Math
AIMS Reference Sheet

Formulas for Area

Triangle	$A = \frac{1}{2} bh$
Rectangle	$A = lw$
Trapezoid	$A = \frac{1}{2} h (b_1 + b_2)$
Parallelogram	$A = bh$
Circle	$A = \pi r^2$

Key

b = base	d = diameter
h = height	r = radius
l = length	ℓ = slant height
w = width	B = area of base
	P = perimeter of base

Use 3.14 or $\frac{22}{7}$ for π.

Formulas for Volume and Area of Solids

Solid	Volume	Total Surface Area
Right Circular Cone	$V = \frac{1}{3} \pi r^2 h$	$T = \frac{1}{2} (2\pi r)\ell + \pi r^2 = \pi r \ell + \pi r^2$
Pyramid	$V = \frac{1}{3} Bh$	$T = B + \frac{1}{2} P\ell$
Sphere	$V = \frac{4}{3} \pi r^3$	$T = 4 \pi r^2$
Right Circular Cylinder	$V = \pi r^2 h$	$T = 2\pi rh + 2\pi r^2$
Right Prism	$V = Bh$	$T = 2B + Ph$

Linear Equation Forms

Point–Slope Form:

$$y - y_1 = m(x - x_1)$$

Standard or General Form:

$$Ax + By = C$$

Slope–Intercept Form:

$$y = mx + b$$

Pythagorean Theorem

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

Coordinate Geometry

Given: Points $A(x_1, y_1)$, $B(x_2, y_2)$

Distance between two points:

$$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Midpoint between two points:

$$\text{Midpoint of } \overline{AB} = \left(\frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2} \right)$$

Slope of line through two points:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Quadratic Formula
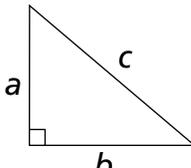
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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Sum of the measures of the interior angles of a convex polygon with n sides: $$S = (n - 2)(180°)$$	Distance, rate, time formula, where d = distance, r = rate, t = time: $$d = rt$$
Permutations of n objects taken r at a time: $$_nP_r = \frac{n!}{(n - r)!}$$	Combinations of n objects taken r at a time: $\quad _nC_r = \frac{n!}{(n - r)! \cdot r!}$

Right-Triangle Relationships

| Trigonometric Ratios	30°–60°–90° Triangle Relationships	45°–45°–90° Triangle Relationships
$\sin A = \dfrac{a}{c}$ $\cos A = \dfrac{b}{c}$ $\tan A = \dfrac{a}{b}$		
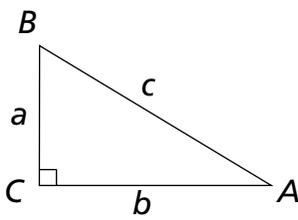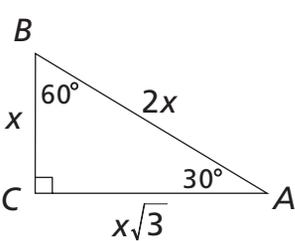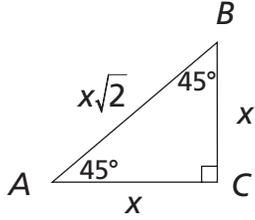
Additional Formulas

|	
Circumference $= \pi d = 2\pi r$	Use 3.14 or $\dfrac{22}{7}$ for π.
Area of a sector: $$A = \pi r^2 \left(\frac{\text{degrees in corresponding arc}}{360°} \right)$$	Length of a circular arc: Length of $\widehat{AB} = 2\pi r \dfrac{m\widehat{AB}}{360°}$
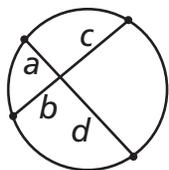
$\dfrac{a}{b} = \dfrac{c}{d}$
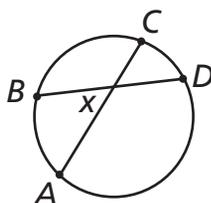
$m\angle x = \dfrac{1}{2}\left(m\widehat{AB} + m\widehat{CD}\right)$
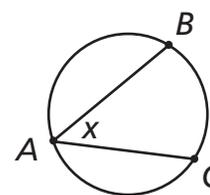
$m\angle x = \dfrac{1}{2} m\widehat{BC}$
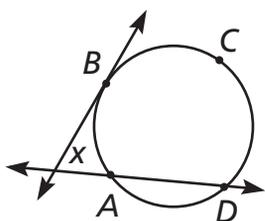
$m\angle x = \dfrac{1}{2}\left(m\widehat{BCD} - m\widehat{AB}\right)$
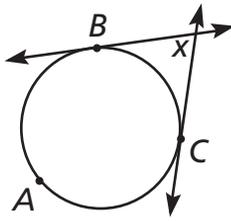
$m\angle x = \dfrac{1}{2}\left(m\widehat{BAC} - m\widehat{BC}\right)$

$m\angle x = \dfrac{1}{2}\left(m\widehat{CD} - m\widehat{AB}\right)$