
Unit IV — Triangles

Appendix B - Definitions and Important Terms

Acute Angle (p. 147) – An angle whose measure is greater than 0, and less than 90 degrees

Acute Triangle (p. 33, p. 320) – A triangle is an acute triangle, if and only if, all of its angles are acute

Adjacent Angles (p. 151) – Two angles which have a common vertex, and a common ray which lies between the other sides of the two angles.

Alternate Exterior Angles of Parallel Lines (p. 277) – Pairs of angles which are not between parallel lines and are on opposite sides of a transversal which cuts them.

Alternate Interior Angles of Parallel Lines (p. 277) – Pairs of angles which are between parallel lines and are on opposite sides of a transversal which cuts them.

Altitude in a Rectangle (p. 43, p. 47) – Using any side as the base, this is the measure of a line segment from a point on the base, drawn perpendicular to the line containing the opposite side.

Altitude in a Triangle (p. 52, p. 316, p. 415, p. 422) – A segment drawn from a vertex of a triangle, perpendicular to the line containing the opposite side.

Altitude of a Prism (p. 66, p. 377) – The perpendicular distance between the two bases of a prism.

Altitude of a Pyramid (p. 71, p. 377) – The perpendicular distance between the apex of a pyramid, and the plane of the base of that pyramid.

Altitude of a Trapezoid (p. 55) – Using either of the two parallel sides as the base, this is the measure of a line segment from a point on the base, drawn perpendicular to the line containing the opposite side.

Analytical Thinking (p. 79, p. 81, p. 85, p. 88) – A type of mental activity which separates a concept, as a whole, into its individual parts, so that each part can be studied independently.

Angle (p. 141, p. 315) – The union of two different rays with a common endpoint.

Apothem of a Regular Polygon (p. 58) – The shortest distance from the center of the polygon to any one of the sides of the polygon.

Arc of a Circle (p. 158, p.524, p.533) – Any set of continuous points on a circle.

Area (p. 43, p. 48, p. 52, p. 55, p. 59, p. 62) – Intuitively, the number of non-overlapping unit squares and parts of unit squares, which will exactly cover the interior of a simple closed plane curve

Area of a Circle (p. 62, p. 76) – The product of the square of the radius of the circle, and the irrational number π .

Area of a Parallelogram (p. 48) – The product of the base and height of a parallelogram.

Area of a Rectangle (p. 43) – The product of the base and height of a rectangle.

Area of a Regular Polygon (p. 59) – One-half the product of the measure of the apothem, and the perimeter of the polygon.

Area of a Rhombus (p. 48) – The product of the base and height of a rhombus.

Area of a Square (p. 43) – The square of the measure of one side of a square.

Area of a Triangle (p. 52) – One-half of the product of the base and height of a triangle.

Area of a Trapezoid (p. 55) – One-half of the product of the height and the sum of the bases of a trapezoid.

Auxiliary Element (p. 291, p. 351, p. 365, p. 404, p. 426, p. 430, p. 442, p. 446, p. 451) – From a Latin word meaning “to help”, this is a geometric element which is not specifically referred to in a given diagram, but which does exist, and is needed, in order to logically complete the demonstration of a conditional. This element is usually drawn in a figure, using dashed lines, and must be referenced in the proof with a step justifying its existence. It is important to note that you must not place too many conditions on the element (called “over-determining”) thereby denying its existence. Neither must you place too few conditions on the element (called “under-determining”), thereby allowing the existence of more than one such element. In other words, a geometric element is considered to be “determined”, if exactly one such element can be drawn to meet the conditions.

Base Angles of an Isosceles Triangle (p. 320) – The angles opposite the legs in an isosceles triangle.

Base of an Isosceles Triangle (p. 320) – The third side of an isosceles triangle, when the triangle has exactly two congruent sides.

Betweenness of Points (p. 124) – For three collinear points, A, B, and C, with coordinates a , b , and c , respectively, point B is said to lie between points A and C, if and only if, either $a < b < c$, or, $a > b > c$.

Betweenness of Rays (p. 131) – For three coplanar rays, AB, AC, and AD, with coordinates b , c , and d , respectively, ray AC is between ray AB and ray AD, if and only if, either $b < c < d$, or $b > c > d$.

Biconditional (p.101) – A compound statement consisting of a given conditional, and its converse, both of which are considered to be true.

Bisector of a Line Segment (p. 135, p. 239) – Any point, line segment, ray, or line which intersects a line segment in the midpoint of the line segment, creating two congruent segments.

Bisector of an Angle (p. 151, p. 253, p. 415, p. 422, p. 426) – A ray which is between the sides of an angle, and divides the angle into two congruent angles.

Center of a Circle (p. 61, p. 157, p. 522) – The fixed point inside a circle which is the same distance from each point on the circle.

Center of a Regular Polygon (p. 58) – the point inside a regular polygon which is the same distance from all of the corners of the polygon.

Central Angle of a Circle (p. 158, p.524, p. 533, p. 537) – An angle whose vertex is the center of a circle.

Chord of a Circle (p. 157, p. 522, p. 537, p. 541) – A line segment whose endpoints are two points on a circle.

Circle (p. 34, p. 61, p. 157, p.522) – The set of all points in a plane that are a given distance from a given point.

Circular Reasoning (p. 111) – An illogical argument which attempts to “prove” a statement by assuming, at some point in the argument, that the statement is true.

Circumference of a Circle (p. 62) – The product of the diameter of the circle, and the irrational number π .

Circumscribed Circle (p. 58, p. 61, p. 530) – A circle which completely encloses a polygon, and touches the polygon at all of its corners.

Circumscribed Polygon (p. 58, p. 530) – A polygon which completely encloses a circle, with all of its sides just touching the circle.

Collinear Points (p. 14, p. 124) – Points which lie on the same line.

Common Angles (p. 400) – A term referring to angles of geometric figures (usually polygons) which are drawn in such a way that they are common to both figures. In other words, you may see only one angle, but it is a part of both geometric figures. Note: These common angles do not have to be corresponding parts of the figures.

Common Chord (p. 528) - A line segment which is a chord of two or more circles

Common External Tangent (p. 529) - A common tangent which does not cross the segment joining the centers of two circles

Common Internal Tangent (p. 529) - A common tangent which crosses the segment joining the centers of two circles.

Common Segments (p. 400) – A term referring to segments of geometric figures (usually polygons) which are drawn in such a way that they are common to both figures. In other words, you may see only one segment, but it is a part of both geometric figures. Note: These common segments do not have to be corresponding parts of the figures.

Common Tangent (p. 528) - A tangent line, or segment, which is tangent to each of two or more circles

Complementary Angles (p. 151) – Two angles, the sum of whose measures is 90.

Compound Statement (p. 92) – A statement in logic which is made up of two or more simple statements, joined by a conjunction or disjunction.

Concentric Circles (p. 527) - Circles which share the same center point.

Concurrent Lines (p. 128) – Three or more lines which are coplanar and intersect in a single point.

Conditional Statement (p. 100, p. 107) – A statement consisting of two phrases, the first called the “hypothesis”, usually beginning with the word “if”, and the second called the “conclusion”, usually beginning with the word “then”.

Cone (p. 39, p. 71) – A special pyramid, whose base is a circle.

Congruence of Corresponding Parts of Congruent Triangles (p. 404) – By definition, corresponding parts of triangles are congruent, if and only if, the triangles themselves are congruent. This definition is used frequently in demonstrations of conditionals in Geometry, and is usually abbreviated as “CPCTC”, standing for “Corresponding Parts of Congruent Triangles are Congruent”.

Congruent Angles (p. 151) – Two angles whose measures are equal.

Congruent Geometric Figures (p. 134, p. 382, p. 389 p. 395, p. 404, p. 414) – Informally, figures which are exactly the same size and shape. Formally, two geometric figures are said to be congruent, if and only if, for some pairing of their vertices, the corresponding angles are congruent, and the corresponding sides are congruent.

Congruent Line Segments (p. 134) – Line segments whose measures are equal.

Conjecture (p. 79, p. 81) – Often called a guess, this is an opinion based on incomplete or inconclusive evidence, but supported by intuition.

Conjunction (p. 92) – An operation in logic which joins two simple statements, using the word “and”.

Contrapositive (p. 107) – A conditional which results from negating the converse of a given conditional.

Convex Polygon (p. 455) – A polygon, all of whose diagonals are in the interior of the polygon. (Otherwise, the polygon is called non-convex, or concave)

Converse (p. 101, p. 107) – A conditional which results from interchanging the hypothesis and conclusion in a given conditional.

Coordinate Geometry (p. 25) – A Geometry in which every point is an “exact location, represented algebraically by an ordered pair of coordinates denoting its position”, and a line is a set of continuous points, with no space between them.

Coplanar Lines (p. 14) – A set of lines, all of which are contained in one plane.

Coplanar Points (p. 14, p. 124) – Points which lie on the same plane.

Corollary (p. 258) – From the Latin meaning “a gratuity”, a proposition which is easily proved to be true, because it naturally follows from a recently proved theorem, corollary, or other recently proved assumption.

Corresponding Parts of Polygons (p. 382) – A term referring to a pairing of angles and sides in two or more polygons of like type.

Corresponding Angles of Parallel Lines (p. 277) – Pairs of angles in the same relative position with regard to parallel lines cut by a transversal.

Counterexample (p. 239) – A statement or diagram that shows that a given statement is not always true.

Curve (p. 30) – Any set of continuous points, not necessarily straight.

Cylinder (p. 38, p. 66) – A special prism, whose bases are circles.

Decagon (p. 34) – A polygon made with ten line segments.

Deductive Reasoning (p. 85, p. 88) – The process of using a general statement which calls for a conclusion, based on certain conditions, and then applying a specific statement which satisfies those conditions, therefore establishing the validity of the conclusion (also called the deduction).

Degree (p. 147) – The measure of one of the 360 equal central angles making up a complete rotation in a circle.

Denominator-Addition Property of a Proportion (p. 336) – For a valid proportion, the property which states that the value of the denominator of each ratio may be added to the numerator of that ratio without affecting the integrity of the proportion.

Denominator-Subtraction Property of a Proportion (p. 337) – For a valid proportion, the property which states that the value of the denominator of each ratio may be subtracted from the numerator of that ratio without affecting the integrity of the proportion.

Denying the Premise (p. 111) – An illogical argument which attempts to use the inverse (or negation) of a true conditional to prove a statement.

Disjunction (p. 92) – An operation in logic which joins two simple statements, using the word “or”.

“Divides Proportionally” (p. 351) – A term referring to points on line segments which “divide” the segments into smaller segments which are in the same ratio.

Diagonal of a Polygon (p. 377) – A line segment joining any two non-consecutive vertices of a polygon.

Diagonal of a Rectangular Solid (p. 377) – A line segment joining any two vertices in a rectangular solid which are not vertices of the same face. Vertices of this type are called “opposite” vertices.

Diameter of a Circle (p. 62, p. 158, p. 522) – A line segment which is a chord of a circle, and passes through the center of that circle.

Dihedral Angle (p. 142, p. 307) – The union of two half-planes (called faces), with the same edge.

Dilation (p. 8) – A transformation in which the distance between any point of the pre-image, and a specified point (called the center of dilation), is multiplied by some constant factor, to produce the image.

Direct Proof (p. 215) – The process of reaching a desired conclusion, logically and deductively, from given statements, from already accepted definitions and postulates, and from any previously proved theorems.

Discrete Geometry (p. 25) – A Geometry in which every point is a “dot”, and every line is made up of separate points, with a space between them.

Disjoint Sets (p. 18) – Two or more sets which have no members, or elements, in common.

Dodecagon (p. 34) – A polygon made with twelve line segments.

Edge (p. 141) – Another name for a separation line in a plane.

Element of a Set (p. 18) – Also referred to as a “member” of a set, this is one of the objects in a set.

Empty Set (p. 18) – A set which contains no members.

Equal Angles (p. 151) – Two angles whose measures are equal.

Equal Line Segments (p. 134) – Line segments whose lengths are equal.

Equal Sets (p. 18) – Two or more sets which contain exactly the same elements.

Equiangular Triangle (p. 33, p. 320, p. 415, p. 422) – A triangle is an equiangular triangle, if and only if, all of its angles are congruent.

Equilateral Triangle (p. 33, p. 320, p. 415, p. 422) – A triangle is an equilateral triangle, if and only if, all of its sides are congruent.

Equivalent Forms of a Proportion (p. 336) – In a valid standard proportion, recognizing that the means-extremes product property is preserved, these are the three additional forms of that proportion which are also considered valid, and therefore equivalent.

Extended Ratio (p. 331) – A numerical comparison between three or more numbers, generally expressed in the colon format, such as 2:3:5.

Exterior Angle of a Polygon (p. 316, p. 327, p. 436) – The angle formed when one side of a polygon is extended.

Exterior of an Angle (p. 141) – The set of points which are not between two rays when one ray lies in the edge of a half-plane.

Externally Tangent Circles (p. 528) - Circles which are positioned in such a way that, neither of them is inside the other, and they touch at only one point. Formally, they are tangent to the same line at the same point, and they are on opposite sides of that shared tangent line.

Extremes of a Proportion (p. 331) – In a standard proportion, the first and fourth terms.

Fallacy (p. 111) – An illogical argument, based on false assumptions, poorly defined terms, and/or facts which are not relevant, all leading to a false conclusion.

Faulty Analogy (p. 111) – An illogical argument which attempts to use similarities between two situations, to erroneously conclude that the two situations must be alike in some other way.

Finite Set (p. 18) – A set whose members can be counted, because it has a definite number of elements.

Fourth Proportional (p. 331) – In a standard proportion, the fourth term.

Geometric Figure (p. 30) – Any set of points in our Geometry.

Geometric Mean in a Proportion (p. 336, p. 364) – For a standard proportion in which the second and third terms are equal, that second or third term.

Geometry (p. 1) – from the Greek, meaning “earth measure”, the field of mathematics involving properties of, and relationships between, points, lines, planes, and surfaces in space.

Half-line (p. 131) – One of the two sets of points on either side of a specific point, called the separation point, on a line.

Half-plane (p. 141) – One of the two sets of points on either side of a specific line, called the separation line, on a plane.

Half-space (p. 141) – One of the two sets of points on either side of a specific plane, called the separation plane, in space.

Height of a Rectangle (p. 43, p. 47) – Another word for the altitude of a rectangle.

Height of a Trapezoid (p. 55) – Another word for the altitude of a trapezoid.

Height of a Triangle (p. 52) – Another word for the altitude of a triangle.

Heptagon (p. 34) – A polygon made with seven line segments.

Hexagon (p. 34) – A polygon made with six line segments.

Image (p. 7) – The geometric shape which appears after a transformation has been applied to the pre-image.

Improper Subset (p. 19) – A subset which contains all of the elements of another set.

Included Angle in a Polygon (p. 315, p. 382) – An angle formed by two sides of a polygon, usually referred to as the angle “included by” the sides.

Included Side in a Polygon (p. 316, p. 382) – The side shared by two angles of a polygon, usually referred to as the side “included by” the two angles.

Indirect Proof (p. 223) – Often called a “proof by contradiction”, this is the process of reaching a desired conclusion by first assuming the negation of the desired conclusion, and then continuing logically and deductively, until arriving at a contradiction of a known truth.

Inductive Reasoning (p. 79, p. 81, p. 85, p. 88) – The process of finding a general principle (called an induction), based upon the evidence of a finite number of specific cases.

Infinite (p. 3) – becoming increasingly large, or small, beyond any fixed boundary.

Infinite Set (p. 18) – A set containing a quantity of members, or elements, which cannot be counted, because it has an infinite number of elements.

Inscribed Angle of a Circle (p. 524, p. 537, p. 542, p. 547) - An angle formed by any two chords with a common endpoint.

Inscribed Circle (p. 58, p. 529) – A circle which is completely enclosed by a polygon, and barely touches all of the sides of a polygon.

Inscribed Polygon (p. 58, p. 529) – A polygon which is completely enclosed by a circle, and touches the circle at all of its corners.

Intercepted Arc of a Circle (p. 525, p. 533, p. 537, p. 542) - An angle intercepts an arc of a circle, if and only if, each of the following conditions hold:

1. The endpoints of the arc lie on the sides of the angle.
2. Each side of the angle contains one endpoint of the arc.
3. All points on the arc, except the endpoints, lie in the interior of the angle.

Interior Angle of a Polygon (p. 489) – An angle inside a polygon, formed by two consecutive sides of the polygon.

Interior Angles on the Same Side of a Transversal (p. 277) – Pairs of angles which are between parallel lines and are on the same side of a transversal.

Interior of an Angle (p. 141) – The set of points between two rays when one ray lies in the edge of a half-plane.

Internally Tangent Circles (p.528) - Circles which are positioned in such a way that one of them is inside the other, and they touch at only one point. Formally, they are both tangent to the same line, at the same point, and they lie on the same side of that shared tangent line.

Intersecting Lines (p. 128) – Two lines which have a point in common.

Intersection (p. 18) – An operation on two or more sets, which selects only those elements common to (or belonging to) all of the original sets.

Intuition (p. 79, p. 81) – A type of mental activity which gives information or beliefs, based on hunches or insight.

Inverse (p. 107) – A conditional which results from negating both the hypothesis and the conclusion in a given conditional.

“Is Greater Than” (p. 442, p. 446, p. 451) – By definition, for any real numbers a and b , a “is greater than” b , if and only if, there is a positive real number c , such that, $a = b + c$.

“Is Less Than” (p. 442, p. 446, p. 451) – By definition, for any real numbers a and b , a “is less than” b , if and only if, there is a positive real number c , such that, $b = a + c$.

Isosceles Trapezoid (p. 33) – A trapezoid in which the two non-parallel sides are of equal measure.

Isosceles Triangle (p. 33, p. 320, p. 415, p. 422) – A triangle is an isosceles triangle, if and only if, it has at least two congruent sides.

Isometry Transformation (p. 8, p. 382) – A transformation or combination of transformations which results in the image being exactly the same shape and size as the pre-image.

Kite (p. 33) – A quadrilateral in which there are two distinct pairs of consecutive sides which are of equal measure.

Law of Syllogism (p. 101) – An application of syllogistic reasoning involving two related conditionals, which, if considered together, using the “law of detachment”, will result in a third valid conditional.

Legs of an Isosceles Triangle (p.320) – The two congruent sides of an isosceles triangle, when that triangle has exactly two congruent sides.

Length of a Line Segment (p.134) – A real number which represents the distance between the endpoints of a line segment.

Line (p. 3) – A basic element of Geometry, which has infinite length, but no thickness. In a drawing, it is represented by a line segment with arrowheads on each end, to show that it goes on forever. We name a line by choosing any two points on the line, and labeling each with a capital letter.

Line Segment (p. 134) – The union of two points on a line, and the set of all the points between them

Linear Pair (p. 151, p. 316, p. 327) – Two angles which have a common side (they are adjacent), and whose exterior sides are opposite rays.

Logic (p. 92, p. 100, p.107) – A system of reasoning, in an orderly fashion, which draws conclusions from specific premises.

Major Arc of a Circle (p. 159, p. 525) – An arc which is the union of two points on a circle, not the endpoints of a diameter, and the set of points on the circle which lie in the exterior of the angle formed by the radii containing the two points.

Mapping (p. 7) – Another name for a transformation in Geometry.

Means-Extremes Product Property of a Proportion (p. 336) – A property of a valid standard proportion, which states that the product of the means is equal to the product of the extremes.

Means of a Proportion (p. 331) – In a standard proportion, the second and third terms.

Measure of a Central Angle of a Circle (p. 525, p. 533, p. 537) - Based on its relationship with the points on a circle, this is the measure of the angle's intercepted arc of that circle.

Measure of a Dihedral Angle (p. 307) – A real number which is defined to be the measure of any of its plane angles.

Measure of a Major Arc of a Circle (p. 159) – A real number which is equal to 360 minus the measure of its related minor arc.

Measure of a Minor Arc of a Circle (p.159) – A real number which is equal to the measure of its related central angle.

Measure of a Semicircle (p. 525, p. 538, p. 542) - Because a semicircle is the intercepted arc of a central angle of 180° , the measure of a semicircle is 180° .

Measure of an Arc of a Circle (p. 525, p. 533, p. 537, p. 542, p. 547) - Based on its relationship with the central angles of a circle, this is the measure of the central angle which intercepts the arc.

Measure of the Arc making up a Complete Circle (p. 159) – Related to a central angle of 360° (a complete rotation about the center of a circle), this defined to be 360° .

Median in a Triangle (p.316, p.416, p.423) – A segment drawn from a vertex of a triangle, to the midpoint of its opposite side.

Midpoint of a Line Segment (p. 135, p. 239) – A point on a line segment which is between the endpoints, and divides the given segment into two congruent segments.

Midsegment of a Polygon (p.480) – A line segment which joins the midpoints of the sides of the polygon. In our Geometry, the midsegments which are generally of most interest, are those which join consecutive sides of the polygon.

Minor Arc of a Circle (p.158, p. 525, p. 533) – An arc which is the union of two points on a circle, not the endpoints of a diameter, and the set of points on the circle which lie in the interior of the angle formed by the radii containing the two points.

Negation (p. 92) – A statement in logic which changes the truth of a statement, using the formal expression “it is not the case that”.

Net (p. 66, p. 71) – The plane geometric figure obtained by “unfolding” a three-dimensional geometric figure and laying it “flat” in a plane.

Network Geometry (p. 26) – A Geometry made up of a graph of “paths”, or arcs, in which every point, called a “node”, is the endpoint of a line, called an “edge”.

N-gon (p. 34) – A polygon made with five line segments.

Nonagon (p. 34) – A general polygon made with “n” line segments.

Non-collinear points (p. 14, p. 124) – Points which do not lie on the same line

Non-coplanar lines (p. 14) – A set of lines, for which there is no one plane containing all of the lines.

Non-coplanar points (p. 14, p. 124) – Points which do not lie on the same plane.

Numerator-Denominator Sum Property of a Proportion (p. 337) – For a valid proportion, the property which states that the numerators of each ratio may be added, and the denominators of each ratio may be added, forming a new ratio, which is in the same proportion as the original ratio.

Oblique Prism (p. 66) – A prism whose lateral faces are at an angle other than 90° with the base.

Oblique Pyramid (p. 71) – A pyramid whose apex is not on a line which is perpendicular to the “center” of the base.

Obtuse Angle (p. 147) – An angle whose measure is greater than 90 degrees, and less than 180 degrees.

Obtuse Triangle (p. 33, p. 320) – A triangle is an obtuse triangle, if and only if, one of its angles is obtuse.

Octagon (p. 34) – A polygon made with eight line segments.

Opposite Angle in a Triangle (p. 315, p. 415, p. 422, p. 426, p. 442, p. 446, p. 451) – With reference to a given segment, this is the angle which does not contain the given segment as a side.

Opposite Rays (p. 131) – Two rays which have a common endpoint and are in different half-lines of a given line.

Opposite Side in a Triangle (p. 315, p. 415, p. 422, p. 426, p. 442, p. 446, p. 451) – With reference to a given angle, this is the segment which is not included as a side of the given angle.

Parallel Lines (p. 14, p. 128) – Lines which are coplanar and do not intersect.

Parallel Planes (p. 307) – Planes are parallel, if and only if, they do not meet. In other words, they have no points in common.

Parallelogram (p. 33, p. 47) – A quadrilateral in which there are two pairs of parallel sides. (The standard symbol for a parallelogram is \square)

Parts of Mathematical Speech (p. 1) – A categorization of the five types of mathematical symbols, as they relate to the syntax and structure of expressions in mathematics.

Pentagon (p. 34) – A polygon made with five line segments.

Perimeter (p. 42, p. 47, p. 52, p. 55, p. 59, p. 62) – Intuitively, the measure of the distance around a simple closed plane curve.

Perimeter of a Parallelogram (p. 48) – The sum of twice the measure of one of two parallel sides, and twice the measure of one of the other two parallel sides of a parallelogram.

Perimeter of a Rectangle (p. 43) – The sum of twice the length and twice the width of a rectangle.

Perimeter of a Regular Polygon (p. 59) – The product of the measure of one of the sides of the polygon, and the total number of sides of the polygon.

Perimeter of a Rhombus (p. 48) – Four times the length of one side of the rhombus.

Perimeter of a Square (p. 43) – Four times the length of one side of the square.

Perimeter of a Trapezoid (p. 55) – The sum of the measures of the four sides of a trapezoid.

Perimeter of a Triangle (p. 52) – The sum of the measures of the three sides of a triangle.

Perpendicular Line to a Plane (p. 307) – A line is perpendicular to a plane, if and only if, every line in the plane, which intersects the given line, is perpendicular to the given line.

Perpendicular Lines (p. 14, p. 128) – Lines which intersect to form a right angle.

Perpendicular Plane to a Line (p. 307) – A plane is perpendicular to a line, if and only if, every line in the plane, which intersects the given line, is perpendicular to the given line.

Perpendicular Planes (p. 308) – Two planes are perpendicular, if and only if, they form a right dihedral angle.

Plane (p. 3) – A basic element of Geometry, which has infinite length and width, but no thickness. We generally represent a plane with a parallelogram, as we might draw a piece of paper, using perspective, and name it by using a single capital letter, or by using three points on the plane.

Plane Angle (p. 308) – The angle determined by the intersection of a plane with a dihedral angle, when the plane is perpendicular to each face of the dihedral angle.

Plane Curve (p. 30) - Any set of continuous points, not necessarily straight, all of which lie in a single flat surface, or plane.

Point (p. 3) – A basic element of Geometry, which has no size, and indicates only position. In a drawing, it is represented by a dot, and labeled with a capital letter.

Polygon (p. 33, p.455) – A general classification for all simple closed plane curves made up of straight line segments.

Polygonal Region (p.494, p.501, p.505, p.508, p.512) – For practical purposes, in our Geometry, this is the set of points inside a polygon, measured by its area, relative to a specific unit. Formally, it may be referred to as “the union of a polygon and its interior points”, even though the polygon itself does not contribute to the area. *Note:* For convenience, we often refer to the area of a particular polygonal region in simple terms related to the polygon itself. For example, the area of a triangular region is usually referred to as “the area of a triangle”. Likewise, the area of a rectangular region is usually referred to as “the area of a rectangle”. Areas of other polygons are treated similarly.

Postulate (p. 165) – Fundamental statements, or assumptions, which are accepted without proof.

Pre-Image (p. 7) – The original geometric shape, before a transformation is applied to it.

Prism (p. 38, p. 65 and p. 377) – A three-dimensional geometric figure created by “translating” a simple closed plane curve, through space, and tracing the path of that translation. The pre-image and the image are generally called the “bases” of the prism, and are used to name it. All of the other faces are parallelograms, called the “lateral faces” of the prism, which are joined to each other at the “lateral edges”.

Projection of a Point on a Line (p. 363) – Using the notion that a projection of a given point P is the “shadow” of that point on a given line ℓ , we say that such a “shadow”, call it point X , is the projection of point P on ℓ . Formally, the projection of a point on a line is the point of intersection of the line and the perpendicular from that point to the line. *Note:* When the given point lies on the given line, it is considered to be its own projection on that line.

Projection of a Segment on a Line, in the same Plane (p. 363) – Using the notion that a projection of a given segment AB is the “shadow” of that segment on a given line ℓ , we say that such a “shadow”, call it segment MN, is the projection of AB on ℓ . Formally, the projection of a segment on a line in the same plane is the segment whose endpoints are the projections of the endpoints of the given segment.

Proper Subset (p. 19) – A subset which contains only part of another set.

Proportion (p. 331) – From the Latin, meaning “for its portion”, this is a relation stating that two ratios are equal.

Pyramid (p. 38, p. 71 and p. 377) – A three-dimensional geometric figure created by “connecting” a simple closed plane curve to a point, called the “apex”, not in the plane of the curve. The simple closed plane curve is called the base of the pyramid, and is used to name it. All of the other faces are triangles, which are joined to each other at the “slant edges”, and are called the “lateral faces” of the pyramid.

Pythagorean Triple (p. 430) – Sometimes called a set of Pythagorean numbers, this is a set of three integers, (usually arranged as an ordered triple), whose members can be the measures of the three sides of a right triangle. In other words, the sum of the squares of two of the numbers is equal to the square of the third number.

Quadrilateral (p.33, p.455, p.460, p.466, p.471, p.476, p.480) – A polygon made with four line segments. Further, the segments are called the sides of the quadrilateral, and the endpoints of the segments are called the vertices of the quadrilateral.

Quod Erat Demonstrandum (p. 215) – From the Latin meaning “which was to be demonstrated”, a phrase which is generally used as an attachment to the last reason in a direct proof, formally noting that the statement in question has been officially proved. It is usually abbreviated as “Q.E.D.”

Radius of a Circle (p. 62, p. 157, p. 522) – A line segment whose endpoints are the center of a circle, and a point on that circle.

Radius of a Regular Polygon (p. 58) – The distance from the center of the polygon to any one of the corners of the polygon.

Radius of a Sphere (p. 76) – The distance from the center of a sphere to any point on the sphere.

Ratio (p. 331) – From the Latin, meaning “computation”, this is a numerical comparison between two numbers (found by division), generally expressed as a fraction.

Ray (p. 131) – A set of points which is the union of the separation point of a line, called the endpoint, and the set of points contained in one half-line.

Reasoning on the Converse (p. 111) – An illogical argument which attempts to use the converse of a true conditional to prove a statement

Rectangle (p.34, p.42, p.455, p.466) – A parallelogram in which there are four right angles. (The standard symbol for a rectangle is \square)

Reductio ad Absurdum (p. 223) – From the Latin meaning “reduce to an absurdity”, a phrase which is generally used as an attachment to the last reason in an indirect proof, formally noting that the statement in question has been officially proved, by reducing the assumed negation to a contradiction. It is usually abbreviated as “R.A.A.”

Reflection (p. 7) – A transformation in which each point of the pre-image moves across a fixed line, to a point in the image, which is the same distance from that fixed line (called the line of reflection, or the “mirror” line) as the original point.

Regular Polygon (p.58, p.489, p.519) – A simple closed plane curve made only with straight line segments, in which all the sides are of equal measure, and all of the angles are of equal measure.

Remote Interior Angles in a Triangle (p. 316, p. 327) – With reference to a given exterior angle, the two angles that are not adjacent to that exterior angle.

Rhombus (p.33, p.47, p.455, p.466) – A quadrilateral in which all four sides are of equal measure

Right Angle (p. 147) – An angle whose measure is 90 degrees.

Right Dihedral Angle (p. 308) – A dihedral angle is a right dihedral angle, if and only if, all of its plane angles are right angles.

Right Prism (p. 66) – A prism whose lateral faces are all at an angle of 90° with the bases.

Right Pyramid (p. 71) – A pyramid whose apex is on a line which is perpendicular to the “center” of the base.

Right Triangle (p. 33, p. 52, p. 320) – A triangle is a right triangle, if and only if, one of its angles is a right angle.

Rotation (p. 7) – This transformation “rotates” the pre-image about a fixed point, in such a way that every point in the pre-image turns through the same-sized angle, relative to that fixed point, preserving size and shape.

Scalene Triangle (p. 33, p. 320) – A triangle is a scalene triangle, if and only if, no two sides are congruent.

Secant Line of a Circle (p. 522, p. 547, p. 551) - A line that intersects a circle in two distinct points.

Secant Segment of a Circle (p. 522) - A segment that intersects a circle in two distinct points, with at least one of its endpoints on the circle.

Semicircle (p. 147, p. 525) – An arc of a circle whose endpoints are the endpoints of a diameter of that circle.

Separation Line (p. 141) – A specified line on a plane, which separates (or divides) the plane into three distinct sets of points: the separation line itself, and the two sets of points on either side of that line.

Separation Point (p. 131) – A specified point on a line, which separates (or divides) the line into three distinct sets of points: the separation point itself, and the two sets of points on either side of that point.

Set (p. 18) – A collection of well-defined objects, called elements, which is described either by a listing of all of the objects (a roster), or by a symbolic description that specifies the objects in the set (a rule).

Set-Builder Notation (p. 18) – A mathematical shorthand used to describe a set.

Sides of a Polygon (p. 315) – The segments which make up a polygon.

Similarity (p. 331, p. 341, p. 346) – From the Latin, meaning “like”, this is a relationship between geometric figures which have the same shape, but not necessarily the same size. Formally, two polygons are said to be similar, if and only if, for some pairing of their vertices, the corresponding angles are congruent, and the corresponding sides are in proportion.

Similarity Transformation (p. 8) – A transformation, or combination of transformations, which results in the image being exactly the same shape, but not necessarily the same size as the pre-image.

Simple Closed Plane Curve (p. 30) - Any set of continuous points, not necessarily straight, all of which lie in a single flat surface, or plane, and which divides the plane into three distinct sets of points: those inside the curve, those on the curve, and those outside the curve.

Simple Closed Plane Curve made up of Straight Line Segments (p.30) – The set of geometric figures, upon which we focus, in our Geometry.

Simple Statement (p. 92, p. 100, p. 107) – A sentence in logic which declares that something is either true or false, but not both true and false, at the same time.

Slant Height (p. 71, p. 377) – The perpendicular distance from the apex of a pyramid, on a lateral face, to an edge of the base of that pyramid. In effect, because each of the lateral faces of a pyramid is itself a triangle, each lateral face has its own “slant height”, which is the altitude of that triangle. It is usually represented by a script letter ℓ .

Skew Lines (p. 128) – Lines which are non-coplanar.

Space (p. 3, p. 124) – The set of all possible points.

Sphere (p. 39, p. 76) – A three-dimensional geometric figure, created by “locating” all of the points in space, which are at a given distance from a given point.

Square (p.34, p.42, p.455, p.466) – A rectangle in which all four sides are of equal measure

Straight Angle (p. 147) – An angle whose sides are opposite rays, giving a measure of 180 degrees.

Subset (p. 19) – A set, all of whose elements are contained in another set.

Supplementary Angles (p. 151) – Two angles, the sum of whose measures is, 180° .

Syllogism (p. 100) – A logical argument consisting of three statements, two of which are accepted as being true, and a third which is to be drawn from the acceptance of the first two.

Symbolic Form of a Simple Statement (p. 92, p. 100) – Used for convenience, this is the conventional way to represent simple statements in logic.

Symmetry Diagonal of a Kite (p. 476) - Of the two diagonals of a kite, this is the only one which is contained in the line of symmetry of the kite.

Synthetic Geometry (p. 25) – A Geometry in which every point is an “exact location”, having no real size, and every line is a set of continuous points, with no space between them.

Tangent Line of a Circle (p. 522, p. 542, p. 551) - A line that intersects a circle in exactly one point, called the “point of tangency”, or the “point of contact”

Tangent Segment of a Circle (p. 522) - A segment that intersects a circle in such a way that the point of tangency is one of its endpoints

Terms of a Proportion (p. 331) – Any of the four individual numbers in a standard proportion.