Glossary

Instructional Words

C

calculate: Figure out the number that answers a question; compute

clarify: Make a statement easier to understand; provide an example

classify: Put things into groups according to a rule and label the groups; organize into categories

compare: Look at two or more objects or numbers and identify how they are the same and how they are different (e.g., Compare the numbers 6.5 and 5.6. Compare the size of the students' feet. Compare two shapes.)

conclude: Judge or decide after reflection or after considering data

construct: Make or build a model; draw an accurate geometric shape (e.g., Use a ruler and a protractor to construct an angle.)

create: Make your own example

D

describe: Tell, draw, or write about what something is or what something looks like; tell about a process in a step-by-step way

determine: Decide with certainty as a result of calculation, experiment, or exploration

draw: 1. Show something in picture form
(e.g., Draw a diagram.)
2. Pull or select an object (e.g., Draw a card from the deck. Draw a tile from the bag.)

E

estimate: Use your knowledge to make a sensible decision about an amount; make a reasonable guess (e.g., Estimate how long it takes to cycle from your home to school. Estimate how many leaves are on a tree. What is your estimate of $3210 + 789$?)

evaluate: 1. Determine if something makes sense; judge
2. Calculate the value as a number

explain: Tell what you did; show your mathematical thinking at every stage; show how you know

explore: Investigate a problem by questioning, brainstorming, and trying new ideas

extend: 1. In patterning, continue the pattern
2. In problem solving, create a new problem that takes the idea of the original problem further

J

justify: Give convincing reasons for a prediction, an estimate, or a solution; tell why you think your answer is correct

M

measure: Use a tool to describe an object or determine an amount (e.g., Use a ruler to measure the height or distance around something. Use a protractor to measure an angle. Use balance scales to measure mass. Use a measuring cup to measure capacity. Use a stopwatch to measure the time in seconds or minutes.)

model: Show or demonstrate an idea using objects and/or pictures (e.g., Model addition of integers using red and blue counters.)

P

predict: Use what you know to work out what is going to happen (e.g., Predict the next number in the pattern 1, 2, 4, 7, ...)

R

reason: Develop ideas and relate them to the purpose of the task and to each other; analyze relevant information to show understanding

relate: Describe how two or more objects, drawings, ideas, or numbers are similar

represent: Show information or an idea in a different way that makes it easier to understand (e.g., Draw a graph. Make a model.)

S

show (your work): Record all calculations, drawings, numbers, words, or symbols that make up the solution

sketch: Make a rough drawing (e.g., Sketch a picture of the field with dimensions.)

solve: Develop and carry out a process for finding a solution to a problem

sort: Separate a set of objects, drawings, ideas, or numbers according to an attribute (e.g., Sort 2-D shapes by the number of sides.)

V

validate: Check an idea by showing that it works

verify: Work out an answer or solution again, usually in another way; show evidence of

visualize: Form a picture in your head of what something is like; imagine

Mathematical Words

A

absolute value: Written as $|x|$; describes the distance of x from 0; equals x when $x \geq 0$ or $-x$ when $x < 0$; for example, $|3| = 3$ and $|-3| = -(-3) = 3$

the ambiguous case of the sine law: A situation in which 0, 1, or 2 triangles can be drawn given the information in a problem. This occurs when you know two side lengths and an angle *opposite* one of the sides rather than *between* them (an SSA triangle). If the given angle is acute, 0, 1, or 2 triangles are possible. If the given angle is obtuse, 0 or 1 triangle is possible

amortization schedule: A record of payments showing the interest paid, the principal, and the current balance on a loan or investment

amount: The total value of an investment or loan. The amount is given by $A = P + I$, where A is the amount, P is the principal, and I is the interest

amplitude: Half the difference between the maximum and minimum values; it is also the vertical distance from the function's axis to the maximum or minimum value

angle of depression (declination): The angle between a line below the horizontal and the horizontal

angle of elevation: The angle formed by the horizontal and the line of sight (to an object above the horizontal)

annuity: A series of payments or investments made at regular intervals, A **simple** annuity is an annuity in which the payments coincide with the compounding period, or *conversion* period; an **ordinary** annuity is an annuity in which the payments are made at the end of each interval

arithmetic sequence: A sequence that has the same difference, the **common difference**, between any pair of consecutive terms

arithmetic series: The sum of the terms of an arithmetic sequence

associative property: With addition and multiplication, you can add or multiply in any order: $(a + b) + c = a + (b + c)$ and $(ab)c = a(bc)$

asymptote: A line that the graph of a relation or function gets closer and closer to, but never meets, on some portion of its domain

asymptotes
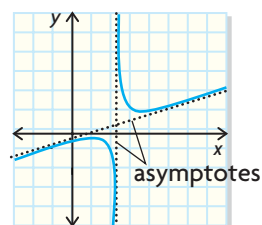
axis of symmetry: A line in a two-dimensional figure such that, if a perpendicular is constructed, any two points lying on the perpendicular and the figure are at equal distances from this line

B

bearing: The direction in which you have to move in order to reach an object. A bearing is a clockwise angle from magnetic north. For example, the bearing of the lighthouse shown is 335°
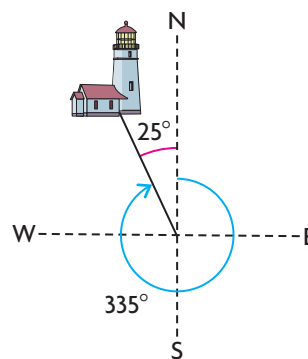
C

common difference: The constant difference between two consecutive terms in an arithmetic sequence or series

common ratio: The constant ratio (quotient) between two consecutive terms in a geometric sequence or series

commutative property: The order in which you add or multiply numbers does not matter. The result is the same; $a + b = b + a$ and $a \times b = b \times a$

completing the square: The process of adding a constant to a given quadratic expression to form a perfect trinomial square. For example, $x^2 + 6x + 2$ is not a perfect square, but if 7 is added it becomes $x^2 + 6x + 9$, which is the square of $x + 3$

compound interest: Interest that is added to the principal *before* new interest earned is calculated. So interest is calculated on the principal *and* on the interest already earned. Interest is paid at regular time intervals called the **compounding period**

compounding period: The intervals at which interest is calculated, for example,

annually $\Rightarrow$ 1 time per year

semi-annually $\Rightarrow$ 2 times per year

quarterly $\Rightarrow$ 4 times per year

monthly $\Rightarrow$ 12 times per year

cosine law: The relationship, for any triangle, involving the cosine of one of the angles and the lengths of the three sides; used to determine unknown sides and angles in triangles. If a triangle has sides a, b, and c, and if the angle A is opposite side a, then $a^2 = b^2 + c^2 - 2bc \cos A$

curve of best fit: The curve that best describes the distribution of points in a scatter plot. Typically found using regression analysis

curve of good fit: A curve that reasonably describes the distribution of points in a scatter plot. Typically found using an informal process

D

direction of opening: The direction in which a parabola opens; up or down

discriminant: The expression $b^2 - 4ac$ in the quadratic formula

distributive property: The principal that says that, when a polynomial is expanded, each of its terms is multiplied or divided by the number or term outside of the brackets

domain: The set of all values of the independent variable of a relation

down payment: The partial amount of a purchase paid at the time of purchase

E

entire radical: A radical with coefficient 1, for example $\sqrt{12}$

equation of the axis: The equation of the horizontal line halfway between the maximum and the minimum; it is determined by

$$y = \frac{\text{maximum value} + \text{minimum value}}{2}$$

exponential function: A function of the form $y = a(b^x)$

F

factored form: A quadratic relation in the form $f(x) = a(x - r)(x - s)$

family: A collection of functions (or lines or curves) sharing common characteristics

family of parabolas: A group of parabolas that all share a common characteristic

function: A relation where each value of the independent variable corresponds with only one value of the dependent variable

function notation: Notation, such as $f(x)$, used to represent the value of the dependent variable—the output—for a given value of the independent variable, x—the input

future value: The total amount, A, of an investment after a certain length of time

G

general term: A formula, labelled t_n, that expresses each term of a sequence as a function of its position. For example, if the general term of a sequence is $t_n = 2n$, then to calculate the 12th term (t_{12}), substitute $n = 12$

$$t_{12} = 2(12)$$
$$= 24$$

geometric sequence: A sequence that has the same ratio, the **common ratio**, between any pair of consecutive terms

geometric series: The sum of the terms of a geometric sequence

H

half life: The time required for a quantity to decay to half of its initial value

harmonic mean: A type of average, denoted by H, involving the reciprocals of a list of numbers

$$H = \frac{n}{\frac{1}{a_1} + \frac{1}{a_2} + ... + \frac{1}{a_n}}, \text{ where}$$

a_1, ..., a_n are positive real numbers

hypotenuse: The longest side of a right triangle; the side that is opposite the right angle

I

identity: A mathematical statement that is true for all values of the given variables. If the identity involves fractions, the denominators cannot be zero. Any restrictions on a variable must be stated

independent variable: In an algebraic relation, a variable whose values may be freely chosen and upon which the values of the other variables depend. Often represented by x

index (plural **indices**): The number at the left of the radical sign. It tells which root is indicated: 3 for cube root, 4 for fourth root, etc. If there is no number, the square root is intended

interest: The cost of borrowing money or the money earned from an investment

invariant point: A point on a graph (or figure) that is unchanged by a transformation; for example, $(-2, 0)$ and $(2, 0)$ for this graph and transformation
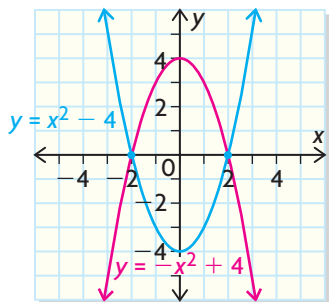
inverse of a function: The reverse of the original function; undoes what the original function has done

L

like radicals: Radicals that have the same number under the radical symbol, such as $3\sqrt{6}$ and $-2\sqrt{6}$

linear relation: A relation between two variables that appears as a straight line when graphed on a coordinate system. May also be referred to as a *linear function*

line of best fit: The straight line that best describes the distribution of points in a scatter plot. Typically found using linear regression analysis

line of good fit: The straight line that reasonably describes the distribution of points in a scatter plot. Typically found using an informal process
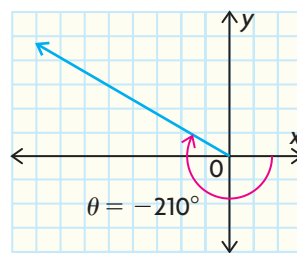
lowest common denominator (LCD): The smallest multiple shared by two or more denominators

M

mixed radical: A radical with coefficient other than 1; for example, $2\sqrt{3}$

N

**negative angle:** An angle measured *clockwise* from the positive x-axis

negative correlation: This indicates that as one variable in a linear relationship increases, the other decreases or vice versa

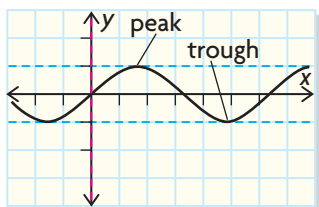**nonperiodic function:** Any function that does not repeat at regular intervals

P

parabola: The graph of a quadratic relation of the form $y = ax^2 + bx + c \ (a \neq 0)$. The graph, which resembles the letter "U," is symmetrical

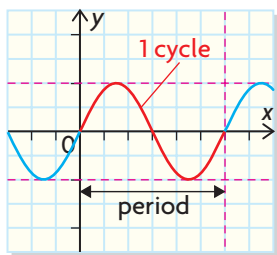**parent function:** The simplest, or base, function in a family
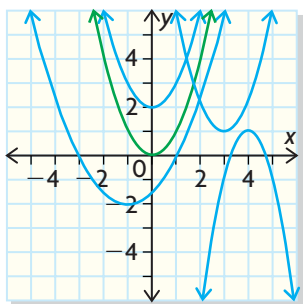
partial sum: The sum, S_n, of the first n terms of a sequence

peak: The maximum point on a graph

period: The change in the independent variable (typically x) corresponding to one cycle; a cycle of a periodic function is a portion of the graph that repeats

periodic function: A function whose graph repeats at regular intervals; the y-values in the table of values show a repetitive pattern when the x-values change by the same increment

phase shift: The horizontal translation of a sinusoidal function is also called a phase shift

positive correlation: This indicates that both variables in a linear relationship increase or decrease together

present value: The principal that would have to be invested now to get a specific future value in a certain amount of time; PV is used for present value instead of P, since P is used for principal

prime number: A number with only two factors, 1 and itself (e.g., 17 is a prime number since its only factors are 1 and 17.)

principal: A sum of money that is borrowed or invested

principal angle: The counterclockwise angle between the initial arm and the terminal arm of an angle in standard position. Its value is between 0° and 360°
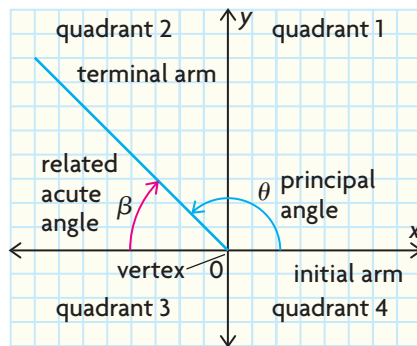
Pythagorean theorem: The conclusion that, in a right triangle, the square of the length of the longest side is equal to the sum of the squares of the lengths of the other two sides

Q

quadratic formula: A formula for determining the roots of a quadratic equation of the form $ax^2 + bx + c = 0$. The formula is phrased in terms of the coefficients of the quadratic equation:

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

quadratic relation: A relation whose equation is in quadratic form; for example, $y = x^2 + 7x + 10$

R

radical: A square, cube, or higher root, such as $\sqrt{4} = 2$ or $\sqrt[3]{27} = 3$; $\sqrt{}$ is called the radical symbol

range: The set of all values of the dependent variable of a relation

rational form: A number written as an integer or a fraction, such as -3 or $-\frac{2}{3}$

rational expression: A quotient of polynomials; for example, $\frac{2x - 1}{3x}$, $x \neq 0$

rational function: Any function whose output can be given by an expression that is the ratio of two polynomials.

A rational function can be expressed as $f(x) = \frac{R(x)}{S(x)}$, where R and S are polynomials and $S \neq 0$—for example,

$$f(x) = \frac{x^2 - 2x + 3}{4x - 1}, \ x \neq \frac{1}{4}$$

real numbers: Numbers that are either rational or irrational; these include positive and negative integers, zero, fractions, and irrational numbers such as $\sqrt{2}$ and π

reciprocal trigonometric ratios: The reciprocal ratios are defined by dividing 1 by each of the primary trigonometric ratios

$$\csc \theta = \frac{1}{\sin \theta} = \frac{\text{hypotenuse}}{\text{opposite}}$$

$$\sec \theta = \frac{1}{\cos \theta} = \frac{\text{hypotenuse}}{\text{adjacent}}$$

$$\cot \theta = \frac{1}{\tan \theta} = \frac{\text{adjacent}}{\text{opposite}}$$

$\cot \theta$ is the short form for the cotangent of angle θ, $\sec \theta$ is the short form for the secant of angle θ, and $\csc \theta$ is the short form for the cosecant of angle θ

recursive formula: A formula relating the general term of a sequence to the previous term or terms

recursive sequence: A sequence for which one term (or more) is given and each successive term is determined from the previous term(s)

related acute angle: The acute angle between the terminal arm of an angle in standard position and the x-axis when the terminal arm lies in quadrants 2, 3, or 4
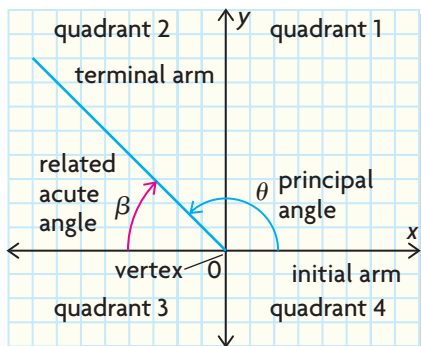
relation: A set of ordered pairs; values of the independent variable are paired with values of the dependent variable

restrictions: The values of the variable(s) in a rational function or rational expression that cause the function to be undefined. These are the zeros of the denominator or, equivalently, the numbers that are not in the domain of the function

S

scatter plot: A graph that attempts to show a relationship between two variables by means of points plotted on a coordinate grid

sequence: An ordered list of numbers

series: The sum of the terms of a sequence

simple interest: Interest earned or paid only on the original sum of money that was invested or borrowed

sine law: The relationships, for any triangle, involving the sines of two of the angles and the lengths of the opposite sides; used to determine unknown sides and angles in triangles. If a triangle has sides a, b, and c, and if the angles opposite each side are A, B, and C, respectively, then

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

sinusoidal function: A periodic function whose graph looks like smooth symmetrical waves, where any portion of the wave can be horizontally translated onto another portion of the curve; graphs of sinusoidal functions can be created by transforming the graph of the function $y = \sin x$ or $y = \cos x$
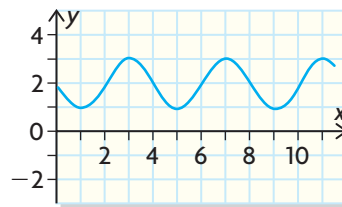
standard form: A quadratic relation in the form $f(x) = ax^2 + bx + c$

standard position: An angle in the Cartesian plane whose vertex lies at the origin and whose initial arm (the arm that is fixed) lies on the positive *x*-axis. Angle θ is measured from initial arm to terminal arm (the arm that rotates)
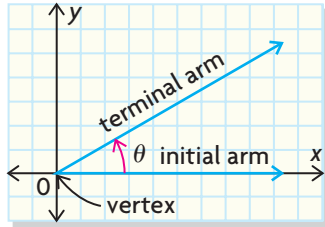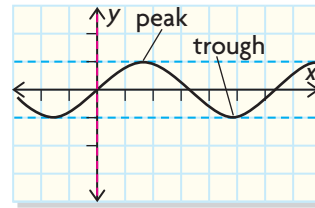

T

term: A number in a sequence. Subscripts are usually used to identify the position of the terms

transformation: A geometric operation such as a translation, rotation, dilation, or reflection

trend: A relationship between two variables for which the independent variable is time

trough: The minimum point on a graph

V

vertex (plural **vertices):** The point at the corner of an angle or shape (e.g., A cube has eight vertices. A triangle has three vertices. An angle has one vertex.)

vertex form: A quadratic function written in the form $f(x) = a(x - h)^2 + k$ is in vertex form; the vertex is (h, k)

vertical line test: If any vertical line intersects the graph of a relation more than once, then the relation is not a function