

SAT Math Formulas to Memorize

Order of Operations:

Parentheses () Exponents x^y , Multiplication \times Division \div , Addition $+$ Subtraction $-$

Slope-Intercept Form:

$$y = mx + b$$

$m = \text{slope}$ and $b = y\text{-intercept}$

Slope Formula:

$$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1}$$

Distance = Rate \times Time

Parallel Lines: *Same Slopes*

Ex: If one line has a slope of 4, a line parallel to it will have a slope of 4.

Perpendicular Lines: *Slopes are the Negative Reciprocals of Each Other*

Ex: If one line has a slope of 3, a line perpendicular to it will have a slope of $-\frac{1}{3}$.

Common Factoring Patterns:

$$(x + y)(x + y) = x^2 + 2xy + y^2$$

$$(x - y)(x - y) = x^2 - 2xy + y^2$$

$$(x + y)(x - y) = x^2 - y^2$$

Exponent Rules:

$$x^2x^3 = x^{2+3} = x^5$$

$$(x^2)^3 = x^{(2 \times 3)} = x^6$$

$$\frac{x^7}{x^3} = x^{(7-3)} = x^4$$

$$x^{-5} = \frac{1}{x^5}$$

$$x^{\frac{2}{3}} = \sqrt[3]{x^2}$$

Quadratic Formula:

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

Vertex form of parabola:

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

(h, k) is the vertex of the parabola. If a is positive, the parabola opens upward; if a is negative, the parabola opens downward.

Vertex of parabola:

For a parabola of the form $y = ax^2 + bx + c$,

the x coordinate of the vertex is equal to $-\frac{b}{2a}$.

$$\text{Mean} = \frac{\text{Sum of All Terms}}{\text{Number of Terms}}$$

Median: Middle Term when Terms are In Order from Least to Greatest.

Mode: Most Frequent Term

Range: Difference Between Least and Greatest Values

Example: For the set (1, 3, 4, 7, 7),

the Mean is $\frac{1 + 3 + 4 + 7 + 7}{5} = 4.4$, the Median is 4, and the Mode is 7, and the Range is 6.

Note that in a set like (1, 3, 5, 7, 8, 9), in which the two middle terms are different, take the

average of the two middle terms to find the median: $\frac{5 + 7}{2} = 6$.

Standard Deviation: *The Greater the Standard Deviation, the Greater the Dispersal of Data.
The Lower the Standard Deviation, the Lower the Dispersal of Data.*

Example: The set (8, 9, 10, 11, 13) has a *lower* standard deviation than the set (1, 5, 10, 16, 20).

Percentages:

$$\text{Percent} = \frac{\text{Part}}{\text{Whole}} \times 100$$

Example: 30 is what percent of 40? Solution: $\frac{30}{40} \times 100 = 75\%$

Exponential Growth & Decay:

$$f(x) = a(1 \pm r)^x$$

$f(x)$ = Exponential Growth or Decay Function

a = Initial Amount

r = growth rate expressed as a decimal (Example: 4 % growth is 0.04).
Add r if there is growth and subtract r if there is decay.

x = number of time intervals.

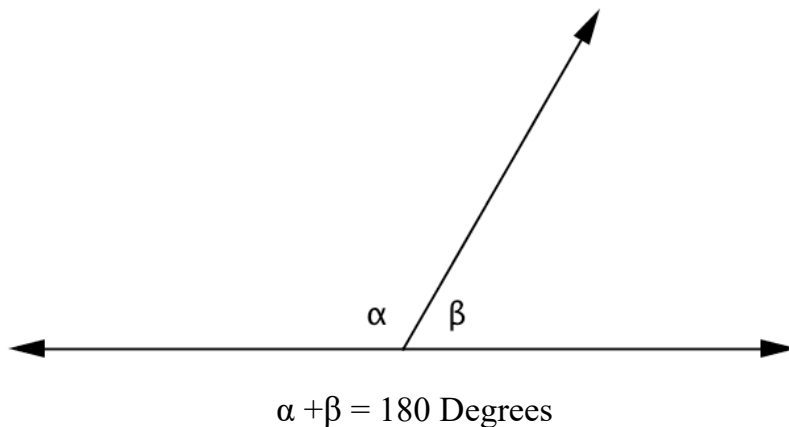
Example 1: If \$100 is in a savings account that has an annual compound interest of 3%, in three years, the amount of money in the account could be calculated as:

$$f(3) = 100(1 + 0.03)^3$$

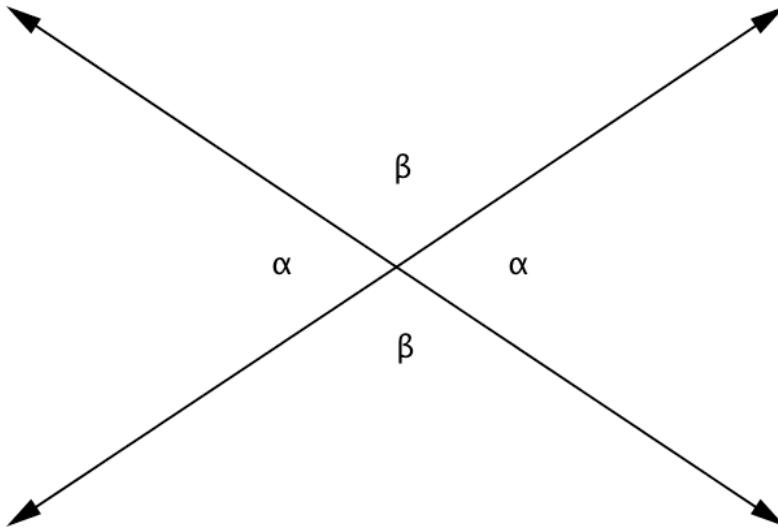
Example 2: If 2,000 pounds of soil experience 4% loss each month to erosion, the total amount of soil remaining after 6 months could be calculated as:

$$f(6) = 2000(1 - 0.04)^6$$

Supplementary Angles:

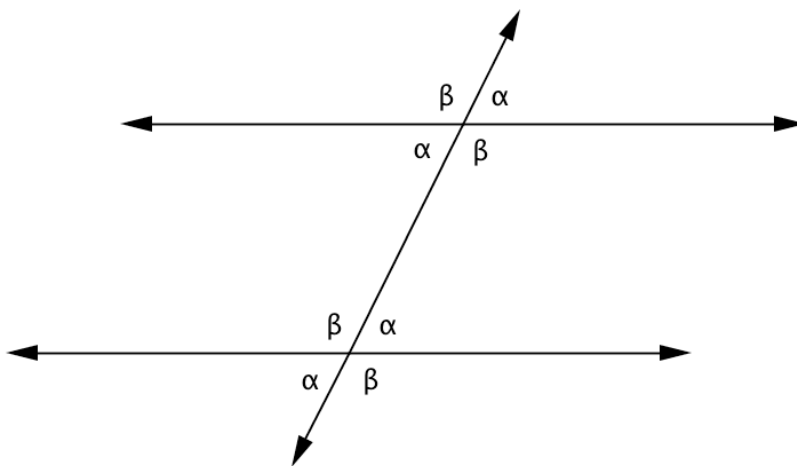


Vertical Angles:



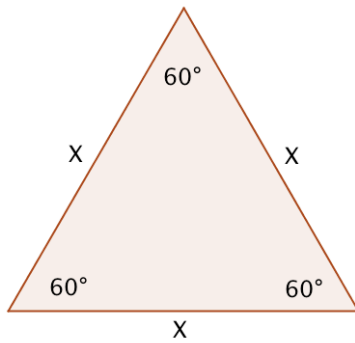
When two lines intersect, the angles opposite one another are equal.

Alternate Interior and Exterior Angles:

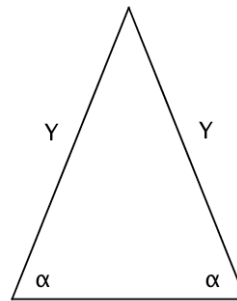


When two parallel lines are cut by a transversal, the alternate interior angles are equal, and the alternate exterior angles are equal.

Equilateral and Isosceles Triangles



Equilateral



Isosceles

Trigonometry:

$$\sin \theta = \frac{\textit{Opposite}}{\textit{Hypotenuse}}$$

$$\cos \theta = \frac{\textit{Adjacent}}{\textit{Hypotenuse}}$$

$$\tan \theta = \frac{\textit{Opposite}}{\textit{Adjacent}}$$

Imaginary Numbers:

$$i = \sqrt{-1}$$

$$i^2 = -1$$

Circle formula:

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

Vertex is (h, k) and the radius is r .

Equilateral Triangle Area:

$$\text{Area} = \frac{\sqrt{3}}{4} (\text{Side Length})^2$$

Complementary Angles:

The Sine and Cosine of two complementary angles (ones that add up to 90 degrees) are equal.

Example:

$$\sin(30^\circ) = \cos(60^\circ)$$