SAT Math Formulas to Memorize

Order of Operations:

Parentheses ( ) **E**xponents x^y , **M**ultiplication $\times$ **D**ivision $\div$, **A**ddition $+$ **S**ubtraction $-$

Slope-Intercept Form:

$$y = mx + b$$

m = slope and *b = y*-intercept

Slope Formula:

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

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:

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

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

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

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

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

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 $-\dfrac{b}{2a}$.

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

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 $\dfrac{1+3+4+7+7}{5} = 4.4$, 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: $\dfrac{5+7}{2} = 6$.

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:

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

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

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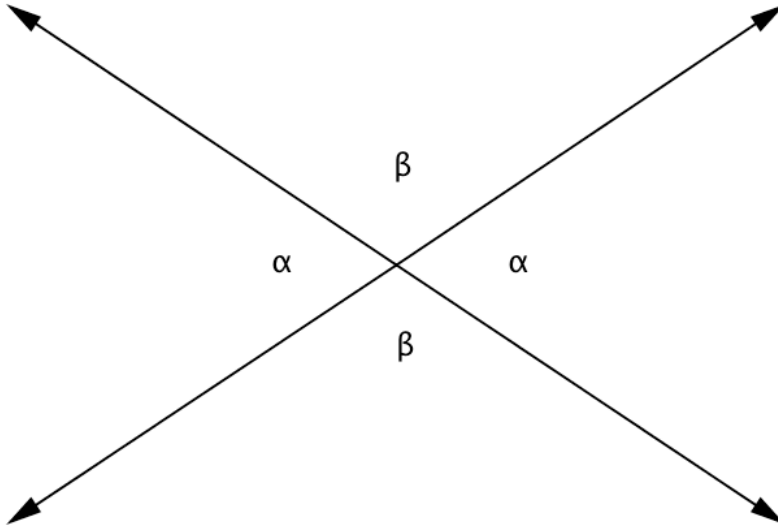
$$f(3) = 100(1 + 0.03)^3$$

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:

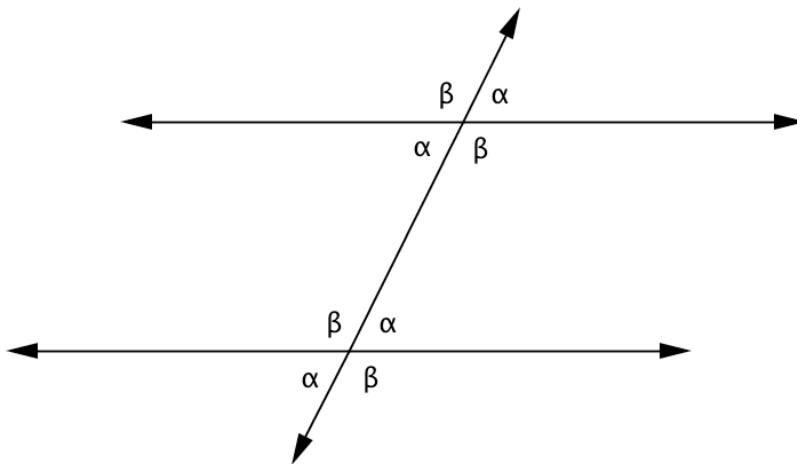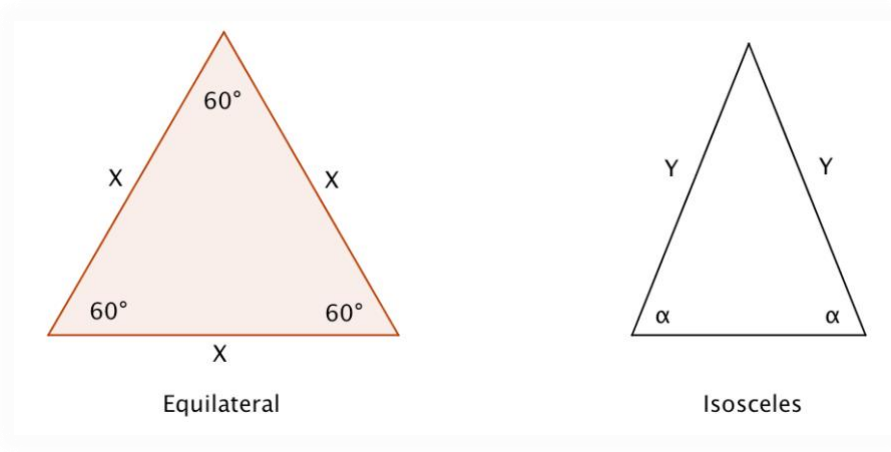$$f(6) = 2000(1 - 0.04)^6$$

Supplementary Angles:

$$\alpha + \beta = 180 \text{ Degrees}$$

Vertical Angles:

β

α   α

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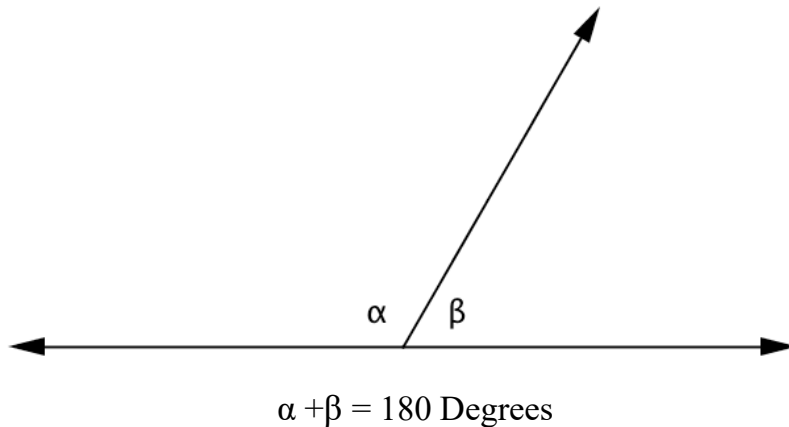
When two lines intersect, the angles opposite one another are equal.

Alternate Interior and Exterior Angles:

β / α
α / β

β / α
α / β

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

Trigonometry:

$$Sin\ \theta = \frac{Opposite}{Hypotenuse}$$

$$Cos\ \theta = \frac{Adjacent}{Hypotenuse}$$

$$Tan\ \theta = \frac{Opposite}{Adjacent}$$

Circle formula:

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

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

Equilateral Triangle Area:

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

Complementary Angles:

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

Example:

$$Sin(30°) = Cos(60°)$$