Glossary

absolute value. A number's distance from zero on the number line. The absolute value of -4 is 4; the absolute value of 4 is 4.

algorithm. An organized procedure for performing a given type of calculation or solving a given type of problem. An example is long division.

arithmetic sequence. A sequence of elements, $a_1, a_2, a_3, \ldots$, such that the difference of successive terms is a constant $a_{i+1} - a_i = k$; for example, the sequence {2, 5, 8, 11, 14, . . .} where the common difference is 3.

asymptotes. Straight lines that have the property of becoming and staying arbitrarily close to the curve as the distance from the origin increases to infinity. For example, the *x*-axis is the only asymptote to the graph of $\sin(x)/x$.

axiom. A basic assumption about a mathematical system from which theorems can be deduced. For example, the system could be the points and lines in the plane. Then an axiom would be that given any two distinct points in the plane, there is a unique line through them.

binomial. In algebra, an expression consisting of the sum or difference of two monomials (see the definition of *monomial*), such as $4a–8b$.

binomial distribution. In probability, a binomial distribution gives the probabilities of *k* outcomes *A* (or *n–k* outcomes *B*) in *n* independent trials for a two-outcome experiment in which the possible outcomes are denoted *A* and *B*.

binomial theorem. In mathematics, a theorem that specifies the complete expansion of a binomial raised to any positive integer power.

box-and-whisker plot. A graphical method for showing the median, quartiles, and extremes of data. A box plot shows where the data are spread out and where they are concentrated.

complex numbers. Numbers that have the form $a + bi$ where *a* and *b* are real numbers and *i* satisfies the equation $i^2 = -1$. Multiplication is denoted by $(a+bi)(c+di) = (ac–bd) + (ad+bc)i$, and addition is denoted by $(a+bi) + (c + di) = (a+c) + (b+d)i$.

congruent. Two shapes in the plane or in space are congruent if there is a rigid motion that identifies one with the other (see the definition of *rigid motion*).

conjecture. An educated guess.

coordinate system. A rule of correspondence by which two or more quantities locate points unambiguously and which satisfies the further property that points unambiguously determine the quantities; for example, the usual Cartesian coordinates *x*, *y* in the plane.

cosine. $\cos(\theta)$ is the *x*-coordinate of the point on the unit circle so that the ray connecting the point with the origin makes an angle of θ with the positive *x*-axis. When θ is an angle of a right triangle, then $\cos(\theta)$ is the ratio of the adjacent side with the hypotenuse.

dilation. In geometry, a transformation D of the plane or space is a dilation at a point P if it takes P to itself, preserves angles, multiplies distances from P by a positive real number r, and takes every ray through P onto itself. In case P is the origin for a Cartesian coordinate system in the plane, then the dilation D maps the point (x, y) to the point (rx, ry).

dimensional analysis. A method of manipulating unit measures algebraically to determine the proper units for a quantity computed algebraically. For example, velocity has units of the form length over time (e.g., meters per second [m/sec]), and acceleration has units of velocity over time; so it follows that acceleration has units $(m/sec)/sec = m/(sec^2)$.

expanded form. The expanded form of an algebraic expression is the *equivalent expression* without parentheses. For example, the expanded form of $(a + b)^2$ is $a^2 + 2ab + b^2$.

exponent. The power to which a number or variable is raised (the exponent may be any real number).

exponential function. A function commonly used to study growth and decay. It has the form $y = a^x$ with a positive.

factors. Any of two or more quantities that are multiplied together. In the expression 3.712×11.315, the factors are 3.712 and 11.315.

function. A correspondence in which values of one variable determine the values of another.

geometric sequence. A sequence in which there is a common ratio between successive terms. Each successive term of a geometric sequence is found by multiplying the preceding term by the common ratio. For example, in the sequence {1, 3, 9, 27, 81, . . .} the common ratio is 3.

histogram. A vertical block graph with no spaces between the blocks. It is used to represent frequency data in statistics.

inequality. A relationship between two quantities indicating that one is strictly *less than* or *less than or equal* to the other.

integers. The set consisting of the positive and negative whole numbers and zero; for example, {. . . -2, -1, 0, 1, 2 . . .}.

irrational number. A number that cannot be represented as an exact ratio of two integers. For example, the square root of 2 or π.

linear expression. An expression of the form $ax + b$ where x is variable and a and b are constants; or in more variables, an expression of the form $ax + by + c$, $ax + by + cz + d$, etc.

linear equation. An equation containing linear expressions.

logarithm. The inverse of exponentiation; for example, $a^{\log a^x} = x$.

mean. In statistics, the average obtained by dividing the sum of two or more quantities by the number of these quantities.

median. In statistics, the quantity designating the middle value in a set of numbers.

mode. In statistics, the value that occurs most frequently in a given series of numbers.

monomial. In the variables x, y, z, a monomial is an expression of the form $ax^m y^n z^k$, in which $m, n,$ and k are nonnegative integers and a is a constant (e.g., $5x^2$, $3x^2y$ or $7x^3yz^2$).

nonstandard unit. Unit of measurement expressed in terms of objects (such as paper clips, sticks of gum, shoes, etc.).

parallel. Given distinct lines in the plane that are infinite in both directions, the lines are parallel if they never meet. Two distinct lines in the coordinate plane are parallel if and only if they have the same slope.

permutation. A permutation of the set of numbers $\{1, 2, \ldots n\}$ is a reordering of these numbers.

polar coordinates. The coordinate system for the plane based on $r\theta$, the distance from the origin and θ, and the angle between the positive x-axis and the ray from the origin to the point.

polar equation. Any relation between the polar coordinates (r, θ) of a set of points (e.g., $r = 2\cos\theta$ is the polar equation of a circle).

polynomial. In algebra, a sum of monomials; for example, $x^2 + 2xy + y^2$.

prime. A natural number p greater than 1 is prime if and only if the only positive integer factors of p are 1 and p. The first seven primes are 2, 3, 5, 7, 11, 13, 17.

quadratic function. A function given by a polynomial of degree 2.

random variable. A function on a probability space.

range. In statistics, the difference between the greatest and smallest values in a data set. In mathematics, the image of a function.

ratio. A comparison expressed as a fraction. For example, there is a ratio of three boys to two girls in a class (3/2, 3:2).

rational numbers. Numbers that can be expressed as the quotient of two integers; for example, 7/3, 5/11, -5/13, 7 = 7/1.

real numbers. All rational and irrational numbers.

reflection. The reflection through a line in the plane or a plane in space is the transformation that takes each point in the plane to its mirror image with respect to the line or its mirror image with respect to the plane in space. It produces a mirror image of a geometric figure.

rigid motion. A transformation of the plane or space, which preserves distance and angles.

root extraction. Finding a number that can be used as a factor a given number of times to produce the original number; for example, the fifth root of 32 = 2 because $2 \times 2 \times 2 \times 2 \times 2 = 32$).

rotation. A rotation in the plane through an angle θ and about a point P is a rigid motion T fixing P so that if Q is distinct from P, then the angle between the lines PQ and $PT(Q)$ is always θ. A rotation through an angle θ in space is a rigid motion T fixing the points of a line l so that it is a rotation through θ in the plane perpendicular to l through some point on l.

scalar matrix. A matrix whose diagonal elements are all equal while the nondiagonal elements are all 0. The identity matrix is an example.

scatterplot. A graph of the points representing a collection of data.

scientific notation. A shorthand way of writing very large or very small numbers. A number expressed in scientific notation is expressed as a decimal number between 1 and 10 multiplied by a power of 10 (e.g., $7000 = 7 \times 10^3$ or $0.0000019 = 1.9 \times 10^{-6}$).

similarity. In geometry, two shapes R and S are similar if there is a dilation D (see the definition of *dilation*) that takes S to a shape congruent to R. It follows that R and S are similar if they are congruent after one of them is expanded or shrunk.

sine. Sin(θ) is the y-coordinate of the point on the unit circle so that the ray connecting the point with the origin makes an angle of θ with the positive x-axis. When θ is an angle of a right triangle, then $sin(\theta)$ is the ratio of the opposite side with the hypotenuse.

square root. The square roots of n are all the numbers m so that $m^2 = n$. The square roots of 16 are 4 and -4. The square roots of -16 are 4 i and -4 i.

standard deviation. A statistic that measures the dispersion of a sample.

symmetry. A symmetry of a shape S in the plane or space is a rigid motion T that takes S onto itself $(T(S) = S)$. For example, reflection through a diagonal and a rotation through a right angle about the center are both symmetries of the square.

system of linear equations. Set of equations of the first degree (e.g., $x + y = 7$ and $x - y = 1$). A solution of a set of linear equations is a set of numbers $a, b, c, \ldots$ so that when the variables are replaced by the numbers all the equations are satisfied. For example, in the equations above, $x = 4$ and $y = 3$ is a solution.

translation. A rigid motion of the plane or space of the form X goes to $X + V$ for a fixed vector V.

transversal. In geometry, given two or more lines in the plane a transversal is a line distinct from the original lines and intersects each of the given lines in a single point.

unit fraction. A fraction whose numerator is 1 (e.g., $\frac{1}{\pi}, \frac{1}{3}, \frac{1}{x}$). Every nonzero number may be written as a unit fraction since, for n not equal to 0, $n = 1/(1/n)$.

variable. A placeholder in algebraic expressions; for example, in $3x + y = 23$, x and y are variables.

vector. Quantity that has magnitude (length) and direction. It may be represented as a directed line segment.

zeros of a function. The points at which the value of a function is zero.

Publications Available from the Department of Education

This publication is one of over 600 that are available from the California Department of Education. Some of the more recent publications or those most widely used are the following:

Item no.	Title (Date of publication)	Price
1372	Arts Work: A Call for Arts Education for All California Students (1997)	$11.25
1436	California Department of Education Early Start Program Guide (1998)	10.00
1393	California Private School Directory, 1997-98 (1998)	17.50
1394	California Public School Directory, 1998	17.50
0488	Caught in the Middle: Educational Reform for Young Adolescents in California Public Schools (1987)	9.25
1373	Challenge Standards for Student Success: Health Education (1998)	10.00
1297	Challenge Standards for Student Success: Language Arts (1997)	10.00
1409	Challenge Standards for Student Success: Language Arts Student Work Addendum (1998)	12.75
1298	Challenge Standards for Student Success: Mathematics (1997)	15.75
1435	Challenge Standards for Student Success: Physical Education (1998)	8.50
1429	Challenge Standards for Student Success: Visual and Performing Arts (1998)	12.50
0777	The Changing Mathematics Curriculum: A Booklet for Parents (1989)	Set of 10/8.50
1439	Check It Out! Assessing School Library Media Programs (1998)	9.25
1281	Connect, Compute, and Compete: The Report of the California Education Technology Task Force (1996)	5.75
1389	English–Language Arts Content Standards for California Public Schools, Kindergarten Through Grade Twelve (1998)	9.25
1244	Every Child a Reader: The Report of the California Reading Task Force (1995)	5.25
1382	Getting Results, Part I: California Action Guide to Creating Safe and Drug-Free Schools and Communities (1998)	15.25
1408	Guide and Criteria for Program Quality Review: Elementary Grades (1998)	13.50
1064	Health Framework for California Public Schools, Kindergarten Through Grade Twelve (1994)	10.00
0737	Here They Come: Ready or Not—Report of the School Readiness Task Force (summary report) (1988)	5.00
1284	History–Social Science Framework for California Public Schools, 1997 Updated Edition (1997)	12.50
1245	Improving Mathematics Achievement for All California Students: The Report of the California Mathematics Task Force (1995)	5.25
1024	It's Elementary! Elementary Grades Task Force Report (1992)	9.00
1065	Physical Education Framework for California Public Schools, Kindergarten Through Grade Twelve (1994)	7.75
1314	Positive Intervention for Serious Behavior Problems: Best Practices in Implementing the Hughes Bill (Assembly Bill 2586) and the Positive Behavioral Intervention Regulations (1998)	14.00
1344	Reading/Language Arts and English as a Second Language: Adoption Report (1997)	11.00
1399	Ready to Learn—Quality Preschools for California in the 21st Century: The Report of the Superintendent's Universal Preschool Task Force (1998)	8.00
0870	Science Framework for California Public Schools, Kindergarten Through Grade Twelve (1990)	9.50
1040	Second to None: A Vision of the New California High School (1992)	9.50
1407	Steering by Results—A High-Stakes Rewards and Interventions Program for California Schools and Students: The Report of the Rewards and Interventions Advisory Committee (1998)	8.00
1276	Teaching Reading: A Balanced, Comprehensive Approach to Teaching Reading in Prekindergarten Through Grade Three (1996)	5.75
1261	Visual and Performing Arts Framework for California Public Schools, Kindergarten Through Grade Twelve (1996)	15.00
1392	Work-Based Learning Guide (1998)	12.50
1381	Workforce Career Development Model (1998)	9.50

Orders should be directed to:

California Department of Education
CDE Press, Sales Office
P.O. Box 271
Sacramento, CA 95812-0271

Please include the item number and desired quantity for each title ordered. Shipping and handling charges are additional, and purchasers in California also add county sales tax.

Mail orders must be accompanied by a check, a purchase order, or a credit card number, including expiration date (VISA or MasterCard only). Purchase orders without checks are accepted from educational institutions, businesses, and governmental agencies and may be placed by FAX (916) 323-0823. Telephone orders will be accepted toll-free (1-800-995-4099) for credit card purchases. Stated prices are subject to change. *All sales are final.*

Note: The new *Reading/Language Arts Framework* and *Mathematics Framework* are forthcoming. Call 1-800-995-4099 after May 1 for information on availability.

Prices are subject to change. Please call 1-800-995-4099 for current prices and shipping charges.

97-71 003-0056-98 300 3-99 40M