Geometry Notations

Notation	Meaning	Notation	Meaning
P	point P	$\triangle ABC$	triangle ABC
$\overleftrightarrow{AB}$	line AB	$\square ABCD$	rectangle $ABCD$
$\overrightarrow{AB}$	ray AB	$\square ABCD$	parallelogram $ABCD$
$\overline{AB}$	segment AB	$\odot C$	circle C
AB	length of $\overline{AB}$	$m \parallel n$	Line m is parallel to line n.
$\angle A$	angle A	$m \perp n$	Line m is perpendicular to line n.
$m\angle A$	measure of $\angle A$	$\triangle ABC \cong \triangle DEF$	$\triangle ABC$ is congruent to $\triangle DEF$.
$\widehat{AB}$	arc $\widehat{AB}$	$\triangle ABC \sim \triangle DEF$	$\triangle ABC$ is similar to $\triangle DEF$.
$m\widehat{AB}$	measure of $\widehat{AB}$		

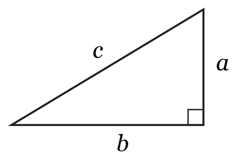
Transformation Notations

Notation	Meaning
$T_{a,b}$	a translation of a units horizontally and b units vertically
r_m	a reflection over line m
$R_{C,\theta}$	a rotation of θ about point C
$D_{C,k}$	a dilation centered at point C with a scale factor of k
$r_{x-axis} \circ R_{O,90°}$	a rotation of 90° about the origin followed by a reflection across the x-axis

Transformation Coordinate Rules

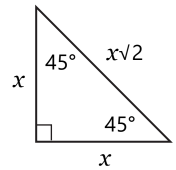
Reflection	$r_{x-axis}(x,y) = (x,-y)$ $r_{y-axis}(x,y) = (-x,y)$ $r_{y=x}(x,y) = (y,x)$ $r_{y=-x}(x,y) = (-y,-x)$	Rotation	$R_{0,90°}(x,y) = (-y,x)$ $R_{0,180°}(x,y) = (-x,-y)$ $R_{0,270°}(x,y) = (y,-x)$
Translation	$T_{a,b}(x,y) = (x+a, y+b)$	Dilation	$D_{O,k}(x,y) = (kx,ky)$

Right Triangles



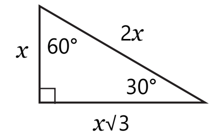
Pythagorean Theorem

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



45°-45°-90° triangle

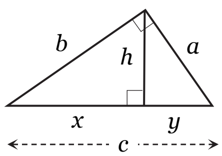
side ratio $= 1:1:\sqrt{2}$



30°-60°-90° triangle

side ratio $= 1:\sqrt{3}:2$

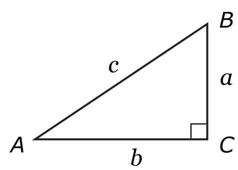
Similar Right Triangles



Altitude rule: $h^2 = xy$

Leg rule: $a^2 = yc$, $b^2 = xc$

Trigonometric Ratios



SOH-CAH-TOA

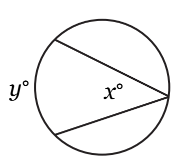
$S\frac{o}{h} \quad C\frac{a}{h} \quad T\frac{o}{a}$

$\sin A = \frac{opposite\ leg}{hypotenuse} = \frac{a}{c}$

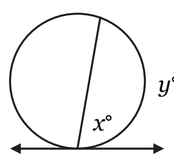
$\cos A = \frac{adjacent\ leg}{hypotenuse} = \frac{b}{c}$

$\tan A = \frac{opposite\ leg}{adjacent\ leg} = \frac{a}{b}$

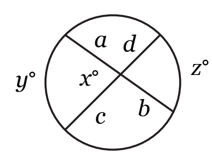
Angles and Segments in Circles



$x = \frac{1}{2}y$

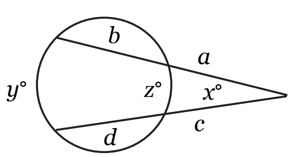


$x = \frac{1}{2}y$



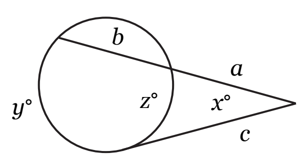
$x = \frac{1}{2}(y + z)$

$a \cdot b = c \cdot d$



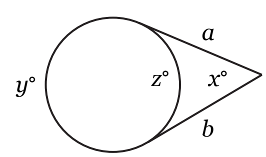
$x = \frac{1}{2}(y - z)$

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



$x = \frac{1}{2}(y - z)$

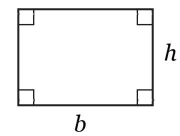
$a(a + b) = c^2$



$x = \frac{1}{2}(y - z)$

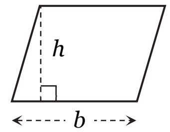
$a = b$

Areas of Polygons



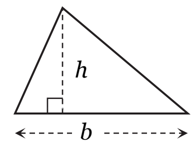
Rectangle

$A = bh$



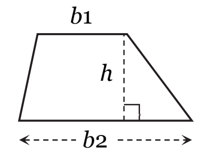
Parallelogram

$A = bh$



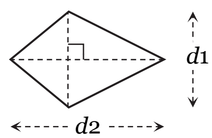
Triangle

$A = \frac{1}{2}bh$



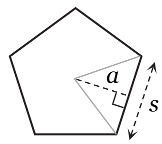
Trapezoid

$A = \frac{1}{2}h(b_1 + b_2)$



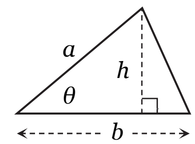
Rhombus/Kite

$A = \frac{1}{2}d_1 d_2$



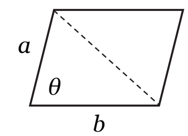
Regular n-gon

$A = \frac{1}{2}sa \cdot n = \frac{1}{2}aP$



Triangle

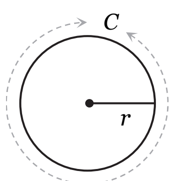
$A = \frac{1}{2}bh = \frac{1}{2}ab \sin\theta$



Parallelogram

$A = ab \sin\theta$

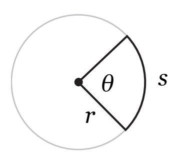
Arc Lengths and Areas of Sectors of Circles



Full circle

$C = 2\pi r$

$A = \pi r^2$



Sector (θ in degrees)

$s = \frac{\theta^\circ}{360^\circ} \cdot 2\pi r$

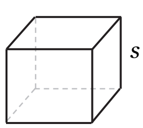
$A = \frac{\theta^\circ}{360^\circ} \cdot \pi r^2$

Sector (θ in radians)

$s = \frac{\theta}{2\pi} \cdot 2\pi r = \theta r$

$A = \frac{\theta}{2\pi} \cdot \pi r^2 = \frac{1}{2}\theta r^2$

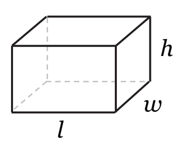
Surface Areas and Volumes of Solids



Cube

$SA = 6s^2$

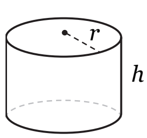
$V = s^3$



Rectangular prism

$SA = 2(lw + lh + wh)$

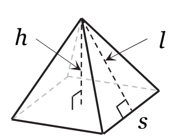
$V = lwh$



Right cylinder

$SA = 2\pi r^2 + 2\pi rh$

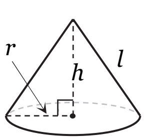
$V = \pi r^2 h$



Square pyramid

$SA = s^2 + 4 \cdot \frac{1}{2}sl = s^2 + 2sl$

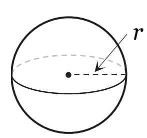
$V = \frac{1}{3}s^2 h$



Right cone

$SA = \pi r^2 + \pi rl$

$V = \frac{1}{3}\pi r^2 h$



Sphere

$SA = 4\pi r^2$

$V = \frac{4}{3}\pi r^3$

Coordinate Geometry Formulas

slope $= \dfrac{y_2 - y_1}{x_2 - x_1}$

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

midpoint $= \left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2}\right)$

Point partitioning a segment in ratio a to b:

x-coordinate $= x_1 + \dfrac{a}{a+b}(x_2 - x_1)$

y-coordinate $= y_1 + \dfrac{a}{a+b}(y_2 - y_1)$

Equations of Lines

Slope-intercept form:	$y = mx + b$
Point-slope form:	$y - y_1 = m(x - x_1)$
Standard form:	$Ax + By = C$
Horizontal line:	$y = k$
Vertical line:	$x = k$

Equations of Circles

Standard form (or center-radius form):

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

General form (or expanded form):

$$x^2 + y^2 + ax + by + c = 0$$

Probability Rules

Probability formula:	$P(E) = \dfrac{Number\ of\ favorable\ outcomes}{Total\ number\ of\ possible\ outcomes}$	
Complement rule:	$P(not\ E) = 1 - P(E)$	
Multipliation rule:	$P(A\ and\ B) = P(A) \cdot P(B\|A)$	for dependent events
	$P(A\ and\ B) = P(A) \cdot P(B)$	for independent events
Addition rule:	$P(A\ or\ B) = P(A) + P(B) - P(A\ and\ B)$	for overlapping events
	$P(A\ or\ B) = P(A) + P(B)$	for mutually exclusive events
Conditional probabiliy:	$P(B\|A) = \dfrac{P(A\ and\ B)}{P(A)}$	

Permutations and Combinations Formulas

\# of permutations of n things taken r at a time

$${}_nP_r = \frac{n!}{(n-r)!}$$

\# of combinations of n things taken r at a time

$${}_nC_r = \frac{n!}{(n-r)!\,r!}$$