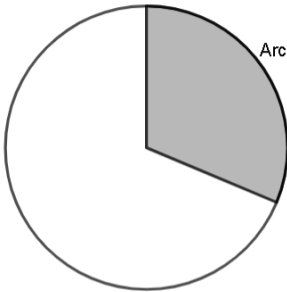


## Glossary of Math Terms on the SAT

**Absolute Value** – Distance from zero. The absolute value can never be negative.

Ex:  $|-17|=17$  and  $|42|=42$

**Arc** – a portion of the circumference of a circle. If the circle was a pizza, your slice would be a sector, and the crust on your slice would be an arc.



**Base** – the bottom (and sometimes the top) of a 3-D geometric figure.

Ex: the base of a cylinder is a circle.

**Box** – A 3-D figure with a length, width, and height, and where all the angles are right. This is also called a **rectangular prism**, and, if the three dimensions are all equal, it is a **cube**. The formula for volume of a box is given in the reference information at the beginning of every SAT math section.

**Circle** – The set of all points in a plane that are equidistant from a given point (aka, the center). A point is *on* the circle if it is on the circumference. A point is *in* the circle if it is in the area enclosed by the circumference.

**Center of a circle** – the point from which all points on a circle are equidistant. The center is in the circle, but not on the circle. All the radii start at the center, and the center is the midpoint of every diameter. In the standard equation for a circle, the center is referred to with the coordinates  $(h, k)$ .

**Complex Number** – A number that is a mix of the real and the imaginary. It is given in the form  $a + bi$ , where  $a$  is the real part and  $bi$  is the imaginary part.

**Cone** – A 3-D shape with a circular base on the bottom and a point on the top. (Or you could turn it upside down and have the circle on the top and the point on the bottom.) A **right circular cone** means the point is directly above (or directly below) the center of the circular base. It would look exactly like an ice cream cone. The formula for volume of a cone is given in the reference information at the beginning of every SAT math section.

**Confidence Interval** – A way to describe the level of uncertainty when a statistic about a population is being estimated by a sampling from that population. The confidence interval gives an upper and lower boundary between which you are a certain percent sure the true value falls.

Ex: Amy polled 100 people and asked them how they would vote in next week’s election. 52% of them said they would vote for her. As a result, she is 90% sure that she will get between 47% and 57% of the vote on election day.

**Conjugates** – two binomials in the form  $(a + b)(a - b)$ . When you multiply conjugates, you will get a difference of squares. When you multiply complex conjugates  $(a + bi)(a - bi)$ , you will magically turn something imaginary into something real!

**Consecutive** – in a row, without skipping over any items.

Ex: 14, 15, and 16 are consecutive integers; 19, 21, and 23 are consecutive odd integers, and  $\angle A$  and  $\angle B$  would be consecutive angles in hexagon ABCDEF.

Use  $n$ ,  $n+1$  and  $n+2$  when representing consecutive integers in an equation, and  $n$ ,  $n+2$ ,  $n+4$  when representing consecutive even or odd integers.

**Constant** – (1) the term of a polynomial that doesn’t have a variable at all.

Ex: in the polynomial  $15x^2 - 19x + 7$  the constant is 7.

(2) A parameter in a function that will always hold the same value, even for different points on the function.

Ex: in the function  $y = 5x - 9$ , the variables are  $x$  and  $y$  while the constants are 5 and -9. If the function is written as  $y = mx + b$ , the variables are  $x$  and  $y$  while the constants are still  $m$  and  $b$ . I know it looks weird because  $m$  and  $b$  are letters rather than numbers, but there’s a reason. This line will go through an infinite number of points, so  $x$  and  $y$  can take on an infinite number of values just for this one function. However, the line will only have one slope and one intercept, so there’s just one  $m$  and one  $b$  for the whole line.

This term can be extra confusing because most of us think in terms of definition 1 when we see the word “constant”, but the SAT usually uses definition 2.

**Correlation** – a way to describe the trend in bivariate data. In other words, if the line of best fit has a positive slope, there is a positive correlation, and if the line of best fit has a negative slope, there is a negative correlation. On the SAT, as in real life, be extra careful not to confuse correlation with causation. You can show that A correlates with B, but you can’t explain *why* they correlate without an experiment that includes a control group.

Ex: Jaida asked her classmates for their most recent grades in their science and English classes. She graphed the data on a scatterplot and found a strong positive correlation. Does this mean high science grades cause high English grades, or that strong English grades cause high science grades? No. If Jaida wants to explain why these grades correlate, she will have to develop a hypotheses and then run an experiment to test it.

**Cosine** – In a right triangle, the ratio between the side adjacent to a given angle and the hypotenuse. Usually abbreviated to “cos”, but please pronounce this as “cosine” not “cos”.  $\cos x = \frac{\text{adjacent}}{\text{hypotenuse}}$

**Cylinder** – a 3-D geometric figure with two circular bases. It looks a lot like a soda can. The formula for Volume is given in the reference information at the beginning of every math section, but not the formula for Surface Area.

**Decreasing** – Getting smaller. A function is decreasing when, if you trace along the function from left to right, you are going in an downward direction.

**Degree** – (1) A way to describe a polynomial by giving the highest exponent.

Ex:  $15x^7 - 12x^4 + 3x - 1$  is a 7<sup>th</sup> degree polynomial.

(2) A unit used to measure an angle. A right angle has 90°, a straight angle has 180°, and a full circle has 360°.

**Deposit** – the amount of money put into a bank account. This does not include any interest earned on that money.

Ex: Jack opens up a new bank account and makes an initial deposit of \$100.

**Diameter** – the longest distance from one side of a circle to another. The diameter is twice the radius and will always go through the center of its circle.

**Domain** – all the values of  $x$  you can use in a function. Most functions have an infinite domain; the exceptions are rational functions, where you have to make sure the denominator will not be zero, and radical functions, where you have to make sure the value under the square root is  $\geq 0$ .

Ex: The domain of  $f(x) = -7x^2 - 4$  is infinite because you can plug in any  $x$  value at all and get an answer. However, the domain of  $g(x) = \frac{x-7}{x+2}$  is all real numbers except  $x = -2$  because if you try to plug in -2 for  $x$ , you will get a zero in a denominator.

**Elements** – the individual items in a set

Ex: The set  $\{-7, 7\}$  has two elements.

**Equation** - A mathematical statement that includes an equal sign.

**Equivalent** – Equal to, or the same as.

**Exponential Decay** – Something that is getting smaller at an ever decreasing-rate. This is represented by a curve that starts off with a steep drop, but eventually levels off. A good example of exponential decay is starting with a value such as 300 and cutting it in half over and over and over. The function that models this situation would be  $f(x) = 300(0.5^x)$ .

**Exponential Growth** – Something that is growing at an ever-increasing rate. This is represented by a curved line that starts off almost flat, but eventually gets very steep. A good example of exponential growth is starting with the number 5, and doubling it over and over and over. The function that models this example is  $f(x) = 5(2^x)$ .

**Expression** – A mathematical statement consisting of numbers, variables, and/or operations that does not have an equal sign or inequality. Expressions cannot be solved; they can only be simplified.

**FOIL** – An acronym that describes the process of multiplying two binomials. It stands for Firsts, Outters, Inners, Lasts.

Ex:  $(x^2 + 3)(2x - 5) = 2x^3 - 5x^2 + 6x - 15$

**Function** – a mathematical description of the relationship between two variables. Typically,  $x$  is the input, and  $f(x)$  is the output. For a relation to be a function, there must be exactly one value of  $f(x)$  for each value of  $x$ .

Ex:  $f(x) = 2x - 1$  is an example of a linear function;  $f(x) = x^2 - 8x + 7$  is an example of a quadratic function, and the equation of a circle such as  $(x - 2)^2 + y^2 = 81$  isn't a function at all because it fails the vertical line test.

**Graph** – a visual representation of the relationship between two variables. On the SAT, you will be analyzing graphs of functions and relations that are shown on the  $xy$ -plane.

**Height** – the measurement from the bottom to the top, along a vertical line.

**Hypotenuse** – the side of a right triangle that is opposite the right angle. It will always be the longest side of the right triangle.

**Imaginary number** – the value that is equal to  $\sqrt{-1}$  and is represented in math as  $i$ . In the real world, you can't take the square root of  $-1$ . Just try it on your calculator, and see what happens! We don't know how big  $i$  is or even if it's positive or negative, so we can't graph it on a number line or coordinate plane. However, we often get it as an answer when we're using the quadratic formula. When you're taking the SAT, make sure you know that  $i^2 = -1$ .

**Increasing** – Getting larger. A function is increasing when, if you trace along the function from left to right, you are going in an upward direction.

**Inequality** – A statement describing the relationship between two expressions. There are 5 inequalities in math:  $<$ ,  $\leq$ ,  $>$ ,  $\geq$ , and  $\neq$ .

**Integers** – All whole numbers and their opposites. Integers can be positive or negative, but cannot be fractions or have decimals.

Ex: 5, -15, 92, and 0 are all integers. However,  $\frac{1}{2}$ , 5.692, and  $\sqrt{2}$  are not integers.

**Intercepts** – The points at which the graph of a function crosses over one of the axes. The  $y$ -intercept will have coordinates  $(0, y)$  and the  $x$ -intercept,  $(x, 0)$ . Therefore, if you have the equation of the function, you can always find the intercepts by setting the opposite variable equal to zero.

**Interest** – The money a bank will give you as a "thank you" for saving your money at their institution. We typically express interest as a percentage of your savings that is given to you on an annual basis, and we represent it with the variable  $r$ . **Simple interest** is money given to you rather than deposited back into your account. **Compounded interest** is when the interest you earn is deposited into your account,

and you start to gain interest on that interest. If, instead of saving money, you decide to borrow money from a bank, you will have to show your gratitude by paying them interest!

**Isosceles triangle** – A triangle with two equal sides. Isosceles triangles will have two congruent base angles and one different vertex angle. Isosceles right triangles will be 45-45-90 triangles. (personal note: my youngest daughter used to pronounce this “is-o-loss-o-lees”)

**Line** – A geometric figure that extends infinitely in two directions and does not change direction.

**Line of Best Fit** – A line drawn on a scatterplot to show the general trend of the data. In real world statistics, there’s a method for drawing a line of best fit in exactly the correct place. On the SAT, you can just eyeball it. The slope of your line of best fit would tell you if there is a positive or negative **correlation** to the data.

**Linear** – a relationship that has a constant slope. Equations in the form  $y = mx + b$  are linear.

**Margin of error** – A way to describe the level of uncertainty when a statistic about a population is being estimated by a sample from that population. The margin of error can be easily converted to a confidence interval, and vice versa.

Ex: Amy polled 100 people and asked them how they would vote in next week’s election. 52% of them said they would vote for her. So, she estimates she will get 52% of the vote with a margin of error of  $\pm 5\%$ .

**Maximum** – (1) the largest value in a set of data

(2) the y-value of the highest point in a function.

**Mean** – a statistic calculated by adding up all the numbers in a set and dividing by how many values were in that set. The mean is also called the average and describes the center of the data. As compared to the median, the mean is more sensitive to outliers.

**Median** – a statistic arrived at by putting the data in ascending order and selecting the middle number. If there are an even number of data points, the mean is calculated by adding the two numbers in the center and then dividing by zero. As compared to the mean, the median is less sensitive to outliers.

**Minimum** – (1) the smallest value in a set of data.

(2) the y-value of the lowest point in a function.

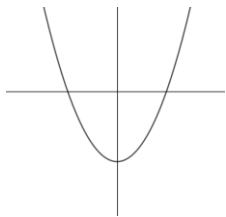
**Model** – a mathematical equation that describes how variables relate to each other in the real world.

Ex: The model  $H = 1.88L + 32.02$  can be used by archeologists to estimate a person’s total height (H) from the length of the femur (L), where H and L are both in inches.

**Outlier** – A number or numbers in a set that just don’t seem to belong with all the other numbers because they are much larger or much smaller than the rest of the group.

Ex: In the set {5, 7, 52, 58, 59, 62, 71, 80}, 5 and 7 are outliers.

**Parabola** – The “U” shaped curve that results from graphing a quadratic function.



**Parallel** – In geometry, two lines in the same plane that will never intersect. In coordinate geometry, two lines that have equal slopes. In a system of equations, two lines that have no solution.

**Percentage** – the expression of a decimal or fraction as a number out of 100.

Ex – 0.5 is the same thing as  $\frac{1}{2}$ , which are both the same thing as 50%.

**Perpendicular** – In geometry, two lines in a plane that meet at a right angle. In coordinate geometry, two lines whose slopes are opposite reciprocals.

**Pi** – A delicious number in math that represents the ratio between the circumference of a circle and its diameter. It is an irrational number, but we usually round it to 3.14 or use the fraction  $\frac{22}{7}$ . On the SAT, it is most common to leave the symbol  $\pi$  in your answer.

**Population** – All of the elements in a group.

Ex: The USA has a population of approximately 329 million people. If you want to find some information about US citizens in general, you certainly don't want to talk to all of them! Instead, you should randomly select a sample, ask them your question, and generalize your results to the full population.

**Product** – the result of multiplication

Ex: The product of 5 and 6 is 30.

**Pyramid** – A 3-D geometric shape that has a polygonal base and comes to a point at the top. The sides are all triangles. The SAT asks questions about pyramids only very rarely, but it does include the formula for the volume of a rectangular pyramid in the reference information at the beginning of every math section.

**Pythagorean Theorem** – An equation relating the three sides of a right triangle. Specifically, it is  $a^2 + b^2 = c^2$  where  $a$  and  $b$  are the legs and  $c$  is the hypotenuse. (Although Pythagoras gets all the credit for coming up with this theorem, it was actually used in ancient Egypt and Babylon more than a thousand years before his time.)

**Pythagorean Triples** – Sets of three integers that satisfy the Pythagorean theorem. The triples you should know for the SAT are 3-4-5 and 5-12-13.

**Quotient** – the result of division

Ex: The quotient of 20 and 5 is 4. (Note that order is important. The quotient of 5 and 20 is  $\frac{1}{4}$ .)

**Radian** – A unit of measurement for angles. A right angle is  $\frac{\pi}{2}$  radians, a straight angle is  $\pi$  radians, and a whole circle is  $2\pi$  radians.

Ex: Imagine there is a circle painted on the ground that has a radius of 4 feet. If you were to start at one point on the circle and walk along the circumference for 4 feet, then you will have walked along one radian, or about  $57.3^\circ$ , of the circle.

**Radius** – The distance between the center of any circle and any point on that circle. The radius is half of the diameter.

**Range** – (1) a statistic calculated by subtracting the smallest value from the largest value. It is a very simple way to describe the amount of spread in a set of data. Finding the standard deviation would be a more involved and more accurate method of describing the spread.

(2) All possible y-values for a given function.

Ex: The range of  $f(x) = x^2 + 7$  is from 7 to positive infinity.

**Rate** – A way to describe the comparison of two separate measurements, such as in miles per hour, dollars per gallon, or pages per minute. If you are working in the context of a  $D=RT$  question, R is the rate. If you are working in the context of a coordinate geometry, rate will be the slope of the line expressed as a positive number preceded by the word “increasing” or “decreasing.”

**Ratio** – A comparison of two numbers, usually written as a fraction or in the form a:b.

Ex: If there are 2 watermelons and 15 pumpkins in a field, then the ratio of watermelons to pumpkins is 2:15.

**Real number** – any number that can be located on a number line. All positives, negatives, decimals, and zero are real numbers. The only numbers that aren't real are imaginary numbers.

**Rectangle** – a 4 sided figure with 4 right angles. Find the perimeter by adding up the 4 sides, and find the area by multiplying length by width.

**Regular** – A geometric shape where all the sides are equal, and all the angles are equal. A regular triangle is an equilateral triangle. A regular quadrilateral is a square. Regular pentagons, hexagons, heptagons, and so on don't have special names. They are just called regular pentagons, hexagons, heptagons, and so on. Regular is the most annoying term in geometry because it means the opposite of how it is used in regular English. In regular English regular means ordinary; in geometry, it means extra special.

**Remainder** – the number “left over” when you divide two numbers.

Ex: When you divide 13 by 5 you get 2 with a remainder of 3. ( $5 \times 2 = 10$ , plus 3 more to get to 13.)

**Right** – (1) an angle of exactly  $90^\circ$ , or a shape that includes an angle of  $90^\circ$ .

(2) what you want all of your answers to be on the SAT.

**Root** – (1) a number that when multiplied by itself a certain number of times results in the given value.

Ex: The square root of 100 is 10 and the 5<sup>th</sup> root of 32 is 2.

(2) another word for the zeros or x-intercepts of a polynomial function. Find the roots by setting the equation equal to zero and solving.

**Sample** – a subset of a population.

Ex: Makenzie wants to know how the kids in her school feel about wearing uniforms, so she talks to a sample of 20 students randomly selected from the student body.

**Sampling Method** – The process a researcher uses to collect data from a portion of a population. This could be accomplished by making observations, running an experiment, or conducting a survey. On the SAT, a good sampling method is one where the participants (or data points) are randomly selected and where every member of the population has a chance of being selected.

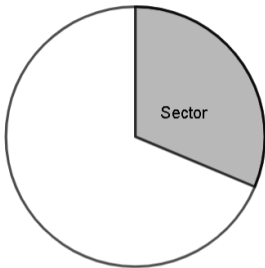
**Satisfies** – causes an equation to be true

Ex. The value of  $x$  that satisfies  $3x + 9 = 12$  is 1.

**Scatterplot** – a method of displaying bivariate data by graphing each pair of numbers as a point with an  $x$  and  $y$  coordinate.

Ex: If you gathered information on how much time your classmates spent studying for a math quiz and each one's grade on the quiz, you could then graph your data on an  $xy$ -plane with the  $x$ -axis being the amount of time studied and the  $y$ -axis being the grade received.

**Sector** – a portion of the area of a circle. If the circle was a pizza, your slice would be a sector, and the crust on your slice would be an arc.



**Similar Triangles** – Two triangles that are the same shape, but not necessarily the same size. Their angles will be equal, but their sides will be proportional.

**Sine** – In a right triangle, the ratio between the side opposite a given angle and the hypotenuse. Usually abbreviated to “sin”, but please, for the sake of math teacher’s everywhere, pronounce this as “sine” not “sin”.  $\sin x = \frac{\text{opposite}}{\text{hypotenuse}}$

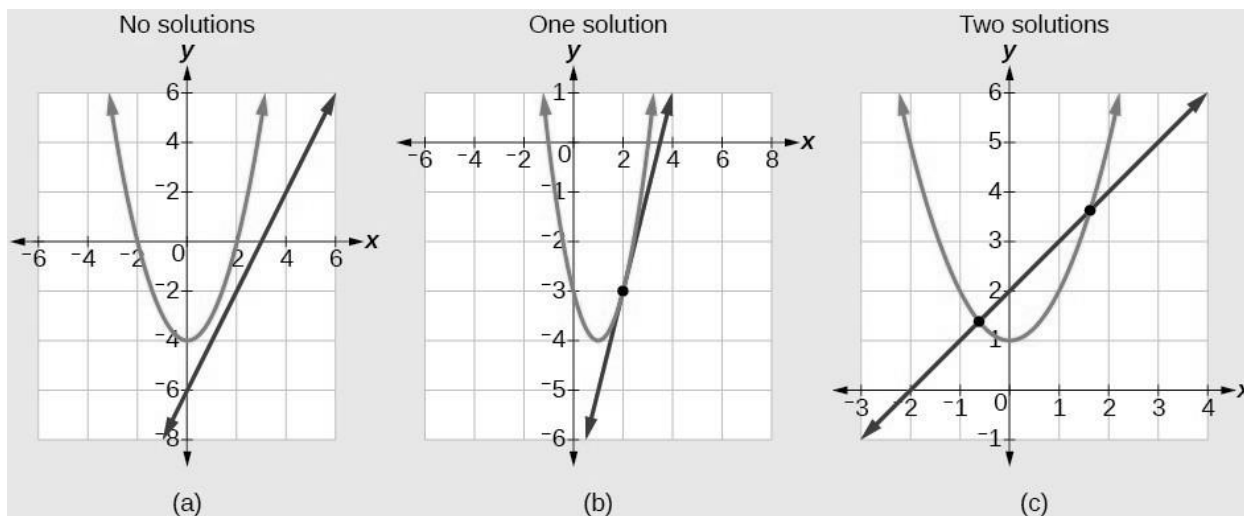
**SOHCATOA** – a mnemonic to help you remember three important formulas in trigonometry.  $\sin x = \frac{\text{opposite}}{\text{hypotenuse}}$ ,  $\cos x = \frac{\text{adjacent}}{\text{hypotenuse}}$ , and  $\tan x = \frac{\text{opposite}}{\text{adjacent}}$ .

**Solution** – (1) the value of a variable that makes an equation true.

Ex: the solution of  $5x - 7 = -2$  is  $x = 1$ .

(2) the point(s) at which the graphs of two or more functions cross.





**Solution Set** – All possible values of the variable

Ex: If  $|x|=7$ , then  $x$  can equal 7 or -7, and the solution set is  $\{-7, 7\}$ .

**Special Right Triangles** – Triangles with angles of  $30^\circ$ - $60^\circ$ - $90^\circ$  or with angles of  $45^\circ$ - $45^\circ$ - $90^\circ$ . These triangles are special because if you are given the length of any one of the sides, you can figure out the other two sides. (This is more powerful than the Pythagorean Theorem, because in that case you need to know two of the sides to figure out the third.) The formulas for both special right triangles are given in the reference information at the beginning of every SAT math section.

**Sphere** – The set of all points in 3-D space that are equidistant from a given point. That given point is the center of the sphere. The formula for the volume of a sphere is given in the reference information at the beginning of every SAT math section.

**Standard deviation** – a statistic that describes how spread out the data is. A low standard deviation means the data are gathered (or “clumped”) close to the mean, while a high standard deviation means that there are data points pretty far to the left and the right of the center. You will need to know this concept for the SAT, but you won’t need to use a formula to calculate a standard deviation.

**Sum** – the result of adding two or more values.

Ex: The sum of 1 and 1 is 2. If only SAT questions were that simple!

**System of equations** – Multiple equations for which there are multiple unknown variables. For instance, if  $x$  and  $y$  are both unknowns, you need to have two equations to solve for them. Do this using the elimination or substitution methods.

**Table** – Data that is organized into rows and columns.

**Tangent** – (1) In a right triangle, the ratio between the side opposite a given angle and side adjacent to that angle. Keep in mind the adjacent side will never be the hypotenuse.  $\tan x = \frac{\textit{opposite}}{\textit{adjacent}}$

(2) a line that touches a circle but doesn’t go inside the circle. For the SAT, you need to remember that a tangent is always perpendicular to the radius at the point of tangency.

**Trapezoid** – a quadrilateral with exactly one pair of parallel sides, called the bases. If one of the sides is perpendicular to the bases, it is a **right trapezoid**. If the two non-parallel sides are congruent, it is an **isosceles trapezoid**.

**Triangle** – A 2-D shape with three sides and three angles. The three angles will always add up to  $180^\circ$ .

**Undefined** – this is what we say when someone tries to divide by zero or tries to describe the slope of a vertical line. Hey, it's better than destroying the universe with a giant black hole!

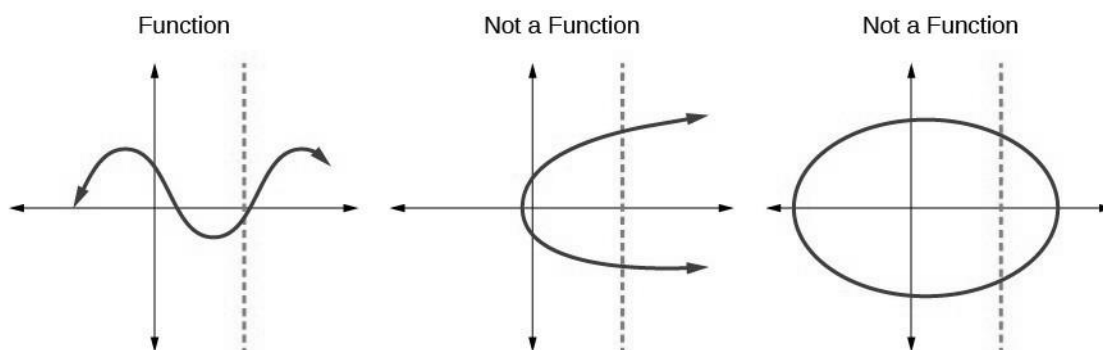
**Union of Two Sets** – The set of elements that are in either one of two given sets.

Ex: The union of  $\{1, 2, 3\}$  and  $\{3, 4, 5\}$  is  $\{1, 2, 3, 4, 5\}$

**Values of a variable** – Numbers that the variable is able to represent.

Ex: The values of  $x$  that satisfy  $x^2 = 9$  are 3 and -3.

**Vertical Line Test** – an easy way to tell if a graph is a function. If you can draw a vertical line that passes through the graph in more than one place, then it's not a function.



**Volume** – A measurement of how much space is inside a 3-D figure. The units that describe volume will be cubic ( $\text{in}^3$ ,  $\text{ft}^3$ ,  $\text{cm}^3$ ) or volume specific (gallon, Liter). The volume formulas for a box, cylinder, sphere, cone, and pyramid are all given to you in the reference information at the beginning of every SAT math section.

**Weight** – An object's mass times the acceleration due to gravity. Common units for weight are pounds (lbs) and Newtons (N).

**x-axis** – the horizontal baseline in the coordinate  $xy$ -plane.

**$xy$ -plane** – A two dimensional system in which the exact location of any point can be described by giving its distance from the baseline horizontal and vertical axes.

**y-axis** – the vertical baseline in the coordinate  $xy$ -plane.

**Zeros** – another word for the roots or  $x$ -intercepts of a polynomial function. Find the zeros by setting the function equal to zero and solving.