



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

**addend** Any one of a set of numbers that are added. For example, in  $5 + 3 + 1 = 9$ , the addends are 5, 3, and 1.

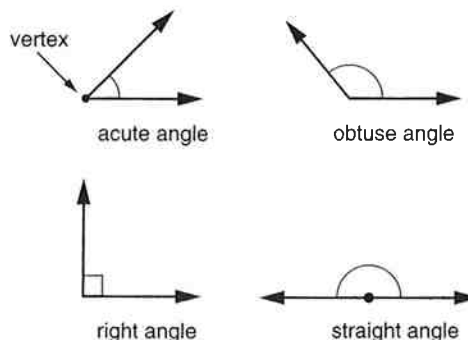
**adjacent angles** Angles that are next to each other; adjacent angles have a common vertex and common side but no other overlap.

**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.

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

**angle** A figure that is formed by two rays or two line segments with a common endpoint. The rays or segments are called the *sides* of the angle. The common endpoint is called the *vertex* of the angle. Angles are measured in *degrees* ( $^\circ$ ). An *acute angle* has a measure greater than  $0^\circ$  and less than  $90^\circ$ . An *obtuse angle* has a measure greater than  $90^\circ$  and less than  $180^\circ$ . A *reflex angle* has a measure greater than

$180^\circ$  and less than  $360^\circ$ . A *right angle* measures  $90^\circ$ . A *straight angle* measures  $180^\circ$ .



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

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

**area model** (1) A model for multiplication problems in which the length and width of a rectangle represent the factors, and the area of the rectangle represents the product. (2) A model for showing fractions as parts of circles, rectangles, or other geometric figures.

**array** (1) An arrangement of objects in a regular pattern, usually in rows and columns. (2) A rectangular array. In *Everyday Mathematics*, an array is a rectangular array unless otherwise specified.

**Associative Property** A property of addition and multiplication (but not of subtraction or division) that says that when you add or multiply three

numbers, it does not matter which two you add or multiply first. For example:

$$(4 + 3) + 7 = 4 + (3 + 7) \text{ and} \\ (5 * 8) * 9 = 5 * (8 * 9).$$

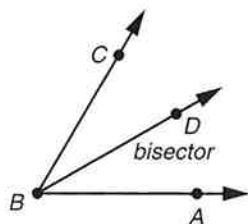
**average** A typical value for a set of numbers. The word *average* usually refers to the *mean* of a set of numbers.

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

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

**base-ten** Our system for writing numbers that uses only 10 symbols, called *digits*. The digits are 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. You can write any number using only these 10 digits. Each digit has a value that depends on its place in the number. In this system, moving a digit one place to the left makes that digit worth 10 times as much. And moving a digit one place to the right makes that digit worth one-tenth as much. See also *place value*.

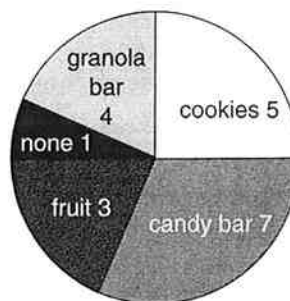
**bisect** To divide a segment, an angle, or another figure into two equal parts.



Ray  $BD$  bisects angle  $ABC$ .

**change diagram** A diagram used in *Everyday Mathematics* to represent situations in which quantities are increased or decreased.

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



**circumference** The distance around a circle; the perimeter of a circle.

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

**column-division method** A division procedure in which vertical lines are drawn between the digits of the dividend. As needed, trades are made from one column into the next column at the right. The lines make the procedure easier to carry out.

**common denominator** (1) If two fractions have the same denominator, that denominator is called a common denominator. (2) For two or more fractions, any number that is a *common multiple* of their denominators. For example, the fractions  $\frac{1}{2}$  and  $\frac{2}{3}$  have the common denominators 6, 12, 18, and so on. See also *quick common denominator*.

**common factor** A counting number is a common factor of two or more

counting numbers if it is a *factor* of each of those numbers. For example, 4 is a common factor of 8 and 12. See also *factor of a counting number n*.

**common multiple** A number is a common multiple of two or more numbers if it is a *multiple* of each of those numbers. The multiples of 2 are 2, 4, 6, 8, 10, 12, and so on; the multiples of 3 are 3, 6, 9, 12, and so on; and the common multiples of 2 and 3 are 6, 12, 18 and so on.

**Commutative Property** A property of addition and multiplication (but not of subtraction or division) that says that changing the order of the numbers being added or multiplied does not change the answer. These properties are often called *turn-around facts* in *Everyday Mathematics*. For example:  $5 + 10 = 10 + 5$  and  $3 * 8 = 8 * 3$ .

**comparison diagram** A diagram used in *Everyday Mathematics* to represent situations in which two quantities are compared.

**complementary angles** Two angles whose measures total  $90^\circ$ .

**concave polygon** A polygon in which at least one vertex is “pushed in.” At least one inside angle of a concave polygon is a reflex angle (has a measure greater than  $180^\circ$ ). Same as *nonconvex polygon*.

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

**congruent** Having the same shape and size. Two 2-dimensional figures are congruent if they match exactly when one is placed on top of the other. (It may be necessary to flip one of the figures over.)

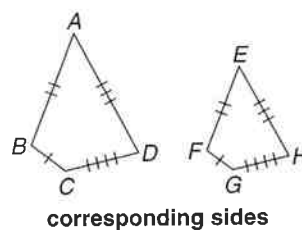
**consecutive angles** Two angles in a polygon that share a common side.

**convex polygon** A polygon in which all vertices are “pushed outward.” Each inside angle of a convex polygon has a measure less than  $180^\circ$ .

**corresponding**

Having the same relative position in *similar* or *congruent*

figures. In the diagram, pairs of *corresponding sides* are marked with the same number of slash marks and *corresponding angles* are marked with the same number of arcs.



**counting numbers** The numbers used to count things. The set of counting numbers is  $\{1, 2, 3, 4, \dots\}$ . Compare to *whole numbers*.

**cross multiplication** The process of finding the cross products of a *proportion*. Cross multiplication can be used in solving proportions.

**cubic unit** A unit used in measuring volume, such as a cubic centimeter or a cubic foot.

**degree ( $^\circ$ )** (1) A unit of measure for angles based on dividing a circle into 360 equal parts. Latitude and longitude are measured in degrees, and these degrees are based on angle measures. (2) A unit of measure for temperature. In all cases, a small raised circle ( $^\circ$ ) is used to show degrees.

**denominator** The number below the line in a fraction. A fraction may be used to name part of a whole. If the *whole* (the *ONE*, or the *unit*) is divided into equal parts, the denominator represents the number of equal parts

into which the whole is divided. In the fraction  $\frac{a}{b}$ ,  $b$  is the denominator.

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

**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 this line segment. The diameter of a circle or sphere is twice the length of its *radius*.

**difference** The result of subtracting one number from another. See also *minuend* and *subtrahend*.

**digit** One of the number symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 in the standard, *base-ten* system.

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

Distributive property of multiplication over addition:

$$\begin{aligned} a * (b + c) &= (a * b) + (a * c), \\ \text{so } 2 * (5 + 3) &= (2 * 5) + (2 * 3) \\ &= 10 + 6 = 16. \end{aligned}$$

Distributive property of multiplication over subtraction:

$$\begin{aligned} a * (b - c) &= (a * b) - (a * c), \\ \text{so } 2 * (5 - 3) &= (2 * 5) - (2 * 3) \\ &= 10 - 6 = 4. \end{aligned}$$

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

**divisibility test** A test to find out whether one counting number is *divisible by* another counting number without actually doing the division. A divisibility test for 5, for example, is to check the digit in the 1s place: if that digit is 0 or 5, then the number is divisible by 5.

**divisible by** If one counting number can be divided by a second counting number with a remainder of 0, then the first number is divisible by the second number. For example, 28 is divisible by 7 because 28 divided by 7 is 4, with a remainder of 0.

**Division of Fractions Property** A fact that makes division with fractions easier: division by a fraction is the same as multiplication by that fraction’s *reciprocal*. For example, because the reciprocal of  $\frac{1}{2}$  is 2, the division problem  $4 \div \frac{1}{2}$  is equivalent to the multiplication problem  $4 * 2$ . See also *multiplicative inverses*.

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

**edge** A line segment or curve where two surfaces meet.

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

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

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

**equivalent rates** Rates that make the same comparison. For example, the rates  $\frac{60 \text{ miles}}{1 \text{ hour}}$  and  $\frac{1 \text{ mile}}{1 \text{ minute}}$  are equivalent. Two rates named as fractions using the same units are equivalent if the fractions (ignoring the units) are equivalent. 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.

**equivalent ratios** Ratios that make the same comparison. Two or more ratios are equivalent if they can be named as equivalent fractions. For example, the ratios 12 to 20, 6 to 10, and 3 to 5 are equivalent ratios because  $\frac{12}{20} = \frac{6}{10} = \frac{3}{5}$ .

**exponent** A small raised number 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  $5^3 = 5 * 5 * 5 = 125$ . See also *power of a number*.

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

**extended multiplication fact** A multiplication fact involving multiples of 10, 100, and so on. For example,  $6 * 70$ ,  $60 * 7$ , and  $60 * 70$  are extended multiplication facts.

**face** A flat surface on a 3-dimensional shape.

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

$35 \div 5 = 7$ , and  $35 \div 7 = 5$  are another fact family.

**factor (in a product)** Whenever two or more numbers are multiplied to give a product, each of the numbers that is multiplied is called a factor. For example, in  $4 * 1.5 = 6$ , 6 is the product and 4 and 1.5 are called factors. See also *factor of a counting number n*. **Note:** This definition of *factor* is much less important than the definition below.

**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.

$$\begin{array}{ccc} 2 * 3 = 6 \\ \uparrow \quad \uparrow \quad \uparrow \\ \text{factors product} \end{array}$$

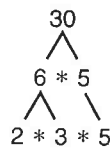
**Note:** This definition of *factor* is much more important than the previous definition.

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

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

**factor string** A counting number written as a product of two or more of its factors. The number 1 is never part of a factor string. For example, a factor string for 24 is  $2 * 3 * 4$ . This factor string has three factors, so its length is 3. Another factor string for 24 is  $2 * 3 * 2 * 2$  (length 4).

**factor tree** A way to get the *prime factorization* of a counting number. Write the original number as a product of counting-number factors.



Then write each of these factors as a product of factors, and so on, until the factors are all prime numbers. A factor tree looks like an upside-down tree, with the root (the original number) at the top and the leaves (the factors) beneath it.

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

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

**fraction** A number in the form  $\frac{a}{b}$  where  $a$  and  $b$  are whole numbers and  $b$  is not 0. A fraction may be used to name part of a whole, or to compare two quantities. A fraction may also be used to represent division. For example,  $\frac{2}{3}$  can be thought of as 2 divided by 3. See also *numerator* and *denominator*.

**Fraction-Stick Chart** A diagram used in *Everyday Mathematics* to represent simple fractions.

**Geometry Template** An *Everyday Mathematics* tool that includes a millimeter ruler, a ruler with sixteenth-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.

**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. The greatest common factor of 24 and 36 is 12.

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

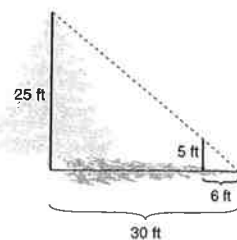
**hypotenuse** In a right triangle, the side opposite the right angle.

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

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

**indirect measurement**

Determining heights, distances, and other quantities that cannot be measured directly.



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

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

**integer** A number in the set  $\{\dots, -4, -3, -2, -1, 0, 1, 2, 3, 4, \dots\}$ ; a *whole*

*number* or the opposite of a whole number, where 0 is its own opposite.

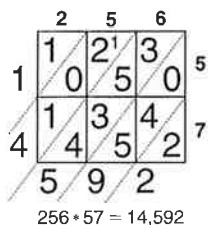
**irrational number** A number that cannot be written as a fraction, where both the numerator and the denominator are *integers* and the denominator is not zero. For example,  $\pi$  (pi) is an irrational number.

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

**landmark** A notable feature of a data set. Landmarks include the *median*, *mode*, *maximum*, *minimum*, and *range*. The *mean* can also be thought of as a landmark.

**lattice method**

A very old way to multiply multidigit numbers.



**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.

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

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

**like terms** In an *algebraic expression*, either the constant terms or any terms

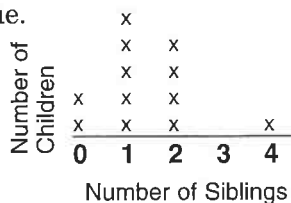
that contain the same variable(s) raised to the same power(s). For example,  $4y$  and  $7y$  are like terms in the expression  $4y + 7y - z$ .

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

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

**line of symmetry** A line drawn through a figure so that it is divided into two parts that are mirror images of each other. The two parts look alike but face in opposite directions.

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



**lowest terms** See *simplest form*.

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

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

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

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

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

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

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

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

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

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

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

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

below zero on a vertical number line. The symbol  $-$  may be used to write a negative number. For example, "negative 5" is usually written as  $-5$ .

**nonconvex polygon** See *concave polygon*.

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

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

**numerator** The number above the line in a fraction. A fraction may be used to name part of a whole. If the *whole* (the *ONE*, or the *unit*) is divided into equal parts, the numerator represents the number of equal parts being considered. In the fraction  $\frac{a}{b}$ ,  $a$  is the numerator.

**ONE** See *whole* and *unit*.

**open sentence** A *number sentence* which has *variables* in place of one or more missing numbers. An open sentence is usually neither true nor false. For example,  $5 + x = 13$  is an open sentence. The sentence is true if 8 is substituted for  $x$ . The sentence is false if 4 is substituted for  $x$ .

**operation symbol** A symbol used to stand for a mathematical operation. Common operation symbols are  $+$ ,  $-$ ,  $\times$ ,  $*$ ,  $\div$ , and  $/$ .

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



(2) of a triangle: An angle is opposite the side of a triangle that is not one of the sides of the angle. (3) of two lines that intersect: The angles that do not share a common side are opposite angles. Opposite angles have equal measures. Same as *vertical angles*.

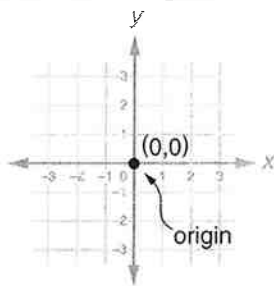
**order of operations** Rules that tell in what order to perform operations in arithmetic and algebra. The order of operations is as follows:

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

**ordered number pair (ordered pair)**

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

**origin** (1) The 0 point on a number line. (2) The point (0,0) where the two axes of a coordinate grid meet.



**outcome** A possible result of an experiment or situation. For example, HEADS and TAILS are the two possible outcomes of tossing a coin.

**parallel** Lines, line segments, or rays in the same plane are parallel if they never cross or meet, no matter how far they are extended. Two planes are parallel if they never cross or meet. A line and a plane are parallel if they never cross or meet. The symbol  $\parallel$  means *is parallel to*.

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

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

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

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

**parts-and-total diagram** A diagram used in *Everyday Mathematics* to represent situations in which two or more quantities are combined to form a total quantity.

**part-to-part ratio** A *ratio* that compares a part of a whole to another

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

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

**percent (%)** Per hundred or out of a hundred. For example, "48% of the students in the school are boys" means that 48 out of every 100 students in the school are boys;  $48\% = \frac{48}{100} = 0.48$ .

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

**perimeter** The distance around a 2-dimensional shape, along the boundary of the shape. 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  $P = 2 * (l + w)$ .

**perpendicular** Crossing or meeting at *right angles*. Lines, rays, line segments, or planes that cross or meet at right angles are perpendicular. The symbol,  $\perp$ , means is *perpendicular* to.

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

**pi ( $\pi$ )** 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. Pi is the sixteenth letter of the Greek alphabet and is written  $\pi$ .

**pie graph** See *circle graph*.

**place value** A system that gives a digit a value according to its position in a number. In our *base-ten* system for writing numbers, moving a digit one place to the left makes that digit worth 10 times as much, and moving a digit one place to the right makes that digit worth one-tenth as much. For example, in the number 456, the 4 in the hundreds place is worth 400; but in the number 45.6, the 4 in the tens place is worth 40.

**plane** A flat surface that extends forever.

**point symmetry** A figure has point symmetry if it can be rotated  $180^\circ$  about a point in such a way that the resulting figure (the *image*) exactly matches the original figure (the *preimage*). Point symmetry is *rotation symmetry* in which the turn is  $180^\circ$ .

**polygon** A 2-dimensional figure that is made up of three or more line segments joined end to end to make one closed path. The line segments of a polygon may not cross.

**polyhedron** A geometric solid whose surfaces (*faces*) are all flat and formed by polygons. Each face consists of a polygon and the interior of that polygon. A polyhedron does not have any curved surfaces.

**positive number** A number that is greater than zero; a number to the right of zero on a horizontal number line, or above zero on a vertical number line. A

positive number may be written using the + symbol, but is usually written without it. For example,  $+10 = 10$  and  $\pi = +\pi$ .

**power of a number** The product of factors that are all the same. For example,  $5 * 5 * 5$  (or 125) is called “5 to the third power” or “the third power of 5” because 5 is a factor three times.  $5 * 5 * 5$  can also be written as  $5^3$ . See also *exponent*.

**power of 10** A whole number that can be written as a *product of 10s*. For example, 100 is equal to  $10 * 10$ , or  $10^2$ . 100 is called “the second power of 10” or “10 to the second power.” A number that can be written as a *product of  $\frac{1}{10}$ s* is also a power of 10. For example,  $10^{-2} = \frac{1}{10^2} = \frac{1}{10 * 10} = \frac{1}{10} * \frac{1}{10}$  is a power of 10.

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

**prime factorization** A counting number expressed as a product of prime factors. Every counting number greater than 1 can be written as a product of prime factors in only one way. For example, the prime factorization of 24 is  $2 * 2 * 2 * 3$ . (The order of the factors does not matter;  $2 * 3 * 2 * 2$  is also the prime factorization of 24.) The prime factorization of a prime number is that number. For example, the prime factorization of 13 is 13.

**prime number** A counting number that has exactly two different *factors*: itself and 1. For example, 5 is a prime number because its only factors are 5 and 1. The number 1 is not a prime number because that number has only a

single factor, the number 1 itself.

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

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

**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.

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

**proportion** A number model that states that two fractions are equal. Often the fractions in a proportion represent rates or ratios.

**protractor** A tool on the *Geometry Template* that is used to measure and draw angles. The half-circle protractor can be used to measure and draw angles up to  $180^\circ$ ; the full-circle protractor, to measure angles up to  $360^\circ$ .

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

**quick common denominator** The product of the denominators of two or more fractions. For example, the quick common denominator of  $\frac{1}{4}$  and  $\frac{3}{6}$  is  $4 * 6$ , or 24. As the name suggests, this is a quick way to get a *common*

*denominator* for a collection of fractions, but it does not necessarily give the *least common denominator*.

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

**radius** (plural: **radii**) (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.

**random numbers** Numbers produced by an experiment, such as rolling a die or spinning a spinner, in which all *outcomes* are equally likely. 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.

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

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

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

**rational number** Any number that can be written or renamed as a *fraction* or the *opposite* of a fraction. Most of the

numbers you have used are rational numbers. For example,  $\frac{2}{3}$ ,  $-\frac{2}{3}$ ,  $60\% = \frac{60}{100}$ , and  $-1.25 = -\frac{5}{4}$  are all rational numbers.

**ray** A straight path that starts at one point (called the endpoint) and continues forever in one direction.

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

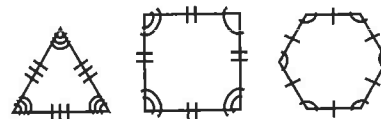
**reciprocal** Same as *multiplicative inverse*.

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

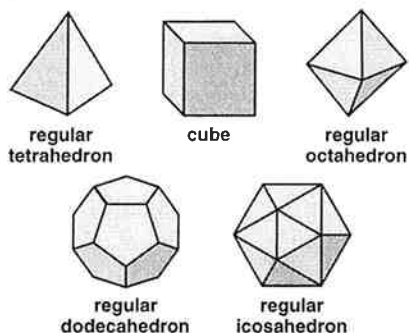
**rectangular coordinate grid** A device for locating points in a plane using *ordered number pairs*, or coordinates. A rectangular coordinate grid is formed by two number lines that intersect at their zero points and form right angles. Also called a coordinate grid.

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

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



**regular polyhedron** A polyhedron whose faces are congruent and formed by *regular polygons*, and whose vertices all look the same. There are five regular polyhedrons.



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

**repeating decimal** A decimal in which one digit or a group of digits is repeated without end. For example,  $0.3333\dots$  and  $23.\overline{147} = 23.147147\dots$  are repeating decimals. See also *terminating decimal*.

**right angle** A  $90^\circ$  angle.

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

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

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

**scale** (1) The *ratio* of a distance on a map, globe, or drawing to an actual distance. (2) A system of ordered marks

at fixed intervals used in measurement; or any instrument that has such marks. For example, a ruler with scales in inches and centimeters, and a thermometer with scales in  $^\circ\text{F}$  and  $^\circ\text{C}$ . See also *scale drawing*.

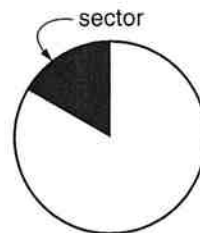
**scale drawing** A drawing of an object or a region in which all parts are drawn to the same *scale*. Architects and builders use scale drawings.

**scale factor** The *ratio* of the size of a drawing or model of an object to the actual size of the object. See also *scale model* and *scale drawing*.

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

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

**sector** A region bounded by an *arc* and two *radii* of a circle. The arc and 2 radii are part of the sector. A sector resembles a slice of pizza. The word *wedge* is sometimes used instead of sector.



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

**similar** Figures that have the same shape, but not necessarily the same size.

**simpler form** An equivalent fraction with a smaller numerator and smaller denominator. A fraction can be put in simpler form by dividing its numerator and denominator by a common factor greater than one. For example, dividing the numerator and denominator of  $\frac{18}{24}$  by 2 gives the simpler form  $\frac{9}{12}$ .

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

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

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

**slide** See *translation*.

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

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

**square number** A number that is the product of a counting number with itself. For example, 25 is a square number because  $25 = 5 * 5$ . The

square numbers are 1, 4, 9, 16, 25, and so on.

**square of a number** The product of a number with itself. For example, 81 is the square of 9 because  $81 = 9 * 9$ . And 0.64 is the square of 0.8 because  $0.64 = 0.8 * 0.8$ .

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

**square unit** A unit used in measuring area, such as a square centimeter or a square foot.

**standard notation** The most familiar way of representing whole numbers, integers, and decimals. In standard notation, numbers are written using the *base-ten place-value* system. For example, standard notation for three hundred fifty-six is 356. See also *scientific notation* and *number-and-word notation*.

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

**subtrahend** In subtraction, the number being subtracted. For example, in  $19 - 5 = 14$ , the subtrahend is 5. See also *minuend*.

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

**supplementary angles** Two angles whose measures total  $180^\circ$ .

**surface area** The total area of all of the surfaces that surround a 3-dimensional object.

**symmetric** (1) Having two parts that are mirror images of each other. (2) Looking the same when turned by some amount less than  $360^\circ$ . See also *point symmetry* and *rotation symmetry*.

**term** In an *algebraic expression*, a number or a product of a number and one or more *variables*. For example, in the expression  $5y + 3k - 8$ , the terms are  $5y$ ,  $3k$ , and  $8$ . The  $8$  is called a constant term, or simply a constant, because it has no variable part.

**terminating decimal** A decimal that ends. For example,  $0.5$  and  $2.125$  are terminating decimals. See also *repeating decimal*.

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

**theorem** A mathematical statement that can be proved to be true.

**3-dimensional (3-D)** Having length, width, and thickness. Solid objects take up volume and are 3-dimensional. A figure whose points are not all in a single plane is 3-dimensional.

**time graph** A graph that is constructed from a story that takes place over time. A time graph shows what has happened during a period of time.

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

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

**translation** A movement of a figure along a straight line; a *slide*. In a translation, each point of the figure slides the same distance in the same direction.

**transversal** A line that crosses two or more other lines.

**tree diagram** A diagram such as a *factor tree* or probability tree diagram. A tree diagram is a network of points connected by line segments. Tree diagrams can be used to factor numbers and to represent probability situations that consist of two or more choices or stages.

**turn** See *rotation*.

**turn-around facts** A pair of multiplication or addition facts in which the order of the factors (or addends) is reversed. For example,  $3 * 9 = 27$  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 division or subtraction. See also *commutative property*.

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

**twin primes** Two *prime numbers* that have a difference of 2. For example, 3 and 5 are twin primes, and 11 and 13 are twin primes.

**2-dimensional (2-D)** Having length and width but not thickness. A figure whose points are all in one plane is 2-dimensional. Circles and polygons are 2-dimensional. 2-dimensional shapes have area but not volume.

**unit** A label used to put a number in context. The *ONE*. In measuring length, for example, the inch and the centimeter are units. In a problem about 5 apples, *apple* is the unit. See also *whole*.

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

**unit percent** One percent (1%).

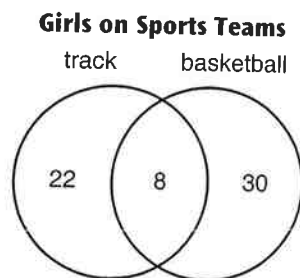
**unlike denominators** Denominators that are different, as in  $\frac{1}{2}$  and  $\frac{1}{3}$ .

**“unsquaring” a number** Finding the *square root* of a number.

**variable** A letter or other symbol that represents a number. In the number sentence  $5 + n = 9$ , any number may be substituted for  $n$ , but only 4 makes the sentence true. In the inequality  $x + 2 < 10$ , any number may be substituted for  $x$ , but only numbers less than 8 make the sentence true. In the equation  $a + 3 = 3 + a$ , any number may be substituted for  $a$ , and every number makes the sentence true.

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

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



**vertex** (plural: **vertices**) The point where the sides of an angle, the sides of a polygon, or the edges of a polyhedron meet.

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

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

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

**volume** A measure of how much space a solid object takes up. Volume is measured in cubic units, such as cubic centimeters or cubic inches. The volume or capacity of a container is a measure of how much the container will hold. Capacity is measured in units such as gallons or liters.

**“What’s My Rule?” problem** A type of problem that asks for a rule connecting two sets of numbers. Also, a type of problem that asks for one of the sets of numbers, given a rule and the other set of numbers.

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

**whole numbers** The *counting numbers*, together with 0. The set of whole numbers is  $\{0, 1, 2, 3, \dots\}$ .