Formulas of 2-D and 3-D Figures

Lateral Area, Surface Area & Volume

P = perimeter of base
B = area of base
l = slant height

Rectangle: $A = bh$
Circle: $A = \pi r^2$
Triangle: $A = \frac{bh}{2}$
Trapezoid: $A = \frac{h(b_1 + b_2)}{2}$

Volume of a Prism: $V = BH$
Volume of a Cylinder: $V = \pi r^2 H$
Volume of a Cone: $V = \frac{\pi r^2 H}{3}$
Volume of a Pyramid: $V = \frac{BH}{3}$
Volume of a Sphere: $V = \frac{4\pi r^3}{3}$

Lateral Area of a Prism: $LA = PH$
Surface Area of a Prism: $SA = PH + 2B$

Lateral Area of a Cylinder: $LA = 2\pi rH$
Surface Area of a Cylinder: $SA = 2\pi rH + 2\pi r^2$

Lateral Area of a Pyramid: $LA = \frac{Pl}{2}$
Surface Area of a Pyramid: $SA = \frac{Pl}{2} + B$

Lateral Area of a Cone: $LA = \pi rl$
Surface Area of a Cone: $SA = \pi rl + \pi r^2$

Surface Area of a Sphere: $SA = 4\pi r^2$

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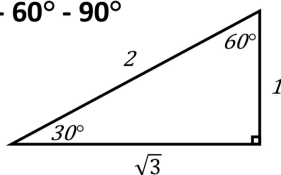
$$a^2 + b^2 = c^2$$

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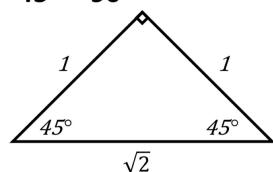If $a^2 + b^2 > c^2$, then the triangle is **acute**
If $a^2 + b^2 < c^2$, then the triangle is **obtuse**

Special Right Triangles

30° - 60° - 90°

(triangle with 60° angle, hypotenuse 2, short side 1, long side $\sqrt{3}$, 30° angle)

45° − 45° − 90°

(triangle with legs 1 and 1, base $\sqrt{2}$, base angles 45° and 45°)

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

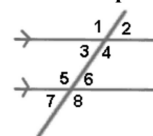|	
Valid	SSS, SAS, ASA, AAS, & HL
NOT Valid	SSA or the coverse
HL only applies to right triangles	

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 …

(diagram of two parallel lines cut by a transversal, angles numbered 1 2 / 3 4 on top intersection and 5 6 / 7 8 on bottom intersection)

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

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Circles

Circles
Secant & Tangent Angles

$\angle 1 = \frac{1}{2}a$

$\angle 3 = \frac{1}{2}(a+b)$

$\angle 2 = \frac{1}{2}(a-b)$

Secant & Tangent Segment Lengths

$ab = cd$

$b(a+b) = d(c+d)$

$a^2 = c(b+c)$
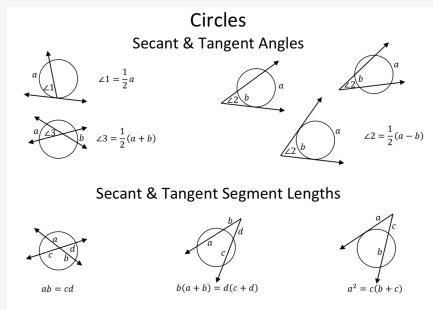
Trigonometric Ratios

Trigonometric Ratios

$\sin x° = \frac{a}{c}$

$\cos x° = \frac{b}{c}$

$\tan x° = \frac{a}{b}$
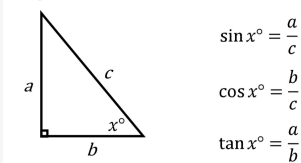
Triangle

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