) In *Everyday Mathematics,* the difference between *n* and the next higher multiple of 10. For example, the complement of 4 is $10 - 4 = 6$ and the complement of 73 is $80 - 73 = 7$. (2) The difference between *n* and the next higher power of 10. In this definition, the complement of 73 is $100 - 73 = 27$.

complementary angles Two *angles* whose measures add to 90°. Complementary angles do not need to be *adjacent*. Compare to *supplementary angles*. See Section 13.6.3: Relations and Orientations of Angles.
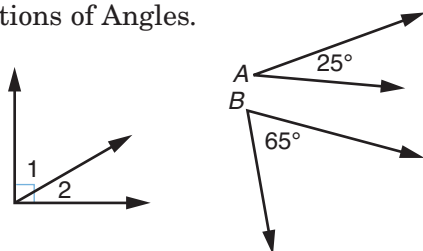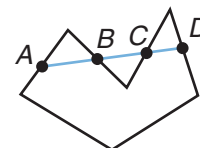

∠1 and ∠2; ∠A and ∠B
are pairs of complementary angles.

composite number A *counting number* greater than 1 that has more than two *factors*. For example, 10 is a composite number because it has four factors: 1, 2, 5, and 10. A composite number is *divisible by* at least three whole numbers. Compare to *prime number.* See Section 9.8.1: Prime and Composite Numbers: Divisibility.

compound unit A quotient or product of *units*. For example, miles per hour (mi/hr, mph), square centimeters (cm^2), and person-hours are compound units.

**concave polygon** A *polygon* on which there are at least two points that can be connected with a *line segment* that passes outside the polygon. For example, segment *AD* is outside the hexagon between *B* and *C.* Informally, at least one vertex appears to be "pushed inward." At least one interior angle has measure greater than 180°. Same as *nonconvex polygon.* Compare to *convex polygon.* See Section 13.4.2: Polygons (*n*-gons).

A concave polygon

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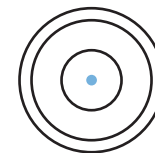

Concentric circles

cone A *geometric solid* with a circular *base,* a vertex *(apex)* not in the *plane* of the base, and all of the line segments with one endpoint at the apex and the other endpoint on the circumference of the base. See Section 13.5.3: Solids with Curved Surfaces.
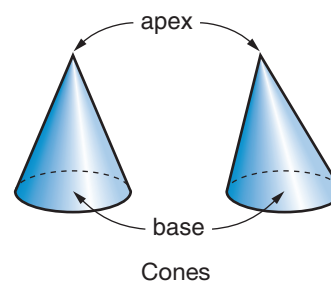
Cones

congruent figures (≅) Figures having the same size and shape. Two figures are congruent if they match exactly when one is placed on top of the other after a combination of slides, flips, and/or turns. In diagrams of congruent figures, the corresponding congruent sides may be marked with the same number of hash marks. The symbol ≅ means "is congruent to." See Section 13.6.2: Congruence and Similarity.
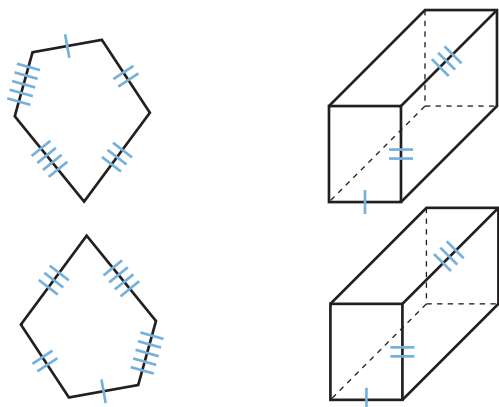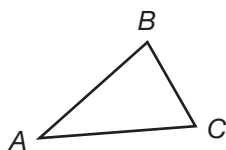

Congruent pentagons   Congruent prisms

consecutive Following one after another in an uninterrupted order. For example, A, B, C, and D are four consecutive letters of the alphabet; 6, 7, 8, 9, and 10 are five consecutive whole numbers.

consecutive angles Two *angles* in a *polygon* with a common side.

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

consecutive sides (1) Two *sides* of a *polygon* with a common *vertex*. (2) Two sides of a *polyhedron* with a common *edge*. Same as *adjacent sides*. See Section 13.6.4: Other Geometric Relations.
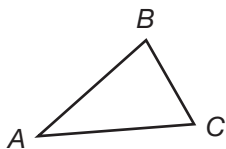

Sides *AB* and *BC*, *BC* and *CA*, and *CA* and *AB* are pairs of consecutive sides.

**consecutive vertices** The vertices of *consecutive angles* in a polygon.

constant A quantity that does not change. For example, the ratio of the circumference of a circle to its diameter is the famous constant π. In $x + 3 = y$, 3 is a constant. See Section 17.2.2: Reading and Writing Open Sentences.

continuous model of area A way of thinking about *area* as sweeping one dimension of a plane figure across the other dimension. For example, the paint roller below shows how the area of a rectangle can be modeled continuously by sweeping the shorter side across the longer side. See Section 14.4.1: Discrete and Continuous Models of Area.
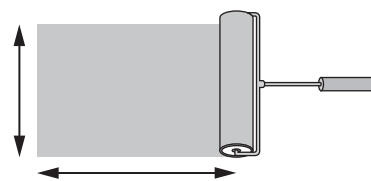
A continuous model of area

continuous model of volume A way of thinking about *volume* as sweeping a 2-dimensional cross section of a solid figure across the third dimension. For example, imagine filling the box below with water. The surface of the water would sweep up the height of the box. See Section 14.5.1: Discrete and Continuous Models of Volume.
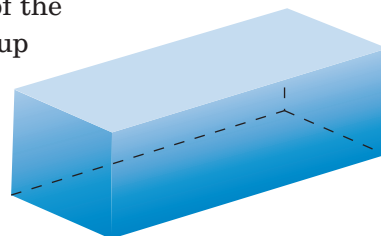
contour line A curve on a map through places where a measurement such as temperature, elevation, air pressure, or growing season is the same. Contour lines often separate regions that have been differently colored to show a range of conditions. See *contour map* and Section 15.4.3: Contour Maps.
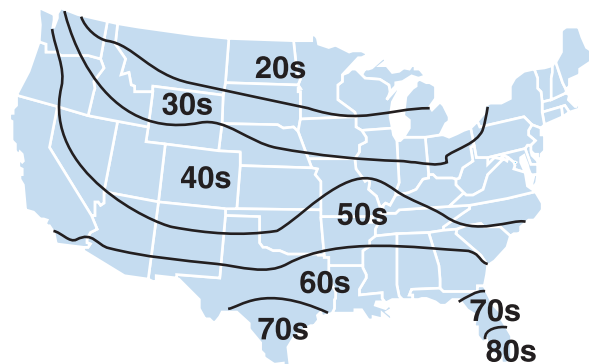
A temperature contour map

contour map A map that uses *contour lines* to indicate areas having a particular feature, such as elevation or temperature. See Section 15.4.3: Contour Maps.

conversion fact A fixed relationship such as 1 yard = 3 feet or 1 inch = 2.54 centimeters that can be used to convert measurements within or between systems of measurement. See Section 14.2.3: Converting between Measures.

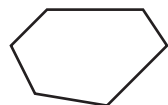**convex polygon** A *polygon* on which no two points can be connected with a *line segment* that passes outside the polygon. Informally, all vertices appear to be "pushed outward." Each angle in the polygon measures less than 180°. Compare to *concave polygon*. See Section 13.4.2: Polygons (*n*-gons).

A convex polygon

coordinate (1) A number used to locate a point on a *number line;* a point's distance from an *origin*. (2) One of the numbers in an *ordered pair* or triple that locates a point on a *coordinate grid* or in coordinate space, respectively. See Section 9.9.2: Number Grids, Scrolls, and Lines and Section 15.3: Coordinate Systems.

coordinate grid (rectangular coordinate grid) A *reference frame* for locating points in a plane by means of *ordered pairs* of numbers. A rectangular coordinate grid is formed by two number lines that intersect at *right angles* at their *zero points*. See Section 15.3.2: 2- and 3-Dimensional Coordinate Systems.
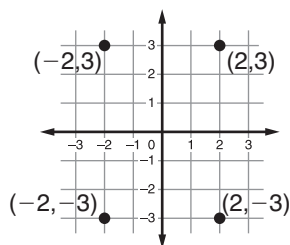
A coordinate grid

corner Same as *vertex*.

corresponding angles (1) *Angles* in the same relative position in *similar* or *congruent figures*. Pairs of corresponding angles are marked either by the same number of arcs or by the same number of hash marks per arc.
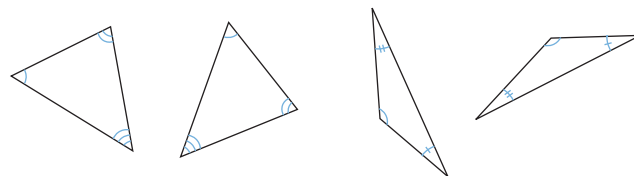
(2) Two angles in the same relative position when two lines are intersected by a *transversal*. In the diagram, ∠a and ∠e, ∠b and ∠f, ∠d and ∠h, and ∠c and ∠g are pairs of corresponding angles. If any two corresponding angles in a pair are congruent, then the two lines are parallel.
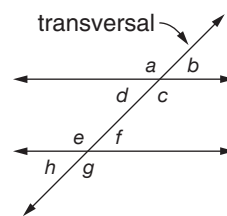
corresponding sides *Sides* in the same relative position in *similar* or *congruent figures*. Pairs of corresponding sides are marked with the same number of hash marks.
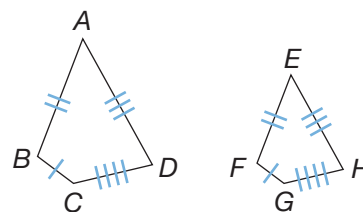
corresponding vertices Vertices in the same relative position in *similar* or *congruent figures*. Pairs of corresponding vertices can be identified by their *corresponding angles*. Sometimes corresponding vertices have the same letter name, but one has a "prime" symbol as in *A* and *A'*.
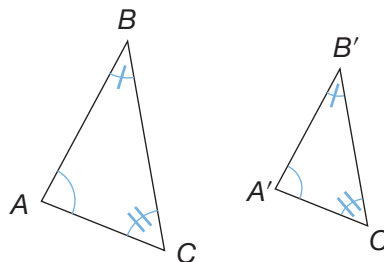
counterclockwise rotation Opposite the direction in which the hands move on a typical *analog clock;* a turn to the left.

counting numbers The numbers used to count things. The set of counting numbers is {1, 2, 3, 4, . . .}. Sometimes 0 is included, but not in *Everyday Mathematics.* Counting numbers are in the sets of *whole numbers, integers, rational numbers,* and *real numbers,* but each of these sets include numbers that are not counting numbers. See Section 9.2.1: Counting.

counting-up subtraction A subtraction *algorithm* in which a difference is found by counting or adding up from the smaller number to the larger number. For example, to calculate $87 - 49$, start at 49, add 30 to reach 79, and then add 8 more to reach 87. The difference is $30 + 8 = 38$. See Section 11.2.2: Subtraction Algorithms.

cover-up method An informal method for finding a *solution of an open sentence* by covering up a part of the sentence containing a *variable.*

credit An amount added to an account balance; a deposit.

cross multiplication The process of rewriting a *proportion* by calculating *cross products.* Cross multiplication can be used in solving open proportions. In the example below, the cross products are 60 and $4z$. See Section 17.2.4: Solving Open Sentences.

$$3 * 20 = 60 \qquad 4 * z = 4z$$
$$\frac{3}{4} = \frac{z}{20}$$

To solve:
$$\frac{3}{4} = \frac{z}{20}$$
$$3 * 20 = 4 * z$$
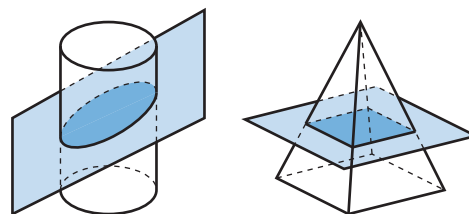$$60 = 4z$$
$$60/4 = 4z/4$$
$$15 = z$$

cross products The two *products* of the numerator of each fraction and the denominator of the other fraction in a *proportion.* The cross products of a proportion are equal. For example, in the proportion $\frac{2}{3} = \frac{6}{9}$, the cross products $2 * 9$ and $3 * 6$ are both 18.

$$2 * 9 = 18 \qquad 3 * 6 = 18$$
$$\frac{2}{3} = \frac{6}{9}$$

cross section A shape formed by the intersection of a *plane* and a *geometric solid.*

Cross sections of a cylinder and a pyramid

cube (1) A *regular polyhedron* with 6 square faces. A cube has 8 *vertices* and 12 *edges.* See Section 13.5.2: Polyhedrons.
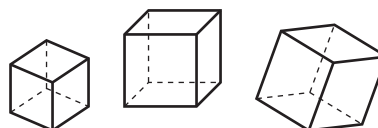
Cubes

(2) In *Everyday Mathematics,* the smaller cube of the *base-10 blocks,* measuring 1 cm on each edge. See Section 9.9.1: Base-10 Blocks.

cube of a number The product of a number used as a *factor* three times. For example, the cube of 5 is $5 * 5 * 5 = 5^3 = 125$. See Section 10.1.2: Powers and Exponents.

cubic centimeter (cc or cm³) A metric unit of *volume* or *capacity* equal to the volume of a cube with 1-cm edges. $1 \text{ cm}^3 = 1$ milliliter (mL). See the Tables of Measures and Section 14.5: Volume (Capacity).

cubic unit A unit such as cubic centimeters, cubic inches, cubic feet, and cubic meters used to measure *volume* or *capacity.* See Section 14.5: Volume (Capacity).

cubit An ancient unit of *length,* measured from the point of the elbow to the end of the middle finger. The cubit has been standardized at various times between 18 and 22 inches. The Latin word *cubitum* means "elbow." See Section 14.1: Personal Measures.
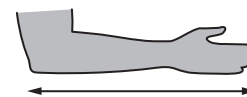
Cubit

cup (c) A U.S. customary unit of *volume* or *capacity* equal to 8 fluid ounces or $\frac{1}{2}$ pint. See the Tables of Measures and Section 14.5: Volume (Capacity).

Glossary

curved surface A 2-dimensional surface that does not lie in a plane. *Spheres, cylinders,* and *cones* each have one curved surface. See Section 13.5.3: Solids with Curved Surfaces.

customary system of measurement In *Everyday Mathematics,* same as *U.S. customary system of measurement.*

cylinder A *geometric solid* with two congruent, parallel circular regions for *bases* and a curved *face* formed by all the segments with an endpoint on each circle that are parallel to a segment with endpoints at the centers of the circles. Also called a circular cylinder. See Section 13.5.3: Solids with Curved Surfaces.

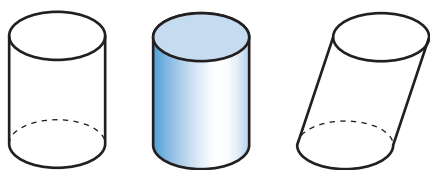Cylinders

D

data Information that is gathered by counting, measuring, questioning, or observing. Strictly, data is the plural of *datum,* but data is often used as a singular word. See Section 12.2: Data Collection, Organization, and Analysis.

debit An amount subtracted from a bank balance; a withdrawal.

deca- A prefix meaning 10.

decagon A 10-sided polygon. See Section 13.4.2: Polygons (*n*-gons).

deci- A prefix meaning 1 tenth.

decimal (1) In *Everyday Mathematics,* a number written in standard *base-ten* notation containing a decimal point, such as 2.54. (2) Any number written in standard base-ten notation. See *repeating decimal, terminating decimal,* Section 9.3.1: Fraction and Decimal Notation, and Section 9.3.4: Rational Numbers and Decimals.

decimal notation In *Everyday Mathematics,* same as *standard notation*.

decimal point A mark used to separate the ones and tenths places in *decimals*. A decimal point separates dollars from cents in dollars-and-cents notation. The mark is a dot in the U.S. customary system and a comma in Europe and some other countries.

decimeter (dm) A metric unit of *length* equivalent to $\frac{1}{10}$ meter, or 10 centimeters.

deficient number A *counting number* whose *proper factors* add 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. Compare to *abundant number* and *perfect number*. See Section 9.8.2: Perfect, Deficient, and Abundant Numbers.

degree (°) (1) A unit of measure for *angles* based on dividing a *circle* into 360 equal parts. Lines of latitude and longitude are measured in degrees, and these degrees are based on angle measures. See Section 13.4.1: Angles and Rotations and Section 15.4.4: The Global Grid System. (2) A unit for measuring *temperature*. See *degree Celsius, degree Fahrenheit,* and Section 15.1.1: Temperature Scales.
The symbol ° means degrees of any type.

degree Celsius (°C) The *unit interval* on *Celsius* thermometers and a metric unit for measuring *temperatures*. Pure water at sea level freezes at 0°C and boils at 100°C. See Section 15.1.1: Temperature Scales.

degree Fahrenheit (°F) The *unit interval* on *Fahrenheit* thermometers and a U.S. customary unit for measuring *temperatures*. Pure water at sea level freezes at 32°F and boils at 212°F. A saturated salt solution freezes at 0°F. See Section 15.1.1: Temperature Scales.

denominator The nonzero divisor b in a fraction $\frac{a}{b}$ and a/b. In a *part-whole fraction,* the denominator is the number of equal parts into which the *whole,* or *ONE,* has been divided. Compare to *numerator*. See Section 9.3.1: Fraction and Decimal Notation.

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

dependent variable (1) A *variable* whose value is dependent on the value of at least one other variable in a *function*. (2) The *variable y* in a *function* defined by the set of *ordered pairs* (*x,y*). Same as the *output* of the function. Compare to *independent variable*. See Section 17.2.1: Uses of Variables.

diagonal (1) A *line segment* joining two nonconsecutive vertices of a *polygon*. See Section 13.4.2: Polygons (*n*-gons). (2) A segment joining two nonconsecutive vertices on different faces of a *polyhedron*.
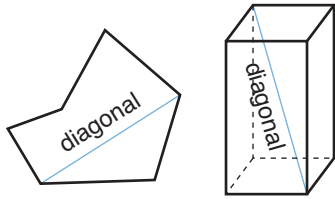
(3) A line of objects or numbers between *opposite corners* of an *array* or a table.
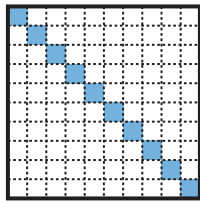
A diagonal of an array

diameter (1) A *line segment* that passes through the center of a *circle* or *sphere* and has endpoints on the circle or sphere. (2) The length of such a segment. The diameter of a circle or sphere is twice the *radius*. See Section 13.4.3: Circles and Pi (π) and Section 13.5.3: Solids with Curved Surfaces.

difference The result of subtracting one number from another. For example, the difference of 12 and 5 is $12 - 5 = 7$.

digit (1) Any one of the symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 in the *base-ten* numeration system. For example, the numeral 145 is made up of the digits 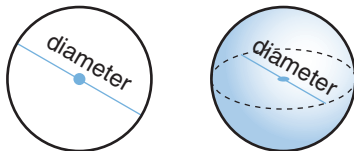1, 4, and 5. (2) Any one of the symbols in any number system. For example, A, B, C, D, E, and F are digits along with 0 through 9 in the base-16 notation used in some computer programming.

digital clock A clock that shows the time with numbers of hours and minutes, usually separated by a colon. This display is discrete, not continuous, meaning that the display jumps to a new time after a minute delay. Compare to *analog clock*. See Section 15.2.1: Clocks.

A digital clock

dimension (1) A measure along one direction of an object, typically length, width, or height. For example, the dimensions of a box might be 24-cm by 20-cm by 10-cm. (2) The number of *coordinates* necessary to locate a point in a geometric space. For example, a line has one dimension because one coordinate uniquely locates any point on the line. A plane has two dimensions because an *ordered pair* of two coordinates uniquely locates any point in the plane. See Section 13.1: Dimension.

discount The amount by which a price of an item is reduced in a sale, usually given as a fraction or percent of the original price, or as a "percent off." For example, a $4 item on sale for $3 is discounted to 75% or $\frac{3}{4}$ of its original price. A $10.00 item at "10% off" costs $9.00, or $\frac{1}{10}$ less than the usual price.

discrete model of area A way of thinking about *area* as filling a figure with unit squares and counting them. For example, the rectangle below has been filled with 40 square units. See Section 14.4.1: Discrete and Continuous Models of Area.
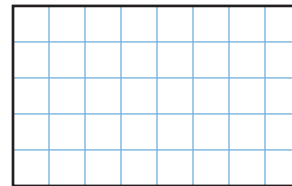
discrete model of volume A way of thinking about *volume* as filling a figure with unit cubes and counting them. For example, the box below will eventually hold 108 cubic units. See Section 14.5.1: Discrete and Continuous Models of Volume.

Glossary
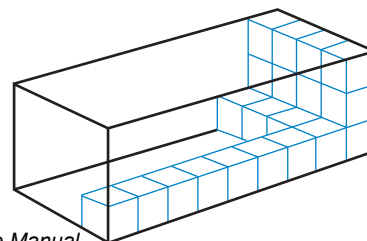
disk A *circle* and its interior region.

displacement method A method for estimating the *volume* of an object by submerging it in water and then measuring the volume of water it displaces. The method is especially useful for finding the volume of an irregularly shaped object. Archimedes of Syracuse (circa 287–212 B.C.) is famous for having solved a problem of finding the volume and density of a king's crown by noticing how his body displaced water in a bathtub and applying the method to the crown. He reportedly shouted "Eureka!" at the discovery, and so similar insights are today sometimes called Eureka moments. See Section 14.5: Volume (Capacity).

Distributive Property of Multiplication over Addition A property relating multiplication to a sum of numbers by distributing a *factor* over the terms in the sum. For example,
$2 * (5 + 3) = (2 * 5) + (2 * 3) = 10 + 6 = 16.$

In symbols:
> For any numbers *a, b,* and *c:*
> $a * (b + c) = (a * b) + (a * c)$
> or $a(b + c) = ab + ac$

See Section 17.2.3: Simplifying Expressions.

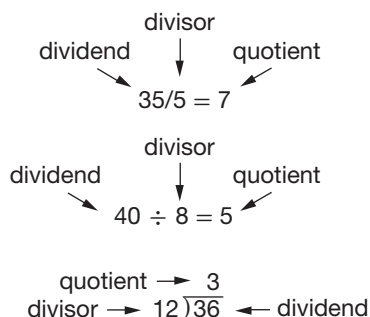**Distributive Property of Multiplication over Subtraction** A property relating multiplication to a difference of numbers by distributing a *factor* over the terms in the difference. For example,
$2 * (5 - 3) = (2 * 5) - (2 * 3) = 10 - 6 = 4.$

In symbols:
> For any numbers *a*, *b,* and *c:*
> $a * (b - c) = (a * b) - (a * c)$
> or $a(b - c) = ab - ac$

See Section 17.2.3: Simplifying Expressions.

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

divisor
dividend   quotient
$35/5 = 7$

divisor
dividend   quotient
$40 \div 8 = 5$

quotient → 3
divisor → $12\overline{)36}$ ← dividend

divisibility rule A shortcut for determining whether a counting number is *divisible by* another counting number without actually doing the division. For example, a number is divisible by 5 if the *digit* in the ones place is 0 or 5. A number is divisible by 3 if the sum of its digits is divisible by 3. See Section 9.8.1: Prime and Composite Numbers: Divisibility.

divisibility test A test to see if a *divisibility rule* applies to a particular number. See Section 9.8.1: Prime and Composite Numbers: Divisibility.

divisible by If the larger of two *counting numbers* can be divided by the smaller with no remainder, then the larger is divisible by the smaller. For example, 28 is divisible by 7, because 28/7 = 4 with no remainder. If a number *n* is divisible by a number *d,* then *d* is a *factor* of *n*. Every counting number is divisible by itself. See Section 9.8.1: Prime and Composite Numbers: Divisibility.

Division of Fractions Property A rule for dividing that says division by a *fraction* is the same a multiplication by the *reciprocal* of the fraction. Another name for this property is the "invert and multiply rule." For example,

$$5 \div 8 = 5 * \frac{1}{8} = \frac{5}{8}$$
$$15 \div \frac{3}{5} = 15 * \frac{5}{3} = \frac{75}{3} = 25$$
$$\frac{1}{2} \div \frac{3}{5} = \frac{1}{2} * \frac{5}{3} = \frac{5}{6}$$

In symbols:
> For any *a* and nonzero *b, c,* and *d:*
> $$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} * \frac{d}{c}$$

If $b = 1$, then $\frac{a}{b} = a$ and the property is applied as in the first two examples above. See Section 11.3.5: Fraction Division.

division symbols The number *a* divided by the number *b* is written in a variety of ways. In *Everyday Mathematics, a* $\div$ *b, a/b,* and $\frac{a}{b}$ are the most common notations, while $b\overline{)a}$ is used to set up the traditional long-division algorithm. *a:b* is sometimes used in Europe, $\boxed{\div}$ is common on calculators, and $\boxed{I}$ is common on computer keyboards. See Section 10.1.1: The Four Basic Arithmetic Operations.

divisor In division, the number that divides another number, the *dividend.* For example, in 35/7 = 5, the divisor is 7. See the diagram under the definition of *dividend.*

dodecahedron A *polyhedron* with 12 faces. If each face is a regular pentagon, it is one of the five *regular polyhedrons*. See Section 13.5.2: Polyhedrons.

A decagonal prism

An irregular
dodecahedron

A regular
dodecahedron
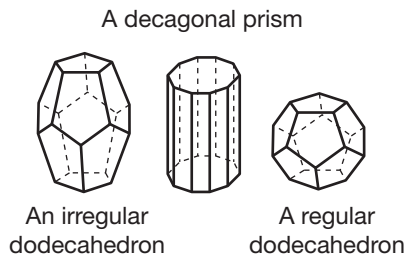
doubles fact The sum (or product) of a 1-digit number added to (or multiplied by) itself, such as $4 + 4 = 8$ or $3 * 3 = 9$. A doubles fact does not have a *turn-around fact* partner.

double-stem plot A *stem-and-leaf plot* in which each stem is split into two parts. Numbers on the original stem ending in 0 through 4 are plotted on one half of the split, and numbers ending in 5 through 9 are plotted on the other half. Double-stem plots are useful if the original stem-and-leaf plot has many leaves falling on few stems. The following plot shows eruption duration in minutes of the Old Faithful Geyser. For example, the first two stems show one observation each of durations lasting 42, 44, 45, 48, and 49 minutes. See Section 12.2.3: Organizing and Displaying Data.

Eruption Duration of Old Faithful
(minutes)

Stems (10s)	Leaves (1s)
4	2 4
4	5 8 9
5	0 1 1 1 3 3 3 4
5	5 5 6 6 7 7 8
6	0 1 1
6	6 7 7 8 8 9
7	0 1 1 1 2 2 3 3 4 4
7	5 5 6 6 6 7 7 8 8 9 9 9
8	0 1 1 1 2 2 3 3 4 4 4
8	5 6 6 6 6 8 8 9
9	
9	

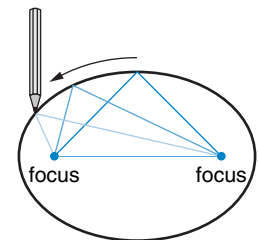A double-stem plot

E

edge (1) Any *side* of a polyhedron's *faces*. (2) A line segment or curve where two surfaces of a geometric solid meet. See Section 13.5.2: Polyhedrons and Section 13.5.3: Solids with Curved Surfaces.

edges

edge
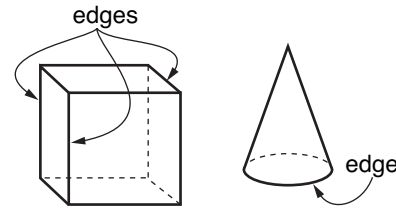
Egyptian multiplication A 4,000-year-old multiplication *algorithm* based on repeated doubling of one factor. See Section 11.2.3: Multiplication Algorithms.

elevation A height above sea level. Same as *altitude (2)*.

ellipse A closed, oval figure that is the set of points in a *plane*, the sum of whose distances from two fixed points is *constant*. Each of the fixed points is called a focus of the ellipse. You can draw an ellipse by attaching the ends of a string at the two focus points, and moving a pencil or pen taut against the string around the focus points. The length of the string is the constant.

focus   focus

An ellipse

embedded figure A figure entirely enclosed within another figure.
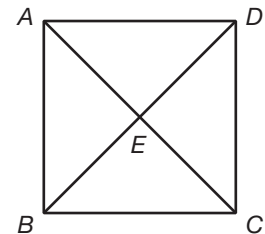
Triangle *ADE* is embedded in square *ADCB*.

endpoint A point at the end of a *line segment, ray,* or *arc*. These shapes are usually named using their endpoints. For example, the segment shown is "segment *TL*" or "segment *LT*."

endpoints

T   *L*

Glossary
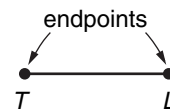
enlarge To increase the size of an object or a figure without changing its shape. Same as *stretch*. See *size-change factor* and Section 13.7.2: Size-Change Transformations

equal Same as *equivalent*.

equal-grouping story A *number story* in which a quantity is divided into equal groups. The total and size of each group are known. For example, *How many tables seating 4 people each are needed to seat 52 people?* is an equal-grouping story. Often division can be used to solve equal-grouping stories. Compare to *measurement division* and *equal-sharing story* and see Section 10.3.2: Multiplication and Division Use Classes.

equal groups Sets with the same number of elements, such as cars with 5 passengers each, rows with 6 chairs each, and boxes containing 100 paper clips each. See Section 10.3.2: Multiplication and Division Use Classes.

equal-groups notation In *Everyday Mathematics,* a way to denote a number of equal-size groups. The size of each group is shown inside square brackets and the number of groups is written in front of the brackets. For example, 3 [6s] means 3 groups with 6 in each group. In general, n [bs] means n groups with b in each group.

equal parts Equivalent parts of a *whole.* For example, dividing a pizza into 4 equal parts means each part is $\frac{1}{4}$ of the pizza and is equal in size to the other 3 parts. See Section 9.3.2: Uses of Fractions.
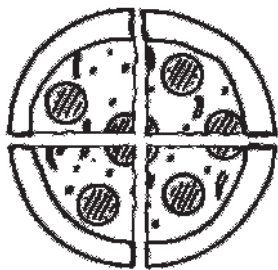
4 equal parts, each $\frac{1}{4}$ of a pizza

equal-sharing story A *number story* in which a quantity is shared equally. The total quantity and the number of groups are known. For example, *There are 10 toys to share equally among 4 children; how many toys will each child get?* is an equal-sharing story. Often division can be used to solve equal-sharing stories. Compare to *partitive division* and *equal-grouping story*. See Section 10.3.2: Multiplication and Division Use Classes.

equally likely outcomes *Outcomes* of a chance experiment or situation that have the same *probability* of happening. If all the possible outcomes are equally likely, then the probability of an *event* is equal to:

$$\frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$$

See *favorable outcomes, random experiment,* and Section 12.1.2: The Language of Chance.

equation A *number sentence* that contains an equal sign. For example, $5 + 10 = 15$ and $P = 2l + 2w$ are equations. See Section 10.2: Reading and Writing Number Sentences and Section 17.2.2: Reading and Writing Open Sentences.

equator An imaginary circle around Earth halfway between the North Pole and the South Pole. The equator is the 0° line for *latitude*.

equidistant marks A series of marks separated by a constant space. See *unit interval.*

Equidistant marks
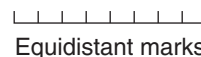
equilateral polygon A *polygon* in which all sides are the same length. See Section 13.4.2: Polygons (*n*-gons).
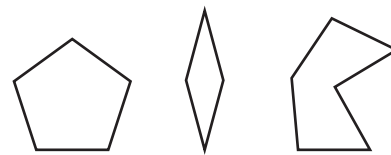
Equilateral polygons

equilateral triangle A *triangle* with all three sides equal in length. Each angle of an equilateral triangle measures 60°, so it is also called an equiangular triangle. See Section 13.4.2: Polygons (*n*-gons).
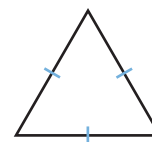
An equilateral triangle

equivalent Equal in value but possibly in a different form. For example, $\frac{1}{2}$, 0.5, and 50% are all equivalent. See Section 9.7.1: Equality.

equivalent equations *Equations* with the same *solution*. For example, $2 + x = 4$ and $6 + x = 8$ are equivalent equations with the common solution 2. See Section 17.2.4: Solving Open Sentences.

equivalent fractions *Fractions* with different *denominators* that name the same number. See Section 9.3.3: Rates, Ratios, and Proportions.

equivalent names Different ways of naming the same number. For example, $2 + 6$, $4 + 4$, $12 - 4$, $18 - 10$, $100 - 92$, $5 + 1 + 2$, eight, VIII, and $\cancel{||||}\,|||$ are all equivalent names for 8. See *name-collection box*.

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 fractions* represent equivalent rates if the units for the rates are the same. For example $\frac{12 \text{ pages}}{4 \text{ minutes}}$ and $\frac{6 \text{ pages}}{2 \text{ minutes}}$ are equivalent rates because $\frac{12}{4}$ and $\frac{6}{2}$ are equivalent with the same unit of pages per minute.

equivalent ratios *Ratios* that make the same comparison. *Equivalent fractions* represent equivalent ratios. For example, $\frac{1}{2}$ and $\frac{4}{8}$ are equivalent ratios. See Section 9.3.3: Rates, Ratios, and Proportions.

estimate (1) An answer close to, or approximating, an exact answer. (2) To make an estimate. See Section 16.1: Estimation.

European subtraction A subtraction *algorithm* in which the subtrahend is increased when regrouping is necessary. The algorithm is commonly used in Europe and in certain parts of the United States. See Section 11.2.2: Subtraction Algorithms.

evaluate an algebraic expression To replace each *variable* in an algebraic *expression* with a number and then calculate a single value for the expression.

evaluate a formula To find the value of one *variable* in a *formula* when the values of the other variables are known.

evaluate a numerical expression To carry out the operations in a numerical *expression* to find a single value for the expression.

even number (1) A *counting number* that is *divisible by* 2. (2) An *integer* that is divisible by 2. Compare to *odd number* and see Section 17.1: Patterns, Sequences, and Functions.

event A set of possible *outcomes* to an experiment. For example, in an experiment flipping two coins, getting 2 HEADS is an event, as is getting 1 HEAD and 1 TAIL. The *probability* of an event is the chance that the event will happen. For example, the probability that a fair coin will land HEADS up is $\frac{1}{2}$. If the probability of an event is 0, the event is *impossible*. If the probability is 1, the event is *certain*. See Section 12.1: Probability.

expanded notation A way of writing a number as the sum of the values of each *digit*. For example, 356 is $300 + 50 + 6$ in expanded notation. Compare to *standard notation, scientific notation,* and *number-and-word notation*.

expected outcome The *average outcome* over a large number of repetitions of a *random experiment*. For example, the expected outcome of rolling one die is the average number of spots landing up over a large number of rolls. Because each face of a fair die has equal *probability* of landing up, the expected outcome is $\frac{(1 + 2 + 3 + 4 + 5 + 6)}{6} = \frac{21}{6} = 3\frac{1}{2}$. This means that the average of many rolls of a fair die is expected to be about $3\frac{1}{2}$. More formally, the expected outcome is defined as an average over infinitely many repetitions.

exponent A small raised number used in *exponential notation* to tell how many times the *base* is used as a *factor*. For example, in 5^3, the base is 5, the exponent is 3, and $5^3 = 5 * 5 * 5 = 125$. Same as *power*. See Section 10.1.2: Powers and Exponents.

exponential notation A way of representing repeated multiplication by the same factor. For example, 2^3 is exponential notation for $2 * 2 * 2$. The *exponent* 3 tells how many times the *base* 2 is used as a factor. See Section 10.1.2: Powers and Exponents.

$$2^3 \longleftarrow \text{exponent}$$
$$\uparrow$$
$$\text{base}$$

expression (1) A mathematical phrase made up of numbers, *variables, operation symbols,* and/or *grouping symbols.* An expression does not contain *relation symbols* such as $=$, $>$, and $\leq$. (2) Either side of an *equation* or *inequality.* See Section 10.2: Reading and Writing Number Sentences and Section 17.2.2: Reading and Writing Open Sentences.

$$2 + 3$$
$$\sqrt{2ab}$$
$$\pi r^2$$
$$9x - 2$$

Expressions

extended facts Variations of basic *arithmetic facts* involving multiples of 10, 100, and so on. For example, $30 + 70 = 100$, $40 * 5 = 200$, and $560/7 = 80$ are extended facts. See *fact extensions* and Section 16.3: Mental Arithmetic.

F

face (1) In *Everyday Mathematics,* a flat *surface* on a *3-dimensional figure.* Some special faces are called *bases.* (2) More generally, any 2-dimensional surface on a 3-dimensional figure. See Section 13.5: Space and 3-D Figures.

a flat face   a curved face
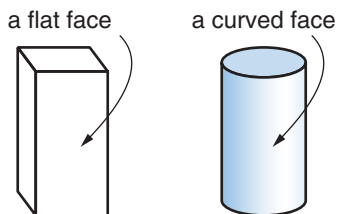
fact extensions Calculations with larger numbers using knowledge of basic *arithmetic facts.* For example, knowing the addition fact $5 + 8 = 13$ makes it easier to solve problems such as $50 + 80 = ?$ and $65 + ? = 73$. Fact extensions apply to all four basic arithmetic operations. See *extended facts* and Section 16.3.3: Fact Practice.

fact family A set of related *arithmetic facts* linking two inverse operations. For example,

$$5 + 6 = 11 \qquad 6 + 5 = 11$$
$$11 - 5 = 6 \qquad 11 - 6 = 5$$

are an addition/subtraction fact family. Similarly,

$$5 * 7 = 35 \qquad 7 * 5 = 35$$
$$35/7 = 5 \qquad 35/5 = 7$$

are a multiplication/division fact family. Same as *number family.* See Section 16.3.3: Fact Practice.

fact habits Same as *fact power.*

fact power In *Everyday Mathematics,* the ability to automatically recall basic *arithmetic facts.* Automatically knowing the facts is as important to arithmetic as knowing words by sight is to reading. Same as *fact habits.* See Section 16.3.2: Basic Facts and Fact Power.

Fact Triangle In *Everyday Mathematics,* a triangular flash card labeled with the numbers of a *fact family* that students can use to practice addition/subtraction and multiplication/division facts. The two 1-digit numbers and their sum or product (marked with a dot) appear in the corners of each triangle. See Section 1.3.1: Fact Families/Fact Triangles.
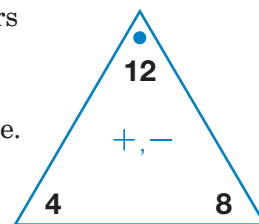
factor (1) Each of the two or more numbers in a *product.* For example, in $6 * 0.5$, 6 and 0.5 are factors. Compare to *factor of a counting number* n. (2) To represent a number as a product of factors. For example, factor 21 by rewriting as $7 * 3$. See Section 9.8.1: Prime and Composite Numbers: Divisibility.

factor of a counting number *n* A *counting number* whose product with some other counting number equals *n.* For example, 2 and 3 are factors of 6 because $2 * 3 = 6$. But 4 is not a factor of 6 because $4 * 1.5 = 6$, and 1.5 is not a counting number.

factor pair Two *factors of a counting number* n whose product is *n.* 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. See Section 9.8.1: Prime and Composite Numbers: Divisibility.

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.

1 2 3 4 6 8 12 24

A factor rainbow for 24

Glossary

factor string A *counting number* written as a product of two or more of its counting-number *factors* other than 1. The length of a factor string is the number of factors in the string. For example, $2 * 3 * 4$ is a factor string for 24 with length 3. By convention, $1 * 2 * 3 * 4$ is not a factor string for 24 because it contains the number 1.

factor tree A way to get the *prime factorization* of a counting number. Write the original number as a product of *factors.* Then write each of these factors as a product of factors, and continue 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 *tree diagram* and Section 9.8.1: Prime and Composite Numbers: Divisibility.
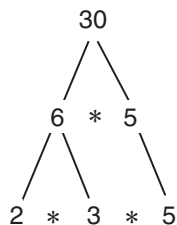
factorial (!) A *product* of a counting number and all smaller counting numbers. The symbol ! means "factorial." For example, 3! is read "three factorial" and $3! = 3 * 2 * 1 = 6$. Similarly, $4! = 4 * 3 * 2 * 1 = 24$.

In symbols:
For any counting number *n,*
$n! = n * (n - 1) * (n - 2) * \ldots * 1.$

By convention, $0! = 1$.

facts table A chart showing *arithmetic facts*. An addition/subtraction facts table shows addition and subtraction facts. A multiplication/division facts table shows multiplication and division facts.

Fahrenheit A *temperature scale* on which pure water at sea level freezes at 32° and boils at 212°. The Fahrenheit scale is widely used in the United States but in few other places. Compare to *Celsius*. See *degree Fahrenheit* and Section 15.1.1: Temperature Scales.

fair Free from bias. Each side of a fair die or coin will land up about equally often. Each region of a fair spinner will be landed on in proportion to its area.

**fair game** A game in which every player has the same chance of winning. See Section 12.1.2: The Language of Chance.

false number sentence A *number sentence* that is not true. For example, $8 = 5 + 5$ is a false number sentence. Compare to *true number sentence*. See Section 10.2: Reading and Writing Number Sentences.

fathom A unit of *length* equal to 6 feet, or 2 yards. It is used mainly by people who work with boats and ships to measure depths underwater and lengths of cables. Same as *arm span*. See Section 14.1: Personal Measures.


Fathom
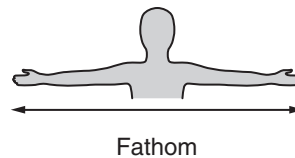
favorable outcome An *outcome* that satisfies the conditions of an *event* of interest. For example, suppose a 6-sided die is rolled and the event of interest is "roll an even number." There are six possible outcomes: roll 1, 2, 3, 4, 5, or 6. Of these, 3 are favorable: roll 2, 4, or 6. See *equally likely outcomes* and Section 12.1.2: The Language of Chance.

figurate numbers Numbers that can be illustrated by specific geometric *patterns. Square numbers* and *triangular numbers* are figurate numbers. See Section 17.1.2: Sequences.

Triangular numbers   Square numbers
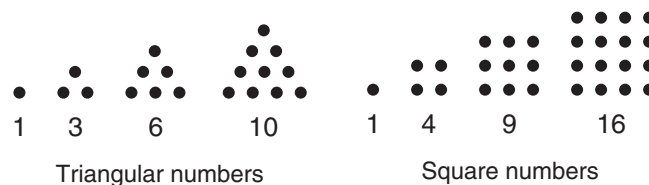
flat In *Everyday Mathematics,* the *base-10 block* consisting of one hundred 1-cm cubes. See Section 9.9.1: Base-10 Blocks.
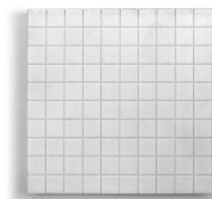
A flat

flat surface A *surface* contained entirely in one *plane*. See Section 13.4: Planes and Plane Figures and Section 13.5: Space and 3-D Figures.

flip An informal name for a *reflection* transformation. See Section 13.7.1: Reflections, Rotations, and Translations.

flowchart A diagram that shows a series of steps to complete a task. A typical flowchart is a network of frames and symbols connected by arrows that provides a guide for working through a problem step by step.

Glossary

fluid ounce (fl oz) A U.S. customary unit of *volume* or *capacity* equal to $\frac{1}{16}$ of a pint, or about 29.573730 milliliters. Compare to *ounce*. See the Tables of Measures and Section 14.5: Volume (Capacity).

foot (ft) A U.S. customary unit of *length* equivalent to 12 inches, or $\frac{1}{3}$ of a yard. See the Tables of Measures and Section 14.3: Length.

formula A general rule for finding the value of something. A formula is usually an *equation* with quantities represented by letter *variables*. For example, a formula for distance traveled d at a rate r over a time t is $d = r * t$. The area A of a triangle with base length b and height h is given at right. See the Tables of Formulas and Section 17.2.1: Uses of Variables.
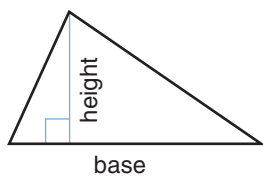
$$A = \tfrac{1}{2} * b * h$$

fraction (primary definition) A number in the form $\frac{a}{b}$ or a/b, where a and b are *whole numbers* and b is not 0. A fraction may be used to name part of an object or part of a collection of objects, to compare two quantities, or to represent division. For example, $\frac{12}{6}$ might mean 12 eggs divided into 6 groups of 2 eggs each, a ratio of 12 to 6, or 12 divided by 6. See Section 9.3: Fractions, Decimals, Percents, and Rational Numbers.

fraction (other definitions) (1) A fraction that satisfies the previous definition and includes a *unit* in both the *numerator* and *denominator*. For example, the *rates*

$$\frac{50 \text{ miles}}{1 \text{ gallon}} \quad \text{and} \quad \frac{40 \text{ pages}}{10 \text{ minutes}}$$

are fractions. (2) A number written using a fraction bar, where the fraction bar is used to indicate division. For example,

$$\frac{2.3}{6.5}, \quad \frac{1\frac{4}{5}}{12}, \quad \text{and} \quad \frac{\frac{3}{4}}{\frac{5}{8}}.$$

fraction stick In *Fifth* and *Sixth Grade Everyday Mathematics,* a diagram used to represent simple fractions. See Section 9.9.4: Fraction-Stick Charts and Fraction Sticks.
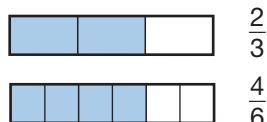
fractional part Part of a *whole. Fractions* represent fractional parts of numbers, sets, or objects. See Section 9.3.2: Uses of Fractions.

Frames and Arrows In *Everyday Mathematics,* diagrams consisting of frames connected by arrows used to represent number *sequences.* Each frame contains a number, and each arrow represents a rule that determines which number goes in the next frame. There may be more than one rule, represented by different-color arrows. Frames-and-Arrows diagrams are also called chains. See Section 17.1.2: Sequences.
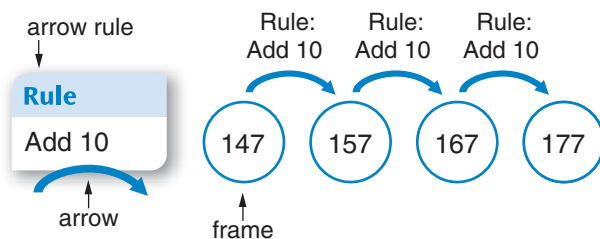
frequency (1) The number of times a value occurs in a set of data. See Section 12.2.3: Organizing and Displaying Data. (2) A number of repetitions per unit of time. For example, the vibrations per second in a sound wave.

frequency graph A graph showing how often each value occurs in a data set. See Section 12.2.3: Organizing and Displaying Data.
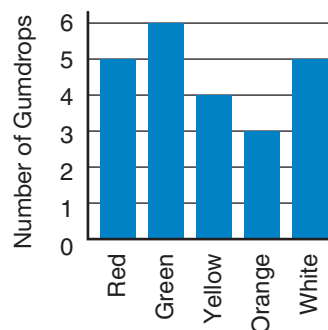
frequency table A table in which data are *tallied* and organized, often as a first step toward making a *frequency graph*. See Section 12.2.3: Organizing and Displaying Data.

Color	Number of Gumdrops
red	卌
green	卌 I
yellow	////
orange	///
white	卌

fulcrum (1) The point on a mobile at which a rod is suspended. (2) The point or place around which a lever pivots. (3) The center support of a *pan balance*.
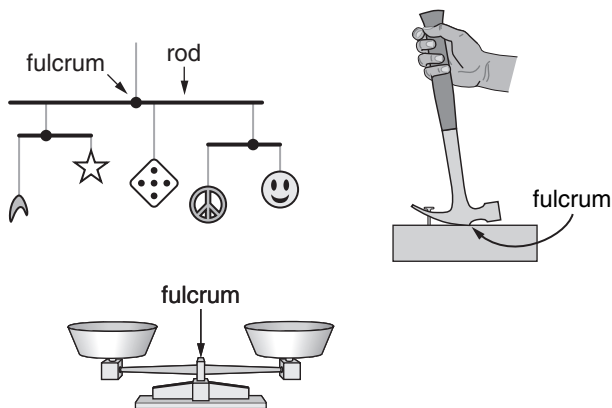
function A set of *ordered pairs* (x, y) in which each value of x is paired with exactly one value of y. A function is typically represented in a table, by points on a coordinate graph, or by a rule such as an *equation*. For example, for a function with the rule "Double," 1 is paired with 2, 2 is paired with 4, 3 is paired with 6, and so on. In symbols, $y = 2 * x$ or $y = 2x$. See Section 17.1.3: Functions.

function machine In *Everyday Mathematics,* an imaginary device that receives *inputs* and pairs them with *outputs.* For example, the function machine below pairs an input number with its double. See *function* and Section 17.1.3: Functions.

in	out
1	2
2	4
3	6
5	10
20	40
300	600
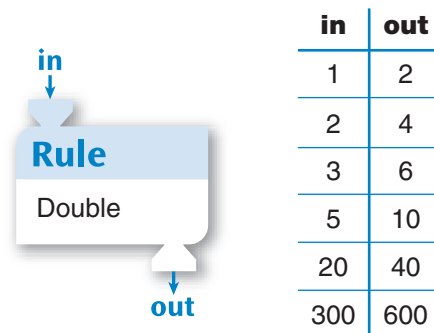
A function machine and function table

furlong A unit of *length* equal to 1 eighth of a mile. Furlongs are commonly used in horse racing.

G

gallon (gal) A U.S. customary unit of *volume* or *capacity* equal to 4 quarts. See the Tables of Measures and Section 14.5: Volume (Capacity).

general pattern In *Everyday Mathematics,* a number model for a *pattern* or *rule.*

generate a random number To produce a *random number* by such methods as drawing a card without looking from a shuffled deck, rolling a fair die, and flicking a fair spinner. In *Everyday Mathematics,* random numbers are commonly generated in games. See Section 12.4.1: Random-Number Generators.

genus In *topology,* the number of holes in a geometric shape. Shapes with the same genus are topologically equivalent. For example, a donut and a teacup are topologically equivalent because both are genus 1. See Section 13.11: Topology.

Genus 0   Genus 1
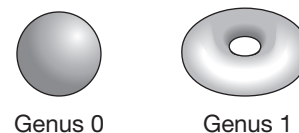
geoboard A manipulative *2-dimensional coordinate system* made with nails or other posts at equally-spaced intervals relative to both axes. Children loop rubber bands around the posts to make polygons and other shapes.

Glossary

geometric solid The *surface* or surfaces that make up a *3-dimensional figure* such as a prism, pyramid, cylinder, cone, or sphere. Despite its name, a geometric solid is hollow; that is, it does not include the points in its interior. Informally, and in some dictionaries, a solid is defined as both the surface and its interior. See Section 13.5.1: "Solid" Figures.

A rectangular prism   A square pyramid

A cylinder   A cone   A sphere
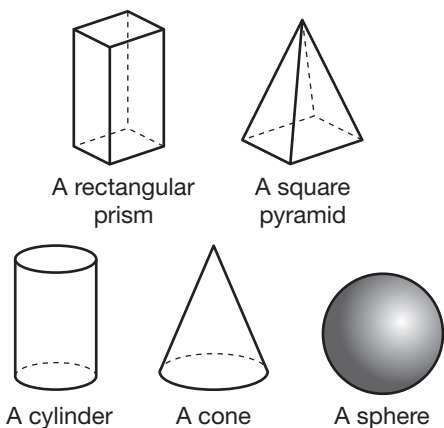
Geometric solids

Geometry Template A *Fourth* through *Sixth Grade Everyday Mathematics* tool that includes a millimeter ruler, a ruler with $\frac{1}{16}$-inch intervals, half-circle and full-circle *protractors,* a *percent circle,* pattern-block shapes, and other geometric figures. The template can also be used as a *compass (1)*. See Section 13.13.2: Pattern-Block and Geometry Templates.

girth The distance around a 3-dimensional object.

Golden Ratio The *ratio* of the length of the long side to the length of the short side of a *Golden Rectangle,* approximately equal to 1.618 to 1. The Greek letter ϕ (phi) sometimes stands for the Golden Ratio. The Golden Ratio is an *irrational number* equal to $\frac{1 + \sqrt{5}}{2}$.

See Section 9.3.3: Rates, Ratios, and Proportions.

Golden Rectangle A rectangle prized for its pleasing proportions in which the longer side is constructed with compass and straightedge from the shorter side. The ratio of these sides is the *Golden Ratio,* about 1.618 to 1. A 5-inch by 3-inch index card is roughly similar to a Golden Rectangle, as are the front faces of many ancient Greek buildings.
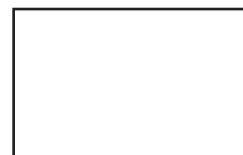

A Golden Rectangle

-gon A suffix meaning *angle*. For example, a *hexagon* is a plane figure with six angles.

gram (g) A metric unit of *mass* equal to $\frac{1}{1,000}$ of a kilogram. See the Tables of Measures and Section 14.6: Weight and Mass.

graph key An annotated list of the symbols used in a graph explaining how to read the graph. Compare to *map legend.*

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

great span The distance from the tip of the thumb to the tip of the little finger (pinkie), when the hand is stretched as far as possible. The great span averages about 9 inches for adults. Same as *hand span*. Compare to *normal span* and see Section 14.1: Personal Measures.
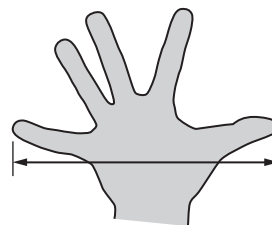
Great span

grouping symbols Parentheses ( ), brackets [ ], braces { }, and similar symbols that define the order in which operations in an *expression* are to be done. *Nested* grouping symbols are groupings within groupings, and the innermost grouping is done first. For example, in $(3 + 4) * [(8 + 2)/5]$, the group $(8 + 2)$ is nested within $[(8 + 2)/5]$ and is done first. So $(3 + 4) * [(8 + 2)/5]$ simplifies as follows:

$$(3 + 4) * [(8 + 2)/5]$$
$$(3 + 4) * [10/5]$$
$$7 * 2$$
$$14$$

See Section 10.2.1: Grouping Symbols.

H

hand span Same as *great span*.

height (1) A perpendicular segment from one *side* of a geometric figure to a parallel side or from a *vertex* to the *opposite side*. (2) The length of this segment. In *Everyday Mathematics,* same as *altitude*. See *height of a parallelogram, height of a rectangle, height of a prism or cylinder, height of a pyramid or cone, height of a triangle,* Section 13.4.2: Polygons (*n*-gons), Section 13.5.2: Polyhedrons, and Section 13.5.3: Solids with Curved Surfaces.


Heights/altitudes of 2-D figures are shown in blue.
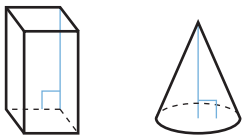

Heights/altitudes of 3-D figures are shown in blue.

height of a parallelogram (1) The *length* of the shortest line segment between a *base of a parallelogram* and the line containing the *opposite side*. The height is perpendicular to the base. (2) The line segment itself. See *altitude, base of a parallelogram*, and Section 13.4.2: Polygons (*n*-gons).
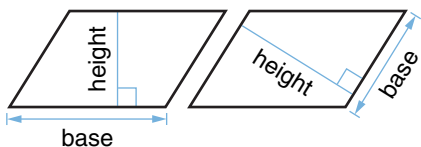
height of a prism or cylinder The *length* of the shortest line segment from a *base of a prism or cylinder* to the plane containing the opposite base. The height is perpendicular to the bases. (2) The line segment itself. See *altitude, base of a prism or cylinder,* Section 13.5.2: Polyhedrons, and Section 13.5.3: Solids with Curved Surfaces.
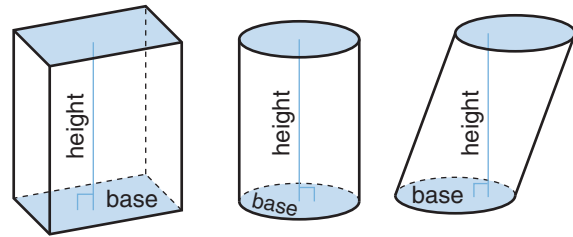

height of a pyramid or cone The *length* of the shortest line segment from the *apex* of a pyramid or cone to the plane containing the *base*. The height is perpendicular to the base. (2) The line segment itself. See *altitude, base of a pyramid or cone*, Section 13.5.2: Polyhedrons, and Section 13.5.3: Solids with Curved Surfaces.
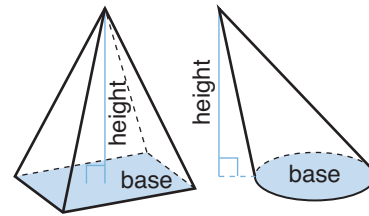
height of a rectangle The *length* of a side perpendicular to a *base of a rectangle*. Same as *altitude* of a rectangle. See Section 13.4.2: Polygons (*n*-gons).

height of a triangle The *length* of the shortest segment from a *vertex* of a triangle to the line containing the opposite *side*. The height is perpendicular to the base. (2) The line segment itself. See *altitude, base of a triangle*, and Section 13.4.2: Polygons (*n*-gons).
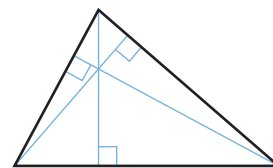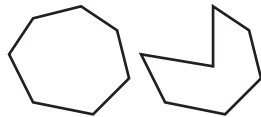

The heights of the triangle are shown in blue.

hemisphere (1) Half of Earth's surface. (2) Half of a *sphere*.

hepta- A prefix meaning seven.

Glossary

heptagon A 7-sided *polygon*. See Section 13.4.2: Polygons (*n*-gons).

Heptagons

hexa- A prefix meaning six.

**hexagon** A 6-sided *polygon*. See Section 13.4.2: Polygons (*n*-gons).

A hexagon

horizon Where the earth and sky appear to meet, if nothing is in the way. The horizon looks like a line when you look out to sea.

horizontal In a left-to-right orientation. Parallel to the *horizon*.

hypotenuse In a *right triangle,* the *side* opposite the *right angle*. See Section 13.4.2: Polygons (*n*-gons).

leg

hypotenuse

leg
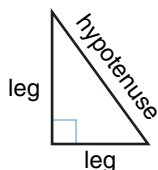
I

icon A small picture or diagram sometimes used to represent quantities. For example, an icon of a stadium might be used to represent 100,000 people on a *pictograph*. Icons are also used to represent functions or objects in computer operating systems and applications.

icosahedron A *polyhedron* with 20 faces. An icosahedron with equilateral triangle faces is one of the five *regular polyhedrons*. See Section 13.5.2: Polyhedrons.
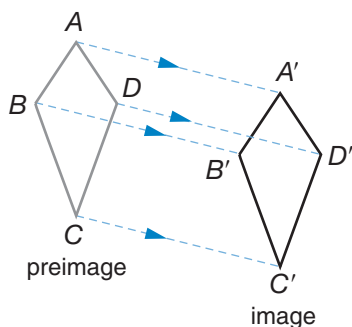
An irregular icosahedron
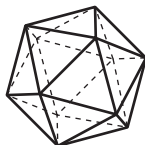
A regular icosahedron

image A figure that is produced by a *transformation* of another figure called the *preimage*. See Section 13.7: Transformations.
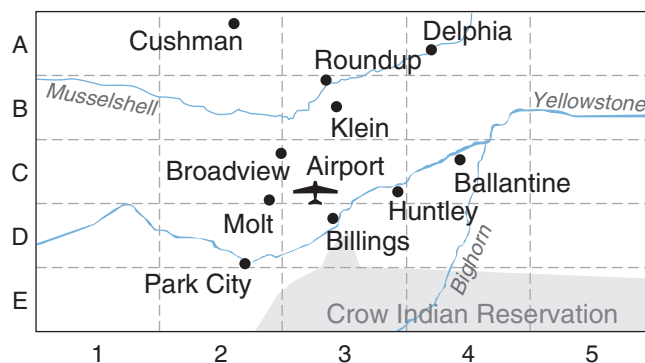
A
B
D
C
preimage

A′
B′
D′
C′
image

improper fraction A *fraction* with a *numerator* that 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.

inch (in.) A U.S. customary unit of *length* equal to $\frac{1}{12}$ of a foot and 2.54 centimeters. See the Tables of Measures and Section 14.3: Length.

independent variable (1) A *variable* whose value does not rely on the values of other variables. (2) The *variable x* in a *function* defined by the set of *ordered pairs* (*x,y*). Same as the *input* of the function. Compare to *dependent variable*. See Section 17.2.1: Uses of Variables.

index of locations A list of places together with a *reference frame* for locating them on a map. For example, "Billings, D3," means that Billings is in the rectangle to the right of D and above 3 on the map below. See Section 15.4.1: Map Coordinates.

Section of Map of Montana

A — Cushman · Delphia
B — Musselshell — Roundup · · — Yellowstone
B — Klein ·
C — Broadview · Airport · Ballantine ·
D — Molt · Huntley · Billings ·
E — Park City · — Bighorn
Crow Indian Reservation

1   2   3   4   5

indirect measurement The determination of heights, distances, and other quantities that cannot be measured directly.

25 ft

5 ft

6 ft

30 ft
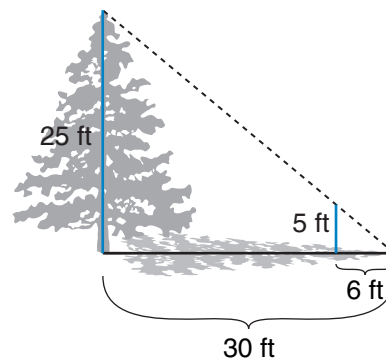
Indirect measurement lets you calculate the height of the tree from the other measures.

inequality A *number sentence* with a *relation symbol* other than =, such as >, <, ≥, ≤, ≠, or ≈. See Section 9.7: Numeric Relations.

Glossary

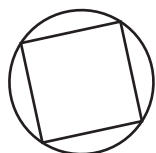**input** (1) A number inserted into an imaginary *function machine,* which applies a rule to pair the input with an *output.* (2) The values for x in a *function* consisting of ordered pairs (x, y). See Section 17.1.3: Functions. (3) Numbers or other information entered into a calculator or computer.

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

An inscribed square

instance of a pattern Same as *special case.*

integer A number in the set $\{\ldots, -4, -3, -2, -1, 0, 1, 2, 3, 4, \ldots\}$. A *whole number* or its *opposite,* where 0 is its own opposite. Compare to *rational number, irrational number,* and *real number.* See Section 9.4: Positive and Negative Numbers.

interest A charge for using someone else's money. Interest is usually a percentage of the amount borrowed.

interior of a figure (1) The set of all points in a *plane* bounded by a closed *2-dimensional figure* such as a *polygon* or *circle*. (2) The set of all points in space bounded by a closed *3-dimensional figure* such as a *polyhedron* or *sphere*. The interior is usually not considered to be part of the figure. See Section 13.4: Planes and Plane Figures and Section 13.5: Space and 3-D Figures.

interpolate To *estimate* an unknown value of a function between known values. Graphs are useful tools for interpolation. See Section 17.1.3: Functions.

interquartile range (IQR) (1) The *length* of the *interval* between the *lower* and *upper quartiles* in a data set. (2) The *interval* itself. The middle half of the data is *in* the interquartile range. See Section 12.2.3: Organizing and Displaying Data.
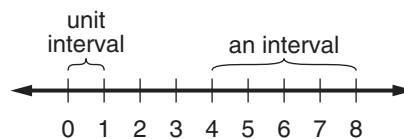
intersect To share a common point or points.
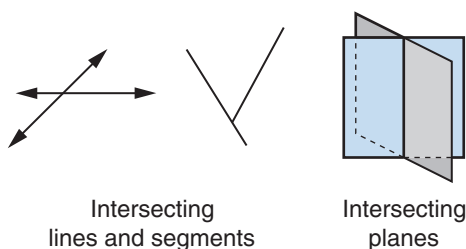
Intersecting lines and segments

Intersecting planes

interval (1) The set of all numbers between two numbers a and b, which may include one or both of a and b. (2) The points and their coordinates on a segment of a number line. The interval between 0 and 1 on a number line is the *unit interval.*

"in the black" Having a positive *account balance;* having more money than is owed.

"in the red" Having a negative *account balance;* owing more money than is available.

irrational numbers Numbers that cannot be written as *fractions* where both the *numerator* and *denominator* are *integers* and the denominator is not zero. For example, $\sqrt{2}$ and π are irrational numbers. An irrational number can be written as a nonterminating, nonrepeating decimal. For example, $\pi = 3.141592653 \ldots$ continues forever without any known pattern. The number $1.10100100010000 \ldots$ is irrational because its pattern does not repeat. See Section 9.5: Irrational Numbers.

isometry transformation A *transformation* in which the *preimage* and *image* are *congruent. Reflections* (flips), *rotations* (turns), and *translations* (slides) are isometry transformations, while a *size change* (stretch or shrink) is not. Although the size and shape of the figures in an isometry transformation are the same, their orientations may be different. From the Greek *isometros* meaning "of equal measure." See Section 13.7.1: Reflections, Rotations, and Translations.


A reflection (flip)   A rotation (turn)   A translation (slide)

isosceles trapezoid A *trapezoid* whose nonparallel sides are the same length. Pairs of base angles have the same measure. See Section 13.4.2: Polygons (*n*-gons).
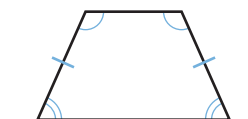
An isosceles trapezoid

Glossary

isosceles triangle A *triangle* with at least two sides equal in length. Angles opposite the congruent sides are congruent to each other. See Section 13.4.2: Polygons (*n*-gons).
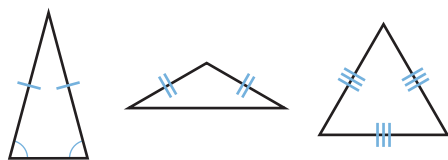
Isosceles triangles

J

juxtapose To represent multiplication in an *expression* by placing *factors* side by side without a multiplication symbol. At least one factor is a *variable*. For example, 5*n* means 5 ∗ *n,* and *ab* means *a* ∗ *b.* See Section 10.1.1: The Four Basic Arithmetic Operations.

K

key sequence The order in which calculator keys are pressed to perform a calculation. See Section 3.1.1: Calculators.

kilo- A prefix meaning 1 thousand.

kilogram A metric unit of *mass* equal to 1,000 grams. The international standard kilogram is a 39 mm diameter, 39 mm high *cylinder* of platinum and iridium kept in the International Bureau of Weights and Measures in Sèvres, France. A kilogram is about 2.2 pounds. See the Tables of Measures and Section 14.6: Weight and Mass.

kilometer A metric unit of *length* equal to 1,000 meters. A kilometer is about 0.62 mile. See the Tables of Measures and Section 14.3: Length.

kite A *quadrilateral* with two distinct pairs of adjacent sides of equal length. In *Everyday Mathematics,* the four sides cannot all have equal length; that is, a *rhombus* is not a kite. The diagonals of a kite are *perpendicular.* See Section 13.4.2: Polygons (*n*-gons).
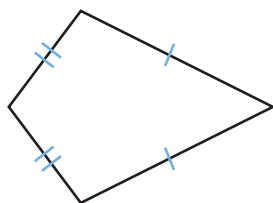
A kite

L

label (1) A descriptive word or phrase used to put a number or numbers in context. Labels encourage students to associate numbers with real objects. Flags, snowballs, and scary monsters are examples of labels. See Section 10.3: Use Classes and Situation Diagrams. (2) In a *spreadsheet* or graph, words or numbers providing information such as the title of the spreadsheet, the heading for a row or column, or the variable on an axis.

landmark In *Everyday Mathematics,* a notable feature of a *data* set. Landmarks include the *median, mode, mean, maximum, minimum,* and *range.* See Section 12.2.4: Data Analysis.

latitude A *degree* measure locating a place on Earth north or south of the *equator.* A location at 0° latitude is on the equator. The North Pole is at 90° north latitude, and the South Pole is at 90° south latitude. Compare to *longitude.* See *lines of latitude* and Section 15.4.4: The Global Grid System.

lattice multiplication A very old *algorithm* for multiplying multidigit numbers that requires only basic multiplication facts and addition of 1-digit numbers in a lattice diagram. See Section 11.2.3: Multiplication Algorithms.

least common denominator (LCD) 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 Section 11.3: Algorithms for Fractions.

least common multiple (LCM) The smallest number that is a *multiple* of two or more given numbers. For example, common multiples of 6 and 8 include 24, 48, and 72. The least common multiple of 6 and 8 is 24. See Section 11.3: Algorithms for Fractions.

left-to-right subtraction A subtraction *algorithm* that works from the left decimal place to the right in several steps. For example, to solve 94 − 57, first calculate 94 − 50 to obtain 44 and then calculate 44 − 7 to obtain 37. The method is especially suited to mental arithmetic. See Section 11.2.2: Subtraction Algorithms.

Glossary

leg of a right triangle Either *side* of the *right angle* in a *right triangle*; a side that is not the *hypotenuse*. See Section 13.4.2: Polygons (*n*-gons).
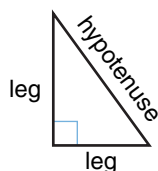
length The distance between two points on a *1-dimensional figure*. For example, the figure might be a line segment, an arc, or a curve on a map modeling a hiking path. Length is measured in units such as inches, kilometers, and miles. See Section 14.3: Length.

**length of a factor string** The number of factors in a *factor string*.

length of a rectangle Typically, but not necessarily, the longer dimension of a *rectangle*.

letter-number pair An *ordered pair* in which one of the coordinates is a letter. Often used to locate places on maps. See Section 15.4.1: Map Coordinates.

like fractions *Fractions* with equal *denominators*.

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 $4y + 7y - z$. See *combine like terms* and Section 17.2.3: Simplifying Expressions.

line In *Everyday Mathematics*, a 1-dimensional straight path that extends forever in opposite directions. A line is named using two points on it or with a single, italicized lower-case letter such as *l*. In formal Euclidean geometry, line is an undefined geometric term. See Section 13.3: Lines, Segments, and Rays.
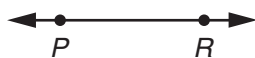
Line *PR* or $\overleftrightarrow{PR}$

line graph A graph in which *data* points are connected by *line segments*. Same as *broken-line graph*. See Section 12.2.3: Organizing and Displaying Data.

line of reflection (mirror line) (1) In *Everyday Mathematics,* a line halfway between a figure and its *reflection* image in a plane. (2) The *perpendicular bisector* of the line segments connecting points on a figure with their corresponding points on its reflection image. Compare to *line of symmetry.* See Section 13.7.1: Reflections, Rotations, and Translations.

line of symmetry A line that divides a figure into two parts that are *reflection* images of each other. A figure may have zero, one, or more lines of symmetry. For example, the numeral 2 has no lines of symmetry, a square has four lines of symmetry, and a circle has infinitely many lines of symmetry. Also called a symmetry line. See Section 13.8.1: Line Symmetry.
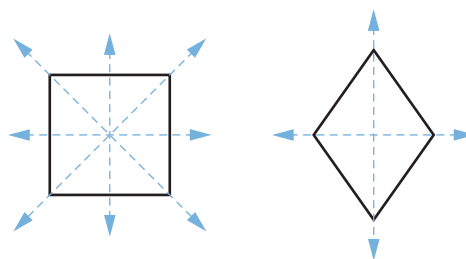
Lines of symmetry are shown in blue.

line plot A sketch of data in which check marks, Xs, or other symbols above a labeled line show the frequency of each value. See Section 12.2.3: Organizing and Displaying Data.
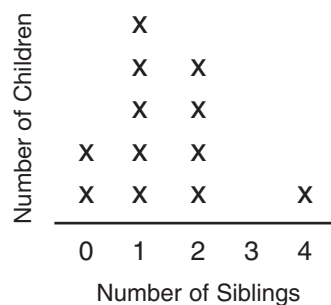
A line plot

line segment A part of a *line* between and including two points called *endpoints* of the segment. Same as *segment*. A line segment is often named by its endpoints. See Section 13.3: Lines, Segments, and Rays.

endpoints

Segment *EF* or $\overline{EF}$

Glossary
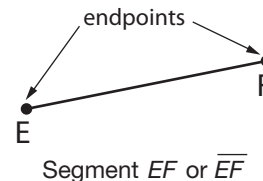
line symmetry A figure has line symmetry if a line can be drawn that divides it into two parts that are *reflection* images of each other. See *line of symmetry* and Section 13.7.1: Reflections, Rotations, and Translations.

line of symmetry

lines of latitude Lines of constant *latitude* drawn on a 2-dimensional map or circles of constant latitude drawn on a globe. Lines of latitude are also called parallels because they are parallel to the equator and to each other. On a globe, latitude lin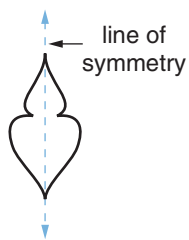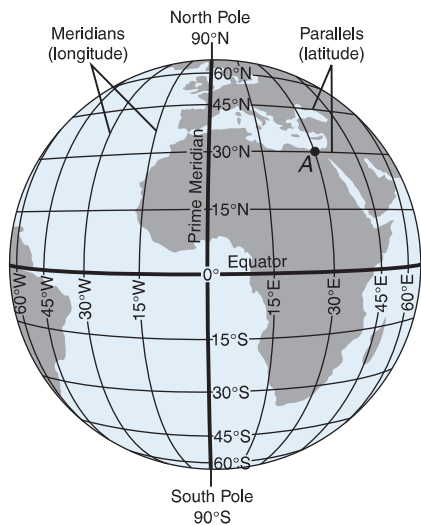es (circles) are intersections of planes parallel to the plane through the equator. Compare to *lines of longitude.* See Section 15.4.4: The Global Grid System.


Point *A* is located at 30°N, 30°E.

lines of longitude Lines of constant *longitude* drawn on a 2-dimensional map or semicircles of constant longitude drawn on a globe connecting the North and South Poles. Lines of longitude are also called meridians. Compare to *lines of latitude.* See Section 15.4.4: The Global Grid System.

liter (L) A metric unit of *volume* or *capacity* equal to the volume of a cube with 10-cm-long edges. 1 L = 1,000 mL = 1,000 cm³. A liter is a little larger than a quart. See the Tables of Measures and Section 14.5: Volume (Capacity).

long In *Everyday Mathematics,* the *base-10 block* consisting of ten 1-cm cubes. Sometimes called a rod. See Section 9.9.1: Base-10 Blocks.

A long
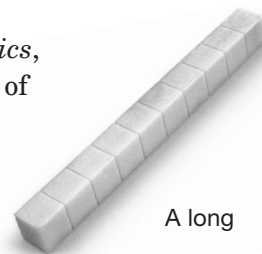
long-term memory *Memory in a calculator* used by keys with an M on them, such as [M−] and [M+]. Numbers in long-term memory are not affected by calculations with keys without an M, which use *short-term memory*. See Section 3.1.1: Calculators.

longitude A degree measure locating a place on Earth east or west of the *prime meridian.* A location at 0° longitude is on the prime meridian. A location at 180° east or west longitude is on or near the international date line, which is based on the imaginary semicircle opposite the prime meridian. Compare to *latitude.* See *lines of longitude* and Section 15.4.4: The Global Grid System.

lower quartile In *Everyday Mathematics,* in an ordered data set, the middle value of the *data* below the *median.* Data values at the median are not included when finding the lower quartile. Compare to *upper quartile.* See Section 12.2.3: Organizing and Displaying Data.

lowest terms of a fraction Same as *simplest form of a fraction*.

M

magnitude estimate A rough *estimate* of whether a number is in the tens, hundreds, thousands, or other powers of 10. For example, the U.S. national debt per person is in the tens of thousands of dollars. In *Everyday Mathematics,* students give magnitude estimates for problems such as *How many dimes are in $200?* or *How many halves are in 30?* Same as *order-of-magnitude estimate*. See Section 16.1.3: Estimates in Calculations.

map direction symbol A symbol on a map that identifies north, south, east, and west. Sometimes only north is indicated. See Section 15.4: Maps.
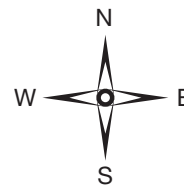
map legend (map key) A diagram that explains the symbols, markings, and colors on a map.

map scale The *ratio* of a distance on a map, globe, or drawing to an actual distance. For example, 1 inch on a map might correspond to 1 real-world mile. A map scale may be shown on a segment of a number line, given as a ratio of distances such as $\frac{1}{63,360}$ or 1:63,360 when an inch represents a mile, or by an informal use of the = symbol such as 1 inch = 1 mile. See Section 15.4.2: Map and Model Scales.
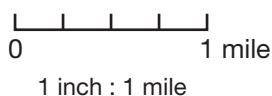
```
|___|___|___|___|
0              1 mile
   1 inch : 1 mile
```

mass A measure of the amount of matter in an object. Mass is not affected by gravity, so it is the same on Earth, the moon, or anywhere else in space. Mass is usually measured in grams, kilograms, and other metric units. Compare to *weight*. See Section 14.6: Weight and Mass.

Math Boxes In *Everyday Mathematics,* a collection of problems to practice skills. Math Boxes for each lesson are in the *Math Journal.* See Section 1.2.3: Math Boxes.

Math Journal In *Everyday Mathematics,* a place for students to record their mathematical discoveries and experiences. Journal pages give models for conceptual understanding, problems to solve, and directions for individual and small-group activities.

Math Master In *Everyday Mathematics,* a page ready for duplicating. Most masters support students in carrying out suggested activities. Some masters are used more than once during the school year.

Math Message In *Everyday Mathematics,* an introductory activity to the day's lesson that students complete before the lesson starts. Messages may include problems to solve, directions to follow, sentences to complete or correct, review exercises, or reading assignments. See Section 1.2.4: Math Messages.

maximum The largest amount; the greatest number in a set of data. Compare to *minimum.* See Section 12.2.4: Data Analysis.

mean For a set of numbers, their sum divided by the number of numbers. Often called the *average* value of the set. Compare to other data *landmarks median* and *mode.* See Section 12.2.4: Data Analysis.

mean absolute deviation (m.a.d.) In a data set, the *average* distance between individual *data* values and the *mean* of those values. See Section 12.2.3: Organizing and Displaying Data.

measurement division A term for the type of division used to solve an *equal-grouping story* such as *How many tables seating 4 people each are needed for 52 people?* Same as *quotitive division.* Compare to *partitive division.* See Section 10.3.2: Multiplication and Division Use Classes.

measurement unit The reference unit used when measuring. Examples of basic units include inches for *length,* grams for *mass* or *weight,* cubic inches for *volume* or *capacity,* seconds for elapsed time, and degrees Celsius for change of *temperature.* Compound units include square centimeters for area and miles per hour for speed. See Section 14.2: Measurement Systems.

median The *middle value* in a set of data when the data are listed in order from smallest to largest or vice versa. If there is an even number of data points, the median is the *mean* of the two middle values. Compare to other data *landmarks mean* and *mode.* See Section 12.2.4: Data Analysis.

memory in a calculator Where numbers are stored in a calculator for use in later calculations. Most calculators have both a *short-term memory* and a *long-term memory.* See Section 3.1.1: Calculators.

mental arithmetic Computation done by people "in their heads," either in whole or in part. In *Everyday Mathematics,* students learn a variety of mental-calculation strategies to develop automatic recall of basic facts and *fact power.* See Section 16.3: Mental Arithmetic.

Mental Math and Reflexes In *Everyday Mathematics,* exercises at three levels of difficulty at the beginning of lessons for students to get ready to think about math, warm-up skills they need for the lesson, continually build mental-arithmetic skills, and help you assess individual strengths and weaknesses. See Section 1.2.5: Mental Math and Reflexes.

meridian bar A device on a globe that shows degrees of *latitude* north and south of the equator. It's called a meridian bar because it is in the same orientation as *meridians.*

Glossary

meridians Same as *lines of longitude*.

meter (m) The basic metric unit of *length* from which other metric units of length are derived. Originally, the meter was defined as $\frac{1}{10,000,000}$ of the distance from the North Pole to the equator along a meridian passing through Paris. From 1960 to 1983, the meter was redefined as 1,630,763.73 wavelengths of orange-red light from the element krypton. Today, the meter is defined as the distance light travels in a vacuum in $\frac{1}{299,792,458}$ second. One meter is equal to 10 decimeters, 100 centimeters, or 1,000 millimeters. See Section 14.3: Length.

metric system A measurement system based on the *base-ten* (decimal) numeration system and used in most countries and by virtually all scientists around the world. Units for *length* include millimeter, centimeter, meter, and kilometer; units for *mass* and *weight* include gram and kilogram; units for *volume* and *capacity* include milliliter and liter; and the unit for *temperature* change is degrees Celsius. See the Tables of Measures and Section 14.2.2: Metric System.

middle value Same as *median*.

midpoint A point halfway between two other points. The midpoint of a line segment is the point halfway between the endpoints.

A   B   C

midpoint

Length of $\overline{AB}$ = length of $\overline{BC}$
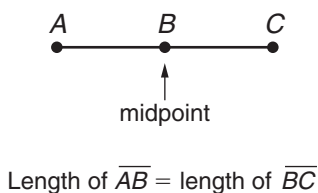
mile (mi) A U.S. customary unit of *length* equal to 5,280 feet, or 1,760 yards. A mile is about 1,609 meters.

milli- A prefix meaning 1 thousandth.

milliliter (mL) A metric unit of *volume* or *capacity* equal to $\frac{1}{1,000}$ of a liter, or 1 cubic centimeter. See Section 14.5: Volume (Capacity).

millimeter (mm) A metric unit of *length* equal to $\frac{1}{10}$ of a centimeter, or $\frac{1}{1,000}$ of a meter. See Section 14.3: Length.

millisecond (ms or msec) A unit of time equal to $\frac{1}{1,000}$ of a second.

minimum The smallest amount; the smallest number in a set of data. Compare to *maximum*. See Section 12.2.4: Data Analysis.

minuend In subtraction, the number from which another number is subtracted. For example, in $19 - 5 = 14$, the minuend is 19. Compare to *subtrahend*.

mirror image Same as *reflection* image.

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 $2 + \frac{1}{4}$.

Möbius strip (Möbius band) A *3-dimensional figure* with only one side and one edge, named for the German mathematician August Ferdinand Möbius (1790–1868).
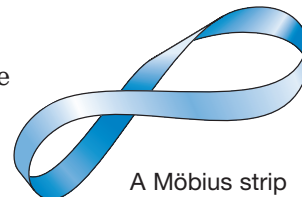
A Möbius strip

modal Of or relating to the *mode*.

mode The value or values that occur most often in a set of data. Compare to other *landmarks median* and *mean*. See Section 12.2.4: Data Analysis.

modified repeated addition A multiplication *algorithm* based on adding a to itself b times to find $a * b$. One of the factors is separated into parts and the partial products of the other factor and those parts are then added. For example, to compute $67 * 53$, think of 10 [67s] as 670 and add five of them to get $50 * 67$. Then add the remaining 3 [67s] to the result. See Section 11.2.3: Multiplication Algorithms.

modified U.S. traditional multiplication A multiplication *algorithm* in which the traditional algorithm is enhanced by introducing 0s into the blanks to maintain the logic of the process and to help avoid sloppy alignment of partial products. See Section 11.2.3: Multiplication Algorithms.

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

multiples of equal groups A *multiple* of a rate in an *equal-grouping* situation. For example, *How many balloons are there altogether in 6 packages with 20 balloons per package?* is a multiples-of-equal-groups problem. See Section 10.3.2: Multiplication and Division Use Classes.

multiplication counting principle A way of determining the total number of possible *outcomes* for two or more separate choices. For example, suppose you roll a typical die and then flip a coin. There are 6 choices for which number on the die lands up (1, 2, 3, 4, 5, or 6) and 2 choices for which side of the coin lands up (HEADS H or TAILS T). So there are $6 * 2 = 12$ possible outcomes all together: $(1,H)$, $(1,T)$, $(2,H)$, $(2,T)$, $(3,H)$, $(3,T)$, $(4,H)$, $(4,T)$, $(5,H)$ $(5,T)$, $(6,H)$, $(6,T)$.

multiplication/division diagram A diagram used in *Everyday Mathematics* to model situations in which a total number is made up of equal-size groups. The diagram contains a number of groups, a number in each group, and a total number. Also called a multiplication diagram for short. See *situation diagram* and Section 10.3.2: Multiplication and Division Use Classes.

rows	chairs per row	total chairs
15	25	?

A multiplication/division diagram

multiplication/division use class In *Everyday Mathematics,* a situation in which multiplication or division is used. These include *equal grouping/sharing, arrays and area, rates and ratio, scaling,* and *Cartesian product* situations. See Section 10.3.2: Multiplication and Division Use Classes.

multiplication fact The product of two 1-digit numbers, such as $6 * 7 = 42$. See *arithmetic facts* and Section 16.3.2: Basic Facts and Fact Power.

Multiplication Property of −1 A property of multiplication that says multiplying any number by −1 gives the opposite of a number. For example, $-1 * 5 = -5$ and $-1 * -3 = -(-3) = 3$. In symbols:

For any number a, $-1 * a = -a$.

Some calculators apply this property with a $+/-$ key that *toggles* between a positive and negative value in the display.

multiplication symbols The number a multiplied by the number b is written in a variety of ways. Many mathematics textbooks and *Second* and *Third Grade Everyday Mathematics* use × as in $a \times b$. Beginning in fourth grade, *Everyday Mathematics* uses ∗ as in $a * b$. Other common symbols are a dot as in $a \bullet b$ and by *juxtaposition* as in ab, which is common in formulas and in algebra courses. See Section 10.1.1: The Four Basic Arithmetic Operations.

multiplicative inverses Same as *reciprocals*.

N

name-collection box In *Everyday Mathematics,* a diagram that is used for collecting *equivalent names* for a number. See Section 9.9.3: Name-Collection Boxes.
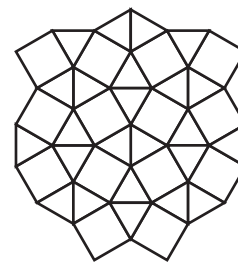
25
37 − 12
20 + 5
HHT HHT HHT HHT HHT
twenty-five
veinticinco

name of a tessellation A numerical description of a *tessellation* listing the number of sides of the polygons that meet at each *vertex point,* in order from the smallest. See Section 13.10.1: Classifying Tessellations.
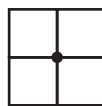
A 4.4.4.4 tessellation

A 3.3.4.3.4 tessellation

natural numbers In *Everyday Mathematics,* same as *counting numbers*.

negative numbers Numbers less than 0; the opposites of the *positive numbers,* commonly written as a positive number preceded by a −. Negative numbers are plotted left of 0 on a horizontal number line or below 0 on a vertical number line. See Section 9.4: Positive and Negative Numbers.

negative power of 10 A number that can be written in the form 10^{-a}, which is shorthand for $\frac{1}{10^a}$ where a is a counting number. For example, $10^{-2} = \frac{1}{10^2}$. Negative powers of 10 can be written as fractions or in standard decimal notation: $10^{-2} = \frac{1}{10^2} = \frac{1}{100} = 0.01$. Compare to *positive power of 10*. See Section 10.1.2: Powers and Exponents.

negative rational numbers *Rational numbers* less than 0; the opposites of the *positive rational numbers*. For example, -24, $-2.333\ldots$, and $-\frac{5}{8}$ are negative rational numbers. See Section 9.4: Positive and Negative Numbers.

nested parentheses Parentheses within parentheses in an *expression*. Expressions are evaluated from within the innermost parentheses outward. See *grouping symbols* for an example and Section 10.2.1: Grouping Symbols.

net score The final score of a turn or game after all calculations have been completed.

net weight The *weight* of the contents of a container, excluding the weight of the container.

n-gon Same as *polygon,* where n is the number of sides. Polygons that do not have special names like squares and pentagons are usually named using n-gon notation, such as 13-gon or 100-gon.

nona- A prefix meaning nine.

nonagon A 9-sided *polygon*.

nonconvex polygon Same as *concave polygon*.

normal span The distance from the end of the thumb to the end of the index (first) finger of an outstretched hand. For estimating lengths, many people can adjust this distance to approximately 6 inches or 15 centimeters. Same as *span*. Compare to *great span*. See Section 14.1: Personal Measures.

n-to-1 ratio A ratio of a number to 1. Every ratio $a{:}b$ can be converted to an n-to-1 ratio by dividing a by b. For example, a ratio of 3 to 2 is a ratio of $3/2 = 1.5$ or a 1.5-to-1 ratio.

number-and-word notation A notation consisting of the *significant digits* of a number and words for the place value. For example, 27 billion is number-and-word notation for 27,000,000,000.

number family Same as *fact family*.

number grid In *Everyday Mathematics,* a table in which *consecutive* numbers are arranged in *rows,* usually 10 *columns* per row. A move from one number to the next within a *row* is a change of 1; a move from one number to the next within a *column* is a change of 10. See Section 9.9.2: Number Grids, Scrolls, and Lines.

| -9	-8	-7	-6	-5	-4	-3	-2	-1	0
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110

A number grid

number-grid puzzle In *Everyday Mathematics,* a piece of a *number grid* in which some, but not all, of the numbers are missing. Students use number-grid puzzles to practice place-value concepts.
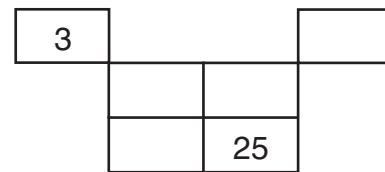
A number-grid puzzle

number line A line on which points are indicated by *tick marks* that are usually at regularly spaced intervals from a starting point called the *origin*, the *zero point*, or simply 0. Numbers are associated with the tick marks on a *scale* defined by the *unit interval* from 0 to 1. Every *real number* locates a point on the line, and every point corresponds to a real number. See Section 9.9.2: Number Grids, Scrolls, and Lines.
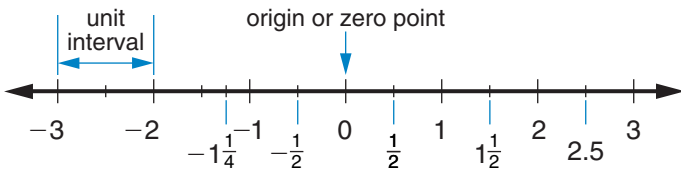

A number line

number model *A number sentence, expression,* or other representation that models a *number story* or situation. For example, the story *Sally had $5, and then she earned $8* can be modeled as the number sentence $5 + 8 = 13$, as the expression $5 + 8$, or by

$$\begin{array}{r} 5 \\ + \ 8 \\ \hline 13 \end{array}$$

See Section 10.2: Reading and Writing Number Sentences and Section 18.3: Mathematical Modeling.

number scroll In *Everyday Mathematics,* a series of *number grids* taped together. See Section 9.9.2: Number Grids, Scrolls, and Lines.
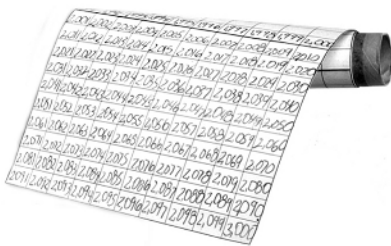
A number scroll

number sentence Two *expressions* with a *relation symbol*.

$$5 + 5 = 10 \qquad 16 \le a * b$$
$$2 - \ ? = 8 \qquad a^2 + b^2 = c^2$$

Number sentences

number sequence A list of numbers, often generated by a rule. In *Everyday Mathematics*, students explore number sequences using *Frames-and-Arrows* diagrams. See Section 17.1.2: Sequences.

$$1, 2, 3, 4, 5, \ldots \qquad 1, 4, 9, 16, 25, \ldots$$
$$1, 2, 1, 2, 1, \ldots \qquad 1, 3, 5, 7, 9, \ldots$$

Number sequences

number story A story that involves numbers and one or more explicit or implicit questions. For example, *I have 7 crayons in my desk. Carrie gave me 8 more crayons. Now I have 15 crayons in all* is a number story. See Section 18.4.1: Number Stories.

numeral A word, symbol, or figure that represents a number. For example, six, VI, ⊞⊞ /, and 6 are all numerals that represent the same number.

numeration A method of numbering or of reading and writing numbers. In *Everyday Mathematics,* numeration activities include counting, writing numbers, identifying equivalent names for numbers in *name-collection boxes,* exchanging coins such as 5 pennies for 1 nickel, and renaming numbers in computation.

numerator The dividend a in a fraction $\frac{a}{b}$ or a/b. In a part-whole *fraction,* in which the *whole* (the ONE or *unit whole*) is divided into a number of equal parts, the numerator is the number of equal parts being considered. Compare to *denominator*. See Section 9.3.1: Fraction and Decimal Notation.
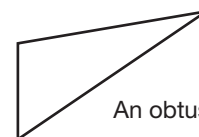
O

obtuse angle An *angle* with measure between 90° and 180°. See Section 13.4.1: Angles and Rotations.
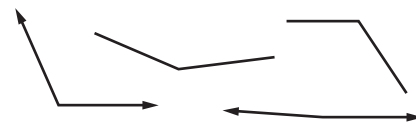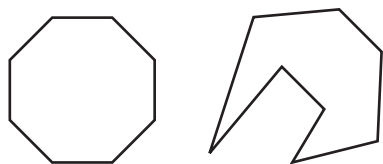

Obtuse angles

obtuse triangle A *triangle* with an angle measuring more than 90°. See Section 13.4.2: Polygons (*n*-gons).

An obtuse triangle

octa- A prefix meaning eight.

octagon An 8-sided *polygon*. See Section 13.4.2: Polygons (*n*-gons).

Octagons

octahedron A *polyhedron* with 8 faces. An octahedron with 8 *equilateral triangle* faces is one of the five *regular polyhedrons*. See Section 13.5.2: Polyhedrons.

odd number A *counting number* that is not *divisible by* 2. Compare to *even number*. See Section 17.1.1: Number Patterns.

ONE In *Everyday Mathematics,* same as *whole* or *unit whole.*

1-dimensional (1-D) coordinate system A *reference frame* in which any point on a *1-dimensional figure* can be located with one *coordinate* relative to the origin of a number line. Compare to *2-dimensional* and *3-dimensional coordinate systems*. See Section 15.3.1: 1-Dimensional Coordinate Systems.

1-dimensional (1-D) figure A figure such as a *line segment, arc,* or part of a curve that has length but no width or depth. Compare to *2-* and *3-dimensional figures.* See Section 13.1: Dimension.

open proportion A *proportion* with one or more *variables.* An open proportion is an *open sentence* and is neither true nor false. For example, $\frac{2}{3} = \frac{a}{5}$ and $\frac{z}{15} = \frac{y}{3}$ are open proportions. See Section 17.2.4: Solving Open Sentences.

open sentence A *number sentence* with one or more *variables*. An open sentence is neither true nor false. For example, $9 + \_\_ = 15$, $? - 24 < 10$, and $7 = x + y$ are open sentences. See Section 17.2.2: Reading and Writing Open Sentences.

operation A rule performed on one or more mathematical objects such as numbers, *variables,* or *expressions* to produce another mathematical object. Addition, subtraction, multiplication, and division are the four basic arithmetic operations. Taking a square root, squaring a number, and multiplying both sides of an *equation* by the same number are also operations. In *Everyday Mathematics,* students learn about many operations along with several procedures, or *algorithms,* for carrying them out. See Chapter 10: Arithmetic Operations.

operation symbol A symbol used in *expressions* and *number sentences* to stand for a particular mathematical operation. Symbols for common arithmetic operations are:
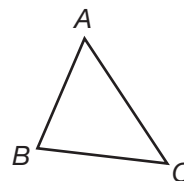
addition	$+$
subtraction	$-$
multiplication	$\times, *, \bullet$
division	$\div, /$
powering	$\wedge$

See Section 10.1: Arithmetic Symbols.

OPP(*n*) In *Everyday Mathematics,* same as *opposite of a number* n.
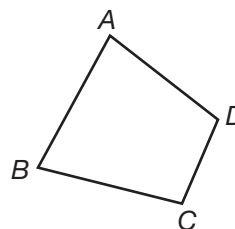
opposite angle in a triangle The *angle* opposite a *side* of a *triangle* that is not one of the sides of the angle.

Angle *C* is opposite side *AB.*

opposite angles Same as *vertical angles.*

opposite angles in a quadrilateral Two *angles* in a *quadrilateral* that do not share a side.


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

opposite-change rule for addition An addition *algorithm* in which a number is added to one *addend* and subtracted from the other addend. Compare to *same-change rule for subtraction*. See Section 11.2.1: Addition Algorithms.

opposite of a number *n* A number that is the same distance from 0 on a number line as *n,* but on the opposite side of zero. In symbols, the opposite of a number *n* is −*n,* and, in *Everyday Mathematics,* OPP(*n*). If *n* is a negative number, −*n* is a positive number. For example, the opposite of −5 is 5. The sum of a number *n* and its opposite is zero; $n + -n = 0$. Same as *additive inverse.* See Section 9.4: Positive and Negative Numbers.

opposite side in a triangle The *side* opposite an *angle* of a *triangle* that is not a side of the angle.

opposite sides in a quadrilateral Two *sides* in a *quadrilateral* that do not share a *vertex.*
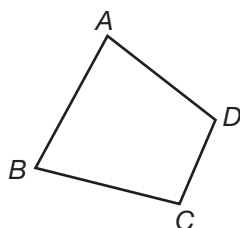
Sides *AB* and *DC*; sides *BC* and *AD* are pairs of opposite sides.

order-of-magnitude estimate Same as *magnitude estimate*.

order-of-magnitude increase A 10-times change in a value. Sometimes simply called a magnitude increase. See Section 10.1.2: Powers and Exponents and Section 16.1.2: Extreme Numbers.

order of operations Rules that tell the order in which operations in an *expression* should be carried out. The conventional order of operations is:

1. Do operations inside *grouping symbols.* Work from the innermost set of grouping symbols outward. Inside grouping symbols, follow Rules 2–4.
2. Calculate all expressions with *exponents.*
3. *Multiply* and *divide* in order from left to right.
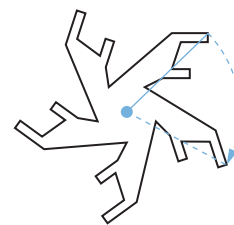4. *Add* and *subtract* in order from left to right.

For example:

$$5^2 + (3 * 4 - 2)/5 = 5^2 + (12 - 2)/5$$
$$= 5^2 + 10/5$$
$$= 25 + 10/5$$
$$= 25 + 2$$
$$= 27$$

Same as *algebraic order of operations*. See Section 10.2.3: The Order of Operations.

order of rotation symmetry The number of times a *rotation* image of a figure coincides with the figure before completing a 360° rotation. See Section 13.8.2: Rotation and Point Symmetries.

A figure with order 5 rotation symmetry

ordered pair (1) Two numbers, or *coordinates,* used to locate a point on a *rectangular coordinate grid.* The first coordinate *x* gives the position along the horizontal axis of the grid, and the second coordinate *y* gives the position along the vertical axis. The pair is written (x, y). See Section 15.3.2: 2- and 3-Dimensional Coordinate Systems. (2) Any pair of objects or numbers in a particular order, as in letter-number *spreadsheet cell* names or map coordinates. See Section 15.4.1: Map Coordinates.
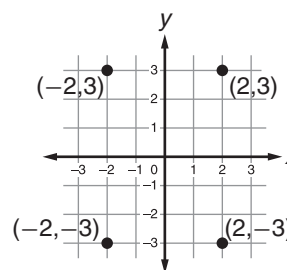

Ordered pairs

orders of magnitude Positive powers of 10 including 10, 100, 1,000, and so on. See *order-of-magnitude increase,* Section 10.1.2: Powers and Exponents and Section 16.1.2: Extreme Numbers.

ordinal number The position or order of something in a *sequence,* such as first, third, or tenth. Ordinal numbers are commonly used in dates, as in "May fifth" instead of "May five." See Section 9.2.2: Ordinal Numbers.

origin The *zero point* in a *coordinate system*. On a number line, the origin is the point at 0. On a coordinate grid, the origin is the point (0,0) where the two axes intersect. See Section 15.3: Coordinate Systems.
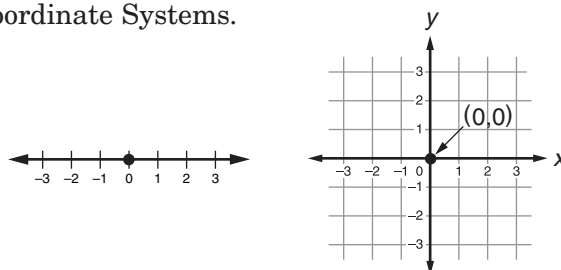
The points at 0 and (0,0) are origins.

ounce (oz) A U.S. customary unit of *weight* equal to $\frac{1}{16}$ of a pound or about 28.35 grams. Compare to *fluid ounce*. See the Tables of Measures and Section 14.6: Weight and Mass.

outcome A possible result of a chance experiment or situation. For example, HEADS and TAILS are the two possible outcomes of flipping a coin. See *event, equally likely outcomes,* and Section 12.1.2: The Language of Chance.

outlier A value far from most of the others in a data set. Commonly, outliers are much larger or smaller than other values. See Section 12.2.4: Data Analysis.

output (1) A number paired to an *input* by an imaginary *function machine* applying a rule. (2) The values for *y* in a *function* consisting of ordered pairs (x, y). See Section 17.1.3: Functions. (3) Numbers or other information displayed by calculator or computer.

P

pan balance A device used to weigh objects or compare their *weights*. See Section 14.11.4: Scales and Balances.

pan-balance problems In *Fifth* and *Sixth Grade Everyday Mathematics,* problems in which pan balances represent linear equations. One weight (real or symbolic) represents the variable, and another weight represents a single unit. Exchanges that keep the pans balanced correspond to mathematical operations on both sides of an equation until, eventually, a single variable weight balances with a number of units representing the solution. See Section 17.2.4: Solving Open Sentences.
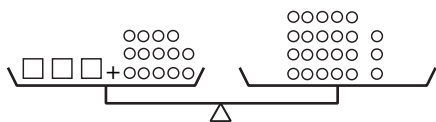

A pan-balance problem

parabola (1) The curve formed by the *intersection* of a right circular *cone* and a *plane* parallel to the lateral edge of the cone. (2) In a plane, the set of points that are the same distance from a line and a point not on the line.


parabolas
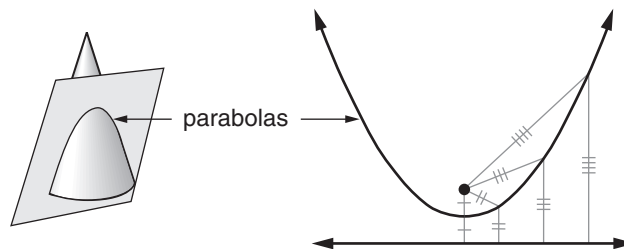
parallel lines *Lines* in a *plane* that never meet. Two parallel lines are always the same distance apart. *Line segments* or *rays* on parallel lines are parallel to each other. See Section 13.6.1: Perpendicular and Parallel.

Parallel lines Line parallel to a plane Parallel planes
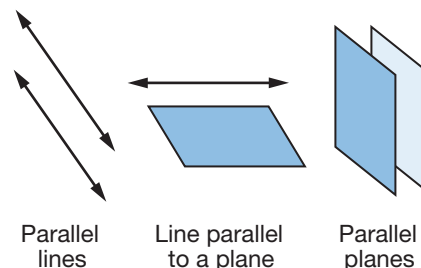
parallel planes *Planes* in space that never meet. Two parallel planes are always the same distance apart. A figure in one plane is parallel to the other plane. Polygons in one plane are said to be parallel to polygons in the other plane. However, 1-dimensional shapes such as lines, segments, and rays in one plane are not necessarily parallel to 1-dimensional shapes in a parallel plane. See *skew lines* and Section 13.6.1: Perpendicular and Parallel.

parallelogram A *quadrilateral* with two pairs of parallel sides. *Opposite sides* of a parallelogram have the same length and *opposite angles* have the same measure. All rectangles are parallelograms, but not all parallelograms are rectangles because parallelograms do not necessarily have right angles. See Section 13.4.2: Polygons (*n*-gons).
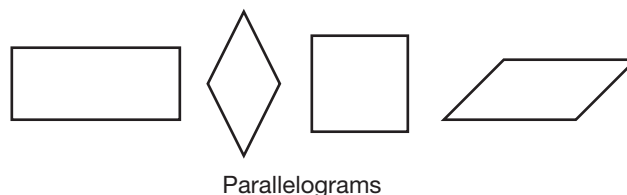
Parallelograms

parallels Same as *lines of latitude.*

parentheses See *grouping symbols.*

partial-differences subtraction A subtraction *algorithm* in which separate differences are computed for each place value of the numbers and then added to get a final difference. See Section 11.2.2: Subtraction Algorithms.

partial-products multiplication A multiplication *algorithm* in which partial products are computed by multiplying the value of each digit in one factor by the value of each digit in the other factor. The final product is the sum of the partial products. See Section 11.2.3: Multiplication Algorithms.

partial-quotients division A division *algorithm* in which a partial quotient is computed in each of several steps. The final quotient is the sum of the partial quotients. See Section 11.2.4: Division Algorithms.

partial-sums addition An addition *algorithm* in which separate sums are computed for each place value of the numbers and then added to get a final sum. See Section 11.2.1: Addition Algorithms.

partitive division A term for the type of division used to solve an *equal-sharing story* such as *If $10 is shared by 4 people, how much does each person get?* Compare to *measurement division.* See Section 10.3.2: Multiplication and Division Use Classes.

parts-and-total diagram In *Everyday Mathematics,* a diagram used to model problems in which two or more quantities (parts) are combined to get a total quantity. See *situation diagram* and Section 10.3.1: Addition and Subtraction Use Classes.

13	
8	?
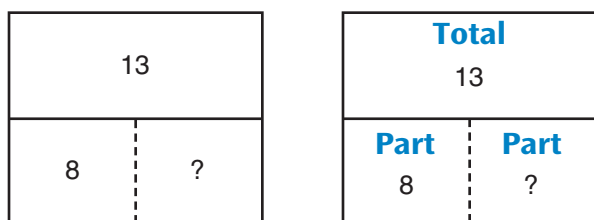
Total	
13	
Part	**Part**
8	?

Parts-and-total diagrams for 13 = 8 + ?

parts-and-total story A *number story* in which a whole is made up of distinct parts. For example, *There are 15 girls and 12 boys in Mrs. Dorn's class. How many students are there in all?* is a parts-and-total story. In other stories, the total and one or more parts may be known and the last part unknown. See Section 10.3.1: Addition and Subtraction Use Classes.

part-to-part ratio A *ratio* that compares a part of a whole to another part of the same whole. For example, *There are 8 boys for every 12 girls* is a part-to-part ratio with a whole of 20 students. Compare to *part-to-whole ratio.* See Section 10.3.2: Multiplication and Division Use Classes.

part-to-whole ratio A *ratio* that compares a part of a whole to the whole. For example, *8 out of 20 students are boys* and *12 out of 20 students are girls* are part-to-whole ratios. Compare to *part-to-part ratio.* See Section 10.3.2: Multiplication and Division Use Classes.

part-whole fraction A *fraction* that describes dividing an object or collection into equal parts. In *Everyday Mathematics,* the object or collection is called the *whole,* or the *ONE,* and is the *denominator* of the fraction. The *numerator* is the number of parts of the whole. For example, in the situation *Padma ate $\frac{3}{5}$ of the pizza,* the ONE is 5 pieces of pizza (a whole pizza divided into 5 parts) and Padma ate 3 of the 5 parts. See Section 9.3.2: Uses of Fractions.

pattern A repetitive order or arrangement. In *Everyday Mathematics,* students mainly explore visual and number patterns in which elements are arranged so that what comes next can be predicted. Compare to *general pattern.* See Section 17.1: Patterns, Sequences, and Functions.

penta- A prefix meaning five.

**pentagon** A 5-sided *polygon.* See Section 13.4.2: Polygons (*n*-gons).
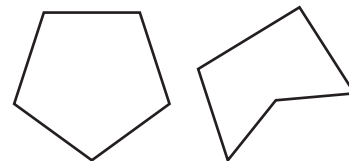
Pentagons

per For each, as in *ten chairs per row* or *six tickets per family.*

per capita For each person. Often used to describe an *average* of a data set, as in *The per-capita debt for U.S. citizens in July 2005 was $26,451.95.*

percent (%) Per hundred, for each hundred, or out of a hundred. $1\% = \frac{1}{100} = 0.01$. For example, *48% of the students in the school are boys* means that, on average, 48 of every 100 students in the school are boys. See Section 9.3.5: Percents.

Percent Circle A tool on the *Geometry Template* that is used to measure and draw figures that involve percents, such as *circle graphs.* See Section 14.11.2: Protractors and the Percent Circle.
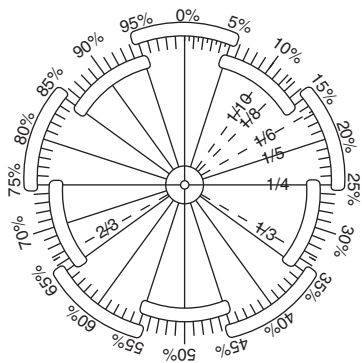

perfect number A *counting number* that equals the sum of its *proper factors.* For example, 6 is a perfect number because the sum of its proper factors is $1 + 2 + 3 = 6$. Compare to *abundant number* and *deficient number.* See Section 9.8.2: Perfect, Deficient, and Abundant Numbers.

perimeter The distance around the boundary of a *2-dimensional figure.* The perimeter of a *circle* is called its *circumference.* A formula for the perimeter P of a *rectangle* with length l and width w is $P = 2 * (l + w)$. Perimeter comes from the Greek words for "around measure." See the Tables of Formulas and Section 14.3: Length.

perpendicular (⊥) Two *lines* or two *planes* that intersect at *right angles. Line segments* or *rays* that lie on perpendicular lines are perpendicular to each other. The symbol ⊥ means "is perpendicular to." See Section 13.6.1: Perpendicular and Parallel.

Perpendicular lines

Perpendicular planes

Perpendicular rays
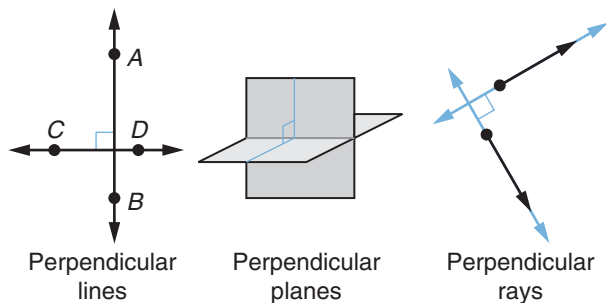
perpendicular bisector A *line, ray,* or *segment* that *bisects* a line segment at a *right angle.* See Section 13.6.1: Perpendicular and Parallel and Section 13.13.1: Compass-and-Straightedge Constructions.
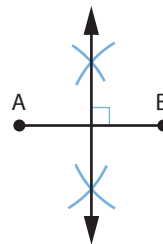
Construction of a perpendicular bisector of $\overline{AB}$

perpetual calendar A table that can be used to determine the correct day of the week for any date in a wide range of years.

personal-measurement reference A convenient approximation for a standard unit of measurement. For example, many people have thumbs that are approximately one inch wide. See Section 14.1: Personal Measures.

perspective drawing A drawing that realistically represents a 3-dimensional object on a 2-dimensional surface. See Section 13.5.4: Connecting 2-D and 3-D.

per-unit rate A *rate* with 1 unit of something in the denominator. Per-unit rates tell how many of one thing there are for 1 unit of another thing. For example, *3 dollars per gallon, 12 miles per hour,* and *1.6 children per family* are 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. The symbol π is the 16th letter of the Greek alphabet. See Section 13.4.3: Circles and Pi (π).

pictograph A graph constructed with pictures or symbols. See Section 12.2.3: Organizing and Displaying Data.

Trees Planted in Park

A pictograph

Glossary
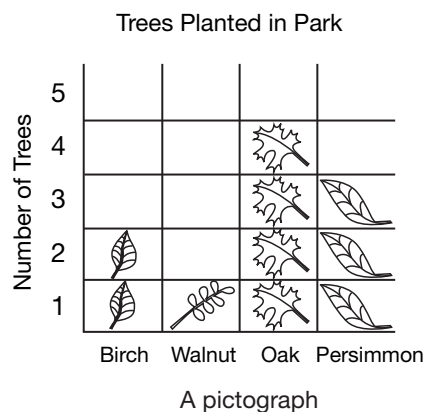
pie graph Same as *circle graph*.

pint (pt) A U.S. customary unit of *volume* or *capacity* equal to 2 cups, or 16 fluid ounces. A handy saying to remember is *A pint's a pound the world around,* meaning that a pint of water weighs about 1 pound. See the Tables of Measures and Section 14.5: Volume (Capacity).

place value A system that gives a *digit* a value according to its position, or place, in a number. In our standard, *base-ten* (decimal) system for writing numbers, each place has a value 10 times that of the place to its right and 1 tenth the value of the place to its left.

| thousands	hundreds	tens	ones	.	tenths	hundredths

A place-value chart

plane In *Everyday Mathematics*, a *2-dimensional* flat surface that extends forever in all directions. In formal Euclidean geometry, plane is an undefined geometric term. See Section 13.4: Planes and Plane Figures.
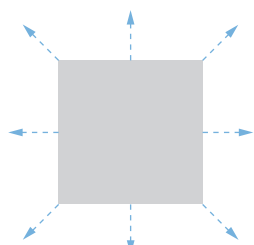

A plane

plane figure A *2-dimensional figure* that is entirely contained in a single *plane*. For example, triangles, squares, pentagons, circles, and parabolas are plane figures; lines, rays, cones, cubes, and prisms are not. See Section 13.4: Planes and Plane Figures.

point In *Everyday Mathematics,* an exact location in space. Points are usually labeled with capital letters. In formal Euclidean geometry, point is an undefined geometric term. See Section 13.2: Points.
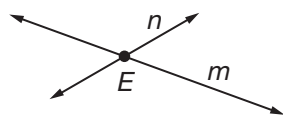

Lines *m* and *n* intersect at point *E*.

point symmetry (1) A figure has point symmetry if it is a *reflection* image of itself through a center of symmetry *C*. A line through *C* and a point *M* on the figure intersects the reflection image at point *M'* where the length of $\overline{CM}$ equals the length of $\overline{CM'}$. (2) Point symmetry is the same as *rotation symmetry* around point *C* through a 180° turn.
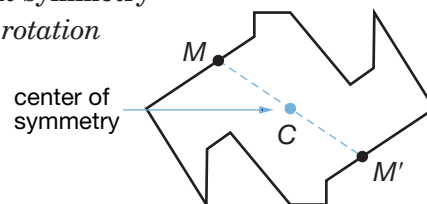
A polygon with point symmetry through *C*.

poly- A prefix meaning many.

polygon A *2-dimensional figure* formed by three or more line segments *(sides)* that meet only at their endpoints *(vertices)* to make a closed path. The sides may not cross one another. See Section 13.4.2: Polygons *(n-gons).*
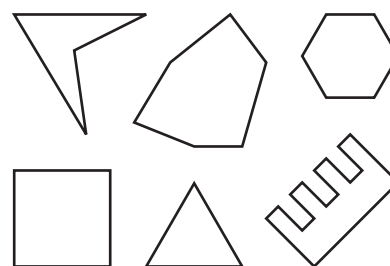
Polygons

polyhedron A *3-dimensional figure* formed by *polygons* with their interiors *(faces)* and having no holes. Plural is polyhedrons or polyhedra. See Section 13.5.2: Polyhedrons.
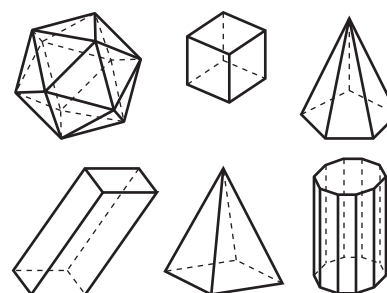
Polyhedrons

population (1) The total number of people living within a defined geographic region. (2) In data collection, the group of people or objects that is the focus of study. Large populations are often studied by picking a representative *random sample* from the population. See Section 12.2.2: Collecting and Recording Data.

Glossary

population density The number of people living in a defined geographic region, usually given as a *rate,* such as *876 people per square mile.*

positive numbers Numbers greater than 0; the opposites of the *negative numbers.* Positive numbers are plotted to the right of 0 on a horizontal number line or above 0 on a vertical number line. See Section 9.4: Positive and Negative Numbers.

positive power of 10 A number that can be written in the form 10^a, where a is a *counting number.* That is, the numbers 10, 100, 1,000, and so on, that can be written using only 10s as factors. Compare to *negative power of 10.* See Section 10.1.2: Powers and Exponents.

positive rational numbers *Rational numbers* greater than 0; the opposites of the *negative rational numbers.* For example, 7, $\frac{4}{3}$, $\frac{1}{1,000}$, 0.01, 8.125, and 5.111 . . . are positive rational numbers. See Section 9.4: Positive and Negative Numbers.

poster In *Everyday Mathematics,* a page displaying a collection of illustrated numerical data. A poster may be used as a source of data for developing *number stories.*

pound (lb) A U.S. customary unit of *weight* equal to 16 ounces and defined as 0.45359237 kilograms. See the Tables of Measures and Section 14.6: Weight and Mass.

power Same as *exponent.*

power of a number A *product* of *factors* that are all the same; the result of a^b for any numbers a and b. For example, $5^3 = 5 * 5 * 5 = 125$ is read "5 to the third power" or "the third power of 5" because 5 is a factor three times. See *exponential notation* and Section 10.1.2: Powers and Exponents.

power of 10 (1) In *Everyday Mathematics,* a number that can be written in the form 10^a, where a is a *counting number.* That is, the numbers $10 = 10^1$, $100 = 10^2$, $1,000 = 10^3$, and so on, that can be written using only 10s as factors. Same as *positive power of 10.* (2) More generally, a number that can be written in the form 10^a, where a is an *integer.* That is, all the *positive* and *negative powers of 10* together, along with $10^0 = 1$. See Section 10.1.2: Powers and Exponents.

precise Exact or accurate.

precise calculations The more accurate measures or other data are, the more *precise* any calculations using those numbers can be. See *significant digits* and Section 16.2: Approximation and Rounding.

precise measures The smaller the *scale* of a measuring tool, the more *precise* a measurement can be. For example, a measurement to the nearest inch is more precise than a measurement to the nearest foot. A ruler with $\frac{1}{16}$-inch markings can be more precise than a ruler with only $\frac{1}{4}$-inch markings, depending on the skill of the person doing the measuring.

predict In mathematics, to say what will happen in the future based on experimental data or theoretical calculation.

prediction line A *line* on a graph of *data* that is used to predict values that are not in the data set. In statistics, prediction lines can be fit to data using a technique called regression analysis. In elementary school, prediction lines are usually drawn "by eye" to pass as close as possible to plotted data points.
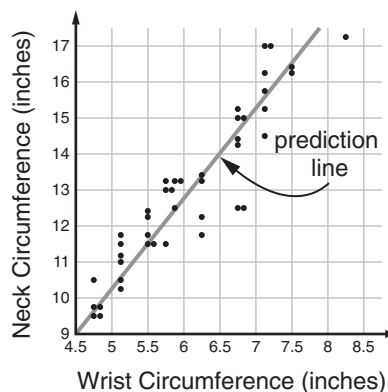
preimage The original figure in a *transformation.* Compare to *image.* See Section 13.7: Transformations.
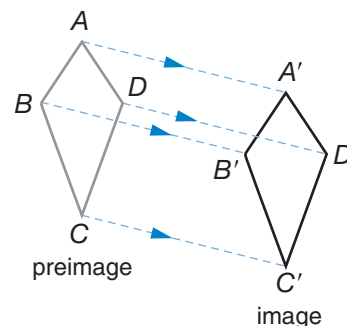
prime factorization A *counting number* written as a product of *prime-number* factors. Every counting number greater than 1 has a unique prime factorization. For example, the prime factorization of 24 is $2 * 2 * 2 * 3$. See Section 9.8.1: Prime and Composite Numbers: Divisibility.

prime meridian An imaginary *semicircle* on Earth that connects the North and South Poles through Greenwich, England. See *lines of longitude* and Section 15.4.4: The Global Grid System.

prime number A *counting number* greater than 1 that has exactly two whole-number factors, 1 and itself. For example, 7 is a prime number because its only factors are 1 and 7. The first five prime numbers are 2, 3, 5, 7, and 11. Also simply called primes. Compare to *composite number*. See Section 9.8.1: Prime and Composite Numbers: Divisibility.
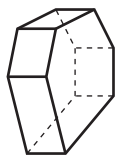
prism A *polyhedron* with two parallel and congruent polygonal regions for *bases* and lateral *faces* formed by all the line segments with endpoints on corresponding edges of the bases. The lateral faces are all parallelograms. Lateral faces intersect at lateral *edges.* In a *right prism,* the lateral faces are rectangular. Prisms get their names from the shape of their bases. See Section 13.5.2: Polyhedrons.

A triangular prism   A rectangular prism   A hexagonal prism

probability A number from 0 through 1 giving the likelihood that an *event* will happen. The closer a probability is to 1, the more likely the event is to happen. The closer a probability is to 0, the less likely the event is to happen. For example, the probability that a fair coin will show HEADS is $\frac{1}{2}$. See Section 12.1: Probability.

Probability Meter In *Fifth* and *Sixth Grade Everyday Mathematics,* a tool used to show probabilities as fractions, decimals, and percents. See Section 12.4.2: Probability Meter.

probability tree diagram A drawing used to analyze a *probability* situation that consists of two or more choices or stages. For example, the branches of the probability tree diagram below represent the four *equally likely outcomes* of HEADS H and TAILS T when one coin is flipped two times. See Section 12.4.3: Tree Diagrams.

H   T

H   T   H   T
(H,H) (H,T)   (T,H) (T,T)
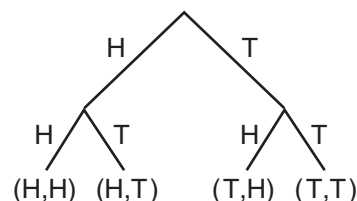
product The result of multiplying two numbers, called *factors*. For example, in $4 * 3 = 12$, the product is 12.

program a calculator To instruct a calculator to repeat a calculation using its *memory* instead of having the user enter a key sequence over and over. In *Everyday Mathematics,* students program their calculators to skip count using the machines' built-in constant operation feature. See Section 3.1.1: Calculators.

Project In *Everyday Mathematics,* a thematic activity to be completed in one or more days by small groups or by a whole class. Projects often involve collecting and analyzing data and are usually cross-curricular in nature. See Section 1.2.7: Projects.

proper factor Any *factor* of a counting number except the number itself. For example, the factors of 10 are 1, 2, 5, and 10, and the proper factors of 10 are 1, 2, and 5. See Section 9.8.1: Prime and Composite Numbers: Divisibility.

proper fraction A *fraction* in which the numerator is less than the denominator. A proper fraction is between -1 and 1. For example, $\frac{3}{4}$, $-\frac{2}{5}$, and $\frac{12}{24}$ are proper fractions. Compare to *improper fraction*. *Everyday Mathematics* does not emphasize these distinctions.

property (1) A generalized statement about a mathematical relationship such as the *Distributive Property of Multiplication over Addition*. (2) Same as *attribute*.

proportion A *number model* equating two *fractions*. 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?* is modeled by the proportion

$$\frac{12 \text{ miles}}{1 \text{ hour}} = \frac{n \text{ miles}}{3 \text{ hours}}.$$

See Section 9.3.3: Rates, Ratios, and Proportions and Section 17.2.4: Solving Open Sentences.

protractor A tool used for measuring or drawing *angles*. A half-circle protractor can be used to measure and draw angles up to 180°. A full-circle protractor can be used to measure and draw angles up to 360°. One of each type is on the *Geometry Template.* See Section 14.11.2: Protractors and the Percent Circle.

A half-circle protractor

A full-circle protractor
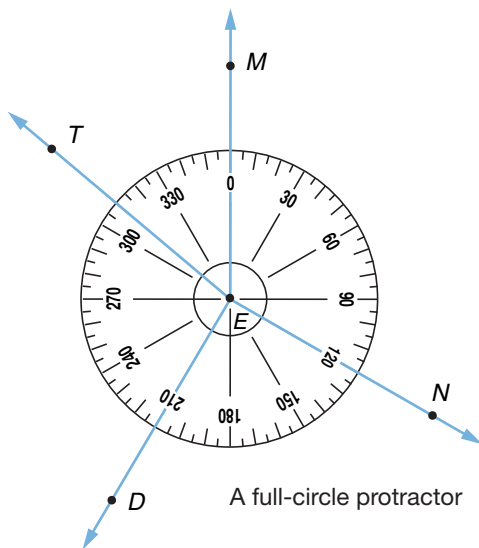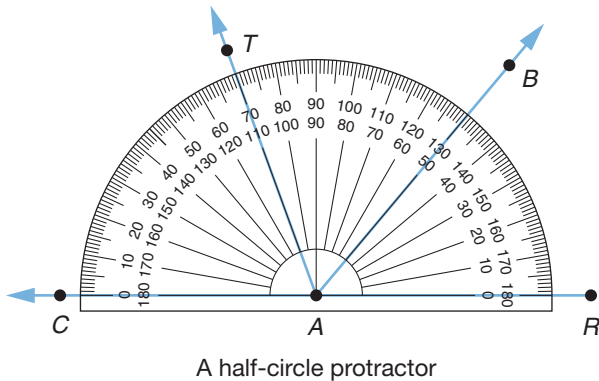
pyramid A *polyhedron* made up of any polygonal region for a *base,* a vertex *(apex)* not in the plane of the base, and all of the line segments with one endpoint at the apex and the other on an edge of the base. All faces except perhaps the base are triangular. Pyramids get their name from the shape of their base. See Section 13.5.2: Polyhedrons.

A hexagonal pyramid   A square pyramid
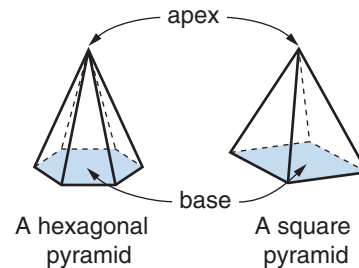
Pythagorean theorem If the *legs of a right triangle* have lengths a and b and the *hypotenuse* has length c, then $a^2 + b^2 = c^2$. See Section 13.4.2: Polygons (n-gons).
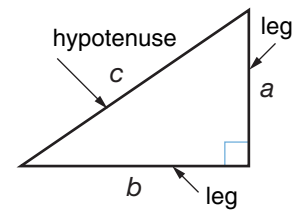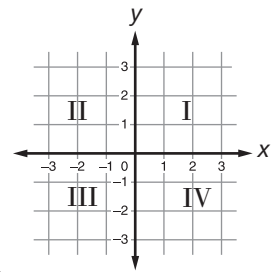
Q

quad- A prefix meaning four.

quadrangle Same as *quadrilateral*.

quadrant One of the four sections into which a *rectangular coordinate grid* is divided by the two axes. The quadrants are typically numbered I, II, III, and IV counterclockwise beginning at the upper right.

quadrilateral A 4-sided *polygon*. See *square, rectangle, parallelogram, rhombus, kite, trapezoid,* and Section 13.4.2: Polygons (n-gons).
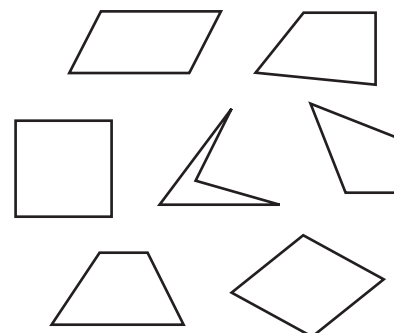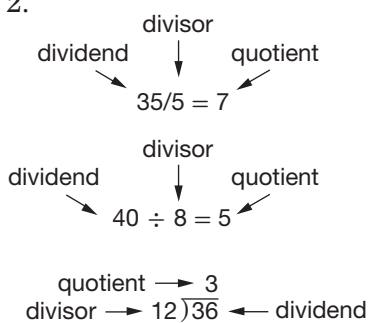
Quadrilaterals

quart A U.S. customary unit of *volume* or *capacity* equal to 32 fluid ounces, 2 pints, or 4 cups. See the Tables of Measures and Section 14.5: Volume (Capacity).

quick common denominator The *product* of the *denominators* of two or more *fractions*. For example, the quick common denominator of $\frac{3}{4}$ and $\frac{5}{6}$ is $4 * 6 = 24$. In general, the quick common denominator of $\frac{a}{b}$ and $\frac{c}{d}$ is $b * d$. 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*. See Section 11.3.5: Fraction Division.

quotient The result of dividing one number by another number. For example, in $10/5 = 2$, the quotient is 2.

divisor
dividend   quotient
$35/5 = 7$

divisor
dividend   quotient
$40 \div 8 = 5$

quotient ⟶ 3
divisor ⟶ 12$\overline{)36}$ ⟵ dividend

quotitive division Same as *measurement division*.

R

radius (1) A *line segment* from the center of a *circle* (or *sphere*) to any point on the circle (or sphere). (2) The length of this line segment. The length of a radius is half the length of a *diameter*. Plural is radiuses or radii. See Section 13.4.3: Circles and Pi (π).
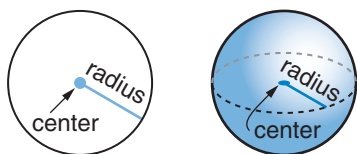
random draw Taking an object from a set of objects in which each object has an *equally likely* chance of being chosen. For example, drawing a card from a deck and drawing a domino from a bag of dominoes are random draws. See Section 12.1.2: The Language of Chance.

random experiment An experiment in which all *outcomes* are *equally likely*. No one outcome is more predictable than any other. See Section 12.1.2: The Language of Chance.

random number A number produced by a *random experiment,* such as rolling a die or spinning a spinner. For example, rolling a fair die produces random numbers because each of the six possible numbers 1, 2, 3, 4, 5, and 6 has the same chance of coming up. See Section 12.1.2: The Language of Chance.

random sample A *sample* that gives all members of the *population* the same chance of being selected. See Section 12.2.2: Collecting and Recording Data.

range The *difference* between the *maximum* and the *minimum* in a set of data. Used as a measure of the spread of the data. See Section 12.2.4: Data Analysis.

rank (1) To put in order by size; to sort from smallest to largest or vice versa. (2) A row in an *array.* In the military, rows and columns of rectangular formations are sometimes called rank and file, respectively.

rate A comparison by division of two quantities with different *units.* For example, traveling 100 miles in 2 hours is an average rate of $\frac{100 \text{ mi}}{2 \text{ hr}}$, or 50 miles per hour. Compare to *ratio.* See Section 9.3.3: Rates, Ratios, and Proportions and Section 10.3.2: Multiplication and Division Use Classes.

rate diagram A diagram used in *Everyday Mathematics* to model *rate* situations. The diagram includes two quantities and the rate comparing them. See *situation diagram* and Section 10.3.2: Multiplication and Division Use Classes.

rows	chairs per row	chairs
6	4	?

A rate diagram

rate-multiplication story A *number story* in which one quantity is a *rate* times another quantity. A typical rate is *speed,* which multiplied by a time traveled gives distance traveled. There are many other rates such as price per pound or hours per person. For example, *8 people work a total of 20 hours. What is the average number of work hours per person?* is a rate-multiplication story. See Section 10.3.2: Multiplication and Division Use Classes.

Glossary

rate table A display of *rate* information. In a rate table, the fractions formed by the two numbers in each column are *equivalent fractions*. For example, $\frac{35}{1} = \frac{70}{2}$ in the table below. See Section 10.3.2: Multiplication and Division Use Classes.

miles	35	70	105	140	175	210
gallons	1	2	3	4	5	6

rate unit A compound *unit* for a *rate*. For example, *miles per hour, dollars per pound,* and *words per minute* are rate units. See Section 9.3.3: Rates, Ratios, and Proportions.

ratio A comparison by division of two quantities with the same *units.* Ratios can be fractions, decimals, percents, or stated in words. Ratios can also be written with a colon between the two numbers being compared. For example, if a team wins 3 games out of 5 games played, the ratio of wins to total games is $\frac{3}{5}$, 3/5, 0.6, 60%, 3 to 5, or 3:5 (read "three to five"). Compare to *rate.* See Section 9.3.3: Rates, Ratios, and Proportions.

rational numbers Numbers that can be written in the form $\frac{a}{b}$, where a and nonzero b are *integers*. The decimal form of a rational number either terminates or repeats. For example, $\frac{2}{3}$, $-\frac{2}{3}$, 0.5, 20.5, and 0.333 . . . are rational numbers. See Section 9.3: Fractions, Decimals, Percents, and Rational Numbers.

ray A part of a *line* starting at the ray's *endpoint* and continuing forever in one direction. A ray is often named by its endpoint and another point on it. See Section 13.3: Lines, Segments, and Rays.

Ray *MN* or $\overrightarrow{MN}$
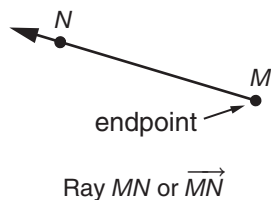
r-by-c array A rectangular arrangement of elements with r rows and c elements per row. Among other things, an r-by-c array models r sets with c objects per set. Although listing rows before columns is arbitrary, it is in keeping with the order used in matrix notation, which students will study later in school.

real numbers All *rational* and *irrational numbers;* all numbers that can be written as decimals. For every real number there is a corresponding point on a number line, and for every point on the number line there is a real number. See Section 9.6: Real Numbers.

recall survey A *survey* in which data are gathered by asking people what they remember about a particular topic. For example, a recall survey might ask people to list what soft drinks they consumed in the previous week.

reciprocals Two numbers whose product is 1. For example, 5 and $\frac{1}{5}$, $\frac{3}{5}$ and $\frac{5}{3}$, and 0.2 and 5 are pairs of reciprocals. Same as *multiplicative inverses*.

rectangle A *parallelogram* with all *right angles.* See Section 13.4.2: Polygons (*n*-gons).

rectangle method A strategy for finding the *area* of a *polygon* in which one or more *rectangles* are drawn around all or parts of the polygon though its vertices. The sides of the drawn rectangle(s), together with the sides of the original figure, define regions that are either rectangles or triangular halves of rectangles. Add and/or subtract the areas of these rectangular and triangular regions to get the area of the original polygon. For example, rectangle *RYSX* was drawn around the original triangle *XYZ* below.
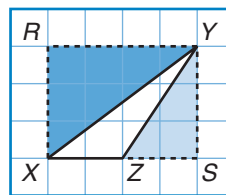
Area of △*XYZ* = area of rectangle *RYSX* −
area of △*XYR* − area of △*YZS*

rectangular array An arrangement of objects in *rows* and *columns* that form a *rectangle*. All rows have the same number of objects, and all columns have the same number of objects. See r-*by*-c *array* and Section 10.3.2: Multiplication and Division Use Classes.
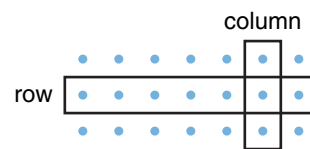

A rectangular array

rectangular coordinate grid (1) In *Everyday Mathematics,* same as *coordinate grid.* (2) A coordinate grid with perpendicular *axes.* See Section 15.3.2: 2- and 3-Dimensional Coordinate Systems.

Glossary

rectangular prism A *prism* with rectangular *bases.* The four faces that are not bases are either *rectangles* or *parallelograms.* For example, a shoe box models a rectangular prism in which all sides are rectangles. See Section 13.5.2: Polyhedrons.
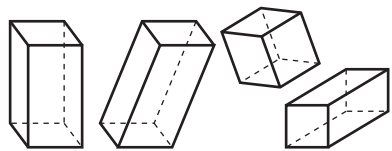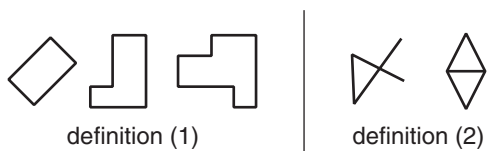
Rectangular prisms

rectangular pyramid A *pyramid* with a rectangular *base*. See Section 13.5.2: Polyhedrons.
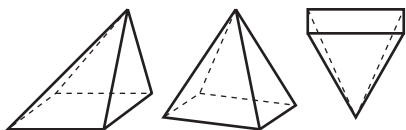
Rectangular pyramids

rectilinear figure (1) In *Everyday Mathematics,* a closed *2-dimensional* shape having *line segments* for *sides* and only 90° or 270° *angles.* (2) Any shape made up of *line segments.*

definition (1)   definition (2)

rectilinear figures

reduce To decrease the size of an object or figure without changing its shape. Same as *shrink.* See *size-change factor* and Section 13.7.2: Size-Change Transformations.

reduce a fraction To rewrite a fraction in a *simpler form.* See *simplest form of a fraction* and Section 9.3.1: Fraction and Decimal Notation.

reference frame A system for locating numbers within a given context, usually with reference to an *origin* or *zero point.* For example, number lines, clocks, calendars, temperature scales, and maps are reference frames. See Chapter 15: Reference Frames.

reflection A point A' is a reflection *image* of a point A over a *line of reflection l* if A' and A are the same distance from l on a line perpendicular to l. If all points on one figure are reflection images of all the points on another figure over the same line, the figures are reflection images. Informally called a *flip.* See Section 13.7.1: Reflections, Rotations, and Translations.
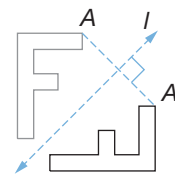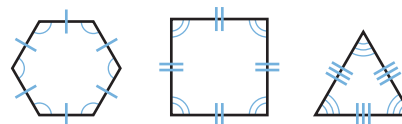
A reflection

reflex angle An *angle* with a measure between 180° and 360°. See Section 13.4.1: Angles and Rotations.
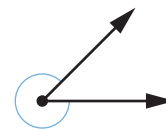
A reflex angle

regular polygon A *polygon* in which all *sides* are the same length and all *angles* have the same measure. See Section 13.4.2: Polygons (*n*-gons).
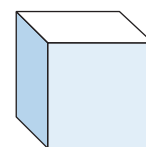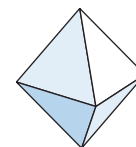
Regular polygons

regular polyhedron A *polyhedron* whose faces are all *congruent regular polygons* and in which the same number of faces meet at each *vertex*. The five regular polyhedrons, known as the Platonic solids, are shown below.
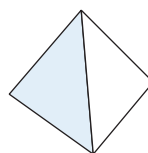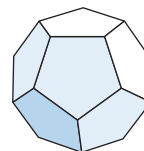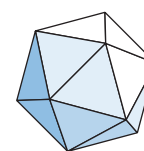
A tetrahedron
(4 equilateral
triangles)

A cube
(6 squares)

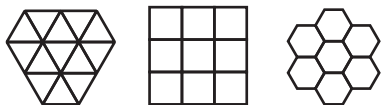An octahedron
(8 equilateral
triangles)

A dodecahedron
(12 regular pentagons)

An icosahedron
(20 equilateral triangles)

Glossary

regular tessellation A *tessellation* of one *regular polygon*. The only three regular tessellations are shown below. See Section 13.10: Tessellations.

Samples of the three regular tessellations

relation symbol A symbol used to express a relationship between two quantities. See Section 10.2: Reading and Writing Number Sentences.

Relation	Meaning
=	is equal to
≠	is not equal to
<	is less than
>	is greater than
≤	is less than or equal to
≥	is greater than or equal to
≈	is approximately equal to

remainder An amount left over when one number is divided by another number. For example, in 16/3 → 5 R1, the *quotient* is 5 and the remainder R is 1. See Section 10.1.1: The Four Basic Arithmetic Operations.

repeating decimal A *decimal* in which one *digit* or a group of digits is repeated without end. For example, 0.3333. . . and $0.\overline{147}$ are repeating decimals. Compare to *terminating decimal*. See Section 9.3.1: Fraction and Decimal Notation.

revolution Movement on a circle or other closed curve around some point. The planets revolve around the sun in nearly-circular elliptical orbits.

rhombus A *parallelogram* with all sides the same length. All rhombuses are parallelograms. Every square is a rhombus, but not all rhombuses are squares. Also called a diamond. Plural is rhombuses or rhombi. See Section 13.4.2: Polygons (*n*-gons).
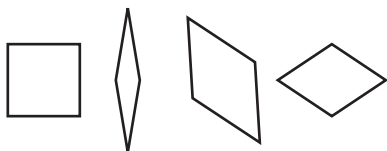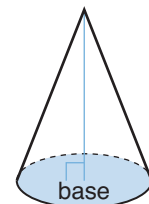

Rhombuses

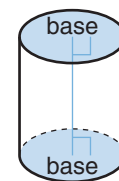**right angle** A 90° *angle*. See Section 13.4.1: Angles and Rotations.
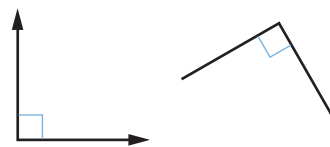
Right angles

right cone or pyramid A *cone* or *pyramid* whose *base* is perpendicular to the line segment joining the *apex* and the center of the base. See Section 13.5.2: Polyhedrons and Section 13.5.3: Solids with Curved Surfaces.

A right cone

right cylinder A *cylinder* whose *bases* are perpendicular to the line segment joining the centers of the bases. See Section 13.5.3: Solids with Curved Surfaces.
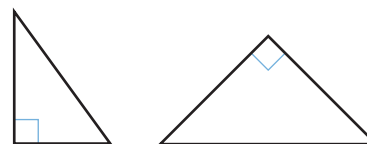

A right cylinder

right prism A *prism* whose *bases* are perpendicular to all of the *edges* that connect the two bases. See Section 13.5.2: Polyhedrons.
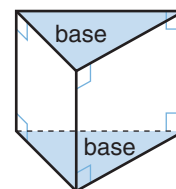
A right triangular prism

right triangle A *triangle* with a *right angle*. See Section 13.4.2: Polygons (*n*-gons).


Right triangles

Glossary

Roman numerals Letters that are used alone and in combination to represent numbers in an ancient Roman system of *numeration*. Roman numerals are found on clocks, building cornerstones, preliminary pages in books, movie copyright dates, and other places.

Roman Numerals		
I = 1	X = 10	C = 100
II = 2	XX = 20 (2 tens)	CC = 200
III = 3	XXX = 30 (3 tens)	CCC = 300
IV = 4	XL = 40 (50 less 10)	CD = 400
V = 5	L = 50	D = 500
VI = 6	LX = 60 (50 plus 10)	CM = 900
VII = 7	LXX = 70 (50 plus 20)	M = 1,000
VIII = 8	LXXX = 80 (50 plus 30)	$\overline{X}$ = 10,000
IX = 9	XC = 90 (100 less 10)	$\overline{C}$ = 100,000
		∞ = 100,000,000 or infinity

rotation (1) A point P' is a rotation *image* of a point P around a center of rotation C if P' is on the *circle* with center C and radius CP. If all the points in one figure are rotation images of all the points in another figure around the same center of rotation and with the same angle of rotation, the figures are rotation images. The center can be inside or outside of the original image. Informally called a *turn*. See Section 13.7.1: Reflections, Rotations, and Translations. (2) If all points on the image of a *3-dimensional figure* are rotation images around a point on a line called the axis of rotation, then the image is a rotation image of the original figure.

C
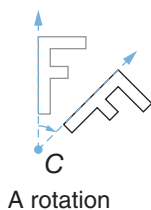
A rotation

rotation symmetry A figure has rotation symmetry if it is the *rotation* image of itself after less than a 360° turn around a center or axis of rotation. See Section 13.8.2: Rotation and Point Symmetries.
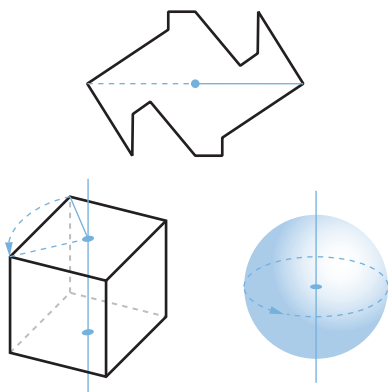
Shapes with rotation symmetry

round (1) To approximate a number to make it easier to work with, or to make it better reflect the precision of the data. "Rounding up" means to approximate larger than the actual value. "Rounding down" means to approximate smaller than the actual value. See *round to the nearest* and Section 16.2: Approximation and Rounding. (2) Circular in shape.

round to the nearest To *round* a number up or down in a particular decimal place, depending on which approximation is closer to the actual value. See Section 16.2: Approximation and Rounding.

row (1) A horizontal arrangement of objects or numbers in an *array* or table. (2) A horizontal section of *cells* in a *spreadsheet*. See Section 3.1.3: Spreadsheets.

rubber-sheet geometry Same as *topology*.

S

same-change rule for subtraction A subtraction *algorithm* in which the same number is added to or subtracted from both numbers. See Section 11.2.2: Subtraction Algorithms.

sample A part of a *population* intended to represent the whole population. See *random sample* and Section 12.2.2: Collecting and Recording Data.

**scale** (1) The relative size of something. (2) Same as *scale factor*. (3) A tool for measuring *weight*. See Section 14.6: Weight and Mass.

scale of a map Same as *map scale*.

scale of a number line The *unit interval* on a number line or measuring device. The scales on this ruler are 1 millimeter on the left side and $\frac{1}{16}$ inch on the right side. See Section 9.9.2: Number Grids, Scrolls, and Lines.

Glossary

scale drawing A drawing of an object in which all parts are drawn to the same *scale* to the object. For example, architects and builders use scale drawings traditionally called blueprints. A map is a scale drawing of a geographical region. See *scale factor* and Section 15.4.2: Map and Model Scales.
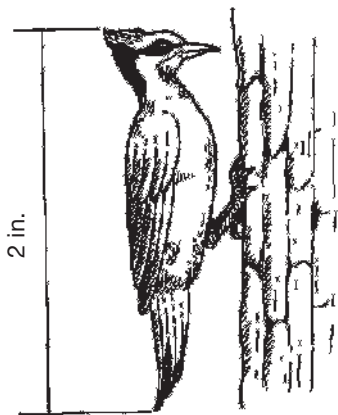
A woodpecker (8 in.) to $\frac{1}{4}$ scale

scale factor (1) The *ratio* of lengths on an *image* and corresponding lengths on a *preimage* in a *size change*. Same as *size-change factor*. See Section 13.7.2: Size-Change Transformations. (2) The ratio of lengths in a *scale drawing* or *scale model* to the corresponding lengths in the object being drawn or modeled. See Section 15.4.2: Map and Model Scales.

scale model A model of an object in which all parts are made to the same *scale* to the object. For example, many model trains or airplanes are scale models of actual vehicles. See *scale factor* and Section 15.4.2: Map and Model Scales.

scalene triangle A *triangle* with sides of three different lengths. The three angles of a scalene triangle have different measures. See Section 13.4.2: Polygons (*n*-gons).

scientific calculator A calculator that can display numbers using *scientific notation*. Scientific calculators follow the *algebraic order of operations* and can calculate a *power of a number,* a *square root,* and several other functions beyond simple 4-function calculators. Some scientific calculators let you enter and do arithmetic with *fractions*. See Section 3.1.1: Calculators.

scientific notation A way of writing a number 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 large and small numbers with only a few symbols. For example, in scientific notation, 4,300,000 is $4.3 * 10^6$, and 0.00001 is $1 * 10^{-5}$. *Scientific calculators* display numbers in scientific notation. Compare to *standard notation* and *expanded notation*. See Section 10.1.2: Powers and Exponents.

second (s or sec) (1) A unit of time defined as $\frac{1}{31,556,925.9747}$ of the tropical year at midnight Eastern Time on New Year's Day, 1900. There are 60 seconds in a minute. (2) An *ordinal number* in the sequence *first, second, third, ...*

sector A region bounded by and including an *arc* and two *radii* of a circle. A sector resembles a slice of pizza. *Circle graphs* are made with sectors corresponding to parts of a data set. Also called a wedge.
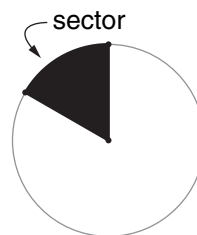
segment Same as *line segment*.

semicircle (1) Half of a *circle*. (2) Half of a circle and the *diameter* between the endpoints of the arc. Sometimes the interior of this closed figure is also included. See *circle* and Section 13.4.3: Circles and Pi (π).

A semicircle

Glossary
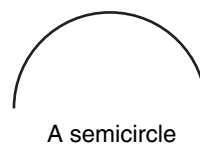
semiregular tessellation A *tessellation* made with *congruent* copies of two or more different *regular polygons.* The same combination of polygons must meet in the same order at each *vertex point,* and the angles at each vertex point must add up to 360°. There are eight semiregular tessellations. Compare to *regular tessellation.* See *name of a tessellation* and Section 13.10.1: Classifying Tessellations.
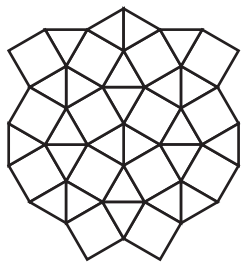
A 3.3.4.3.4 semiregular tessellation

sequence A list of numbers, often with an underlying rule that may be used to generate subsequent numbers in the list. *Frames-and-Arrows* diagrams are used to represent sequences. See Section 17.1.2: Sequences.

set A collection or group of objects, numbers, or other items.

short-term memory *Memory* in a calculator used to store values for immediate calculation. Short-term memory is usually cleared with a $\boxed{C}$, $\boxed{AC}$, $\boxed{Clear}$, or similar key. Compare to *long-term memory.* See Section 3.1.1: Calculators.

shrink Same as *reduce.*

side (1) One of the *line segments* that make up a *polygon*. (2) One of the *rays* or *segments* that form an *angle*. (3) One of the *faces* of a *polyhedron*.

side-by-side bar graph A *bar graph* that uses pairs of bars to compare two related data sets. The graph below compares road miles and air miles from Los Angeles to different cities. See Section 12.2.3: Organizing and Displaying Data.

Miles from Los Angeles
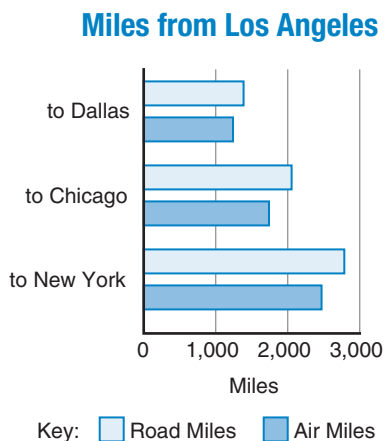
A side-by-side bar graph

Sieve of Eratosthenes A method for identifying *prime numbers* named for Eratosthenes (circa 276–194 B.C.), a mathematician and head librarian at the Great Library in Alexandria, Egypt.

To find all prime numbers less than *n:*

1. List all the counting numbers from 2 to *n*.
2. Circle 2. Cross out all the multiples of 2 greater than 2.
3. Circle the first number that is not crossed out. Cross out all the multiples of that number.
4. Repeat Step 3 until the first uncircled and uncrossed number is greater than $\sqrt{n}$. At this point, the numbers that are not crossed out are all the prime numbers less than or equal to *n*.

Sieve of Eratosthenes for primes less than 25

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. In general, calculations should not produce results with more significant digits than the original numbers. See *scientific notation* and Section 16.2: Approximation and Rounding.

similar figures Figures that have the same shape, but not necessarily the same size. Compare to *congruent*. See Section 13.6.2: Congruence and Similarity.
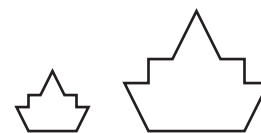
Similar polygons

simpler form of a fraction A *fraction* renamed as an *equivalent fraction* with a smaller numerator and smaller denominator. To put a fraction in simpler form, divide both the numerator and the denominator by a common factor greater than 1. For example, divide the numerator and the denominator of $\frac{18}{24}$ by 2 to get the simpler form $\frac{9}{12}$.

Glossary

simplest form of a fraction A *fraction* that cannot be renamed in *simpler form*. Same as *lowest terms of a fraction*. A *mixed number* is in simplest form if its fractional part is in simplest form.

**simplify a fraction** To write a fraction in *simplest form*.

simplify an expression To rewrite an *expression* by clearing grouping symbols and combining *like terms* and *constants*. For example, $7y + 4 + 5 + 3y$ simplifies to $10y + 9$ and $3(2k + 5) - k$ simplifies to $5k + 15$. Equations with simplified expressions are often easier to solve. For example, $2(a + 4) = 4a + 1 + 3$ simplifies to $2a + 8 = 4a + 4$. This step is sometimes called "simplifying the equation," although a completely simplified equation is the solution $2 = a$. See Section 17.2.3: Simplifying Expressions.

situation diagram A diagram used to organize information in a problem situation in one of the *addition/subtraction* or *multiplication/division use classes*. See Section 10.3: Use Classes and Situation Diagrams.

size change A *transformation* in which the *image* of a figure is a an enlargement *(stretch)* or reduction *(shrink)* of the original figure by a given *scale factor*. See Section 13.7.2: Size-Change Transformations.

size-change factor Same as *scale factor*.

skew lines *Lines* in space that do not lie in the same *plane*. Skew lines do not *intersect* and are not *parallel*. An east-west line on the floor and a north-south line on the ceiling are skew. See Section 13.6.1: Perpendicular and Parallel.
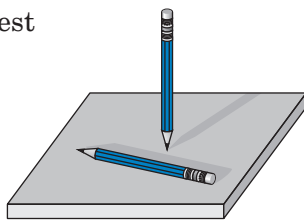
Skew lines can be modeled with two pencils.

slanted (oblique) cylinder, cone, prism, or pyramid A *cylinder, cone, prism,* or *pyramid* that is not a *right cylinder, right cone, right prism,* or *right pyramid*.
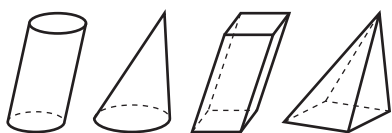
A slanted (oblique) cylinder, cone, prism, and pyramid

slate A lap-size (about 8-inch by 11-inch) chalkboard or whiteboard that children use in *Everyday Mathematics* for recording responses during group exercises and informal group assessments. See Section 1.2.8: Slates.

slide An informal name for a *translation*. See Section 13.7.1: Reflections, Rotations, and Translations.

slide rule An *Everyday Mathematics* tool for adding and subtracting integers and fractions.

Fraction Slider

slider fits inside holder

Fraction Holder

fold line
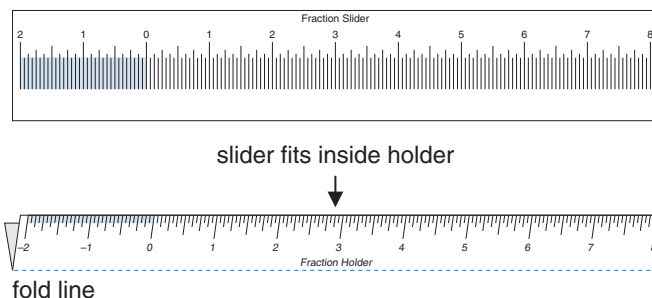
An *Everyday Mathematics* slide rule

solution of an open sentence A value or values for the *variable(s)* in an *open sentence* that make the sentence true. For example, 7 is a solution of $5 + n = 12$. Although equations are not necessarily open sentences, the solution of an open sentence is commonly referred to as a solution of an equation. See Section 17.2.4: Solving Open Sentences.

solution of a problem (1) The method by which an answer to a problem is obtained. (2) The answer to a problem. See Chapter 18: Problem Solving.

solution set The set of all *solutions of an open sentence*. For example, the solution set of $x^2 = 25$ is $\{5, -5\}$ because substituting either 5 or -5 for x makes the sentence true.

span Same as *normal span*.

special case In *Everyday Mathematics,* a specific example of a *general pattern*. For example, $6 + 6 = 12$ is a special case of $y + y = 2y$ and $9 = 4.5 * 2$ is a special case of $A = l * w$. Same as *instance of a pattern*.

speed A *rate* that compares distance traveled with the time taken to travel that distance. For example, if a car travels 100 miles in 2 hours, then its average speed is $\frac{100 \text{ mi}}{2 \text{ hr}}$, or 50 miles per hour. See Section 9.3.3: Rates, Ratios, and Proportions.

Glossary

sphere The set of all points in space that are an equal distance from a fixed point called the *center of the sphere*. The distance from the center to the sphere is the *radius* of the sphere. The *diameter* of a sphere is twice its radius. Points inside a sphere are not part of the sphere. See Section 13.5.3: Solids with Curved Surfaces.
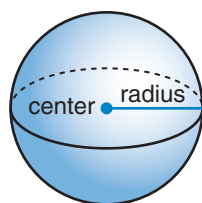

A sphere

spreadsheet program A computer application in which numerical information is arranged in *cells* in a grid. The computer can use the information in the grid to perform mathematical operations and evaluate *formulas*. When a value in a cell changes, the values in all other cells that depend on it are automatically changed. The name spreadsheet comes from ledger worksheets for financial records. Such sheets were often taped together and then spread out for examination. See Section 3.1.3: Spreadsheets.

|	A	B	C	D
		Class Picnic ($$)		
1		budget for class picnic		
2				
3	quantity	food items	unit price	cost
4	6	packages of hamburgers	2.79	16.74
5	5	packages of hamburger buns	1.29	6.45
6	3	bags of potato chips	3.12	9.36
7	3	quarts of macaroni salad	4.50	13.50
8	4	bottles of soft drinks	1.69	6.76
9			subtotal	52.81
10			8% tax	4.22
11			total	57.03

A spreadsheet

square A *rectangle* with all sides of equal length. All angles in a square are *right angles*. See Section 13.4.2: Polygons (*n*-gons).
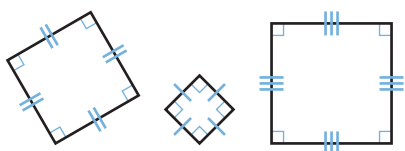
Squares

square array A rectangular *array* with the same number of *rows* as *columns*. For example, 16 objects will form a square array with 4 objects in each row and 4 objects in each column. See Section 10.3.2: Multiplication and Division Use Classes.
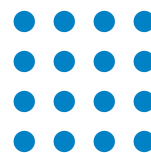
A square array

**square corner** Same as a *right angle*.

square numbers *Figurate numbers* that are the product of a *counting number* and itself. For example, 25 is a square number because $25 = 5 * 5$. A square number can be represented by a square *array* and as a number squared, such as $25 = 5^2$. See Section 10.1.2: Powers and Exponents and Section 17.1.2: Sequences.

square of a number *n* The product of *n* and itself, commonly written n^2. For example, $81 = 9 * 9 = 9^2$ and $3.5^2 = 3.5 * 3.5 = 12.25$. See Section 10.1.2: Powers and Exponents.

square pyramid A *pyramid* with a square *base*. See Section 13.5.2: Polyhedrons.

square root of a number *n* A number that multiplied by itself is *n*, commonly written $\sqrt{n}$. For example, 4 is a square root of 16, because $4 * 4 = 16$. Normally, square root refers to the positive square root, but the *opposite* of a positive square root is also a square root. For example, -4 is also a square root of 16 because $-4 * -4 = 16$.

square unit A unit to measure *area*. A model of a square unit is a square with each side a related unit of *length*. For example, a square inch is the area of a square with 1-inch sides. Square units are often labeled as the length unit squared. For example, 1 cm^2 is read "1 square centimeter" or "1 centimeter squared." See Section 14.4: Area.


Square units

Glossary
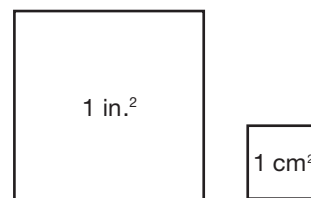
stacked bar graph A *bar graph* in which the bars are sub-divided to show additional information. A stacked bar graph shows how a total is made up of several parts. In this example, of all the boys, 30% are on 0 teams, about 45% are on 1 team, and the rest are on 2 or more teams. Compare to *side-by-side bar graph*. See Section 12.2.3: Organizing and Displaying Data.

Number of Sports Teams

Key:
☐ 0 teams
▨ 1 team
▨ 2 or more teams
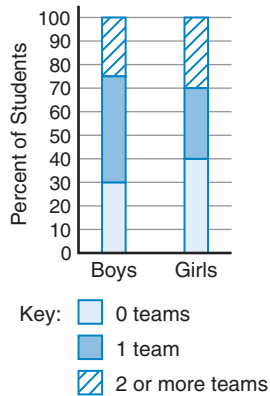
A stacked bar graph

standard notation Our most common way of representing *whole numbers, integers,* and *decimals.* Standard notation is *base-ten place-value* numeration. For example, standard notation for three hundred fifty-six is 356. Same as *decimal notation.* See Section 9.3.1: Fraction and Decimal Notation.

standard unit A unit of measure that has been defined by a recognized authority, such as a government or a standards organization. For example, *inches, meters, miles, seconds, pounds, grams,* and *acres* are all standard units. See Section 14.2: Measurement Systems.

stem-and-leaf plot A display of data values in which *digits* with larger place values are "stems" and digits with smaller place values are "leaves." See Section 12.2.3: Organizing and Displaying Data.

Data List: 24, 24, 25, 26, 27, 27, 31, 31, 32, 32, 36, 36, 41, 41, 43, 45, 48, 50, 52.

Stems (10s)	Leaves (1s)
2	4 4 5 6 7 7
3	1 1 2 2 6 6
4	1 1 3 5 8
5	0 2

step graph A *2-dimensional coordinate* graph that looks like steps because the vertical values of points are the same over an interval of horizontal values, and then change, or "step," for another interval. Horizontal values in a step graph often represent time. See Section 12.2.3: Organizing and Displaying Data.
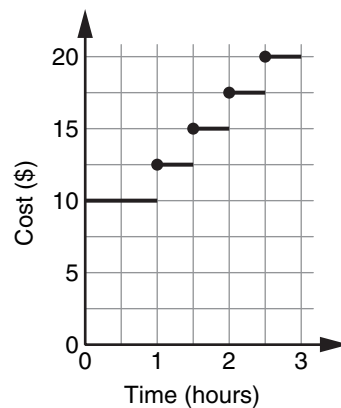
A step graph

straight angle A 180° *angle*. See Section 13.4.1: Angles and Rotations.

A straight angle

straightedge A tool used to draw *line segments.* Strictly speaking, a straightedge does not have a measuring *scale* on it, so ignore the marks if you use a ruler as a straightedge. Together, a *compass* and straightedge are used to construct geometric figures. See Section 13.13.1: Compass-and-Straightedge Constructions.

stretch Same as *enlarge.*

Study Links In *Fourth* through *Sixth Grade Everyday Mathematics,* a suggested follow-up or enrichment activity to be completed at home. See Section 1.2.10: Study Links.

substitute (1) To replace one thing with another. (2) To replace *variables* with numbers in an *expression* or *formula*. For example, substituting $b = 4.5$ and $h = 8.5$ in the formula $A = b * h$ gives $A = 4.5 * 8.5 = 38.25$. See Section 17.2.1: Uses of Variables.

subtrahend The number being taken away in a subtraction problem. For example, in $15 - 5 = 10$, the subtrahend is 5.

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

Glossary

summer solstice The longest day of the year, when the sun is farthest north of Earth's equator. The number of hours of daylight depends on the latitude of a location. In Colorado, the summer solstice averages a little less than 16 hours of daylight. Compare to *winter solstice*.

supplementary angles Two angles whose measures add to 180°. Supplementary angles do not need to be *adjacent*. Compare to *complementary angles*. See Section 13.6.3: Relations and Orientations of Angles.
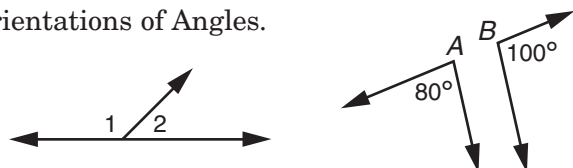
∠1 and ∠2; ∠A and ∠B
are two pairs of supplementary angles.

surface (1) The boundary of a 3-dimensional 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. See Section 13.5: Space and 3-D Figures. (2) Any 2-dimensional layer, such as a *plane* or a face of a *polyhedron*.

surface area The *area* of the *surface* of a *3-dimensional figure*. The surface area of a polyhedron is the sum of the areas of its faces. See the Tables of Formulas and Section 14.4.2: Area Formulas.

survey A study that collects *data*. Surveys are commonly used to study "demographics" such as people's characteristics, behaviors, interests, and opinions. See Section 12.2.2: Collecting and Recording Data.

symmetric figure A figure that exactly matches with its *image* under a *reflection* or *rotation*. See *line symmetry, point symmetry, rotation symmetry,* and Section 13.8: Symmetry.

symmetry The balanced distribution of points over a line or around a point in a *symmetric figure*. See *line symmetry, point symmetry, rotation symmetry,* and Section 13.8: Symmetry.

A figure with line symmetry

A figure with rotation symmetry

T

tally (1) To keep a record of a count, commonly by making a mark for each item as it is counted. (2) The mark used in a count. Also called tally mark and tick mark. See Section 12.2.2: Collecting and Recording Data.

tally chart A table to keep track of a *tally,* typically showing how many times each value appears in a set of data.

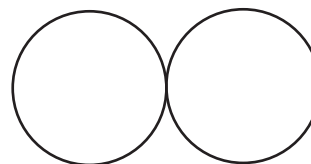| Number of Pull-Ups	Number of Children
0	~~HHH~~ /
1	~~HHH~~
2	////
3	//

A tally chart

tangent A *line, segment, ray,* or curve that *intersects* a curve or curved surface at exactly one point.
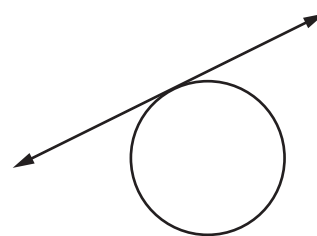
A line tangent to a circle

tangent circles Two *circles* with exactly one point in common.

Tangent circles

temperature How hot or cold something is relative to another object or as measured on a standardized *scale* such as *degrees Celsius* or *degrees Fahrenheit.* See Section 15.1: Temperature.

template In *Everyday Mathematics,* a sheet of plastic with geometric shapes cut out of it, used to draw patterns and designs. See Section 13.13.2: Pattern-Block and Geometry Templates.

term (1) In an *algebraic expression,* a number or a product of a number and one or more *variables.* For example, in the equation $5y + 3k = 8$, the terms are $5y$, $3k$, and 8. The 8 is a *constant* term, or simply a *constant,* because it has no variable part. See Section 17.2.2: Reading and Writing Open Sentences. (2) An element in a *sequence.* In the sequence of square numbers, the terms are 1, 4, 9, 16, and so on.

terminating decimal A *decimal* that ends. For example, 0.5 and 0.125 are terminating decimals. See Section 9.3.1: Fraction and Decimal Notation and Section 9.3.4: Rational Numbers and Decimals.

tessellate To make a *tessellation;* to tile a surface.

tessellation A pattern of shapes that covers a surface completely without overlaps or gaps. Same as a *tiling*. See Section 13.10: Tessellations.
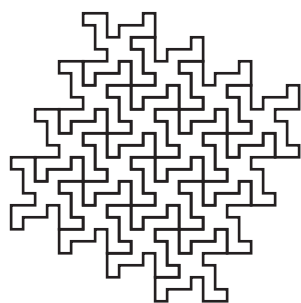
A tessellation

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 Section 17.2.4: Solving Open Sentences.

tetrahedron A *polyhedron* with 4 faces. A tetrahedron is a *triangular pyramid*. See Section 13.5.2: Polyhedrons.

theorem A mathematical statement that can be proven to be true. For example, the Pythagorean theorem states that if the *legs of a right triangle* have lengths a and b and the *hypotenuse* has length c, then $a^2 + b^2 = c^2$. The Pythagorean theorem has been proven in hundreds of ways over the past 2,500 years.

3-dimensional (3-D) coordinate system A *reference frame* in which any point on a *3-dimensional figure* can be located with three *coordinates* relative to the *origin* of three axes intersecting perpendicularly at their origins in space. Compare to *1-* and *2-dimensional coordinate systems*. See Section 15.3.2: 2- and 3-Dimensional Coordinate Systems.

3-dimensional (3-D) figure A figure whose points are not all in a single *plane*. Examples include *prisms, pyramids,* and *spheres,* all of which have length, width, and height. See Section 13.1: Dimension.

tick marks (1) Marks showing the *scale* of a number line or ruler. (2) Same as *tally (2)*.

tile A shape used in a *tessellation*. A tessellation of only one tile is called a same-tile tessellation.

tiling Same as *tessellation*.

time graph A graph representing a story that takes place over time. The units on the horizontal axis are time units.
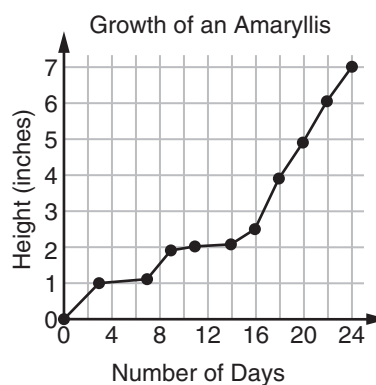
A time graph

timeline A *number line* showing when events took place. In some timelines the *origin* is based on the context of the events being graphed, such as the birth date of the child's life graphed below. The origin can also come from another reference system, such as the year A.D., in which case the scale below might cover the years 2000 through 2005. See Section 15.2.3: Timelines.
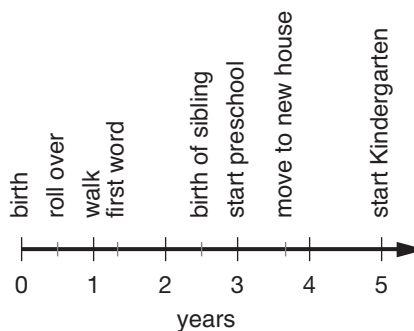
A timeline of a child's milestones

Glossary

toggle A key on a calculator that changes back and forth between two displays each time it is pressed. For example, on some calculators $\boxed{+/-}$ toggles between a number and its *opposite*. See Section 3.1.1: Calculators.

top-heavy fraction Same as *improper fraction.*

topological transformation A *transformation* that pairs a figure with its *image* after shrinking, stretching, twisting, bending, or turning inside out. Tearing, breaking, and sticking together are not allowed. Shapes that can be changed into one another by a topological transformation are called topologically equivalent shapes. For example, a donut is topologically equivalent to a coffee cup. See *topology, genus,* and Section 13.11: Topology.

topology The study of the properties of shapes that are unchanged by shrinking, stretching, twisting, bending, and turning inside out. Tearing, breaking, and sticking together are not allowed. Same as *rubber-sheet geometry.* See *topological transformation* and Section 13.11: Topology.

trade-first subtraction A subtraction *algorithm* in which all necessary trades between places in the numbers are done before any subtractions are carried out. Some people favor this algorithm because they can concentrate on one thing at a time. See Section 11.2.2: Subtraction Algorithms.

transformation An operation on a geometric figure (the *preimage*) that produces a new figure (the *image*). The study of transformations is called transformation geometry. Transformations are often based on rules for how points compare, as in the translation shown in the next definition. Although the preimage does not actually move under a transformation, it is convenient to think and talk about transformations as moving a figure from one place to another and sometimes changing its size or shape. So *Everyday Mathematics* encourages using informal terms such as *flip, turn,* and *slide.* See *isometry transformation, reflection, rotation, translation, size change* and Section 13.7: Transformations.

translation A *transformation* in which every point in the *image* of a figure is at the same distance in the same direction from its corresponding point in the figure. Informally called a *slide.* See Section 13.7.1: Reflections, Rotations, and Translations.


preimage → image
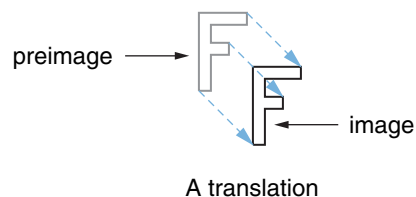
A translation

translation tessellation A *tessellation* made of a *tile* in which one or more sides are *translation images* of the opposite side(s). Dutch artist M. C. Escher (1898–1972) created many beautiful and elaborate translation tessellations. See Section 13.10: Tessellations.
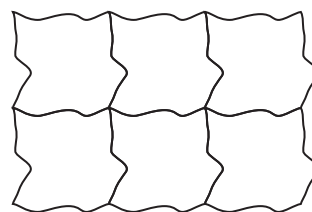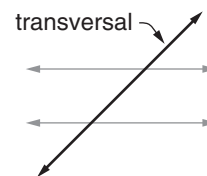

A translation tessellation

transparent mirror A piece of semitransparent plastic used to draw and study reflections. See Section 13.13.5: Transparent Mirrors.

back face   end   front face   end   drawing edge
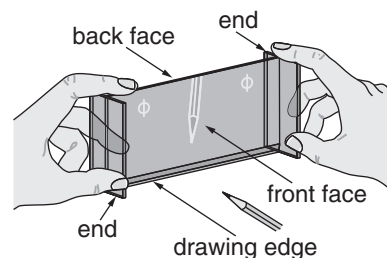
transversal A *line* that intersects two or more other lines. See Section 13.6.3: Relations and Orientations of Angles.


transversal

trapezoid A *quadrilateral* that has exactly one pair of *parallel* sides. In *Everyday Mathematics,* both pairs of sides cannot be parallel; that is, a parallelogram is not a trapezoid. See Section 13.4.2: Polygons (*n*-gons).


Trapezoids

Glossary
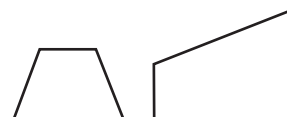
tree diagram A network of points connected by *line segments* and containing no closed loops. *Factor trees* and *probability trees* are tree diagrams used, respectively, to factor numbers and to represent probability situations in which there is a series of events. The first tree diagram below shows the prime factorization of 30. The second tree diagram models flipping one coin two times to get HEADS H or TAILS T.


Tree diagrams
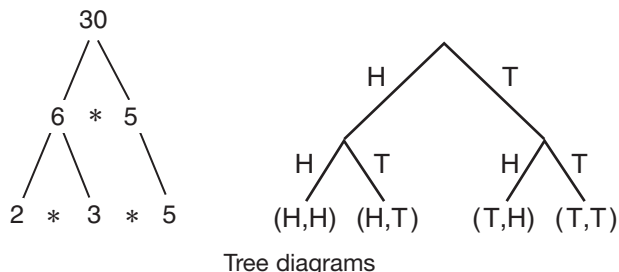
tri- A prefix meaning three, as in tricycle.

trial-and-error method A method for finding the *solution of an equation* by trying a sequence of *test numbers*. See Section 17.2.4: Solving Open Sentences.

triangle A 3-sided polygon. See *equilateral triangle, isosceles triangle, scalene triangle, acute triangle, right triangle, obtuse triangle,* and Section 13.4.2: Polygons (*n*-gons).

equilateral   isosceles   scalene   right
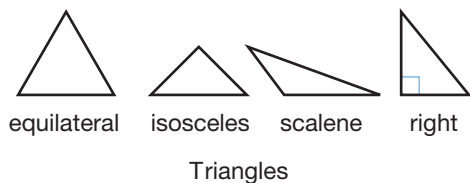
Triangles

triangular numbers *Figurate numbers* that can be shown by triangular arrangements of dots. The triangular numbers are {1, 3, 6, 10, 15, 21, 28, 36, 45, . . .}. See Section 17.1.2: Sequences.

1   3   6   10

Triangular numbers
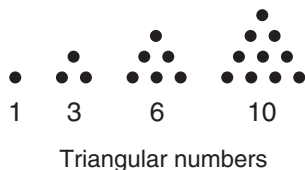
triangular prism A *prism* whose *bases* are *triangles*. See Section 13.5.2: Polyhedrons.
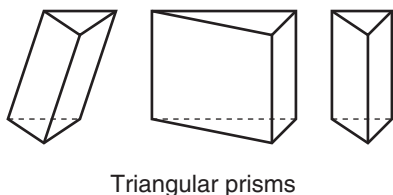

Triangular prisms

triangular pyramid A *pyramid* in which all *faces* are *triangles,* any one of which is the *base.* A regular tetrahedron has four *equilateral triangles* for faces and is one of the five *regular polyhedrons*. See Section 13.5.2: Polyhedrons.

regular tetrahedron

Triangular pyramids
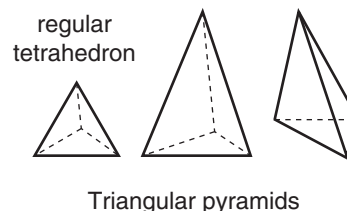
true number sentence A *number sentence* stating a correct fact. For example, $75 = 25 + 50$ is a true number sentence. See Section 10.2: Reading and Writing Number Sentences.

truncate (1) In a *decimal,* to cut off all *digits* after the decimal point or after a particular place to the right of the decimal point. For example, 12.345 can be truncated to 12.34, 12.3, or 12. *Integers* cannot be truncated. Same as rounding down in places to the right of the decimal point. See *round* and Section 16.2: Approximation and Rounding. (2) Informally, to cut off a part of a solid figure.

A truncated pyramid
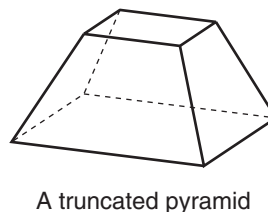
turn An informal name for a *rotation*.

turn-around facts A pair of multiplication (or addition) facts in which the order of the factors (or addends) is reversed. For example, $3 * 9 = 27$ and $9 * 3 = 27$ 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 facts are instances of the *Commutative Properties of Addition* and *Multiplication*. See Section 16.3.2: Basic Facts and Fact Power.

turn-around rule A rule for solving addition and multiplication problems based on the *Commutative Properties of Addition* and *Multiplication*. For example, if you know that $6 * 8 = 48$, then, by the turn-around rule, you also know that $8 * 6 = 48$.

Glossary

twin primes Two prime numbers with a difference of 2. For example, 3 and 5 and 11 and 13 are pairs of twin primes.

2-dimensional (2-D) coordinate system A reference frame in which any point on a *2-dimensional figure* can be located with an *ordered pair* of coordinates relative to the *origin* of two intersecting perpendicular axes in space. Compare to *1-* and *3-dimensional coordinate systems*. See Section 15.3.2: 2- and 3-Dimensional Coordinate Systems.

2-dimensional (2-D) figure A figure whose points are all in one *plane* but not all on one *line*. Examples include polygons and circles, all of which have length and width but no height. See Section 13.1: Dimension.

U

unfair game A game in which every player does not have the same chance of winning. See Section 12.1.2: The Language of Chance.

unit A label used to put a number in context. In measuring *length,* for example, inches and centimeters are units. In a problem about 5 apples, apple is the unit. In *Everyday Mathematics,* students keep track of units in *unit boxes.* See Section 10.3.1: Addition and Subtraction Use Classes.

unit box In *Everyday Mathematics*, a box displaying the *unit* for the numbers in the problems at hand. See Section 1.3.6: Unit Boxes.
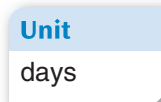
Unit
days

A unit box

unit fraction A *fraction* whose *numerator* is 1. For example, $\frac{1}{2}, \frac{1}{3}, \frac{1}{12}, \frac{1}{8}$, and $\frac{1}{20}$ are unit fractions. Unit fractions are especially useful in converting among units within measurement systems. For example, because 1 foot = 12 inches you can multiply a number of inches by $\frac{1}{12}$ to convert to feet. See Section 14.2.3: Converting between Measures.

unit interval The *interval* between 0 and 1 on a *number line*.

unit percent One *percent* (1%).

unit price The price for one item or *per* unit of measure. For example, the unit price of a 5-ounce package of onion powder selling for $2.50 is $0.50 per ounce. In recent years, grocery stores have begun posting unit prices to help consumers compare prices of different brands of a similar product or different size containers of the same product. See Section 14.2.3: Converting between Measures.

unit ratio Same as *n*-to-1 ratio.

unit whole Same as *whole* or *ONE*.

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

unlike fractions *Fractions* with *unlike denominators*.

upper quartile In *Everyday Mathematics,* in an ordered data set, the middle value of the *data* above the *median*. Data values at the median are not included when finding the upper quartile. Compare to *lower quartile*. See Section 12.2.3: Organizing and Displaying Data.

U.S. customary system The measuring system used most often in the United States. Units for *length* include inch, foot, yard, and mile; units for *weight* include ounce and pound; units for *volume* or *capacity* include cup, pint, quart, gallon, and cubic units; and the main unit for *temperature* change is degrees Fahrenheit. See Section 14.2.1: U.S. Customary System.

use class In *Everyday Mathematics,* a problem situation that one of the basic arithmetic operations can be used to solve. Students use *situation diagrams* to help model problems from the different use classes. See *addition/subtraction use classes, multiplication/division use classes,* and Section 10.3: Use Classes and Situation Diagrams.

V

value of a variable A specific number or quantity represented by a *variable*. For example, in $y = 4x + 3$, if the value of x is 7, then the value of y that makes the equation true is 31. See Section 17.2.2: Reading and Writing Open Sentences.

Glossary

vanishing line A line connecting a point on a figure in a *perspective drawing* with a *vanishing point.*
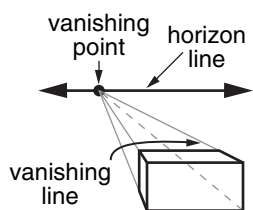

vanishing point In a *perspective drawing,* the point at which *parallel* lines that extend away from the viewer seem to meet. It is located on the *horizon* line. See *vanishing line* and Section 13.5.4: Connecting 2-D and 3-D.

variable A letter or other symbol that represents a number. A variable can represent a single number, as in $5 + n = 9$, because only $n = 4$ makes the sentence true. A variable can also stand for many different numbers, as in $x + 2 < 10$, because any number x less than 8 makes the sentence true. In *formulas* and *properties,* variables stand for all numbers. For example, $a + 3 = 3 + a$ for all numbers a. See Section 17.2.1: Uses of Variables.

variable term A *term* that contains at least one *variable.* For example, in $4b - 8 = b + 5$, $4b$ and b are variable terms. See Section 17.2.2: Reading and Writing Open Sentences.

Venn diagram A picture that uses circles or rings to show relationships between sets. In this diagram, $22 + 8 = 30$ girls are on the track team, and 8 are on both the track and the basketball teams. See Section 12.2.3: Organizing and Displaying Data.

Number of Girls on Sports Teams
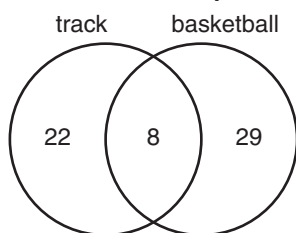
vernal equinox The first day of spring, when the sun crosses the plane of Earth's equator and day and night are about 12 hours each. "Equinox" is from the Latin *aequi-* meaning "equal" and *nox* meaning "night." Compare to *autumnal equinox.*

vertex The point at which the *rays* of an angle, the *sides* of a polygon, or the *edges* of a polyhedron meet. Plural is vertexes or vertices. In *Everyday Mathematics,* same as *corner.* See Section 13.4: Planes and Plane Figures and Section 13.5: Space and 3-D Figures.
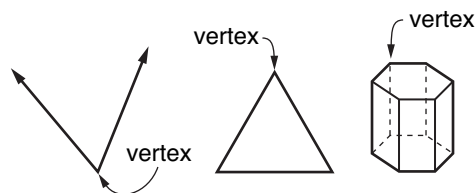
vertex point A point where the corners of *tessellation tiles* meet.

vertical Upright; perpendicular to the *horizon.* Compare to *horizontal.*

vertical angles The angles made by *intersecting* lines that do not share a common side. Same as *opposite angles.* Vertical angles have equal measures. See Section 13.6.3: Relations and Orientations of Angles.
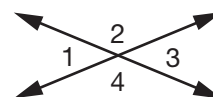

Angles 1 and 3; angles 2 and 4 are pairs of vertical angles.

volume (1) The amount of space occupied by a *3-dimensional figure.* Same as *capacity.* (2) Less formally, the amount a container can hold. Volume is often measured in cubic units, such as cm^3, cubic inches, or cubic feet. See the Tables of Formulas and Section 14.5: Volume (Capacity).

W

weight A measure of how heavy something is; the force of gravity on an object. An object's *mass* is constant, but it weighs less in weak gravity than in strong gravity. For example, a person who weighs 150 pounds in San Diego weighs about 23 pounds on the moon. See Section 14.6: Weight and Mass.

"What's My Rule?" problem In *Everyday Mathematics,* a problem in which two of the three parts of a *function* (*input, output,* and rule) are known, and the third is to be found out. See Section 17.1.3: Functions.

in	out
4	2
7	5
12	10
8	
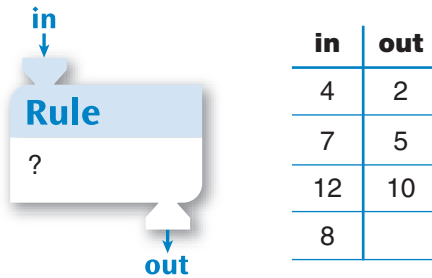
A "What's My Rule?" problem

whole An entire object, collection of objects, or quantity being considered in a problem situation; 100%. Same as *ONE* and *unit whole.* See Section 9.3.2: Uses of Fractions.

whole numbers The *counting numbers* and 0. The set of whole numbers is {0, 1, 2, 3, . . .}.

width of a rectangle The *length* of one side of a *rectangle* or rectangular object, typically the shorter side.

wind-chill temperature A measure of how cold the air feels, based on a combination of wind speed and air temperature.

winter solstice The shortest day of the year, when the sun is farthest south of Earth's equator. The number of hours of daylight depends on the latitude of a location. In Colorado, the winter solstice averages a little more than 9 hours of daylight. Compare to *summer solstice.*

Y

yard (yd) A U.S. customary unit of *length* equal to 3 feet, or 36 inches. To Henry I of England, a yard was the distance from the tip of the nose to the tip of the middle finger. In *Everyday Mathematics,* it is from the center of the chest to the tip of the middle finger. See the Tables of Measures and Section 14.1: Personal Measures.

Z

zero fact In *Everyday Mathematics:* (1) The *sum* of two 1-digit numbers when one of the *addends* is 0, as in $0 + 5 = 5$. If 0 is added to any number, there is no change in the number. Same as the additive identity. (2) The product of two 1-digit numbers when one of the factors is 0, as in $4 * 0 = 0$. The product of a number and 0 is always 0.

zero point Same as *origin.*

Glossary