

Glossary

- abscissa** (p. 216). The first coordinate of an ordered pair of real numbers that is assigned to a point on a coordinate plane. Also called *x-coordinate*.
- absolute value** (p. 63). The positive number of any pair of opposite nonzero real numbers. The absolute value of 0 is defined to be 0.
- addition property of equality** (p. 114). For all real numbers a , b , and c : if $a = b$, then $a + c = b + c$ and $c + a = c + b$.
- addition property of order** (p. 158). For all real numbers a , b , and c :
1. If $a < b$, then $a + c < b + c$ and $c + a < c + b$.
 2. If $a > b$, then $a + c > b + c$ and $c + a > c + b$.
- additive inverse** (pp. 68, 69). For every real number a , the unique real number $-a$ such that $a + (-a) = 0$ and $(-a) + a = 0$. Also called the *opposite of a*.
- angle** (p. 579). The union of two rays that have the same endpoint. *See also* directed angle.
- arithmetic mean** (p. 637). The sum of n values divided by n . Also called the *average* or the *mean*.
- associated equation** (p. 237). The equation of the boundary of the graph of an inequality.
- associative axioms** (p. 54). For all real numbers a , b , and c :
- Addition: $(a + b) + c = a + (b + c)$
Multiplication: $(ab)c = a(bc)$
- average** (p. 637). *See* arithmetic mean.
- axes** (singular: *axis*) (p. 215). On a coordinate plane, two perpendicular number lines that intersect at the origin of each. These lines are used for reference in locating points on the plane.
- axiom** (p. 53). A statement that is assumed to be true. Also called *postulate*.
- axiom of comparison** (p. 157). For all real numbers a and b , one and only one of the following statements is true: $a < b$, $a = b$, $b < a$
- axioms of closure** (p. 53). For all real numbers a and b : $a + b$ is a unique real number; ab is a unique real number.
- axioms of equality** (p. 55). *See* reflexive axiom, symmetric axiom, and transitive axiom.
- axis of symmetry** (p. 558, 561). A line that divides a curve into two matching parts. For a parabola with equation $y = ax^2 + bx + c$, $a \neq 0$, the axis of symmetry is the line $x = -\frac{b}{2a}$.
- base (in a power)** (p. 24). In an expression such as 3^4 , 3 is the base.
- basic property of quotients** (p. 381). For all real numbers r and s and all nonzero real numbers t and u :
- $$\frac{rs}{tu} = \frac{r}{t} \cdot \frac{s}{u}$$
- binary operation** (p. 52). An operation that pairs any two real numbers with a third real number.
- binomial** (p. 324). A polynomial of two terms.
- Boolean algebra** (p. 204). An "algebra of logic" in which letters such as p and q are used to represent statements. Truth values are assigned to compound statements produced from operations on the given statements p and q .
- boundary of a half-plane** (p. 236). *See under* open half-plane.
- cancellation property of opposites** (p. 62). For all real numbers a , $-(-a) = a$.
- Cartesian coordinate system** (p. 217). A one-to-one correspondence between the set of all points on a coordinate plane and the set of all ordered pairs of real numbers. Also called *plane rectangular coordinate system*.
- closed half-plane** (p. 237). The union of an open half-plane and its boundary.
- coefficient of a monomial** (p. 324). The numerical factor of a monomial that contains one or more variables. Also called *numerical coefficient*.
- coefficients of a polynomial** (p. 324). The coefficients of the terms of the polynomial.
- coincident lines** (p. 268). Two lines that have all their points in common.
- collinear points** (p. 244). Points that lie on the same line.
- combined variation** (p. 468). A relationship in which a variable varies *directly as* one variable (or a power of the variable) and *inversely as* another variable (or a power of the variable).
- commutative axioms** (p. 53). For all real numbers a and b :
- Addition: $a + b = b + a$
Multiplication: $ab = ba$
- complementary angles** (p. 184). Two angles the sum of whose measures is 90° . Each angle is called a *complement* of the other.
- complete factorization** (p. 359). The factorization of a polynomial in which each factor is either a monomial or an irreducible polynomial whose greatest monomial factor is 1.
- completing the square** (p. 545). Transforming a quadratic expression into a trinomial square.
- complex fraction** (p. 415). A fraction with a numerator or denominator that contains a fraction or a term with a negative exponent.
- conclusion** (p. 78). That part of a theorem which states what follows logically from the hypothesis.
- conjugates** (p. 521). Two binomials that are of the form $a\sqrt{b} + c\sqrt{d}$ and $a\sqrt{b} - c\sqrt{d}$, where b and d are nonnegative real numbers, are called conjugates.
- conjunction** (p. 170). A sentence formed by joining two sentences with the word *and*.
- consecutive even integers** (p. 181). The numbers obtained by counting by twos from any given even integer.
- consecutive integers** (p. 179). The numbers obtained by counting by ones from any given integer.
- consecutive multiples of a real number** (p. 180). The

- numbers obtained by multiplying the given number by consecutive integers.
- consecutive odd integers** (p. 181). The numbers obtained by counting by twos from any given odd integer.
- consistent system of equations** (p. 269). A system of equations that has at least one solution.
- constant monomial, or constant** (p. 323). *See under monomial.*
- constant of variation** (p. 458). *See under direct variation and under indirect variation.* Also called *constant of proportionality.*
- constant term** (p. 353). The numerical term of a polynomial in simplest form.
- converse** (p. 364). A statement formed by interchanging the hypothesis and conclusion of a given statement.
- convex polygonal region** (p. 303). A plane region that is the intersection of a finite number of closed half-planes.
- convex region** (p. 303). A region that contains the line segment drawn between any two points of the region.
- coordinate of a point** (p. 3). The number that corresponds to a point on a number line.
- coordinate axes** (p. 216). The x - and y -axes on a coordinate plane.
- coordinate plane** (p. 216). A plane on which a coordinate system has been set up.
- coordinates of a point** (p. 216). The pair of real numbers assigned to a point on a coordinate plane.
- corner point** (p. 303). A point where the boundary lines in a system of inequalities intersect.
- cosine of an angle** (pp. 585, 594). For an angle in standard position, the abscissa of the point at which the terminal side intersects the unit circle. For an acute angle of a right triangle, the ratio of the length of the side adjacent to the angle to the length of the hypotenuse.
- coterminal angles** (p. 580). Two or more angles that have the same initial side and the same terminal side.
- counting number** (p. 11). *See natural number.*
- cube root** (p. 524). A number b is a cube root of a if $b^3 = a$. The cube root of a is denoted by $\sqrt[3]{a}$.
- cubic equation** (p. 365). Any equation of the form $ax^3 + bx^2 + cx + d = 0$, where $a \neq 0$.
- cumulative frequency** (p. 631). In a set of data, the number of measurements that are less than or equal to a given value.
- cumulative frequency polygon** (p. 631). A broken-line graph joining dots whose ordinates are cumulative frequencies and whose abscissas are the right-hand endpoints of the corresponding intervals.
- cumulative percent** (p. 631). In a set of data, the percent of measurements that are less than or equal to a given value.
- degree of a monomial** (p. 323). The total number of times that the variables in a monomial occur as factors. A nonzero constant monomial has degree 0. The monomial 0 has no degree.
- degree of a polynomial** (p. 324). The greatest of the degrees of the terms of the polynomial after it has been simplified.
- degree of a variable in a monomial** (p. 323). The number of times that the variable occurs as a factor in the monomial.
- density property of rational numbers** (p. 484). Between any two different rational numbers, there is another rational number.
- difference** (p. 82). *See under subtraction.*
- difference of cubes** (p. 350). A polynomial that can be written in the form $a^3 - b^3$.
- difference of squares** (p. 336). A polynomial that can be written in the form $a^2 - b^2$.
- direct proof** (p. 78). The process of starting with the hypothesis of a theorem and arriving at its conclusion through a logical chain of statements.
- direct variation** (p. 458). Any function defined by an equation of the form $y = kx$, where k is a nonzero constant that is called the *constant of variation.*
- directed angle** (p. 579). The union of two ordered rays with a common endpoint, called the *vertex* of the angle, together with a rotation from the initial side to the terminal side.
- directed numbers** (p. 3). Positive and negative numbers.
- direction of a vector** (p. 604). The measure of the angle of rotation from the positive x -axis to a vector in standard position.
- discriminant of a quadratic equation** (p. 549). The value of $b^2 - 4ac$ is called the discriminant of the quadratic equation $ax^2 + bx + c = 0$.
- disjoint sets** (p. 167). Sets that have no members in common.
- disjunction** (p. 171). A sentence formed by joining two sentences with the word *or.*
- distance formula** (p. 514). Given any points $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$: $P_1P_2 = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
- distributive axiom of multiplication with respect to addition** (pp. 57, 58). For all real numbers a, b , and c , $a(b + c) = ab + ac$ and $(b + c)a = ba + ca$.
- divisible** (p. 386). One polynomial is said to be divisible by another polynomial if their quotient is also a polynomial.
- division** (p. 99). For all real numbers a and all nonzero real numbers b , the *quotient* denoted as $a \div b$ is defined by:
- $$a \div b = a \cdot \frac{1}{b}$$
- That is, to divide a by b , multiply a by the reciprocal of b .
- division property of equality** (p. 115). For all real numbers a and b and all nonzero real numbers c : if $a = b$, then $\frac{a}{c} = \frac{b}{c}$.
- domain of a function** (p. 221). *See under function.*
- domain of a relation** (p. 219). The set of all first coordinates of the ordered pairs that form the relation.
- domain of a variable** (p. 18). The set of numbers that a variable may represent. Also called *replacement set.*
- dot frequency diagram** (p. 624). A graph of the fre-

quency of measurements that uses a dot to represent each measurement.

element of a set (p. 6). *See* member of a set.

empty set (p. 8). The set that contains no members. Also called *null set*.

equal sets (p. 6). Sets that contain exactly the same members.

equation (p. 30). A mathematical sentence which states that two expressions name the same number.

equation of a line (p. 232). An equation whose solutions give the coordinates of all the points on the line.

equivalent equations (p. 118). Equations that have the same solution set over a given domain.

equivalent expressions (p. 58). Expressions that represent the same number for all values of the variables that they contain.

equivalent inequalities (p. 163). Inequalities that have the same solution set over a given domain.

equivalent systems (p. 274). Systems that have the same solution set over a given domain.

equivalent vectors (p. 608). Vectors that have the same norm and same direction.

evaluate a variable expression (p. 18). To replace each variable in the expression with one of its values and simplify the resulting numerical expression. Also called *finding the value of the expression*.

event (p. 646). A specified subset of the set of all possible outcomes in an experiment.

experimental probability (p. 649). If an experiment is conducted n times, and an event E occurs e of these times, then the experimental probability that E will occur in another trial is $\frac{e}{n}$.

exponent (p. 24). In a power, the number of times that the base occurs as a factor.

exponential form of a power (p. 24). The expression x^n is the exponential form of the n th power of x .

extremes of a proportion (p. 450). In the proportion $\frac{a}{b} = \frac{c}{d}$, a and d are the extremes.

factor (p. 52). In a product, the numbers that are multiplied. For example, a and b are the factors of the product ab .

factor a number (p. 341). To express the number as the product of two or more members of a given set.

factor set (p. 341). The set from which the factors of a given number or expression are selected.

find the value of a variable expression (p. 18). *See* evaluate a variable expression.

finite set (p. 12). A set that is not infinite.

formula (p. 144). An equation that states a relationship among quantities represented by variables.

fractional equation (p. 437). An equation in which a variable appears in the denominator of one or more terms.

frequency of a measurement (p. 624). The number of occurrences of the particular measurement in a set of data.

frequency polygon (p. 627). A broken-line graph that

represents the frequency of measurements over given intervals.

function (pp. 219, 221). A relation in which no two ordered pairs have the same first coordinate. More formally, a function is a pairing that assigns to each member of one set, called the *domain*, exactly one member of a second set, called the *range*, and that assigns each member of the range to at least one member of the domain.

graph of an equation (p. 232). The set of all those points and only those points whose coordinates satisfy the equation.

graph of a number (p. 3). The point that corresponds to a number on a number line.

graph of an open sentence (p. 43). The graph of the solution set of the open sentence.

graph of an ordered pair (p. 216). The point that corresponds to the ordered pair on a coordinate plane.

graph of a relation (p. 220). The set of points on a coordinate plane that correspond to the ordered pairs that form the relation.

graph of a set of numbers (p. 6). The set of points on a number line corresponding to the set of numbers.

greatest common factor (GCF) of monomials (p. 343). The monomial with the greatest degree and the greatest numerical coefficient that is a factor of each of two or more given monomials.

greatest integer function (p. 227). The function $f: x \rightarrow [x]$, where the symbol $[x]$ is used to represent the greatest integer that is less than or equal to the real number x .

greatest monomial factor (p. 346). The greatest common factor of the terms of a polynomial that is in simplest form.

grouping symbol (p. 21). A device that is used to enclose an expression. Examples of grouping symbols include parentheses, brackets, braces, and fraction bars.

histogram (p. 626). A bar graph that represents the frequency of measurements over given intervals.

hypotenuse (p. 505). In a right triangle, the side opposite the right angle.

hypothesis (p. 78). That part of a theorem which states what is assumed to be true.

identity (p. 135). An equation that is true for all values of the variable(s).

identity element for addition (p. 68). Zero. When zero is added to any given real number, the sum is identical to the given number.

identity element for multiplication (p. 88). One. When a given real number is multiplied by one, the product is the given real number.

imaginary numbers (p. 530). Numbers that involve the imaginary unit, i .

imaginary unit, i (p. 530). A square root of -1 . That is, $i = \sqrt{-1}$.

inconsistent system of equations (p. 269). A system of equations whose solution set is the empty set.

index (p. 525). In the symbol $\sqrt[n]{a}$, the positive integer n is called the index.

indirect proof (pp. 149, 150). The process of indirect reasoning used to prove a theorem by assuming that the conclusion of the theorem is false until a statement is obtained that contradicts an accepted fact. As a result of this contradiction, the assumption must be incorrect and the conclusion of the theorem must be true.

inequality (p. 30). A mathematical sentence that is formed by placing an inequality symbol between two mathematical expressions.

infinite set (p. 12). A set for which the process of counting its members would never end.

initial side (p. 579). The ray of an angle that is at the starting position of the generating ray.

integer (p. 11). A member of the set $\{\dots, -3, -2, -1, 0, 1, 2, 3, \dots\}$.

intersection (p. 167). The set consisting of the members belonging to both of two given sets.

inverse operations (p. 124). Operations that undo each other, such as addition and subtraction.

inverse variation (p. 472). Any function defined by an equation of the form $xy = k$, or $y = \frac{k}{x}$, where k is a nonzero constant that is called the *constant of variation*.

irrational number (p. 12). Any number that cannot be expressed as the quotient of two integers. Irrational numbers may be represented by nonterminating, nonrepeating decimals.

irreducible polynomial (p. 355). A polynomial that is not reducible over a given factor set.

joint variation (p. 467). A relationship in which one variable varies directly as the product of two or more other variables.

laws of exponents for division (p. 383). For all positive integers m and n and every nonzero real number a :

1. If $m = n$, then $\frac{a^m}{a^n} = 1$.
2. If $m > n$, then $\frac{a^m}{a^n} = a^{m-n}$.
3. If $m < n$, then $\frac{a^m}{a^n} = \frac{1}{a^{n-m}}$.

laws of exponents for multiplication (p. 329). For all real numbers a and b , if m and n are positive integers:

1. $a^m \cdot a^n = a^{m+n}$
2. $(a^m)^n = a^{mn}$
3. $(ab)^m = a^m b^m$

least common denominator (LCD) (p. 410). The least common multiple of the denominators of two or more fractions.

least common multiple (LCM) of integers (p. 342). The least positive integer that is a multiple of each of two or more given integers.

least common multiple (LCM) of monomials (p. 343). The monomial with the least degree and the least positive numerical coefficient that is a multiple of each of two or more given monomials.

least common multiple (LCM) of polynomials (p. 410). The polynomial of least degree and least positive

constant factor that has each of two or more given polynomials as a factor.

like monomials (p. 324). See similar monomials.

linear combination (p. 278). The equation obtained by multiplying one equation of a system by a nonzero constant and another equation of the system by another nonzero constant and adding or subtracting the two resulting equations.

linear equation in three variables (p. 307). For the variables x , y , and z , any equation that is of the form $ax + by + cz = d$, where a , b , c , and d are real numbers and a , b , and c are not all zero. In space, the graph of any equation of this form is a plane.

linear equation in two variables (p. 232). For the variables x and y , any equation that is of the form $ax + by = c$, where a , b , and c are real numbers and a and b are not both zero. The graph of any equation of this form is a line.

linear function (p. 234). A function whose ordered pairs satisfy a linear equation.

linear inequality in two variables (p. 237). An inequality whose associated equation is a linear equation in two variables.

linear programming (p. 302). A method of solving problems in which a quantity represented by a linear equation is to be maximized or minimized subject to conditions expressed by a system of linear inequalities.

linear term (p. 353). A term of degree one in a quadratic polynomial in simplest form.

mathematical expression (p. 18). A numerical or variable expression.

mathematical sentence (p. 30). A statement that indicates a relationship between two mathematical expressions.

maximum point of a curve (p. 557). A point on the curve whose y -coordinate is greater than or equal to the y -coordinate of every other point on the curve.

maximum value of a function (p. 557). The y -coordinate of the maximum point of the graph of the function.

mean (p. 637). See arithmetic mean.

means of a proportion (p. 450). In the proportion $\frac{a}{b} = \frac{c}{d}$, b and c are the means.

measure of an angle (p. 580). The number of degrees through which a ray rotates from the initial side to the terminal side of the angle.

median (p. 637). In an ordered set of n values, the median is the middle entry if n is odd, and is half the sum of the two middle entries if n is even.

member of a set (p. 6). Any object in the set. Also called *element*.

minimum point of a curve (p. 557). A point on the curve whose y -coordinate is less than or equal to the y -coordinate of every other point on the curve.

minimum value of a function (p. 557). The y -coordinate of the minimum point of the graph of the function.

mode (p. 637). In a set of data, the value that occurs with greatest frequency.

- monomial** (p. 323). An expression that is either a numeral, a variable, or an indicated product of a numeral and one or more variables. A *constant monomial*, or *constant*, contains no variable.
- multiple** (p. 180). The product of any real number and an integer is called a multiple of that real number.
- multiplication property of equality** (p. 114). For all real numbers a and b : if $a = b$, then $ac = bc$ and $ca = cb$.
- multiplication property of order** (p. 159). For all real numbers a , b , and c :
1. If $a < b$ and $c > 0$, then $ac < bc$ and $ca < cb$.
If $a > b$ and $c > 0$, then $ac > bc$ and $ca > cb$.
 2. If $a < b$ and $c < 0$, then $ac > bc$ and $ca > cb$.
If $a > b$ and $c < 0$, then $ac < bc$ and $ca < cb$.
- multiplicative inverse** (pp. 93, 94). For all nonzero real numbers a , the unique real number $\frac{1}{a}$ such that $a \cdot \frac{1}{a} = 1$ and $\frac{1}{a} \cdot a = 1$. Also called *reciprocal*.
- natural number** (p. 11). A member of the set $\{1, 2, 3, \dots\}$. Also called *counting number*.
- negative number** (p. 2). A number that corresponds to a point on the negative side of a number line.
- norm of a vector** (p. 604). The length, or magnitude, of a vector.
- n th root** (p. 524). If n is a positive integer and a is a real number, any real number whose n th power equals a is called an n th root of a .
- null set** (p. 8). *See* empty set.
- number line** (p. 1). A line for which numbers have been placed in correspondence with points on the line.
- numerical coefficient** (p. 324). *See* coefficient of a monomial.
- numerical expression** (p. 17). A name for a number. Also called *numeral*.
- one-to-one correspondence** (p. 6). A pairing of the members of two sets that assigns to each member of each set one and only one member of the other set.
- open half-plane** (p. 236). Either of two regions into which a line separates a coordinate plane. The line is called the *boundary* of each half-plane.
- open sentence** (p. 31). A mathematical sentence that contains at least one variable. Also called *open mathematical sentence*.
- opposite of a number** (p. 62). *See* additive inverse.
- order of operations** (p. 25). The steps to be followed in order when simplifying expressions.
- ordered pair** (p. 216). A pair of numbers in which the order of the numbers is important.
- ordered triple** (p. 306). A group of three numbers in which the order of the numbers is important.
- ordinate** (p. 216). The second coordinate of an ordered pair of real numbers that is assigned to a point on a coordinate plane. Also called *y-coordinate*.
- origin** (pp. 2, 215). On a number line, the point that corresponds to the number zero. On a coordinate plane, the point of intersection, labeled O , of the axes.
- parabola** (p. 557). A smooth curve that is the graph of a quadratic function with domain \mathcal{R} .
- parallel lines** (p. 249). Lines in a plane that do not intersect.
- percent** (p. 431). Percent means "per 100" or "divided by 100." The symbol for percent is %.
- perfect square** (p. 494). Any number that can be expressed as the square of a rational number.
- plane rectangular coordinate system** (p. 217). *See* Cartesian coordinate system.
- plotting a point** (p. 216). To find the point on a coordinate plane that corresponds to an ordered pair. Also called *graphing an ordered pair*.
- point of intersection** (p. 268). The one point that is common to two or more lines.
- polynomial** (p. 324). A monomial or a sum of monomials.
- polynomial equation** (p. 365). Any equation that can be written equivalently with 0 as one side and a polynomial as the other side.
- polynomial function** (p. 564). Any function of the form $x \rightarrow P(x)$, where $P(x)$ represents a polynomial.
- positive number** (p. 2). A number that corresponds to a point on the positive side of a number line.
- postulate** (p. 53). *See* axiom.
- power** (p. 24). The number named by an expression of the form a^n which represents the product of n factors equal to a . For example, $3^4 = 3 \times 3 \times 3 \times 3 = 81$.
- prime factorization** (p. 341). The expression of a positive integer as the product of prime factors.
- prime number** (p. 341). An integer greater than 1 that has no positive integral factor other than itself and 1. Also called *prime*.
- principal n th root** (p. 524). If n is an even integer, the positive n th root of a number is called the principal n th root.
- principal square root** (p. 493). The positive square root.
- probability** (p. 645). The measure of the chance that a particular outcome will occur.
- product** (p. 52). The number that is paired with two real numbers a and b by the operation of multiplication. This product is denoted by ab .
- property of completeness** (p. 489). Each decimal represents a real number, and every real number can be represented as a decimal.
- proportion** (p. 450). An equation which states that two ratios are equal.
- Pythagorean numbers** (p. 508). Any set of positive integers that satisfies the equation $c^2 = a^2 + b^2$. Also called a *Pythagorean triple*.
- Pythagorean Theorem** (p. 505). In any right triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the other two sides.
- quadrant** (p. 216). One of the four regions into which a coordinate plane is separated by the coordinate axes.
- quadrantal angle** (p. 580). An angle in standard position whose terminal side coincides with a coordinate axis.
- quadratic equation** (p. 363). Any equation that can be written equivalently in the form $ax^2 + bx + c = 0$, where $a \neq 0$.

quadratic formula (pp. 549–550). The solutions of the equation $ax^2 + bx + c = 0$, $a \neq 0$, are given by the formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}.$$

quadratic function (p. 557). Any function of the form $f: x \rightarrow ax^2 + bx + c$, $a \neq 0$.

quadratic inequality (p. 567). An inequality whose associated equation is a quadratic equation.

quadratic polynomial (p. 353). A polynomial of the form $ax^2 + bx + c$, $a \neq 0$.

quadratic term (p. 353). A term of degree two in a quadratic polynomial that is expressed in simplest form.

quadratic trinomial (p. 354). A polynomial that can be expressed in the form $ax^2 + bx + c$, $a, b, c \neq 0$.

quantifier (p. 50). A word or phrase that is used in combination with a variable in an open sentence to convey the idea of how many, or quantity. For example, *any*, *some*, and *at least one* are quantifiers.

quotient (p. 99). *See under* division.

radical (p. 493). When a mathematical expression appears under a radical sign, the entire expression is called a radical.

radical sign (p. 493). The symbol $\sqrt[n]{\quad}$ in an expression like $\sqrt[n]{a}$.

radicand (p. 493). Any numeral or expression under a radical sign.

range of a function (p. 221). *See under* function.

range of a relation (p. 219). The set of all the second coordinates of the ordered pairs in the relation.

range of a set of data (p. 640). The difference between the greatest and least values in the set.

ratio (p. 449). The quotient of one number divided by another, provided that the divisor is not zero.

rational expression (p. 390). Any expression that can be written as the quotient of two polynomials, provided that the denominator is not zero.

rational number (p. 12). Any number that can be expressed as the quotient of two integers, provided that the denominator is not zero.

rationalizing the denominator (p. 518). The process of expressing a fraction with an irrational denominator as an equivalent fraction with a rational denominator.

real number (p. 3). A number that is either a positive number, a negative number, or zero.

reciprocal (p. 93). *See* multiplicative inverse.

reducible polynomial (p. 355). A polynomial that can be expressed as a product of two or more polynomials of lower positive degree taken from a given factor set.

reflection (p. 372). A transformation, or mapping, of a plane in which each point on the plane is transformed into its mirror image across an *axis of reflection*.

reflexive axiom of equality (p. 55). For all real numbers a , $a = a$.

relation (p. 219). Any set of ordered pairs.

relative frequency of a measurement (p. 624). In a set of data, the frequency of the measurement divided by the total number of measurements.

repeating decimal (p. 486). A nonterminating decimal in which the same block of digits *repeats* without end.

replacement set (p. 18). *See* domain of a variable.

resultant of vectors (p. 608). The vector whose x -component is the sum of the x -components of two or more given vectors and whose y -component is the sum of the y -components of the given vectors. Also called *sum of vectors*.

right angle (p. 184). An angle whose measure is 90° .

root of an open sentence (p. 31). *See* solution of an open sentence.

roster (p. 6). A list of all the members of a set.

rule (p. 6). A description that identifies the members of a set.

satisfy (p. 31). Each member of the solution set of an open sentence is said to satisfy the open sentence.

scientific notation (p. 399). A notation used to express any positive number in the form $k \times 10^n$, where $1 \leq k < 10$ and n is an integer.

set (p. 6). A collection of objects.

set-builder notation (p. 32). A notation used in describing a set. For example, $\{x: x < 5\}$ is written in set-builder notation.

side of an equation (p. 30). One of two mathematical expressions that are joined by an equals sign.

side of an inequality (p. 30). One of two mathematical expressions that are joined by an inequality symbol.

similar monomials (p. 324). Monomials that are identical or that differ only in their numerical coefficients. Also called *like monomials*.

simple fraction (p. 415). A fraction free of negative exponents and fractions in the denominator or numerator.

simplest form of a fraction (p. 393). That form of the fraction in which the greatest common factor (GCF) of the numerator and denominator is 1.

simplest form of a polynomial (p. 324). That form of the polynomial in which no two of its terms are similar.

simplest form of a radical (p. 518). An expression that contains a radical is in simplest form when:

1. no integral radicand has a perfect square factor other than 1,
2. no fractions are under a radical, and
3. no radicals are in a denominator.

simplify a numerical expression (p. 17). To replace a numerical expression with the simplest, or most common, name of its value.

simplify a variable expression (p. 58). To replace a variable expression with an equivalent expression that has as few terms as possible.

simultaneous linear equations (p. 267). *See* system of linear equations.

sine of an angle (pp. 585, 594). For an angle in standard position, the ordinate of the point at which the terminal side intersects the unit circle. For an acute angle of a right triangle, the ratio of the length of the side opposite the angle to the length of the hypotenuse.

slope of a line (p. 243). The steepness of a nonvertical line as defined by the ratio:

$$\frac{\text{difference of ordinates}}{\text{difference of abscissas}}$$

More formally, if (x_1, y_1) and (x_2, y_2) are any two different points on the line, then

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1} \quad (x_1 \neq x_2).$$

A horizontal line has slope 0; a vertical line has no slope.

slope-intercept form of a linear equation (p. 249).

$y = mx + b$, where m is the slope of the line represented by the equation and b is its y -intercept.

solution of an open sentence (p. 31). Any value of the variables for which the open sentence is true. A solution of an open sentence in two variables is an ordered pair; a solution of an open sentence in three variables is an ordered triple. Also called *root*.

solution of a system (p. 267). A solution of a system of linear equations in two variables is an ordered pair that satisfies each equation in the system. A solution of a system of linear equations in three variables is an ordered triple.

solution set of an open sentence (p. 31). The set of all solutions of the open sentence.

solution set of a system (p. 267). The set of all solutions of the system.

solve an open sentence (p. 31). To determine the solution set of the open sentence over a given domain.

solve a triangle (p. 595). To find measures, or approximations to measures, of angles or sides of a triangle when measures of other angles or sides of the triangle are given.

square root (p. 493). A number b is a square root of a number a if $b^2 = a$. The positive square root of a is denoted by \sqrt{a} , the negative square root by $-\sqrt{a}$.

standard deviation (p. 641). In a set of data, the nonnegative square root of the variance.

standard position of an angle (p. 580). On a coordinate plane, the position of the angle with its vertex at the origin and the positive x -axis as its initial side.

subset (p. 7). If every member of a set S is also a member of a set T , then S is a subset of T .

substitution method (p. 281). A method for solving a system of linear equations in two variables by:

- (1) solving one equation for one of the variables,
- (2) substituting this expression in the other equation and solving this equation,
- (3) finding the corresponding value of the other variable, and
- (4) checking the solution in both original equations.

substitution principle (p. 17). Changing the numeral by which a number is named in an expression does not change the value of the expression.

subtraction (p. 82). For all real numbers a and b , the *difference* denoted as $a - b$ is defined by

$$a - b = a + (-b).$$

That is, to subtract b from a , add the opposite of b to a .

subtraction property of equality (p. 114). For all real numbers a , b , and c : if $a = b$, then $a - c = b - c$.

supplementary angles (p. 184). Two angles the sum of whose measures is 180° . Each angle is called a *supplement* of the other.

sum (p. 52). The number that is paired with two real numbers a and b by the operation of addition. This sum is denoted as $a + b$.

sum of cubes (p. 350). A polynomial that can be written in the form $a^3 + b^3$.

sum of vectors (p. 608). *See* resultant of vectors.

symmetric axiom of equality (p. 55). For all real numbers a and b , if $a = b$, then $b = a$.

system of linear equations (p. 267). A set of two or more linear equations in the same variables. Also called a set of *simultaneous linear equations*.

tangent of an angle (pp. 585, 594). For an angle in standard position whose terminal side intersects the unit circle at the point (p, q) , with $p \neq 0$, the ratio $\frac{q}{p}$.

For an acute angle of a right triangle, the ratio of the length of the side opposite the angle to the length of the side adjacent to the angle.

tautology (p. 206). A compound statement that is true for all truth values of its component statements.

terminal side (p. 579). The ray of an angle that is at the final position of the generating ray.

terminating decimal (p. 486). A decimal in which the division process *terminates* when a final remainder of zero is reached.

term of a polynomial (p. 324). A monomial in the expression for the polynomial.

terms (p. 52). In a sum, the numbers that are added. For example, a and b are the terms of the sum $a + b$.

theorem (p. 78). A statement that can be proved to be true.

transform an equation (p. 118). To change an equation into an equivalent equation.

transformation Each of the following always produces an equation equivalent to the original equation:

by addition (p. 119): Adding the same real number to each side of a given equation.

by division (p. 122): Dividing each side of a given equation by the same nonzero real number.

by multiplication (p. 122): Multiplying each side of a given equation by the same nonzero number.

by substitution (p. 119). Substituting for any expression in a given equation an equivalent expression.

by subtraction (p. 119). Subtracting the same real number from each side of a given equation.

transitive axiom of equality (p. 55). For all real numbers a , b , and c , if $a = b$ and $b = c$, then $a = c$.

transitive property of order (p. 158). For all real numbers a , b , and c :

1. If $a < b$ and $b < c$, then $a < c$.
2. If $a > b$ and $b > c$, then $a > c$.

translation of a plane (p. 256). A *transformation*, or *mapping*, of the plane in which the axes remain fixed while the points "slide" to new locations.

trigonometric functions (p. 586). A set of functions that includes the sine, cosine, and tangent functions. The domain of each trigonometric function is a set of angles, and the range is a set of real numbers. For example, $\sin 90^\circ = 0$.

trinomial (p. 324). A polynomial of three terms.
trinomial square (p. 335). A trinomial obtained by squaring a binomial.

uniform motion (p. 189). An object that moves at a constant speed, or rate, is said to be in uniform motion.

union (p. 167). The set consisting of the members belonging to at least one of two given sets.

unit circle (p. 585). A circle whose radius is one unit long and whose center is at the origin of a coordinate plane.

value of a function (p. 225). A member of the range of the function.

value of a numerical expression (p. 17). The number named by the expression.

value of a variable (p. 18). A number in the domain of the variable.

variable (p. 18). A symbol that is used to represent one or more numbers.

variable expression (p. 18). An expression that contains a variable.

variance (p. 641). In a set of data, the average of the squares of the deviations, or differences, of all the measurements from their arithmetic mean.

vector (p. 604). An arrow indicating both magnitude and direction, with an initial point at the origin and a terminal point at the tip of the arrowhead.

Venn diagram (p. 8). A diagram that shows how certain sets are related.

vertex of an angle (p. 579). *See under* directed angle.

vertex of a parabola (p. 558). The maximum or minimum point of the parabola.

whole number (p. 11). A member of the set $\{0, 1, 2, 3, \dots\}$.

x-axis (p. 216). Usually, the horizontal axis on a coordinate plane.

x-component of a vector (p. 605). The length of the horizontal displacement of the vector from its initial point to its terminal point.

x-coordinate (p. 216). *See* abscissa.

y-axis (p. 216). Usually, the vertical axis on a coordinate plane.

y-component of a vector (p. 605). The length of the vertical displacement of the vector from its initial point to its terminal point.

y-coordinate (p. 216). *See* ordinate.

y-intercept (p. 249). The ordinate of the point at which a line intersects the y -axis.

zero of a function (p. 559). Any member of the domain of the function for which the value of the function is zero.

zero-product property (p. 364). For all real numbers a and b , $ab = 0$ if and only if $a = 0$ or $b = 0$.