Glossary of Geometry Terms

A

Acute angle An angle whose degree measure is less than 90 and greater than 0.

Acute triangle A triangle with three acute angles.

Adjacent angles Two angles with the same vertex, a common side, and no interior points in common.

Altitude In a triangle, a segment that is perpendicular to the side to which it is drawn.

Angle The union of two rays that have the same endpoint.

Angle of rotational symmetry The smallest positive angle through which a figure with rotational symmetry can be rotated to coincide with itself. For a regular n-polygon, this angle is $\frac{360}{n}$.

Apothem The radius of the inscribed circle of a regular polygon.

Arc A part of a circle whose endpoints are two distinct points of the circle. If the degree measure of the arc is less than 180, the arc is a **minor arc**. If the degree measure of the arc is greater than 180, the arc is a **major arc**. A **semicircle** is an arc whose degree measure is 180.

B

Biconditional A statement of the form "p if and only if q" where statement p is the hypothesis of a conditional statement and statement q is the conclusion. A biconditional represents the conjunction of a conditional statement and its converse. It is true only when both parts of the biconditional have the same truth values.

Bisect To divide into two congruent parts.

C

Center of a regular polygon The point in the interior of the polygon that is equidistant from each of the vertices. It is also the common center of its inscribed and circumscribed circles.

Center–radius equation of circle The equation $(x - h)^2 + (y - k)^2 = r^2$ where (h, k) is the center of a circle with radius r.

Central angle of a circle An angle whose vertex is at the center of a circle and whose sides contain radii.

Central angle of a regular polygon An angle whose vertex is the center of the polygon and whose sides are drawn to consecutive vertices of the polygon.

Centroid of a triangle The point of intersection of its three medians.

Chord of a circle A line segment whose endpoints are points on a circle.

Circle The set of points (x, y) in the plane that are a fixed distance r from a given point (h, k) called the *center.* An equation of the circle is

$$(x - h)^2 + (y - k)^2 = r^2$$

Circumcenter of a triangle The center of the circle that can be circumscribed about a triangle. It can be located by finding the point of intersection of the perpendicular bisectors of two of its sides.

Circumscribed circle about a polygon A circle that has each vertex of a polygon on it.

Circumscribed polygon about a circle A polygon that has all of its sides tangent to the circle.

Collinear points Points that lie on the same line.

Common external tangent A line tangent to two circles that does *not* intersect the line joining their centers at a point between the two circles.

Common internal tangent A line tangent to two circles that intersects the line joining their centers at a point between the two circles.

Complementary angles Two angles whose degree measures add up to 90.

Composition of transformations A sequence of transformations in which one transformation is applied to the image of another transformation.

Concave polygon A polygon in which there are two points in the interior of the polygon such that the line through them, when extended, intersects the polygon in more than two points. A concave polygon contains at least one interior angle that measures more than 180.

Concentric circles Circles in the same plane with the same center but unequal radii.

Conclusion In a conditional statement of the form "If . . . then . . . ," the statement that follows "then."

Concurrent When three or more lines intersect at the same point.

Conditional statement A statement of the form "If p, then q." A conditional statement is always true except in the single instance in which statement p (hypothesis) is true and statement q (the conclusion) is false.

Cone A solid figure with a circular base and a curved lateral surface that joins the base to a point in a different plane called the *vertex*.

Congruent angles (or sides) Angles (or sides) that have the same measure. The symbol "is congruent to" is $\cong$.

Congruent circles Circles with congruent radii.

Congruent parts Pairs of angles or sides that are equal in measure and, as a result, are congruent.

Congruent polygons Two polygons with the same number of sides such that all corresponding angles are congruent and all corresponding sides are congruent.

Congruent triangles Two triangles that agree in all of their corresponding parts. Two triangles are congruent if any one of the following conditions is true: the three sides of one triangle are congruent to the corresponding sides of the other triangle (SSS $\cong$ SSS); two sides and the included angle of one triangle are congruent to the corresponding parts of the other triangle (SAS $\cong$ SAS); two angles and the included side of one triangle are congruent to the corresponding parts of the other triangle (ASA $\cong$ ASA); two angles and the side opposite one of these angles is congruent to the corresponding parts of the other triangle (AAS $\cong$ AAS).

Conjunction A statement that uses "and" to connect two other statements called *conjuncts*. A conjunction is true only when both conjuncts are true.

Contrapositive The statement formed by interchanging and then negating the "If" and "then" parts of a conditional statement. Symbolically, the contrapositive of $p \rightarrow q$ is $\sim q \rightarrow \sim p$.

Converse The statement formed by interchanging the "If" and "then" parts of a conditional statement. Symbolically, the converse of $p \rightarrow q$ is $q \rightarrow p$.

Convex polygon A polygon for which any line that passes through it, provided the line is not tangent to a side or a corner point, intersects the polygon in exactly two points. Each interior angle of a convex polygon measures less than 180. A nonconvex polygon is called a *concave* polygon.

Coplanar A term applied to figures that lie in the same plane.

Corollary A theorem that is a direct consequence of another theorem and can be easily proved from it.

Counterexample A specific example that disproves a statement.

Cylinder A solid figure with congruent circular bases that lie in parallel planes connected by a curved lateral surface.

D

Deductive reasoning A logical chain of reasoning that uses general principles and accepted facts to reach a specific conclusion.

Degree A unit of angle measurement defined as $\frac{1}{360}$th of one complete rotation of a ray about its vertex.

Diagonal of a polygon A line segment whose endpoints are two nonconsecutive vertices of the polygon.

Diameter A chord of a circle that contains the center of the circle.

Dilation A transformation in which a figure is enlarged or reduced in size according to a given scale factor.

Direct isometry An isometry that preserves orientation.

Disjunction A statement that uses "or" to connect two other statements called *disjuncts*. A disjunction is true when at least one of the disjuncts is true.

E

Edge of a solid A segment that is the intersection of two faces of the solid.

Equidistant A term that means "same distance."

Equilateral triangle A triangle in which the three sides have the same length.

Equivalence relation A relation in which the reflexive ($a = a$), symmetric ($a = b$ and $b = a$), and transitive properties (if $a = b$ and $b = c$, then $a = c$) hold. Congruence, similarity, and parallelism are equivalence relations.

Exterior angle of a polygon An angle formed by a side of the polygon and the extension of an adjacent side of the polygon.

Externally tangent circles Circles that lie on opposite sides of their common tangent.

Extremes The first and last terms of a proportion. In the proportion $\frac{a}{b} = \frac{c}{d}$, the terms a and d are the extremes.

F

Frustrum The part of a cone that remains after a plane parallel to the base of the cone slices off a part of the cone below its vertex.

G

Geometric mean See *mean proportional.*

Glide reflection The composite of a line reflection and a translation whose direction is parallel to the reflecting line.

Great circle The largest circle that can be drawn on a sphere.

H

Hypotenuse In a right triangle, the side opposite the right angle.

Hypothesis In a conditional statement of the form "If . . . then . . . ," the statement that follows "If."

I

Image The result of applying a geometric transformation to an object called the *preimage.*

Incenter of a triangle The center of the inscribed circle of a triangle that represents the common point at which its three angle bisectors intersect.

Indirect proof A deductive method of reasoning that eliminates all but one possibility for the conclusion.

Inductive reasoning The process of reasoning from a few specific cases to a broad generalization. Conclusions obtained through inductive reasoning may or may not be true.

Inscribed angle An angle of a circle whose vertex is a point on a circle and whose sides are chords.

Inscribed circle of a triangle A circle drawn so that the three sides of the triangle are tangent to the circle.

Internally tangent circles Tangent circles that lie on the same side of their common tangent.

Inverse of a statement The statement formed by negating the "If" and "then" parts of a conditional statement. Symbolically, the inverse of $p \rightarrow q$ is $\sim p \rightarrow \sim q$.

Isometry A transformation that preserves distance. Reflections, translations, and rotations are isometries. A dilation is *not* an isometry.

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

K

Kite A quadrilateral in which two pairs of adjacent, not opposite, sides are congruent.

L

Lateral edge An edge of a prism or pyramid that is not a side of a base.

Lateral face A face of a prism or pyramid that is not a base.

Leg of a right triangle Either of the two sides of a right triangle that include the right angle.

Linear pair Two adjacent angles whose exterior sides are opposite rays.

Line of symmetry A line that divides a figure into two congruent reflected parts.

Line reflection A transformation in which each point P on one side of the reflecting line is paired with a point P' on the opposite side of it so that the reflecting line is the perpendicular bisector of $\overline{PP'}$. If P is on the reflecting line, then P' coincides with P.

Line symmetry When a figure can be reflected in a line so that the image coincides with the original figure.

Locus The set of points, and only those points, that satisfy a given condition. The plural of *locus* is *loci.*

Logically equivalent Statements that always have the same truth values. A statement and its contrapositive are logically equivalent.

M

Major arc An arc whose degree measure is greater than 180 and less than 360.

Mapping A pairing of the elements of one set with the elements of another set. A mapping between sets A and B is one–to–one if every member of A corresponds to exactly one member of B, and every member of B corresponds to exactly one member of A.

Mean proportional When the second and third terms of a proportion are equal, either of these terms is the mean proportional between the first and fourth terms of the proportion. In $\frac{a}{x} = \frac{x}{d}$, x is the mean proportional between a and d where $x = \sqrt{ad}$.

Midsegment The line segment whose endpoints are the midpoints of two sides of a triangle.

Minor arc An arc whose degree measure is between 0° and 180°.

N

***n*–gon** A polygon with n sides.

Negation of a statement The statement with the opposite truth value. Symbolically, the negation of statement p is $\sim p$.

Noncollinear points Points that do not all lie on the same line.

Non–Euclidean geometries Geometry systems that do not accept the Parallel Postulate.

O

Orthocenter of a triangle The point of intersection of the three altitudes of a triangle.

P

Parallel lines Coplanar lines that do not intersect.

Parallelogram A quadrilateral that has two pairs of parallel sides. In a parallelogram, opposite sides are congruent, opposite angles are congruent, consecutive angles are supplementary, and diagonals bisect each other.

Parallel Postulate Euclid's controversial assumption that through a point not on a line exactly one line can be drawn parallel to the given line.

Perpendicular bisector A line that is perpendicular to a line segment at its midpoint.

Perpendicular lines Two lines that intersect to form right angles.

Point–slope equation of a line An equation of a line with the form $y - b = m(x - a)$, where m is the slope of the line and (a, b) is a point on the line.

Point symmetry A figure has point symmetry if after it is rotated 180° (a half-turn) the image coincides with the original figure.

Polygon A closed plane figure bounded by line segments that intersect only at their endpoints.

Polyhedron A closed solid figure in which each side is a polygon.

Postulate A statement that is accepted as true without proof.

Preimage The original figure in a transformation. If A' is the image of A under a transformation, then A is the preimage of A'.
Prism A polyhedron whose faces, called *bases*, are congruent polygons in parallel planes.
Proportion An equation that states that two ratios are equal. In the proportion $\frac{a}{b} = \frac{c}{d}$, a and d are called the *extremes* and b and c are called the *means*. In a proportion, the product of the means is equal to the product of the extremes. Thus, $a \times d = b \times c$.
Pyramid A solid figure formed by joining the vertices of a polygon base to a point in a different plane known as the *vertex*.
Pythagorean Theorem In a right triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the two legs.

Q

Quadrilateral A polygon with four sides.

R

Ray Part of a line consisting of an endpoint and the set of all points on one side of the endpoint.
Rectangle A parallelogram with four right angles.
Reflection A transformation that produces an image that is the mirror image of the original object.
Reflection rules Reflections of points in the coordinate axes are given by the following rules: $r_{x\text{-axis}}(x, y) = (x, -y)$, $r_{y\text{-axis}}(x, y) = (-x, y)$. To reflect a point in the origin, use the rule $r_{\text{origin}}(x, y) = (-x, -y)$. See also *line reflection.*
Reflexive property A quantity is equal (or congruent) to itself.
Regular polygon A polygon that is both equilateral and equiangular, such as a square.
Rhombus A parallelogram with four congruent sides.
Right angle An angle whose degree measure is 90.
Right triangle A triangle that contains a right angle.
Rotation A transformation in which a point or figure is turned a given number of degrees about a fixed point.
Rotation rules The images of points rotated about the origin through angles that are multiples of 90° are given by the following rules: $R_{90°}(x, y) = (-y, x)$, $R_{180°}(x, y) = (-x, -y)$, and $R_{270°}(x, y) = (y, -x)$.
Rotational symmetry When a figure can be rotated through a positive angle of less than 360° so that the image coincides with the original figure.

S

Scalene triangle A triangle in which no two sides are congruent.
Secant line A line that intersects a circle in two different points.
Sector of a circle The interior region of a circle bounded by two radii and their intercepted arc.
Segment of a circle The interior region of a circle bounded by a chord of a circle and its intercepted arc.
Semicircle An arc whose degree measure is 180.
Similar polygons Polygons with the same shape. Similar polygons have congruent corresponding angles and corresponding sides that are in proportion.
Skew lines Lines in different planes that do not intersect but are not parallel.
Slope A numerical measure of the steepness of a line. The slope of a vertical line is undefined.
Slope–intercept equation of a line An equation of a line with the form $y = mx + b$, where m is the slope of the line and b is the y-intercept.
Sphere The set of all points in space that are at a fixed distance from a given point called the *center* of the sphere.
Square A parallelogram with four right angles and four congruent sides.
Substitution property A quantity may be replaced by its equal in an equation.
Supplementary angles Two angles whose degree measures add up to 180.
Symmetric property If $a = b$, then $b = a$.

T

Tangent circles Circles in the same plane that are tangent to the same line at the same point. *Internally tangent circles* lie on the same side of the common tangent. *Externally tangent circles* lie on opposite sides of the common tangent.
Tangent of a circle A line in the same plane as the circle that intersects it in exactly one point.
Theorem A mathematical generalization that can be proved.
Transformation A change in the position, size, or shape of a figure according to some given rule.
Transitive property If $a = b$ and $b = c$, then $a = c$.
Translation A transformation in which each point of a figure is shifted the same distance and in the same direction. The transformation $T_{h,k}$ slides a point h units horizontally and k units vertically. Thus, $T_{h,k}(x, y) = (x + h, y + k)$.
Transversal A line that intersects two or more other lines in different points.
Trapezoid A quadrilateral in which exactly one pair of sides is parallel. The nonparallel sides are called *legs.*
Triangle inequality In any triangle, the length of each side must be less than the sum of the lengths of the other two sides, and greater than their difference.
Truth value For a statement, either true or false, but not both.

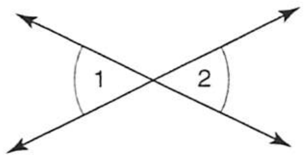
V

Vertex angle In an isosceles triangle, the angle formed by the two congruent sides.
Vertex of a polygon The point at which two sides of the polygon intersect. The plural of *vertex* is *vertices.*
Vertical angles Opposite pairs of congruent angles formed when two lines intersect.
Volume The amount of space a solid figure occupies as measured by the number of nonoverlapping $1 \times 1 \times 1$ unit cubes that can exactly fill its interior.

Some Geometric Relationships Worth Remembering

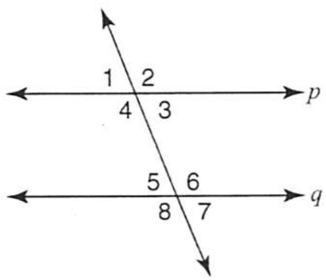
Pairs of Angles

- Vertical angles are congruent:



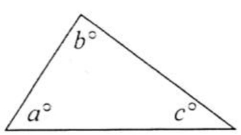
$\angle 1 \cong \angle 2$

- If two parallel lines are cut by a transversal, any two of the eight angles that are formed are either congruent or supplementary.

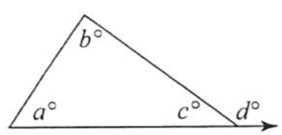


$p \parallel q$

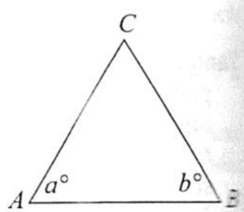
Angles of a Triangle



$a + b + c = 180$



$d = a + b$



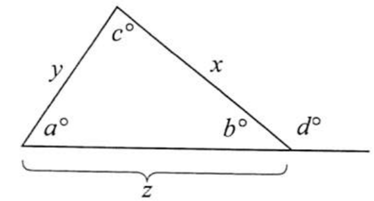
$\overline{AC} \cong \overline{BC} \Rightarrow a = b$
and
$a = b \Rightarrow \overline{AC} \cong \overline{BC}$

Angles of a Polygon

Polygon with n Sides	**Regular Polygon with n sides**
Sum of exterior angles = 360	Each exterior angle = $\frac{360}{n}$
Sum of interior angles = $(n-2) \times 180$	Each interior angle = $180 - \frac{360}{n}$

Inequalities in a Triangle

- If $x > y$, then $a > b$.
- If $a > b$, then $x > y$.
- $d > a$ and $d > c$.
- $z < x + y$, $x < y + z$, and $y < x + z$.



Proving Triangles Congruent

Two triangles are congruent if any one of the following is true:

- ASA ≅ ASA
- SAS ≅ SAS
- SSS ≅ SSS
- AAS ≅ AAS
- Hy–Leg ≅ Hy–Leg (only for right triangles)

Two triangles are *not* congruent when SSA ≅ SSA or AAA ≅ AAA.

Proving Triangles Similar

Two triangles are similar if any one of the following is true:

- AA ≅ AA
- Corresponding sides are in proportion.
- The lengths of two pairs of sides are in proportion and their included angles are congruent.

Properties of Parallelograms

In a parallelogram:

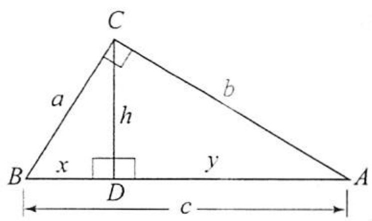
- Opposite sides are parallel.
- Opposite sides and opposite angles are congruent.
- Diagonals bisect each other.

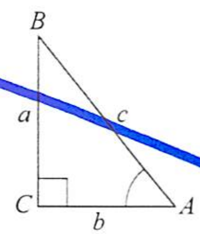
Properties of Special Quadrilaterals

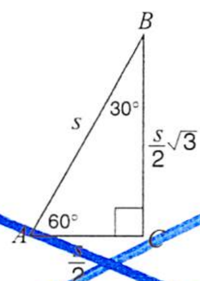
Property	Rectangle	Rhombus	Square	Isosceles Trapezoid
• All the properties of a parallelogram	✓	✓	✓	
• Equiangular (four right angles)	✓		✓	
• Equilateral (four congruent sides)		✓	✓	
• Congruent diagonals	✓		✓	✓
• Diagonals bisect opposite angles		✓	✓	
• Diagonals intersect at right angles		✓	✓	

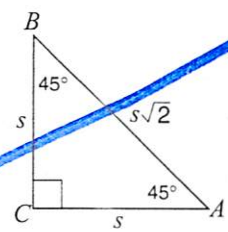
Right Triangle Relationships

- $\frac{x}{a} = \frac{a}{c}$ and $\frac{y}{b} = \frac{b}{c}$
- $\frac{x}{h} = \frac{h}{y}$
- $a^2 + b^2 = c^2$







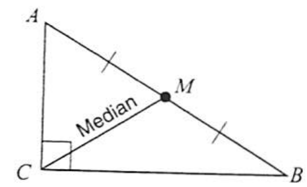


- $\sin A = \frac{a}{c}$
- $\cos A = \frac{b}{c}$
- $\tan A = \frac{a}{b}$

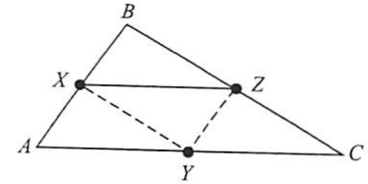
- $AC = \frac{1}{2} \times AB$
- $BC = AC \times \sqrt{3}$

- $AC = BC$
- $AB = \sqrt{2} \times AC$
- $AB = \sqrt{2} \times BC$

Midpoint and Centroid Relationships

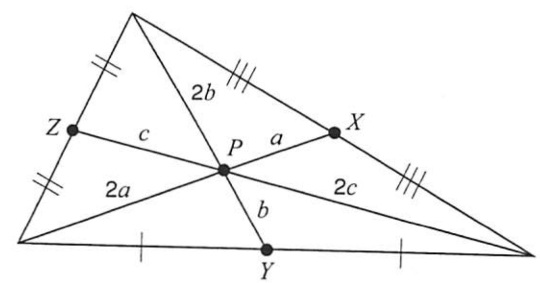


- In right $\triangle ABC$, $CM = \frac{1}{2}AB$.

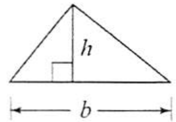
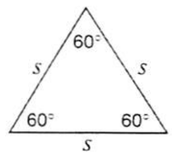
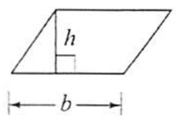
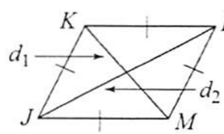
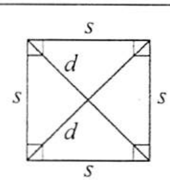
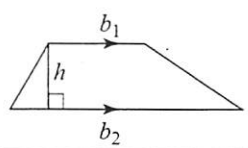
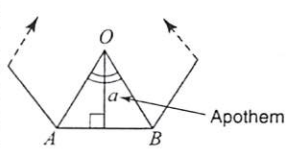


- If X and Z are midpoints, then $\overline{XZ} \parallel \overline{AC}$ and $YZ = \frac{1}{2}AC$.
- If X, Y, and Z are midpoints, then perimeter $\triangle XYZ = \frac{1}{2}$ perimeter of $\triangle ABC$.

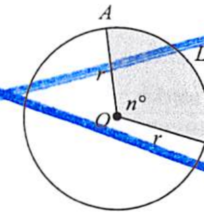
The three medians of a triangle are concurrent at a point P, called the **centroid** of the triangle, such that each median is divided into segments whose lengths are in the ratio of 2:1. The distance from each vertex to the centroid is two-thirds of the length of the entire median drawn from that vertex.



Area Formulas for Special Polygons

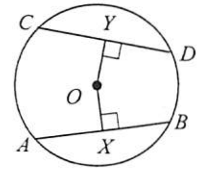
Polygon	Diagram	Area Formula
Triangle		$A = \frac{1}{2} \times b \times h$
Equilateral triangle		$A = \frac{s^2}{4}\sqrt{3}$
Parallelogram and Rectangle		$A = b \times h$
Rhombus		$A = \frac{1}{2} \times d_1 \times d_2$
Square		$A = s^2$ or $A = \frac{1}{2} \times d^2$
Trapezoid		$A = \frac{1}{2} \times h(b_1 + b_2)$
Regular n-sided polygon		Central $\angle AOB = \frac{360}{n}$ Area $= \frac{1}{2} \times a \times$ perimeter

Circle Formulas

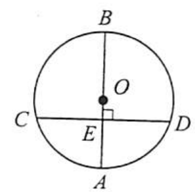


- $L = \frac{n}{360} \times \underbrace{(2\pi r)}_{\text{Circumference}}$
- Area $AOB = \frac{n}{360} \times \underbrace{(\pi r^2)}_{\text{Area of circle}}$

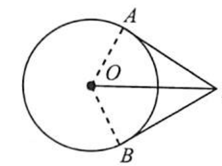
Chord, Tangent, and Secant Relationships



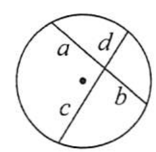
$\overline{AB} \cong \overline{CD} \Rightarrow OX = OY$
and
$OX = OY \Rightarrow \overline{AB} \cong \overline{CD}$



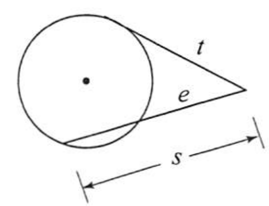
$\overline{AB} \perp \overline{CD} \Rightarrow \overline{CE} \cong \overline{DE}$,
$\overset{\frown}{AC} \cong \overset{\frown}{AD}$, and $\overset{\frown}{BC} \cong \overset{\frown}{BD}$



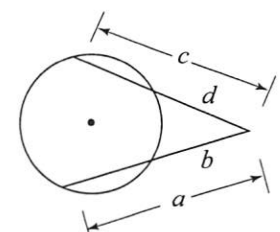
$\overline{PA} \cong \overline{PB}$
and
$\overline{OP}$ bisects $\angle APB$



$a \times b = c \times d$

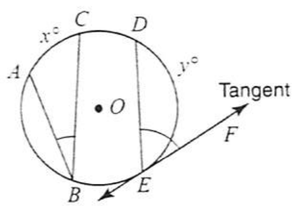
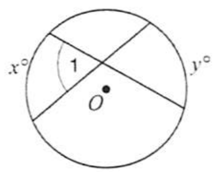
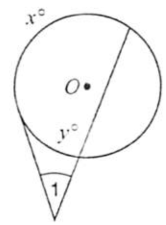


$t^2 = s \times e$



$a \times b = c \times d$

Circle Angle Measurement

Inscribed and Chord–Tangent Angles	**Chord–Chord Angle**	**Secant–Tangent, Secant–Secant, and Tangent–Tangent Angles**
		
$m\angle ABC = \frac{1}{2}x$ and $m\angle DEF = \frac{1}{2}y$	$m\angle 1 = \frac{1}{2}(x + y)$	$m\angle 1 = \frac{1}{2}(x - y)$

Coordinate Formulas

Given $A(x_A, y_A)$ and $B(x_B, y_B)$:

- Midpoint of $\overline{AB} = \left(\frac{x_A + x_B}{2}, \frac{y_A + y_B}{2}\right)$
- Slope of $\overline{AB} = \frac{\Delta y}{\Delta x} = \frac{y_B - y_A}{x_B - x_A}$
- Length of $\overline{AB} = \sqrt{(x_B - x_A)^2 + (y_B - y_A)^2}$

General Equations:

- Slope–intercept equation of a line: $y = mx + b$
- Point–slope equation of a line: $y - y_A = m(x - x_A)$
- Circle with center (h, k) and radius r: $(x - h)^2 + (y - k)^2 = r^2$

Volume and Area Formulas for Solids

Let h = height, ℓ = slant height, p = perimeter, r = radius, and B = area of a base.

Solid Figure*	**Volume (V)**	**Area**[†]
Prism	$V = B \times h$	L.A. $= hp$
Pyramid	$V = \frac{1}{3}B \times h$	L.A. $= \frac{1}{2}p\ell$
Cylinder	$V = \pi r^2 h$	L.A. $= 2\pi rh$
Cone	$V = \frac{1}{3}\pi r^2 h$	L.A. $= \pi r\ell$
Sphere	$V = \frac{4}{3}\pi r^3$	S.A. $= 4\pi r^2$

*Volume formulas hold for both right and oblique solids (prisms, cylinders, and cones) and for both regular and nonregular pyramids.
[†]L.A. = lateral area and S.A. = surface area.

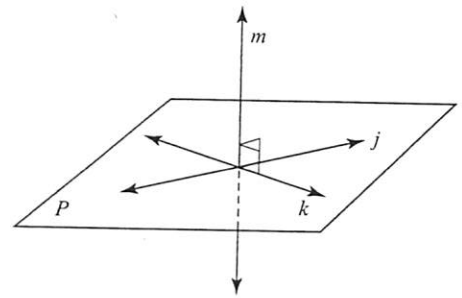
Properties of Transformations

Transformation	Properties Preserved	Isometry*	Coordinate Rules
Line Reflection	Collinearity Angle measure Distance	Opposite	$r_{x\text{-axis}}(x, y) = (x, -y)$ $r_{y\text{-axis}}(x, y) = (-x, y)$ $r_{\text{origin}}(x, y) = (-x, -y)$ $r_{y=x}(x, y) = (y, x)$
Translation	Collinearity Angle measure Distance Orientation	Direct	$T_{h,k}(x, y) = (x + h, y + k)$
Rotation	Collinearity Angle measure Distance Orientation	Direct	$R_{90^\circ}(x, y) = (-y, x)$ $R_{180^\circ}(x, y) = (-x, -y)$ $R_{270^\circ}(x, y) = (y, -x)$
Dilation	Collinearity Angle measure Orientation	Image is similar to the original figure	$D_k(x, y) = (kx, ky)$ where k is the scale factor
Glide reflection	Collinearity Angle measure Distance	Opposite	

*Isometry is a transformation that produces a congruent image. A *direct* isometry preserves orientation, and an *opposite* isometry reverses orientation.

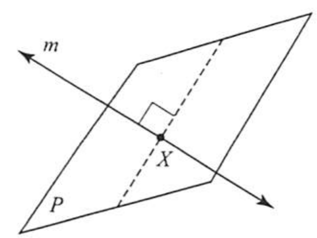
Appendix I
More Facts About Planes

- If a line is perpendicular to each of two intersecting lines at their point of intersection, then the line is perpendicular to the plane determined by them.



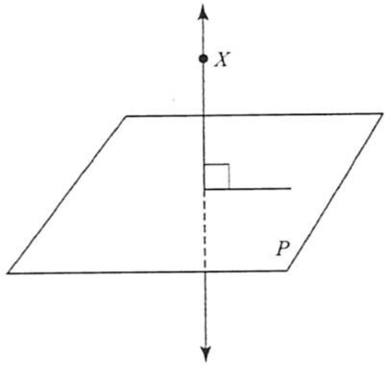
If $m \perp j$ and $m \perp k$, then $m \perp P$.

- Through a given point there passes one and only one plane perpendicular to a given line.



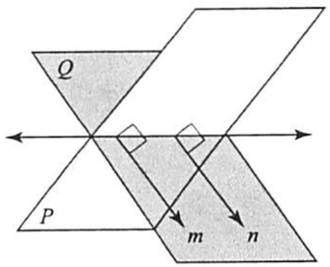
At point X on line m, only plane $P \perp m$.

- Through a given external point, there passes one and only one line perpendicular to a given plane.



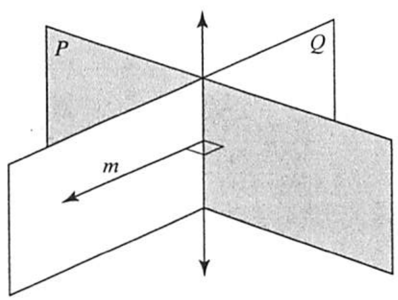
Only one line can be drawn through X and perpendicular to plane P.

- Two lines perpendicular to the same plane are coplanar.



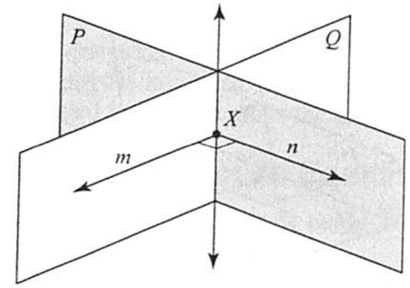
If $m \perp P$ and $n \perp P$, then lines m and n both lie in plane Q.

- Two planes are perpendicular to each other if and only if one plane contains a line perpendicular to the other plane.



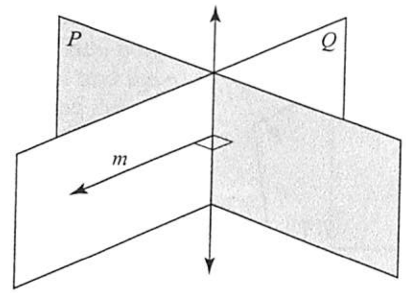
$P \perp Q$ if and only if Q contains m and $m \perp P$.

- If a line is perpendicular to a plane, then any line perpendicular to the given line at its point of intersection with the given plane is in the given plane.



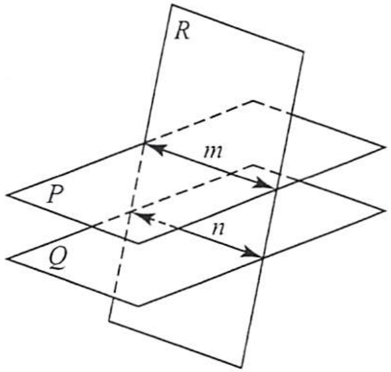
If $m \perp P$ at point X, then $n \perp m$ at X and n is in P.

- If a line is perpendicular to a plane, then every plane containing the line is perpendicular to the given plane.



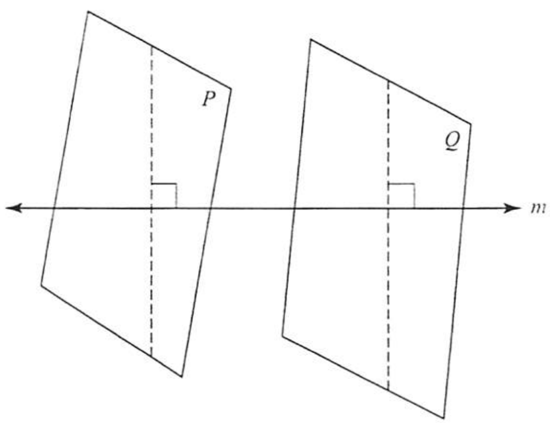
If $m \perp P$, then $Q \perp P$.

- If a plane intersects two parallel planes, then the intersection is two parallel lines.



If plane R intersects parallel planes P and Q, then lines m and n are parallel.

- If two planes are perpendicular to the same line, they are parallel.



If $P \perp m$ and $Q \perp m$, then $P \parallel Q$.

Are Any Formulas Provided?

The Regents Examination in Geometry will include a reference sheet containing the formulas specified below.

Volume	Cylinder	$V = Bh$, where B is the area of the base
	Pyramid	$V = \frac{1}{3}Bh$, where B is the area of the base
	Right circular cone	$V = \frac{1}{3}Bh$, where B is the area of the base
	Sphere	$V = \frac{4}{3}\pi r^3$

Lateral Area (L.A.)	Right circular cylinder	L.A. $= 2\pi rh$
	Right circular cone	L.A. $= \pi r \ell$, where ℓ is the slant height

Surface Area (S.A.)	Sphere	S.A. $= 4\pi r^2$

What Else Should I Know?

- Do not omit any questions from Part I. Since there is no penalty for guessing, make certain that you record an answer for each of the 28 multiple-choice questions.
- If the method of solution is not stated in the problem, choose an appropriate method (numerical, graphical, or algebraic) with which you are most comfortable.
- If you solve a problem in Parts II, III, or IV using a trial-and-error approach, show the work for at least *three* guesses with appropriate checks. Should the correct answer be reached on the first trial, you must further illustrate your method by showing that guesses below and above the correct guess do *not* work.
- Avoid rounding errors when using a calculator. Unless otherwise directed, the (pi) key on a calculator should be used in computations involving the constant π rather than the common rational approximation of 3.14 or $\frac{22}{7}$. When performing a sequence of calculations in which the result of one calculation is used in a second calculation, do not round off. Instead, use the full power/display of the calculator by performing a "chain" calculation, saving intermediate results in the calculator's memory. Unless otherwise specified, rounding, if required, should be done only when the *final* answer is reached.
- Check that each answer is in the requested form. If a specific form is not required, answers may be left in any equivalent form, such as $\sqrt{75}$, $5\sqrt{3}$, or 8.660254038 (the full power/display of the calculator).
- If a problem involves finding the volume or lateral area of a solid, look for the appropriate formula in the reference sheet that is included in the test booklet.
- Clearly write any formula you use before making any appropriate substitutions. Then evaluate the formula in step-by-step fashion.
- For any problem solved in Parts II, III, and IV using a graphing calculator, you must indicate how the calculator was used to obtain the answer such as by copying graphs or tables created by your calculator together with the equations used to produce them. When copying graphs, label each graph with its equation, state the dimensions of the viewing window, and identify the intercepts and any points of intersection with their coordinates. Whenever appropriate, indicate the rationale of your approach.