

## NYS Geometry Vocabulary not found in PH

**adjacent sides** (G) (A2T) Two sides of any polygon that share a common vertex.

**algebraic representation** (A), (G), (A2T) The use of an equation or algebraic expression to model a mathematical relationship.

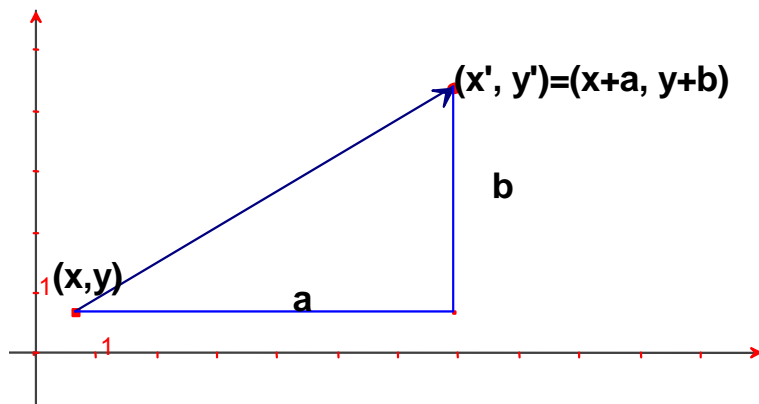
**algorithm** (A), (G), (A2T) a defined series of steps for carrying out a computation or process.

**analytical geometry** (G) An approach to geometry in which the points of a figure are represented by coordinates on the Cartesian plane and algebraic methods of reasoning are used to study the figure.

**analytical geometric proof** (G) A proof in geometry that employs the coordinate system and algebraic reasoning. .

**analytical representation of a transformation** (G) The functional notation of a transformation using analytical equations.

**Example:**  $T_{a,b}(x, y) = (x + a), (y + b) = (x', y')$  where  $x' = x + a$  and  $y' = y + b$  is a translation that moves points  $a$  units in the  $x$  direction and  $b$  units in the  $y$  direction. See figure below.



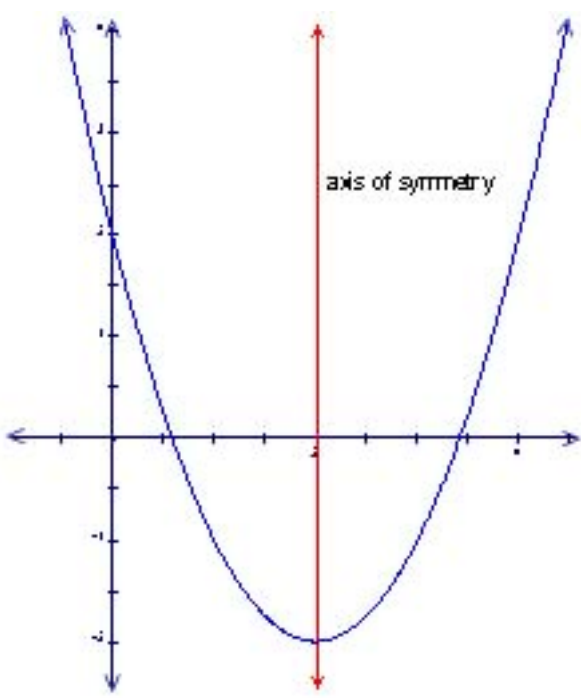
**analyze** (A), (G), (A2T) to examine methodically by separating into parts and studying their relationships.

**antecedent** (G) The “if” part of a conditional (if..., then...) statement. (See hypothesis.)

**argument** (A), (G), (A2T) The communication, in verbal or written form, of the reasoning process that leads to a valid conclusion.

**axis of symmetry** (G) A line that divides a plane figure into two congruent reflected halves; Any line through a figure such that a point on one side of the line is the same distance to the axis as its corresponding point on the other side.

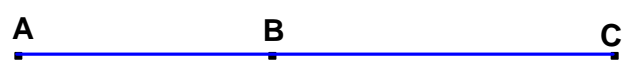
**Example:**



This is a graph of the parabola  $y = x^2 - 4x + 2$  together with its axis of symmetry  $x = 2$ .

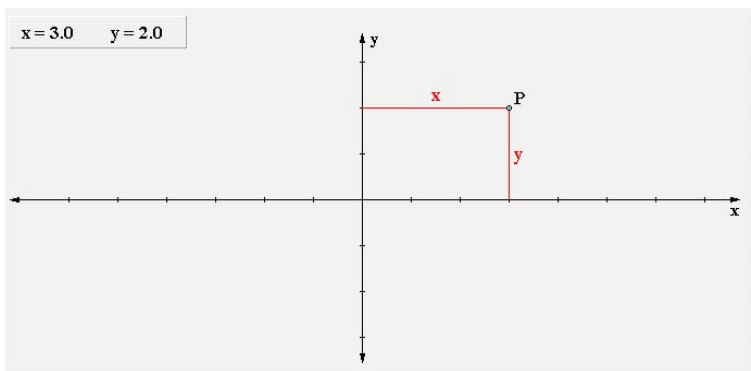
**betweenness** (G) A point  $B$  is between points  $A$  and  $C$  if and only if  $AB + BC = AC$ .

**Example:**



**Cartesian coordinates** (G) An ordered pair of real numbers that establishes the location or address of a point in a coordinate plane using the distances from two perpendicular intersecting lines called the coordinate axes.

**Example: Point P is identified by ordered pair (3,2)**



**center of gravity** (G) The balance point of an object.

**Example:** In a triangle, the center of gravity is the point of concurrency of the triangle's medians. This point is also called the centroid.

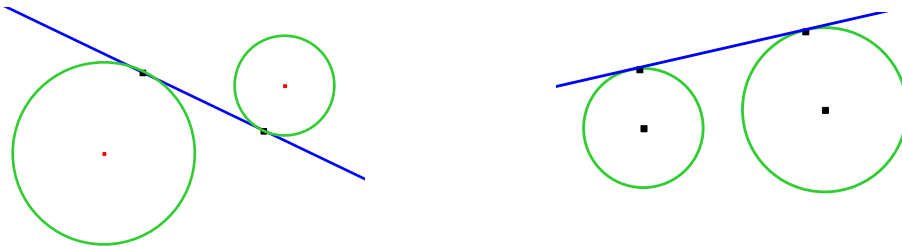
**circumcircle** (G) A circle that passes through all of the vertices of a polygon. Also called a circumscribed circle.

**clockwise** (G) The direction in which the hands of a clock move around the dial. Used to indicate the orientation of a transformation.

**closure** (A), (G) A set "S" and a binary operation "\*" are said to exhibit closure if applying the binary operation to any two elements in "S" produces a value that is a member of "S".

**common tangents** (G) Lines that are tangent to two or more circles.

**Examples:**



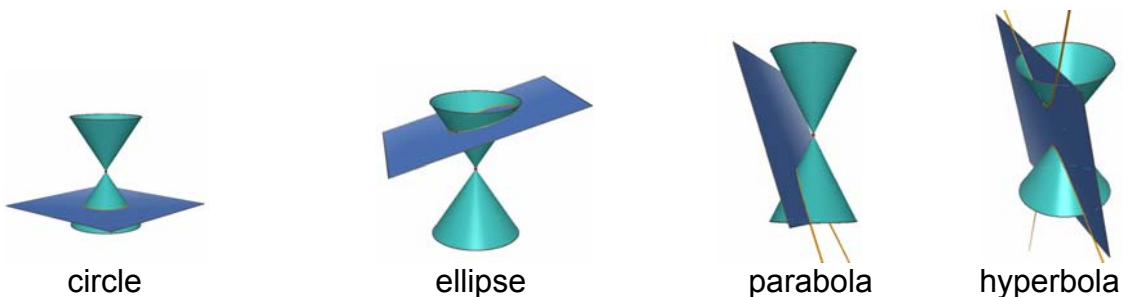
**composition of functions** (G) (A2T) A way of combining functions in which the output of one function is used as the input of another function; the formation of a new function  $h$  from functions  $f$  and  $g$  using the rule  $h(x) = g \circ f(x) = g[f(x)]$  for all  $x$  in the domain of  $f$  for which  $f(x)$  is in the domain of  $g$ .

**conjunction** (G) A compound statement formed using the word "and". A conjunction is true only if both clauses are true.

**Example:** Today is Tuesday and the sun is shining.

**conic sections** (G) The plane section created by the intersection of a plane and a cone.

**Example:** a parabola, a circle, an ellipse, or a hyperbola:



**consistency** (G) A property of an axiomatic system where no axiom(s) can be used to contradict any other axiom(s).

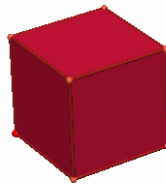
**constant of proportionality** (G) The number representing the ratio of any two corresponding sides in two similar geometric figures.

**constraints** (G) Any restriction placed on the variables in a problem.

**counterclockwise** (G) The direction opposite the way in which the hands of a clock move around the dial. Used to indicate the orientation of a rotation.

**cube** (G) A polyhedron with six square faces. A cube (or hexahedron) is one of the five platonic solids.

**Example:**



**dihedral angle** (G) An angle formed by two intersecting planes.

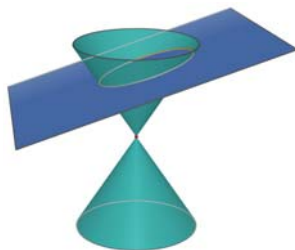
**distance between two parallel lines** (G) The length of a line segment drawn from any point on one line perpendicular to the second line.

**dynamic geometry software** (G) Computer or calculator software used to construct and manipulate geometric figures.

**Examples:** *Cabri II Geometry*<sup>™</sup> and *Geometer's Sketchpad*<sup>®</sup> are two common types of dynamic geometry software.

**ellipse** (G) A set of points  $P_1$  in a plane, such that the sum of the distances from  $P$  to two fixed points  $F_1$  and  $F_2$  is a given constant  $k$ . Any plane section of a circular conical surface which is a closed curve.

**Example:**  $PF_1 + PF_2 = k$



**equidistant** (G) At the same distance.

**equivalence relation** (G) A relation that exhibits the *reflexive*, *symmetric*, and *transitive* properties.

**Example:** Triangle congruence is an equivalence relation since it is:

reflexive:  $\triangle ABC \cong \triangle ABC$ ,

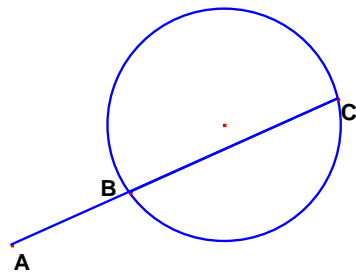
symmetric: If  $\triangle ABC \cong \triangle DEF$  then  $\triangle DEF \cong \triangle ABC$ , and

transitive: If  $\triangle ABC \cong \triangle DEF$  and  $\triangle DEF \cong \triangle GHI$  then  $\triangle ABC \cong \triangle GHI$

**Euler line** (G) For any given triangle, the line that contains the circumcenter, the centroid and the orthocenter.

**external segment of a secant** (G) If a secant is drawn to a circle from an external point, the portion of the secant that lies outside the circle.

**Example:**



$\overline{AB}$  is the external segment for secant  $\overline{AC}$

**fixed point** (G) A point that is its own image under a transformation of the plane.

**Example:** The center of a rotation or a dilation; a point on the line of reflection.

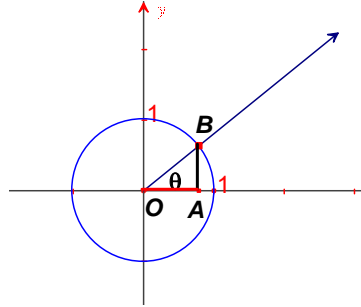
**foot of an altitude** (G) The point of intersection of an altitude and the line or plane to which it is perpendicular.

**geometric inequality** (G) A statement in geometry which indicates that quantity is greater than another quantity.

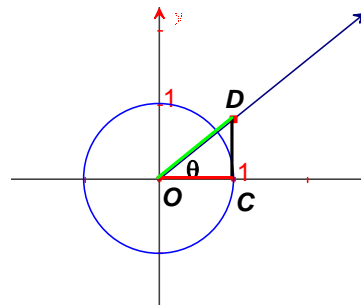
**Example:** In a triangle, the measure of an exterior angle is greater than the measure of either remote interior angle.

**geometric representation of the circular functions (G, A2T)** The representation of circular functions on a circle of unit radius. The trigonometric functions are called circular functions because their values are related to the lengths of specific line segments associated with a circle of unit radius.

**Example:**



$$OA = \cos \theta, AB = \sin \theta, OB = 1$$

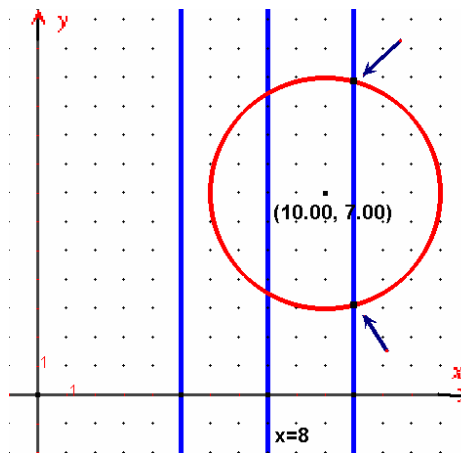


$$CD = \tan \theta, OD = \sec \theta, OC = 1$$

**geometry (A) (G) (A2T)** Branch of mathematics that deals with the properties, measurement, and relationships of points, lines, angles, surfaces, and solids.

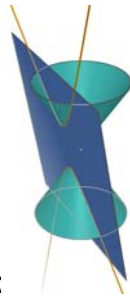
**graphical representation (A) (G) (A2T)** A graph or graphs used to model a mathematical relationship.

**Example:** The figure below is a graphical representation of the locus of all points 4 units from A(10,7) and 3 units from  $x = 8$ .



**half turn (G)** A 180 degree rotation about a point.

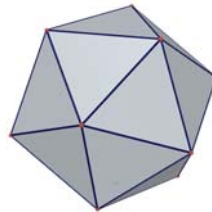
**hyperbola** (G) Set of points  $P$  in a plane such that the difference between the distances from  $P$  to the foci  $F_1$  and  $F_2$  is a given constant  $k$ .



**Example:**  $PF_1 - PF_2 = k$

**icosahedron** (G) A polyhedron having twenty faces. A regular icosahedron is one of the five Platonic solids and has twenty equilateral triangles as faces.

**Example:**



**included angle** (G) The interior angle formed by two sides of a polygon.

**included side** (G) The side between two consecutive angles in a polygon.

**inscribed circle** (G) A circle in the interior of a polygon that is tangent to each side of the polygon.

**interior** (G) The set of all points inside a geometric figure.

**intersection of sets** (A) (G) The intersection of two or more sets is the set of all elements that are common to all of the given sets.

**Example:** If  $A = \{1,2,3,6\}$  and  $B = \{0,2,5,6,7\}$ , then the intersection of A and B, denoted by  $A \cap B$ , is  $\{2,6\}$

**invariant** (G) A figure or property that remains unchanged under a transformation of the plane.

**lateral edge** (G) A line segment that is the intersection of any two lateral faces of a polyhedron.

**line segment** (G) Given any two points  $A$  and  $B$ ,  $\overline{AB}$  is equal to the union of points  $A$ ,  $B$ , and all of those points between  $A$  and  $B$ .

**linear pair of angles** (G) Any two adjacent angles whose non-common sides form a line.

**logical equivalence** (G) Statements that have the same truth value.

**mean proportional** (G) The mean proportional, also called the geometric mean, of two numbers  $a$  and  $b$  is the square root of their product. If  $\frac{a}{m} = \frac{m}{b}$  then  $m = \sqrt{ab}$  is the geometric mean of  $a$  and  $b$ .

**median of a trapezoid** (G) A line segment that connects the midpoints of the two non-parallel sides of the trapezoid.

**non-collinear points** (G) Three or more points that do not lie on the same line.

**non-Euclidean geometry** (G) A geometry that contains an axiom which is equivalent to the negation of the Euclidean parallel postulate.

**Examples:**

**Riemannian geometry** (G) A non-Euclidean geometry using as its parallel postulate

any statement equivalent to the following: If  $l$  is any line and  $P$  is any point not on  $l$ , then there are no lines through  $P$  that are parallel to  $l$ . (Also called elliptic geometry.)

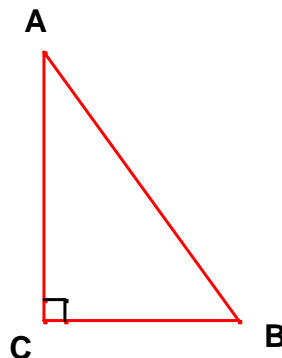
**hyperbolic geometry** (G) A non-Euclidean geometry using as its parallel postulate any statement equivalent to the following: If  $l$  is any line and  $P$  is any point not on  $l$ , then there exists at least two lines through  $P$  that are parallel to  $l$ .

**Oblique line and a plane** (G) A line and a plane that are neither parallel nor perpendicular.

**one-to-one function** (G) (A2T) A function where the inverse is also a function.

**opposite side in a right triangle** (A) (G) (A2T) The side across from an angle. In a right triangle the hypotenuse is opposite the right angle and each leg is opposite one of the acute angles.

**Example:** With respect to  $\angle A$ ,  $\overline{BC}$  is the opposite side, and  $\overline{AC}$  is the adjacent side. With respect to side  $\overline{AC}$ ,  $\angle B$  is the opposite angle.



**opposite transformation** (G) A transformation of the plane that changes the orientation of a figure.

**Example:** Reflections and glide reflections are opposite transformations.

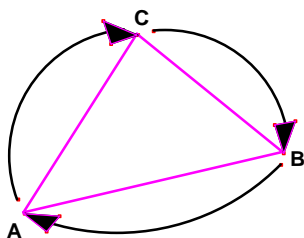
**ordered pair** (A) (G) Two numbers that are used to identify the position of a point in a plane. The two numbers are called coordinates and are represented by  $(x, y)$ .

**ordered triple** (G) Three numbers that are used to identify the position of a point in space. The three numbers are called coordinates and are represented by  $(x, y, z)$ .

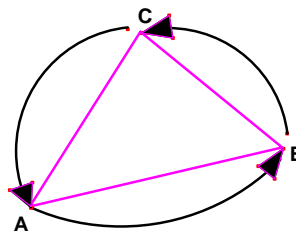
**ordinate** (A), (G), (A2T) The vertical coordinate of a two-dimensional rectangular coordinate system; usually denoted by  $y$ .

**orientation** (G) The arrangement of the points, relative to one another, after a transformation; the reference made to the direction traversed (clockwise or counterclockwise) when traveling around a geometric figure.

**Example:**



$\triangle ACB$  has a clockwise orientation

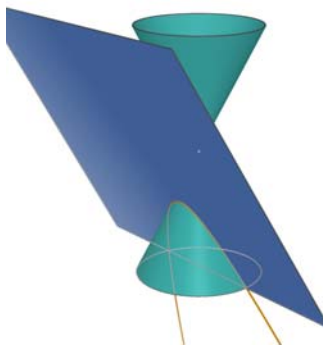


$\triangle ABC$  has a counterclockwise orientation

**origin** (G) The point in the Cartesian coordinate plane at which the horizontal and vertical axes intersect, designated by the ordered pair  $(0,0)$ .

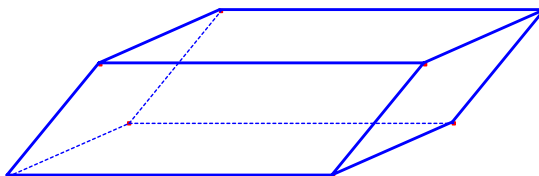
**Parabola** (G) Any plane section of a circular conical surface by a plane parallel to the slant height of the cone.

**Example:**



**parallelepiped** (G) A prism whose bases are parallelograms.

**Example:**



**parallel postulate** (G) Any postulate or axiom that designates the number of lines through a given point that are parallel to a given line.

**parameter** (A)(G)(A2T) A quantity or constant whose value varies with the circumstances of its application.

**Example:** In  $y = ax^2$   $a$  is a parameter

**position vector** (G) A coordinate vector whose initial point is the origin. Any vector can be expressed as an equivalent position vector by translating the vector so that it originates at the origin.

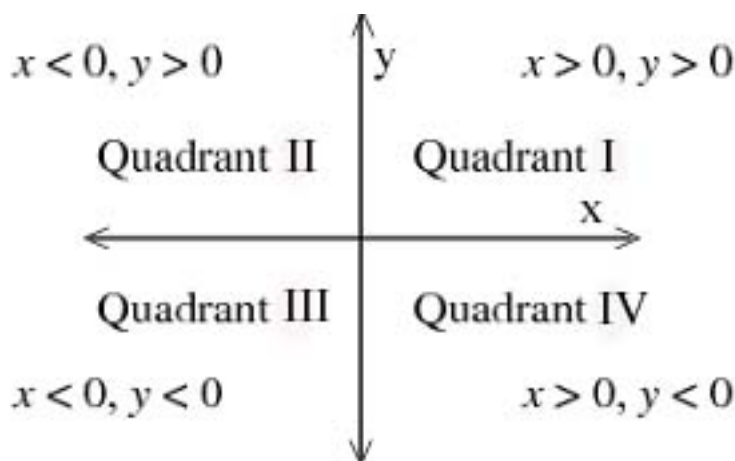
**premise** (A) (G) A proposition upon which an argument is based or from which a conclusion is drawn.

**proof** (A) (G) A logical argument that establishes the truth of a statement; a valid argument, expressed in written form, justified by axioms, definitions, and theorems.

**proof by contradiction** (G) A method of proof which demonstrates the truth of an implication by proving that the negation of the conclusion of that implication leads to a contradiction; also called an indirect proof.

**quadrant** (G) The four regions of a plane created by the intersection of the coordinate axes. Each of these quadrants has a number designation:

**Example:**



**reason** (G) A true statement justifying a step in a proof; the use of logic, examples, etc. to determine a result.

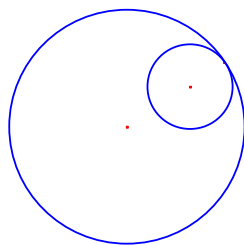
**rectangular coordinates** (A) (G) (A2T) An ordered pair of real numbers that establishes the location of a point in a coordinate plane using the distances from two perpendicular intersecting lines called the coordinate axes. (See also Cartesian coordinates.)

**restricted domain** (G), (A2T) The domain resulting from a restriction placed on a function, based on the context of the problem.

**right pyramid** (G) A pyramid whose lateral faces are isosceles triangles.

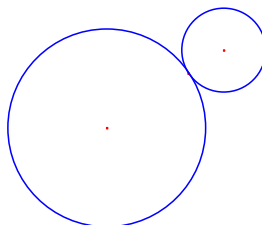
**tangent circles (internal) (G)** Two circles are internally tangent if they intersect in exactly one point and one circle lies in the interior of the other circle.

**Example:**



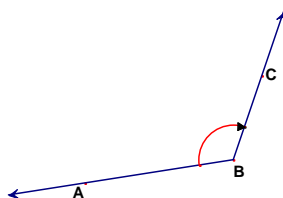
**tangent circles (external) (G)** Two circles are externally tangent if they meet in exactly one point and neither circle has any points in the interior of the other circle.

**Example:**



**tangent segment (G)** A line segment that is a subset of a tangent line. This usually refers to the line segment drawn from an external point to the point of tangency.

**terminal side of an angle (A2T)** If  $\angle ABC$  is the directed angle from  $\overrightarrow{BA}$  to  $\overrightarrow{BC}$  then  $\overrightarrow{BC}$  is the terminal side.



**tetrahedron (G)** A polyhedron with four faces; one of the five Platonic solids that has four equilateral triangles as faces (pyramid).

**Example:**



**three-dimensional space (G)** The set of all points in space. The position of each point can be represented by a unique ordered triple  $(x,y,z)$ .

**transformational geometry** (G) A method for studying geometry that illustrates congruence and similarity by the use of transformations.

**transformational proof** (G) A proof that employs the use of transformations.

**trichotomy property** (G) A property of the real numbers that states: for every  $x$  and  $y$ , one and only one of the following conditions is true:  $x < y$ ;  $x = y$ ,  $x > y$ .

**trigonometry of the right triangle** (G) The trigonometric functions for acute angles are the ratios of the sides of the right triangle containing the angle.

**Examples:**

$$\sin \theta = \frac{\text{length of the side opposite } \theta}{\text{length of the hypotenuse}},$$

$$\cos \theta = \frac{\text{length of the side adjacent to } \theta}{\text{length of the hypotenuse}},$$

$$\tan \theta = \frac{\text{length of the side opposite } \theta}{\text{length of the side adjacent to } \theta}$$

**two-dimensional space** (G) The set of all points in the plane. The position of each point can be represented by a unique ordered pair  $(x,y)$ . Figures such as angles, pairs of parallel and intersecting lines, circles and polygons exist in two-dimensional space.

**undefined terms** (G) The fundamental components of an axiomatic system whose understanding is agreed upon but not formally defined. In geometry undefined terms traditionally include point, line, and plane.

**union of sets** (A) (G) The union of two or more sets is the set of all elements contained in at least one of the sets.

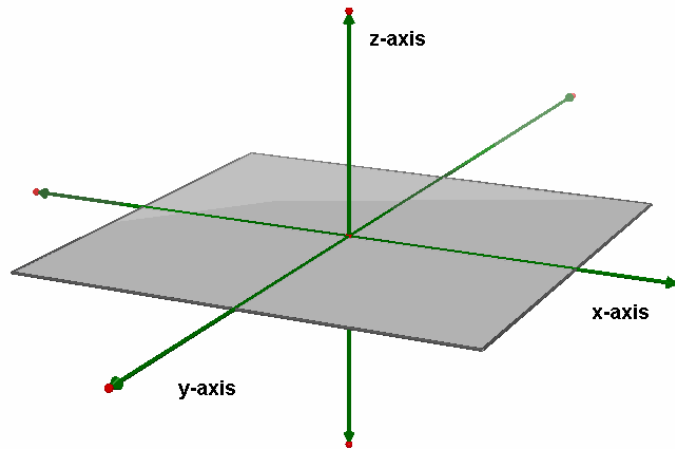
**Example:** if Set  $A = \{2,4,6,8,10\}$  and Set  $B = \{1,2,3,4,5,6\}$ , then the union of sets  $A$  and  $B$ , written as  $A \cup B$ , is  $\{1,2,3,4,5,6,8,10\}$ .

**valid argument** (A) (G) A logical argument supported by known facts or assumed axioms; an argument in which the premise leads to a conclusion.

**x-axis** (A) (G) One of the two intersecting lines used to establish the coordinates of points in the Cartesian plane; in that plane, the line whose equation is  $y = 0$ ; in space the axis perpendicular to the  $yz$ -plane.

**y-axis** (A) (G) One of the two intersecting lines used to establish the coordinates of points in the Cartesian plane; in that plane, the line whose equation is  $x = 0$ ; in space the axis perpendicular to the  $xz$ -plane.

**z-axis** (G) A line perpendicular to the plane determined by the x-axis and y-axis at their point of intersection; this axis is used as a reference to determine the third component of the ordered triple  $(x, y, z)$ .



**z-coordinate** (A) (G) The third coordinate in any  $(x,y,z)$  ordered triple; the number represents how many units the point is located above or below of the  $xy$ -plane.

**zero product property** (A), (G), (A2T) If  $a$  and  $b$  are real numbers, then  $ab = 0$  if and only if  $a = 0$  or  $b = 0$ , or  $a$  and  $b = 0$ .