Improve Your ACT Math Score

ACT MATH FORMULAS TO KNOW

LINES

For a line that goes through two points (x_1,y_1) and (x_2,y_2)

Slope of the line that connects the points, m = $\frac{y_2-y_1}{x_2-x_1} = \frac{rise}{run}$

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

Midpoint Formula = $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

Slope-Intercept Form: y = mx + b slope = m, y-int = (0, b)

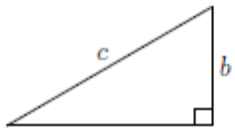
Standard Form = Ax + By = C slope = $-\frac{A}{B}$, y-int = $\left(0, \frac{C}{B}\right)$

Horizontal line: y = #, m = 0
Parallel lines = same slope

Vertical Line = x = #, m = undefined
Perpendicular lines = slopes are opposite reciprocals (i.e. 1/3, -3)

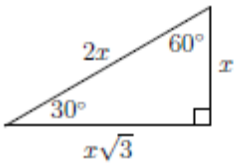
TRIANGLES

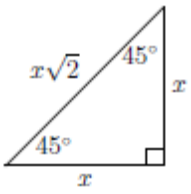
Right triangles:



Pythagorean Theorem

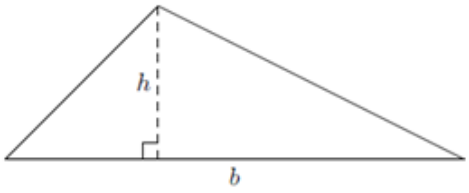
$a^2+b^2=c^2$





Special Right Triangles

All triangles:



Area = $\frac{1}{2}\cdot b\cdot h$

30-60-90 Right Triangle:

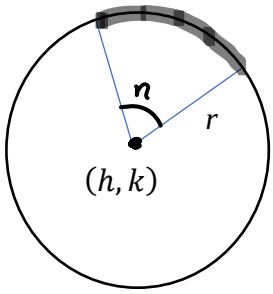
Longer Leg = Shorter leg*√3 --- Hypotenuse = Shorter leg*2 --- Shorter Leg = $\frac{\text{Longer Leg}}{\sqrt{3}}$ or $\frac{\text{Hypotenuse}}{2}$

45-45-90 Right Triangle:

Hypotenuse = Leg * √2 or Leg = $\frac{\text{Hypotenuse}}{\sqrt{2}}$

CIRCLES

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



Circumference = $2\pi r$
Area = πr^2
Length of arc = $\left(\frac{n}{360}\right) * 2\pi r$
Area of sector = $\left(\frac{n}{360}\right) * \pi r^2$

IMAGINARY NUMBERS:

$i=\sqrt{-1}$

$i^2=-1$

$i^3=-i$

$i^4=1$

QUADRATIC FORMULA:

For $ax^2+bx+c=0$, $x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

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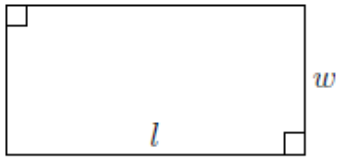
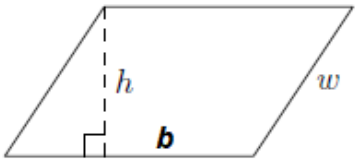
GEOMETRIC SHAPES & FIGURES

Rectangles and Parallelograms:

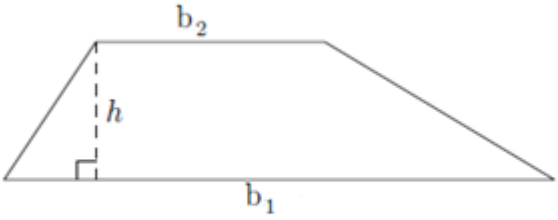


Rectangle
(Square if $l = w$)
Area $= lw$
Perimeter = 2l + 2w



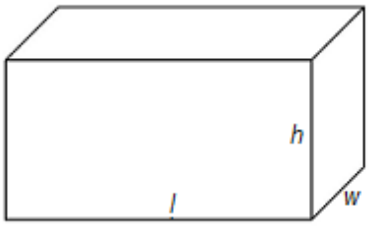
Parallelogram
(Rhombus if $\boldsymbol{b} = w$)
Area $= \boldsymbol{bh}$

Trapezoids



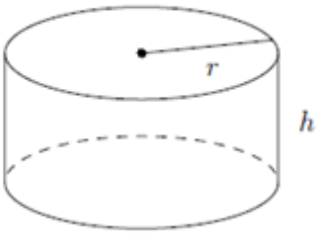
Area of trapezoid $= \left(\frac{b_1 + b_2}{2}\right) \cdot h$

Solids



Rectangular Solid

Volume $= lwh$
Surface Area = 2lw + 2hw + 2lh



Right Cylinder

Volume $= \pi r^2 h$
Surface Area = $2\pi r^2 h + 2\pi r^2$

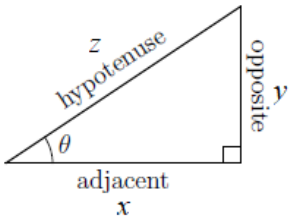
of Diagonals in Regular Polygon with n sides:

$$\frac{(n-3)n}{2}$$

or

$${}_nC_r - n$$

TRIGONOMETRY



$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{y}{z}$ "SOH"

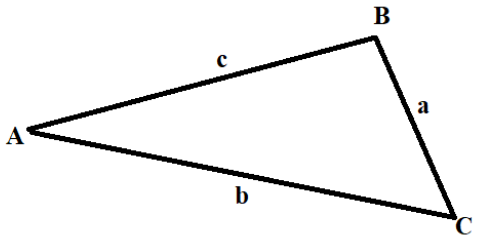
$\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{x}{z}$ "CAH"

$\tan\theta = \frac{\text{opposite}}{\text{adjacent}} = \frac{y}{x}$ "TOA"

Law of Sines: $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

Law of Cosines:

$$a^2 = b^2 + c^2 - 2bc\cos A$$
$$b^2 = a^2 + c^2 - 2ac\cos B$$
$$c^2 = a^2 + b^2 - 2ab\cos C$$



MEAN: AVG (MEAN) $= \frac{\text{SUM}}{\text{\# OF ITEMS}}$ or AVG * # OF ITEMS = SUM

EXPECTED VALUE = $P(x_1)*x_1 + P(x_2)*x_2 + P(x_3)*x_3 + P(x_4)*x_4 + \ldots\ldots$

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