

### 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

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

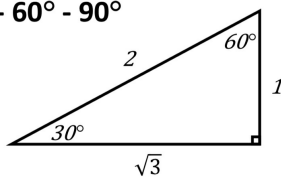
If  $a^2 + b^2 = c^2$ , then the triangle is **right**

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

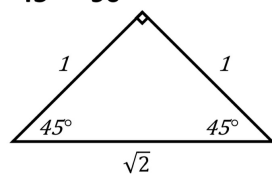
If  $a^2 + b^2 < c^2$ , then the triangle is **obtuse**

### Special Right Triangles

**30° - 60° - 90°**



**45° - 45° - 90°**



### Arc Length and Sector Area

Arc Length  $(M/360) * 2\pi r$

Sector Area  $(M/360) * \pi r^2$

$M$  = 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 converse

HL only applies to right triangles

### Equation of a Circle

#### Circles:

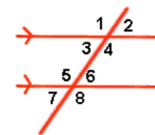
Equation of circle center at origin:  
 $x^2 + y^2 = r^2$  where  $r$  is the radius.

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.

$m\angle 1 = m\angle 5$ ,  $m\angle 2 = m\angle 6$ ,  $m\angle 3 = m\angle 7$ ,  $m\angle 4 = m\angle 8$

**Alternate Interior angles** are equal.

$m\angle 3 = m\angle 6$ ,  $m\angle 4 = m\angle 5$

**Alternate Exterior angles** are equal.

$m\angle 1 = m\angle 8$ ,  $m\angle 2 = m\angle 7$

**Same side interior angles** are supp.

$m\angle 3 + m\angle 5 = 180$ ,  $m\angle 4 + m\angle 6 = 180$

### 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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Published 13th May, 2025.

Last updated 17th June, 2025.

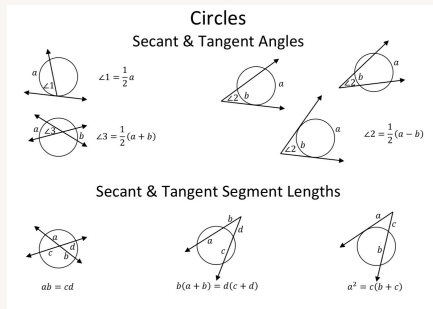
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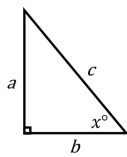
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### Circles



### Trigonometric Ratios

#### Trigonometric Ratios



$$\sin x^\circ = \frac{a}{c}$$

$$\cos x^\circ = \frac{b}{c}$$

$$\tan x^\circ = \frac{a}{b}$$

### 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

### Transformation Rules

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



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