

# Glossary of GRE Math Terms

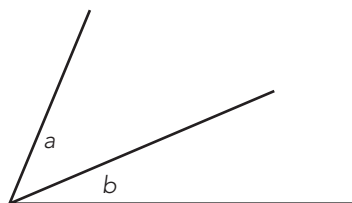
This glossary includes many of the concepts tested on the GRE Quantitative section. We recommend that you thoroughly review difficult mathematical concepts, and refer to this glossary as necessary during your preparation.

## A

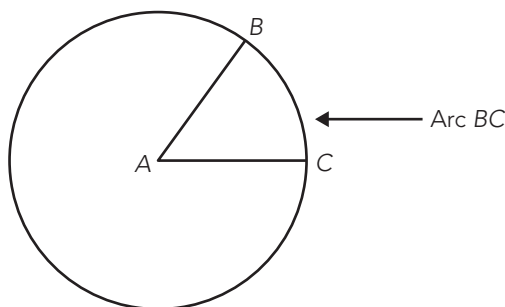
**Absolute Value** A number's distance on the number line from 0, without considering which direction from 0 the number lies. Therefore, absolute value will always be positive.

**Acute Angle** An angle less than 90 degrees.

**Adjacent Angle** Either of two angles having a common side and common vertex. For example, in the following figure, angles  $a$  and  $b$  are adjacent angles:



**Arc** A portion of the circumference of a circle, as shown in the following figure:



The complete arc of a circle has  $360^\circ$ .

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**Area** The number of square units that covers the shape or figure. Following are the formulas for the area of some common figures:

- Square: side ( $s$ ) squared ( $s^2$ )
- Rectangle: length ( $l$ ) times width ( $w$ ) ( $l \times w$ )
- Circle: pi ( $\pi$ ) times the radius ( $r$ ) squared ( $\pi r^2$ )
- Triangle: one half the base ( $b$ ) times the height ( $h$ ) ( $\frac{1}{2} b \times h$ )

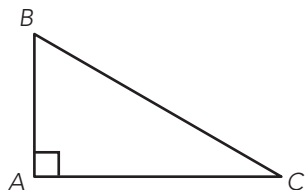
**Arithmetic Mean (see Average)** The average of a group of values. Calculate the arithmetic mean by dividing the sum of all of the values in the group by the total count of values in the group. For example, the average of the 3 test scores 82%, 83%, and 87% is equivalent to  $(82 + 83 + 87)$  divided by 3;  $252 \div 3 = 84$ .

**Associative Property** A mathematical property whereby the grouping of numbers being added or multiplied can be changed without changing the sum or the product. The associative property of multiplication can be expressed as  $(a \times b) \times c = a \times (b \times c)$ . Likewise, the associative property of addition can be expressed as  $(a + b) + c = a + (b + c)$ .

**Average (see Arithmetic Mean)** The arithmetic mean of a group of values. Calculate the average by dividing the sum of all of the values in the group by the total count of values in the group. For example, the average of the 3 test scores 82%, 83%, and 87% is equivalent to  $(82 + 83 + 87)$  divided by 3;  $252 \div 3 = 84$ .

### B–C

**Base** In geometry, the bottom of a plane figure. For example, in the right triangle that follows,  $AC$  is the base:



In algebra, the base is the number that is raised to various powers. For example,  $2^3$  indicates a base of 2 raised to the power of 3.

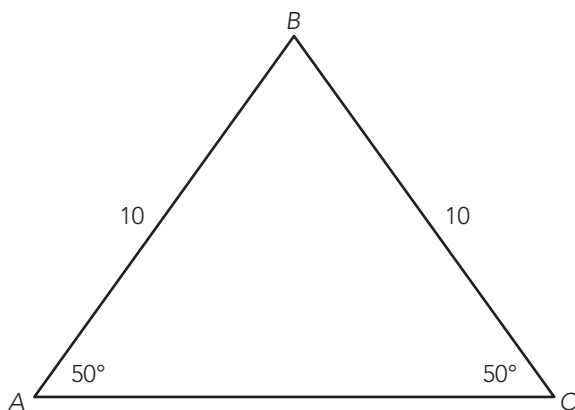
**Circumference** The distance around a circle. The circumference of a circle is equal to pi times the diameter ( $\pi d$ ). The formula for the circumference of a circle can also be expressed as  $2\pi r$ , because the diameter,  $d$ , is twice the radius,  $r$ .

**Collinear** A term referring to points that pass through or lie on the same straight line.

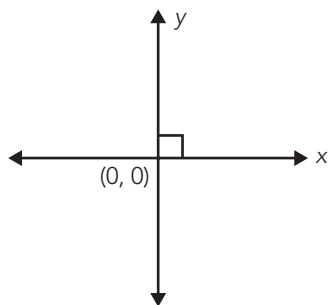
**Commutative Property** A mathematical property whereby the order of numbers being added or multiplied can be changed without changing the sum or the product. The commutative property of addition is expressed as  $a + b = b + a$ . Likewise, the commutative property of multiplication is expressed as  $a \times b = b \times a$ , or  $ab = ba$ .

**Complementary Angles** Two angles for which the sum is 90 degrees.

**Congruent** A term describing any shapes or figures, including line segments and angles, that have the same size or measure. For example, in the triangle below, sides  $AB$  and  $BC$  are congruent, and angles  $A$  and  $C$  are congruent:



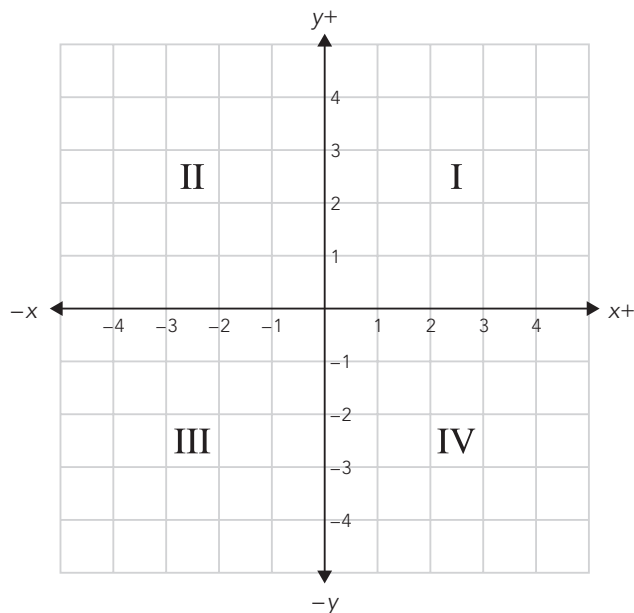
**Coordinate Plane** A plane, typically defined with the coordinates  $x$  and  $y$ , where the two axes are at right angles to each other. The horizontal axis is the  $x$ -axis, and the vertical axis is the  $y$ -axis, as shown in the following figure:



You can locate any point  $(x,y)$  on the coordinate plane by an ordered pair of numbers. The ordered pair  $(0,0)$ , where the  $x$  and  $y$  axes meet, is the origin.

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The coordinate plane is divided into four quadrants, as shown in the following figure:

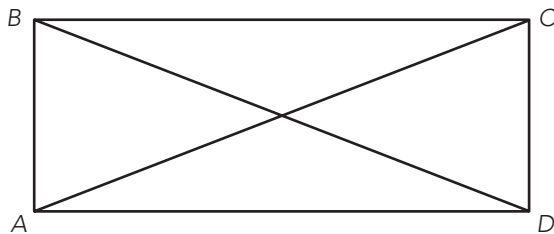


### D

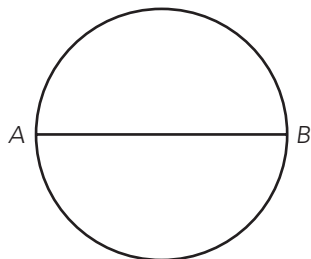
**Decimal** The point that separates values less than 1 from those greater than 1. In our number system, digits can be placed to the left and right of a decimal point. *Place value* refers to the value of a digit in a number relative to its position. Starting from the left of the decimal point, the values of the digits are ones, tens, hundreds, and so on. Starting to the right of the decimal point, the values of the digits are tenths, hundredths, thousandths, and so on.

**Denominator** The bottom part of a fraction. For example, in the fraction  $\frac{3}{4}$ , 4 is the denominator.

**Diagonal** A line segment that connects two nonadjacent vertices in any polygon. In the following rectangle,  $AC$  and  $BD$  are diagonals:



**Diameter** A line segment that joins two points on a circle and passes through the center of the circle, as shown in the following figure, where  $AB$  is the diameter:



**Distributive Property** A mathematical property observed when an expression involves both addition and multiplication. The distributive property is expressed as  $a(b + c) = ab + ac$ , where the variable  $a$  is distributed to the variables  $b$  and  $c$ .

**Divisible** Capable of being divided, usually with no remainder. For example, 6 is divisible by 2, because when 6 is divided by 2, the result is 3 with no remainder.

#### E–F

**Equilateral Triangle** A triangle in which all of the sides are congruent and each of the angles equals 60 degrees.

**Exponent** A number that indicates the operation of repeated multiplication. A number with an exponent is said to be “raised to the power” of that exponent. For example,  $2^3$  indicates 2 raised to the power of 3, which translates into  $2 \times 2 \times 2$ . In this instance, 3 is the exponent.

**Factor** One of two or more expressions that are multiplied together to get a product. For example, in the equation  $2 \times 3 = 6$ , 2 and 3 are factors of 6. Likewise, in the equation  $x^2 + 5x + 6$ ,  $(x + 2)$  and  $(x + 3)$  are factors.

**FOIL Method** A method of multiplying two binomials, such as  $(x + 2)$  and  $(x + 3)$ , according to the following steps:

Multiply the **FIRST** terms together:  $(x)(x) = x^2$

Multiply the **OUTSIDE** terms together:  $(x)(3) = 3x$

Multiply the **INSIDE** terms together:  $(2)(x) = 2x$

Multiply the **LAST** terms together:  $(2)(3) = 6$

Now, combine like terms to get  $x^2 + 5x + 6$

**Fraction** An expression that indicates the quotient of two quantities. For example,  $\frac{2}{3}$  is a fraction, where 2 is the numerator and 3 is the denominator.

**Frequency Distribution** The frequency with which a data value occurs in any given set of data.

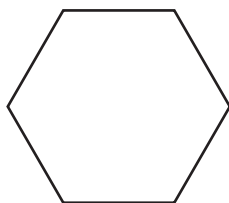
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**Function** A set of ordered pairs where no two of the ordered pairs has the same  $x$ -value. In a function, each input ( $x$ -value) has exactly one output ( $y$ -value). For example,  $f(x) = 2x + 3$ . If  $x = 3$ , then  $f(x) = 9$ . For every  $x$ , only one  $f(x)$ , or  $y$ , exists.

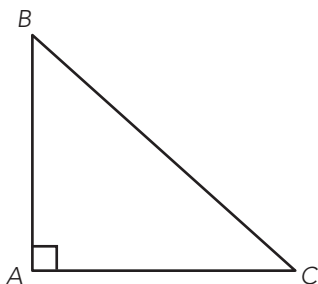
### G–H–I

**Greatest Common Factor (GCF)** The largest number that will divide evenly into any two or more numbers. For example, 1, 2, 4, and 8 are all factors of 8; likewise, 1, 2, 3, and 6 are all factors of 6. Therefore, the greatest common factor of 8 and 6 is 2.

**Hexagon** A six-sided figure, shown below:



**Hypotenuse** The leg of a right triangle that is opposite the right angle. For example, in the right triangle in the following figure,  $BC$  is the hypotenuse:



The hypotenuse is always the longest leg of a right triangle.

**Improper Fraction** An integer combined with a fraction. For example,  $2\frac{1}{2}$  is an improper fraction (**see also Mixed Number**).

**Inequality** A mathematical expression that shows that two quantities are not equal. For example,  $2x < 8$  is an inequality that means that  $2x$  is less than 8. Likewise,  $3a > 17$  is an inequality that means that  $3a$  is greater than 17.

**Integer** Integers include both positive and negative whole numbers. Zero is also considered an integer.

**Interior Angle** The angle inside two adjacent sides of a polygon. The sum of the interior angles in a triangle is always 180 degrees.

**Irrational Number** A number that cannot be exactly expressed as the ratio of two integers. For example,  $\pi$  ( $\approx 3.14$ ) is an irrational number.

**Isosceles Triangle** A triangle in which two sides have the same length.

## J–L

**Least Common Denominator (LCD)** The smallest multiple of the denominators of two or more fractions. For example, the least common denominator of  $\frac{3}{4}$  and  $\frac{2}{5}$  is 20.

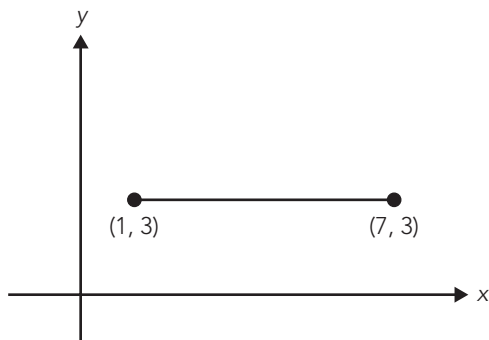
**Least Common Multiple (LCM)** The smallest number that any two or more numbers will divide evenly into. For example, the common multiples of 3 and 4 are 12, 24, and 36; 12 is the smallest multiple, and is, therefore, the least common multiple of 3 and 4.

**Like Terms** Terms that contain the same variable raised to the same power. For example,  $3x^2$  and  $10x^2$  are like terms that can be combined to get  $13x^2$ . Also,  $-x$  and  $4x$  are like terms that can be combined to get  $3x$ .

**Line** A straight set of points that extends into infinity in both directions, as shown in the following figure:



**Line Segment** A figure representing two points on a line and all of the points in between, as shown in the following figure:



## M–N

**Median** The middle value of a series of numbers when those numbers are in either ascending or descending order. In the series (2, 4, 6, 8, 10) the median is 6. To find the median in an even set of data, find the average of the middle two numbers. In the series (3, 4, 5, 6) the median is 4.5.

**Midpoint** The center point of a line segment. To find the midpoint of a line given two points on the line, use the formula  $\left(\frac{[x_1 + x_2]}{2}, \frac{[y_1 + y_2]}{2}\right)$ .

**Mixed Number** A number that combines an integer with a fraction. Mixed numbers are also called **Improper Fractions**;  $1\frac{1}{2}$  is a mixed number.

**Mode** The number that appears most frequently in a series of numbers. In the series (2, 3, 4, 5, 6, 3, 7) the mode is 3, because 3 appears twice in the series and the other numbers each appear only once in the series.

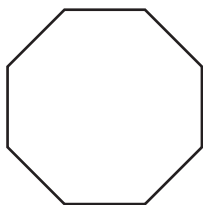
**Number Line** The line on which every point represents a real number. On a number line, numbers that correspond to points to the right of zero are positive, and numbers that correspond to points to the left of zero are negative. For any two numbers on the number line, the number to the left is less than the number to the right.

**Numerator** The top part of a fraction. For example, in the fraction  $\frac{3}{4}$ , 3 is the numerator.

### O-P

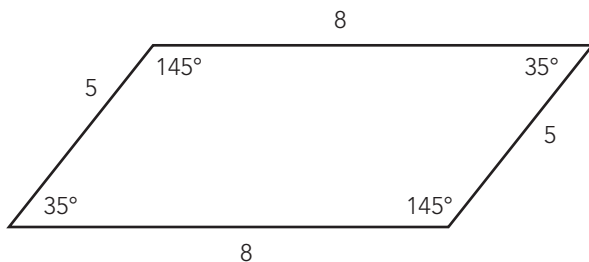
**Obtuse Angle** An angle that measures greater than 90 degrees and less than 180 degrees.

**Octagon** An eight-sided figure, shown as follows:



**Parallel** A term that describes two distinct lines that lie in the same plane and do not intersect. Two lines are parallel if and only if they have the same slope. For example, the two lines with equations  $2y = 6x + 7$  and  $y = 3x - 14$  have the same slope (3) (**see Point-slope Form**).

**Parallelogram** A quadrilateral in which the opposite sides are of equal length and the opposite angles are equal, as shown below:



The sum of the angles in a parallelogram is always 360 degrees.



**PEMDAS** An acronym that describes the correct order in which to perform mathematical operations. The acronym PEMDAS stands for Parentheses, Exponents, Multiplication, Division, Addition, and Subtraction. It should help you to remember to do the operations in the correct order, as follows:

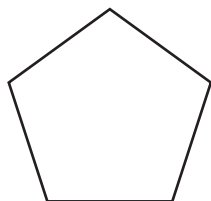
**P** First, do the operations within the *parentheses*, if any.

**E** Next, do the *exponents*, if any.

**M, D** Next, do the *multiplication* or *division*, if any.

**A, S** Next, do the *addition* or *subtraction*, in order from left to right, if any.

**Pentagon** A five-sided figure, shown as follows:



**Percent** A fraction whose denominator is 100. The fraction  $25/100$  is equal to 25% and can also be expressed as 0.25.

**Perimeter** The distance around any shape or object. Following are the formulas for the perimeter of some common figures:

- The perimeter (P) of a rectangle is equivalent to  $2l + 2w$ , where  $l$  is the length and  $w$  is the width.
- The perimeter (P) of a square is  $4s$ , where  $s$  is the length of a side.
- The perimeter (P) of other polygons is the sum of the lengths of the sides.
- The perimeter (P) of a triangle is the sum of the lengths of the sides.

**Perpendicular** A term describing two distinct lines whose intersection creates a right angle. Two lines are perpendicular if and only if the slope of one of the lines is the negative reciprocal of the slope of the other line. In other words, if line  $a$  has a slope of 2, and line  $b$  has a slope of  $-\frac{1}{2}$ , then the two lines are perpendicular.

**Point** A location in a plane or in space that has no dimensions.

**Point-slope Form** The equation of a line in the form  $y = mx + b$ , where  $m$  is the slope and  $b$  is the  $y$ -intercept.

**Polygon** A closed plane figure made up of at least three line segments that are joined. For example, a triangle, a rectangle, and an octagon are polygons.

**Polynomial** A mathematic expression consisting of more than two terms.  $2x^2 + 4x + 4$  is a simple quadratic equation, and also a polynomial.

**Prime Number** Any number that can only be divided by itself and 1. That is, 1 and number itself are the only factors of a prime number. For example, 2, 3, 5, 7, and 11 are prime numbers.

**Probability** The likelihood that an event will occur. For example, Jeff has three striped and four solid ties in his closet; therefore, he has a total of seven ties in his closet. He has three chances to grab a striped tie out of the seven total ties, because he has three striped ties. So, the probability of Jeff grabbing a striped tie is 3 out of 7, which can also be expressed as 3:7, or  $\frac{3}{7}$ .

**Proportion** A mathematical statement indicating that one ratio is equal to another ratio. For example,  $\frac{1}{5} = \frac{x}{20}$  is a proportion.

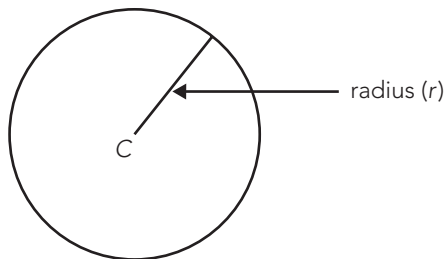
**Pythagorean Theorem** This theorem applies only to finding the length of the sides in right triangles, and states that  $c^2 = a^2 + b^2$ , where  $c$  is the hypotenuse (the side opposite the right angle) of a right triangle and  $a$  and  $b$  are the two other sides of the triangle.

## Q–R

**Quadrilateral** Any four-sided polygon with four angles. A parallelogram, a rectangle, a square, and a trapezoid are all examples of quadrilaterals.

**Quotient** The result of division.

**Radius** The distance from the center of a circle to any point on the circle, as shown below in the following circle with center  $C$ :



**Ratio** A mathematical comparison between two quantities. A ratio of 1 to 5, for example, is written as either  $\frac{1}{5}$  or 1:5.

**Rational Number** A fraction whose numerator and denominator are both integers and the denominator does not equal 0.

**Real Number** Any rational or irrational number, used to express quantities, lengths, amounts, and the like. All real numbers correspond to points on the number line. All real numbers except zero are either positive or negative.

**Reciprocal** Given a number,  $n$ , the reciprocal is expressed as 1 over  $n$ , or  $\frac{1}{n}$ .

The product of a number and its reciprocal is always 1. In other words,

$$\frac{1}{3} \times \frac{3}{1} = \frac{3}{3}, \text{ which is equivalent to } 1.$$

**Rectangle** A polygon with four sides (two sets of congruent, or equal sides) and four right angles. All rectangles are parallelograms.

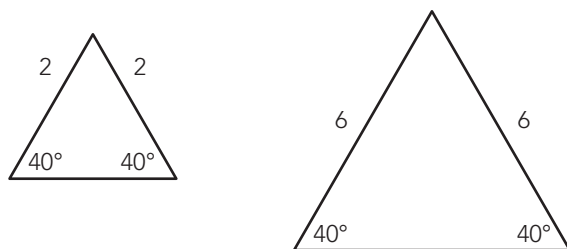
**Right Angle** An angle that measures 90 degrees.

### S–T

**Sequence** An *arithmetic* sequence is one in which the difference between one term and the next is the same. For example, the following sequence is an arithmetic sequence because the difference between the terms is 2: 1, 3, 5, 7, 9. A *geometric* sequence is one in which the ratio between two terms is constant. For example, the following sequence is a geometric sequence because the ratio between the terms is  $\frac{1}{2}$ : 16, 8, 4, 2, 1,  $\frac{1}{2}$ .

**Set** A well-defined group of numbers or objects. For example, {2, 4, 6, 8} is the set of positive even whole numbers less than 10.

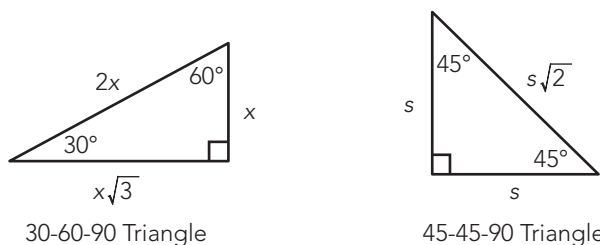
**Similar Triangles** Triangles in which the measures of corresponding angles are equal and the corresponding sides are in proportion, as shown in the following figure:



**Slope** The change in  $y$ -coordinates divided by the change in  $x$ -coordinates from two given points on a line. The formula for slope is  $m = \frac{(y_2 - y_1)}{(x_2 - x_1)}$ , where  $(x_1, y_1)$  and  $(x_2, y_2)$  are the two given points. For example, the slope of a line that contains the points (3,6) and (2,5) is equivalent to  $\frac{(6 - 5)}{(3 - 2)}$ , or  $\frac{1}{1}$ , which equals 1.

**Slope-intercept Equation**  $y = mx + b$ , where  $m$  is the slope of the line and  $b$  is the  $y$ -intercept (that is, the point at which the graph of the line crosses the  $y$ -axis).

**Special Triangles** Triangles whose sides have special ratios. The following are angle measures and side lengths for special right triangles:



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**Square** A number multiplied by itself. Squaring a negative number yields a positive result. For example,  $-2^2 = 4$ .

**Square Root** Given a number,  $n$ , the square root is written as  $\sqrt{n}$ , or the non-negative value  $a$  that fulfills the expression  $a^2 = n$ . For example, the square root of 5 is expressed as  $\sqrt{5}$ , and  $(\sqrt{5})^2 = 5$ .

**System of Equations** A group of two or more equations with the same set of unknowns. In solving a system of equations, try to find values for each of the unknowns that will satisfy every equation in the system.

**Triangle** A closed plane figure having three sides and three angles.

### V–Z

**Volume** A measure of space or capacity of a three-dimensional object. The formula for the volume of a rectangular solid is  $V = lwh$ , where  $l$  = length,  $w$  = width, and  $h$  = height.

**y-intercept** The point at which a line crosses the  $y$ -axis in the  $(x,y)$ -coordinate plane.