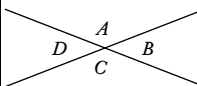
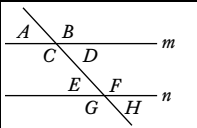
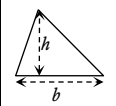
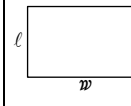
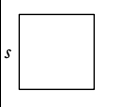
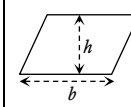
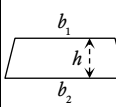
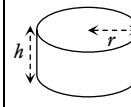
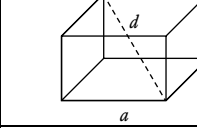
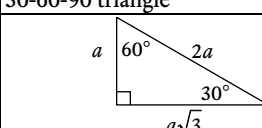
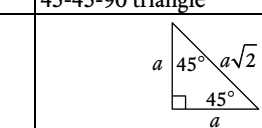
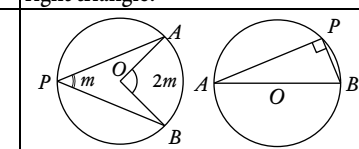


## ACT Math Formulas

Geometry		Coordinate Geometry	
 <p>Vertical angles are congruent: <math>\angle A \cong \angle C</math> and <math>\angle B \cong \angle D</math>. Adjacent angles are supplementary: <math>\angle A</math> and <math>\angle B</math> are supplementary, <math>\angle A</math> and <math>\angle D</math> are supplementary.</p>		<p>Slope-intercept form of line: <math>y = mx + b</math></p>	
 <p>For parallel lines <math>m</math> and <math>n</math>: <math>\angle A \cong \angle D \cong \angle E \cong \angle H</math> and <math>\angle B \cong \angle C \cong \angle F \cong \angle G</math>. <math>\angle A</math> is supplementary to <math>\angle B, \angle C, \angle F,</math> and <math>\angle G</math>.</p>		<p>To find the <math>y</math>-intercept of a line: Set <math>x = 0</math>, solve for <math>y</math>.</p>	
<p><b>Polygons</b></p> <p>Sum of interior angles of a polygon with <math>n</math> sides is <math>(n-2) \cdot 180^\circ</math></p> <p>Measure of each interior angle of a regular polygon with <math>n</math> sides is <math>\frac{(n-2) \cdot 180^\circ}{n}</math></p>		<p>To find the <math>x</math>-intercept of a line: Set <math>y = 0</math>, solve for <math>x</math>.</p>	
 <p><b>Triangle</b> Area: <math>A = \frac{1}{2}hb</math></p>	 <p><b>Rectangle</b> Area: <math>A = \ell w</math> Perimeter: <math>P = 2\ell + 2w</math></p>	<p>Slope formula: <math>m = \frac{y_2 - y_1}{x_2 - x_1}</math></p> <p>Slope of a <b>horizontal</b> line = 0 Slope of a <b>vertical</b> line is <i>undefined</i>. <b>Parallel</b> lines have the <i>same</i> slope. <b>Perpendicular</b> lines have negative reciprocal slopes, e.g. 2 and <math>-\frac{1}{2}</math></p>	
 <p><b>Square</b> Area: <math>A = s^2</math> Perimeter: <math>P = 4s</math></p>	 <p><b>Parallelogram</b> Area of a <math>A = bh</math></p>	<p><b>Midpoint Formula:</b> <math>x_m = \frac{x_1 + x_2}{2}, y_m = \frac{y_1 + y_2}{2}</math></p>	
 <p><b>Trapezoid Area</b> <math>A = \frac{b_1 + b_2}{2}h</math></p>	 <p><b>Right Circular Cylinder</b> Volume <math>V = \pi r^2 h</math></p>	<p><b>Distance Formula:</b> <math>d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}</math></p>	
 <p><b>Rectangular Solid</b> Volume: <math>V = abc</math> Surface area <math>A = 2ab + 2ac + 2bc</math> Longest diagonal: <math>d = \sqrt{a^2 + b^2 + c^2}</math></p>	<p>Equation of a circle in the coordinate system: <math>(x-h)^2 + (y-k)^2 = r^2</math> Center <math>(h, k)</math> Radius <math>r</math></p>		
<p><b>Right Triangles</b></p> <p>Pythagorean Theorem: <math>a^2 + b^2 = c^2</math></p> <p>Pythagorean Triples: <math>\{3, 4, 5\}, \{5, 12, 13\}, \{8, 15, 17\}, \dots</math></p>		<p>Given the point <math>(x, y)</math>, reflecting it across:</p> <p>the <math>x</math>-axis yields: <math>(x, -y)</math></p> <p>the <math>y</math>-axis yields: <math>(-x, y)</math></p> <p>the origin yields: <math>(-x, -y)</math></p>	
<p>30-60-90 triangle</p> 	<p>45-45-90 triangle</p> 	<p><b>Quadratics</b></p> <p><math>(x + y)^2 = x^2 + 2xy + y^2</math> } The perfect square formulas <math>(x - y)^2 = x^2 - 2xy + y^2</math> } <math>x^2 - y^2 = (x + y)(x - y)</math> } The difference of two squares</p> <p>FOIL = First Outside Inside Last <math>(a + b)(c + d) = \underbrace{ac}_{\text{First}} + \underbrace{ad}_{\text{Outer}} + \underbrace{bc}_{\text{Inner}} + \underbrace{bd}_{\text{Last}}</math></p>	
<p><b>General Triangles</b></p> <p>Third side of a triangle rule: <math>a + b &gt; c</math> where <math>c</math> is the longest side. A triangle is obtuse if <math>a^2 + b^2 &lt; c^2</math> where <math>c</math> is the longest side. A triangle is acute if <math>a^2 + b^2 &gt; c^2</math> where <math>c</math> is the longest side.</p>		<p><b>Quadratic Formula</b></p> <p>The roots of the equation <math>ax^2 + bx + c = 0</math> are <math>x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}</math></p>	
<p><b>Circles</b></p> <p>Circumference <math>C = 2\pi r</math> Area <math>A = \pi r^2</math></p>		<p><b>Parabolas</b></p> <p>Standard form of a parabola: <math>y = ax^2 + bx + c</math></p> <p>Vertex form of a parabola with vertex <math>(h, k)</math>: <math>y = a(x - h)^2 + k</math></p>	
<p>Inscribed and Central Angles <math>m\angle APB = \frac{1}{2}m\angle AOB</math> If <math>AB</math> is a diameter, then <math>\triangle APB</math> is a right triangle.</p>		<p><b>Percents</b></p> <p>Percent of: <math>\frac{\text{is}}{\text{of}} = \frac{\%}{100}</math></p> <p>Percent greater than: <math>\frac{\text{new}}{\text{original}} = \frac{100 + \%}{100}</math></p> <p>Percent less than: <math>\frac{\text{new}}{\text{original}} = \frac{100 - \%}{100}</math></p>	
<p>length of arc = <math>\frac{\text{angle}}{360^\circ} \cdot 2\pi r</math></p> <p>area of sector = <math>\frac{\text{angle}}{360^\circ} \cdot \pi r^2</math></p>			
<p><b>Exponent Rules</b></p> <p><math>a^0 = 1</math>      <math>a^{-x} = \frac{1}{a^x}</math>      <math>(a^x)^y = a^{xy}</math>      <math>a^x b^x = (ab)^x</math></p> <p><math>a^x a^y = a^{x+y}</math>      <math>\frac{a^x}{a^y} = a^{x-y}</math>      <math>a^{1/x} = \sqrt[x]{a}</math></p>			

## ACT Math Formulas

Series and Sequences	
Arithmetic Sequences	
$n$ th term in the sequence: $a_n = a_1 + (n-1)d$	
First term $a_1$	Common difference $d$
Sum of first $n$ terms $S_n = (a_1 + a_n) \frac{n}{2}$	
Geometric Sequences	
$n$ th term in the sequence: $a_n = a_1 r^{n-1}$	
First term $a_1$	Common ratio $r$

Statistics	
Average	average = $\frac{\text{sum of things}}{\text{number of things}}$
Median	The middle number (or average of the two middles) of an ordered set of numbers
Mode	The number which occurs most often in a set of numbers
Standard Deviation	Measurement of how spread out numbers are from the middle of a set
Expected Value	The weighted average of a set

Probability	
Probability = $\frac{\text{successful outcomes}}{\text{total possible outcomes}}$	or $P(A) = \frac{s}{n}$
If a problem uses the word <b>or</b> between two possible outcomes, you must <i>add</i> the probabilities.	
EXAMPLE: The probability of rolling a 1 on a standard die is $1/6$ . The probability of rolling a 3 on a standard die is $1/6$ . The probability of rolling a 1 <i>or</i> a 3 on a standard die is $1/6 + 1/6 = 1/3$ .	
If a problem uses the word <b>and</b> between two events, you must <i>multiply</i> the two probabilities.	
EXAMPLE: The probability of rolling a 1 on a standard die is $1/6$ . The probability of getting heads on a fair coin is $1/2$ . The probability of rolling a 1 <i>and</i> getting heads is $(1/6)(1/2) = 1/12$ .	

Arrangements, Permutations, and Combinations	
Arrangements	Multiply the numbers of choices for independent events (using slots)
Factorial (!)	the product of every integer from $n$ down to 1. e.g. $5! = 5 \times 4 \times 3 \times 2 \times 1$
Permutation	truncated factorial, used when <i>order matters</i> : e.g. ${}_7P_3 = 7 \times 6 \times 5$
Combination	altered permutation, used when <i>order doesn't matter</i> : e.g. ${}_7C_3 = \frac{{}_7P_3}{3!} = \frac{7 \times 6 \times 5}{3 \times 2 \times 1}$

Trigonometry	
SOH-CAH-TOA	Inverses
$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$	$x = \sin \theta \Leftrightarrow \theta = \sin^{-1}(x)$
$\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}}$	$x = \cos \theta \Leftrightarrow \theta = \cos^{-1}(x)$
$\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$	$x = \tan \theta \Leftrightarrow \theta = \tan^{-1}(x)$
Important identities	$\tan x = \frac{\sin x}{\cos x}$ $\sin^2 x + \cos^2 x = 1$
Law of Sines	$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$
Law of Cosines	$c^2 = a^2 + b^2 - 2ab \cos C$

Number Terms	
Digit	the numbers 0–9
Integer	any whole number, whether positive, negative, or zero
Multiple (of integer $n$ )	an integer that is divisible by the integer $n$ e.g. 4, 8, 12, and 16 are all multiples of 4
Factors (of integer $n$ )	integers by which $n$ is divisible e.g. the positive factors of 6 are 1, 2, 3, and 6
Prime number	a positive integer with precisely two factors: the number itself and 1. NOTE neither 0 nor 1 is prime.
Consecutive numbers	numbers (e.g. integers, or primes) that follow one another in order e.g. 16, 18, and 20 are consecutive even integers
Real number	any number that can be expressed on a number line (whether rational or irrational)
Remainder	the number left over when one integer is divided by another e.g. the remainder when 17 is divided by 3 is 2
Exponent	a number which indicates how many times another number is multiplied by itself
( $n$ )th Root (of $p$ )	a number which is multiplied by itself a number of times $n$ to produce $p$ (e.g. 4 is the third root of 64)
Sequence	an ordered set of quantities e.g. 0, 1, 1, 2, 3, 5, ... is the <b>Fibonacci Sequence</b>
Set	a collection of distinct elements, often depicted within brackets. e.g. the set $A = \{0, 1, 2, 4\}$ consists of the elements 0, 1, 2, and 4