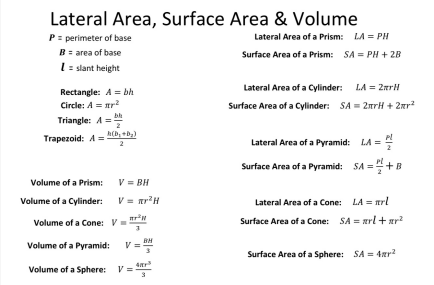
Formulas of 2-D and 3-D Figures

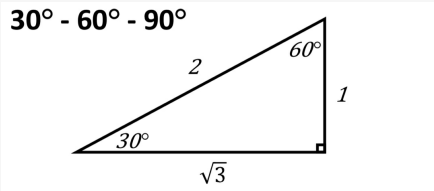


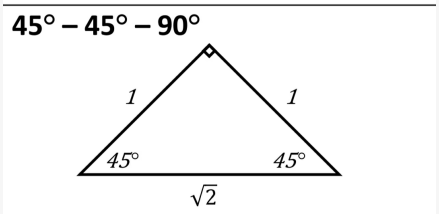
Pythagorean Theorem

$a^2 + b^2 = c^2$

If $a^2 + b^2 = c^2$, then the triangle is **right**
If $a^2 + b^2 > c^2$, then the triangle is **acute**
If $a^2 + b^2 < c^2$, then the triangle is **obtuse**

Special Right Triangles





Arc Length and Sector Area

Arc Length	(M/360)*2πr
Sector Area	(M/360)*πr^2

M = angle measure of sector

Coordinate Formulas

Distance between 2 points	$\sqrt{((x_2-x_1)^2+(y_2-y_1)^2)}$
Midpoint of a line segment	$(x_2 + x_1)/2, (y_2 + y_1)/2$
Slope Formula	$(y_2 - y_1)/(x_2 - x_1$

Congruent Triangles

Valid	SSS, SAS, ASA, AAS, & HL
NOT Valid	SSA or the coverse

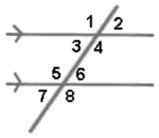
HL only applies to right triangles

Equation of a Circle

Circles:
Equation of circle center at origin:
$x^2 + y^2 = r^2$ where r is the radius.
Equation of circle not at origin:
$(x-h)^2 + (y-k)^2 = r^2$ where (h,k) is the center and r is the radius.

Parallel Lines cut by a Transversal

Parallels: If lines are parallel …



Corresponding angles are equal.
m<1=m<5, m<2=m<6, m<3=m<7, m<4=m<8
Alternate Interior angles are equal.
m<3=m<6, m<4=m<5
Alternate Exterior angles are equal.
m<1=m<8, m<2=m<7
Same side interior angles are supp.
m<3+m<5=180, m<4+m<6=180

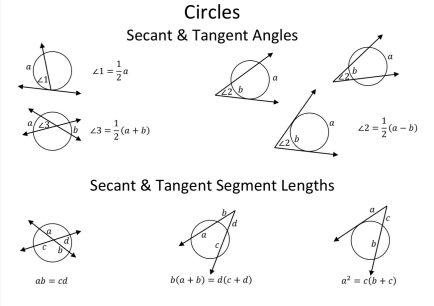
Polygon Interior/Exterior Angles

Sum of Int. Angles	180(n - 2)
Each Int. Angle Measure	180(n - 2)/n
Sum of Ext. Angles	360
Each Ext. Angle Measure	360/n

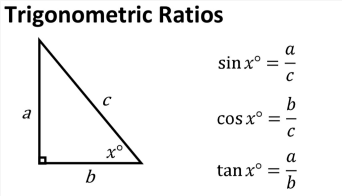
Conditionals

Conditional (Original)	if p, then q
Converse	If q, then p
Inverse	If not p, then not q
Contrapositive	If not q, then not p
Biconditional	p if and only if q

Circles



Trigonometric Ratios



Triangle

Scalene	no congruent sides
Isosceles	2 congruent sides
Equilateral	3 sides congruent
Equiangular	3 congruent angles (60 degrees)
Acute	all acute angle
Right	one right angle
Obtuse	one obtuse angle

Equiangular = Equilateral

Exterior angle of a triangle equals the sum of the 2 non-adjacent interior angles

Mid-segment of a triangle is parallel to the third side and half the length of the third side

Transformation Rules

Type of Transformation	Change to Coordinate Point
Vertical translation up d units	$(x, y) \to (x, y + d)$
Vertical translation down d units	$(x, y) \to (x, y - d)$
Horizontal translation left c units	$(x, y) \to (x - c, y)$
Horizontal translation right c units	$(x, y) \to (x + c, y)$
Reflection over x-axis	$(x, y) \to (x, -y)$
Reflection over y-axis	$(x, y) \to (-x, y)$