

Glossary

Pairwise comparison method In the *pairwise comparison method* of voting, the voters rank the candidates. The method consists of a series of comparisons in which each candidate is compared to each of the other candidates. If choice A is preferred to choice B , then A receives 1 point. If B is preferred to A , then B receives 1 point. If the candidates tie, each receives $\frac{1}{2}$ point. The candidate with the most points is the winner.

Parabola A set of points in the plane equidistant from a given point (called the *focus*) and a given line (called the *directrix*). It is the path of a projectile. The *axis of symmetry* is the axis of the parabola. The point where the axis cuts the parabola is the *vertex*.

Parallel circuit Two switches connected together so that if either of the two switches is turned on, the circuit is on.

Parallel lines Two nonintersecting straight lines in the same plane.

Parallelepiped A polyhedron, all of whose faces are parallelograms.

Parallelogram A quadrilateral with its opposite sides parallel.

Parentheses See *Grouping symbols*.

Pareto principle If each voter prefers A over B , then the group chooses A over B .

Partial sum If s_1, s_2, s_3, \dots is a sequence, then the partial sums are

$$S_1 = s_1, S_2 = s_1 + s_2, S_3 = s_1 + s_2 + s_3, \dots$$

Pascal's triangle A triangular array of numbers that is bordered by ones and the sum of two adjacent numbers in one row is equal to the number in the next row between the two numbers.

$$\begin{array}{ccccccc} & & & & 1 & & & & \\ & & & & & 1 & & 1 & \\ & & & & & & 1 & & 2 & & 1 \\ & & & & & & & 1 & & 3 & & 3 & & 1 \\ & & & & & & & & 1 & & 4 & & 6 & & 4 & & 1 \\ & & & & & & & & & 1 & & 5 & & 10 & & 10 & & 5 & & 1 \\ & & & & & & & & & & & & & \vdots & & & & & & \end{array}$$

Password A word or set of symbols that allows access to a computer account.

Pattern recognition A computer function that entails the automatic identification and classification of shapes, forms, or relationships.

Pearson correlation coefficient A number between -1 and $+1$ that indicates the degree of linear relationship between two sets of numbers. In the text, we call this the *linear correlation coefficient*.

Pentagon A polygon with 5 sides.

Percent The ratio of a given number to 100; hundredths; denoted by %; that is, 5% means $5/100$.

Percent markdown The percent of an original price used to find the amount of discount.

Percent problem A is $P\%$ of W is formulated as a proportion

$$\frac{P}{100} = \frac{A}{W}$$

Percentage The given amount in a percent problem.

Percentile Ninety-nine values that divide a data set into one hundred equal parts.

Perfect number An integer that is equal to the sum of all of its factors except the number itself. For example, 28 is a perfect number since

$$28 = 1 + 2 + 4 + 7 + 14$$

Perfect square $1^2 = 1$, $2^2 = 4$, $3^2 = 9$, ..., so the perfect squares are 1, 4, 9, 16, 25, 36, 49,

Perimeter The distance around a polygon.

Periodic payment problem A financial problem that involves monthly or other periodic payments.

Peripheral A device, such as a printer, that is connected to and operated by a computer.

Permutation A selection of objects from a given set with regard to the order in which they are selected. Sometimes it refers to the number of ways this selection can be done and is denoted by ${}_nP_r$. The formula for finding it is

$${}_nP_r = \frac{n!}{(n - r)!}$$

Perpendicular lines Two lines are perpendicular if they meet at right angles.

Personal computer A computer kept for and used by an individual.

Pi (π) A number that is defined as the ratio of the circumference to the diameter of a circle. It cannot be represented exactly as a decimal, but it is a number between 3.1415 and 3.1416.

Pictograph See *Graph*.

Pie chart See *Graph*.

Pirating Stealing software by copying it illegally for the use of someone other than the person who paid for it.

Pivot A process that uses elementary row operations to carry out the following steps:
1. Divide all entries in the row in which the pivot appears (called the *pivot row*) by the nonzero pivot element so that the pivot entry becomes a 1. This uses elementary row operation 3.
2. Obtain zeros above and below the pivot element by using elementary row operation 4.

Pivot row In an elementary row operation, it is the row that is multiplied by a constant. See *Elementary row operations*.

Pivoting See *Pivot*.

Pixel Any of the thousands (or millions) of tiny dots that make up a computer or calculator image.

Place-value names Trillions, hundred billions, ten billions, billions, hundred millions, ten millions, millions, hundred thousands, ten thousands, thousands, hundreds, tens, units, tenths, hundredths, thousandths, ten-thousandths, hundred-thousandths, and millionths (from large to small).

Planar curve A curve completely contained in a plane.

Plane In mathematics, it is an undefined term. It is flat and level and extends infinitely in horizontal and vertical directions. It is considered two-dimensional.

Plot a point To mark the position of a point.

Plurality rule The winner of an election is the candidate with the highest number of votes.

Point (1) In the decimal representation of a number, it is a mark that divides the whole number part of a number from its fractional part. (2) In relation to a home loan, it represents 1% of the value of a loan, so that 3 points would be a fee paid to a lender equal to 3% of the amount of the loan. (3) In geometry, it is an undefined word that signifies a position, but that has no dimension or size.

Point-slope form An algebraic form of an equation of a line that is given in terms of a point (x_1, y_1) and slope m of a given line:

$$y - y_1 = m(x - x_1)$$

Police patrol problem Suppose a police car needs to patrol a gated subdivision and would like to enter the gate, cruise all the streets exactly once, and then leave by the same gate.

Polygon A geometric figure that has three or more straight sides that all lie in a plane so that the starting point and the ending point are the same.

Polynomial An algebraic expression that may be written as a sum (or difference) of terms. Each *term* of a polynomial contains multiplication only.

Population The total set of items (actual or potential) defined by some characteristic of the items.

Population growth The population, P , at some future time can be predicted if you know the population P_0 at some time, and the annual growth rate, r . The predicted population t years after the given time is $P = P_0 e^{rt}$.

Population paradox When there is a fixed number of seats, a reapportionment may cause a state to lose a seat to another state, even though the percent increase in the population of the state that loses the seat is larger than the percent increase of the state that wins the seat. When this occurs, it is known as the *population paradox*.

Positional system A numeration system in which the position of a symbol in the representation of a number determines the meaning of that symbol.

Positive number A number greater than 0.

Positive sign The symbol “+” when used in front of a number or an expression.

Positive square root The symbol \sqrt{x} is the positive number that, when multiplied by itself, gives the number x . The symbol “ $\sqrt{\quad}$ ” is always positive.

Postulate A statement that is accepted without proof.

Pound A unit of measurement for mass in the United States system. It is equal to 16 oz.

Power See *Exponent*.

Precision The accuracy of the measurement; for example, a measurement is taken to the nearest inch, nearest foot, or nearest mile. It is not to be confused with accuracy that applies to the calculation.

Predecessor In a sequence, the predecessor of an element a_n is the preceding element, a_{n-1} .

Premise A previous statement or assertion that serves as the basis for an argument.

Present value See *Compound interest formula*.

Present value formula The present value, P , of a known future value A invested at an annual interest rate of r for t years compounded n times per year is found by the formula

$$P = A\left(1 + \frac{r}{n}\right)^{-nt}$$

Present value of an annuity A financial formula that seeks the present value from periodic payments over a period of time. the formula is

$$P = m \left[\frac{1 - \left(1 + \frac{r}{n}\right)^{-nt}}{\frac{r}{n}} \right]$$

Previous balance method A method of calculating credit card interest using the formula $I = Prt$ in which P is the balance owed before the current payment is subtracted.

Prime factorization The factorization of a number so that all of the factors are primes and so that their product is equal to the given number.

Prime number $P = \{2, 3, 5, 7, 11, 13, 17, 19, 23, \dots\}$: a number with exactly two factors: 1 and the number itself.

Principal See *Compound interest formula*.

Printer An output device for a computer.

Prism In this book, it refers to a right prism, which is also called a parallelepiped or more commonly a box.

Probabilistic model A model that deals with situations that are random in character and attempts to predict the outcomes of events with a certain stated or known degree of accuracy.

Probability If an experiment can result in any of n ($n \geq 1$) mutually exclusive and equally likely outcomes, and if s of these are considered favorable to event E , then $P(E) = s/n$.

Probability function A function P that satisfies the following properties:

$$0 \leq P(E) \leq 1, P(S) = 1, \text{ and if } E \text{ and } F \text{ are mutually exclusive events, then } P(E \cup F) = P(E) + P(F).$$

Problem-solving procedure

1. *Read the problem.* Note what it is all about. Focus on processes rather than numbers. You can't work a problem you don't understand.
2. *Restate the problem.* Write a verbal description of the problem using operation signs and an equal sign. Look for equality. If you can't find equal quantities, you will never formulate an equation.
3. *Choose a variable.* If there is a single unknown, choose a variable.
4. *Substitute.* Replace the verbal phrases by known numbers and by the variable.
5. *Solve the equation.* This is the easy step. Be sure your answer makes sense by checking it with the original question in the problem. Use estimation to eliminate unreasonable answers.
6. *State the answer.* There were no variables

defined when you started, so $x = 3$ is not an answer. Pay attention to units of measure and other details of the problem. Remember to answer the question that was asked.

Product The result of a multiplication.

Profit formula $P = S - C$, where P represents the profit, S represents the selling price (or revenue), and C the cost (or overhead).

Program A set of step-by-step instructions that instruct a computer what to do in a specified situation.

Progression See *Sequence*.

Projective geometry The study of those properties of geometric configurations that are invariant under projection. It was developed to satisfy the need for depth in works of art.

Prompt In a computer program, a prompt is a direction that causes the program to print some message to help the user understand what is happening at a particular time.

Proper divisor A divisor of a number that is less than the number itself.

Proper fraction A fraction for which the numerator is less than the denominator.

Proper subset See *Subset*.

Proof A logical argument that establishes the truth of a statement.

Property of complements See *Complementary probabilities*.

Property of proportions If the product of the means equals the product of the extremes, then the ratios form a proportion. Also, if the ratios form a proportion, then the product of the means equals the product of the extremes.

Property of rational expressions Let P , Q , R , S , and K be any polynomials such that all values of the variable that cause division by zero are excluded from the domain.

Equality $\frac{P}{Q} = \frac{R}{S}$ if and only if $PS = QR$.

Fundamental property $\frac{PK}{QK} = \frac{P}{Q}$

Addition $\frac{P}{Q} + \frac{R}{S} = \frac{PS + QR}{QS}$

Subtraction $\frac{P}{Q} - \frac{R}{S} = \frac{PS - QR}{QS}$

Multiplication $\frac{P}{Q} \cdot \frac{R}{S} = \frac{PR}{QS}$

Division $\frac{P}{Q} \div \frac{R}{S} = \frac{PS}{QR}$

Property of zero $AB = 0$ if and only if $A = 0$ or $B = 0$ (or both). Also called the *zero-product rule*.

Proportion A statement of equality between two ratios. For example,

$$\frac{a}{b} = \frac{c}{d}$$

For this proportion, a and d are called the *extremes*; b and c are called the *means*.

Protractor A device used to measure angles.

Pseudosphere The surface of revolution of a tractrix about its asymptote. It is sometimes called a “four-dimensional sphere.”

Pyramid A solid figure having a polygon as a base, the sides of which form the bases of triangular surfaces meeting at a common vertex.

Pythagorean theorem If a triangle with legs a and b and hypotenuse c is a right triangle, then $a^2 + b^2 = c^2$.