SAT®

FORMULAS

Lines / Linear Growth

Standard Form: $Ax + By = C$
Slope = $-A / B$

Point-Slope Form: $(y - y_1) = m(x - x_1)$
Slope = m

Slope-Intercept Form: $y = mx + b$
Slope = m

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

Parallel lines: Slope = same

Perpendicular lines: Other line's slope is negative reciprocal of 1st line

Intercepts

X-intercept: Where the line crosses the x-axis; Set y = 0

Y-intercept: Where the line crosses the y-axis; Set x = 0

Statistics

Mean:
$$Average = \frac{Sum\ of\ the\ Terms}{Number\ of\ Terms}$$

Median = Middle value in the list; Average middle numbers if even number of values

Mode = Value that appears most often

Standard Deviation = Measure of how far the numbers deviate from the mean (average)

Radicals

$$\sqrt{xy} = \sqrt{x} \cdot \sqrt{y}$$

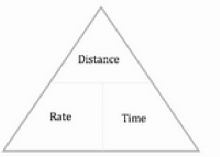
Interior Angle Theorem

180(n-2)

n = number of sides

Distance Rate and Time

Distance = Rate x Time



Exponential/Financial Models/Interest

Compounding - Annual Rate:

$$A = P(1 \pm r)^t$$

Compounding - Non-Annual:

$$A = P\left(1 \pm \frac{r}{n}\right)^{nt}$$

Simple Interest

$$A = Prt$$

If t is a fraction, it happen EVERY so often. So t/2 is "Every two years"
If t has a coefficient, it happens every so often. So 2t is "twice a year "

Percents

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

Probability

$$probability = \frac{number\ of\ desired\ outcomes}{number\ of\ \text{total}\ outcomes}$$

Factoring

$$(x + a)(x + b) = x^2 + (b + a)x + ab$$

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

$$a^2 - 2ab + b^2 = (a - b)(a - b)$$

Parabola

Standard form: $y = ax^2 + bx + c$
Vertex = -b/2a

Vertex form: $f(x) = a(x - h)^2 + k$
Vertex = (h,k)

Distance / Midpoint

Distance between two points:

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

Midpoint:

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

Exponents

$a^m \cdot a^n = a^{m+n}$	$5^{1/2} \cdot 5^{3/2} = 5^{(1/2+3/2)}$
$(a^m)^n = a^{mn}$	$(3^{5/2})^2 = 3^{(5/2 \cdot 2)}$
$(ab)^m = a^m b^m$	$(16 \cdot 9)^{1/2} = 16^{1/2} \cdot 9^{1/2}$
$a^{-m} = \frac{1}{a^m}, a \neq 0$	$36^{-1/2} = \frac{1}{36^{1/2}}$
$a^0 = 1, a \neq 0$	$213^0 = 1$
$\frac{a^m}{a^n} = a^{m-n}, a \neq 0$	$\frac{4^{5/2}}{4^{1/2}} = 4^{(5/2-1/2)}$
$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}, b \neq 0$	$\left(\frac{27}{64}\right)^{1/3} = \frac{27^{1/3}}{64^{1/3}}$

Quick Guide:
-Multiply / Add
-Divide / Subtract
-Power / Multiply`

$$a^{\frac{m}{n}} = \sqrt[n]{a^m} = \left(\sqrt[n]{a}\right)^m$$

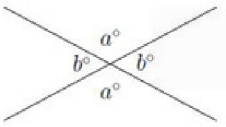
"Index" "Radical Symbol" "Radicand" The value under the radical symbol

Lines / Angles

Intersecting lines

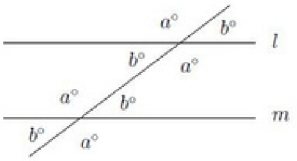
-Opposite angles are equal

-Each pair of angles along the same line sum to 180 degrees



Parallel lines

-Eight angles are formed when a line crosses two parallel lines.



Quadratic Equation

Standard Form:

$$ax^2 + bx + c$$

Solutions:

Sum: -b/a
Product: c/a

Quadratic Formula:

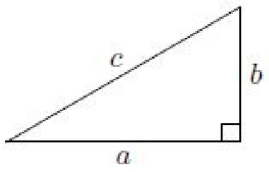
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Discriminant: Portion under the square root, used for number of solutions

Triangles

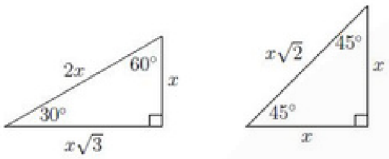
Sum of the angles: 180 degrees

Pythagorean Theorem: $a^2 + b^2 = c^2$



Special right triangles

Good to have memorized. ex so when you see a rad 2 you can think of a 90/45/45



Similar Triangle Ratios

these show up as shown or in multiples

3/4/5 | 5/12/13

Complex Numbers

A complex number is of the form a + bi where $i^2 = -1$

Pattern for the value of complex numbers repeat after the first four

$i^0 = 1$ $i^1 = i$ $i^2 = -1$ $i^3 = -i$

$i^4 = 1$ $i^5 = i$ $i^6 = -1$ $i^7 = -i$

Radian/Degree Convert

Radian to Degree

$$\frac{Radian\ value\ (\pi)}{1} \times \frac{180}{\pi}$$

Degree to Radian

$$\frac{Degree\ Value}{1} \times \frac{\pi}{180}$$

Percent Change

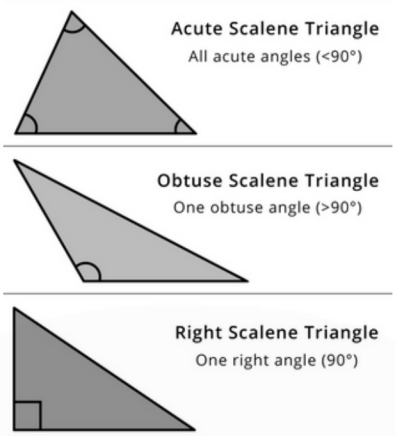
$$\frac{New - Old}{Old}$$

Think NOOOO

Complete The Square

Used to find/make equation of circle to obtain center or radius	Sort x and Y, Break X (or Y) term and divide by two and square and add to both sides

The 3 Triangles



Triangles Theorems

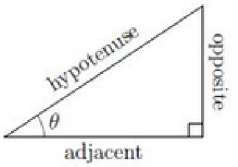
Inequality theorem:

The length of one side of any triangle is always less than the sum and more than the difference of the lengths of the other two sides.

Exterior angle:

An exterior angle of any triangle is equal to the sum of the two remote interior angles.

Trigonometry



$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$

"SOH"

$\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}}$

"CAH"

$\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$

"TOA"

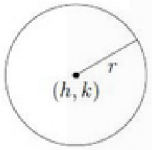
The **sine** of any acute **angle** is **equal** to the **cosine** of its **complement**.

Sin X = Cos (90 - X)
Cos X = Sin (90 - X)

The Great Proportion | Circles

$$\frac{\theta}{360°} = \frac{Arc}{2\pi r} = \frac{sector}{\pi r^2}$$

Circles

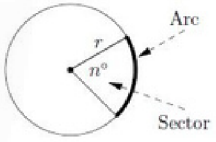


$(x - h)^2 + (y - k)^2 = r^2$

(*h*, *k*) = center of the circle

r = radius

pay attention to the sign of h when getting the center from the equation.



$\text{Area} = \pi r^2$

$\text{Circumference} = 2\pi r$

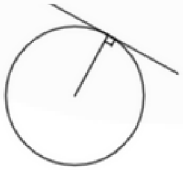
$\text{Full circle} = 360°$

$\text{Length Of Arc} = (n°/360°) \cdot 2\pi r$

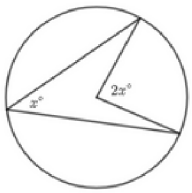
$\text{Area Of Sector} = (n°/360°) \cdot \pi r^2$

Circle Tangent Line

A radius and tangent make a right ∠



Circle Central Angle



Number of Solutions (Linear)

One ex. 2x = 4	**Infinate** ex. 2x = 2x	**Zero** ex. 2 = 4
Different slopes On a graph this is two lines intersecting at a single point.	Same slope different Y-Intercept Parallel lines	Same Y-Intercept & Same Slope Lines on top of each other

Transformations of Functions		
f(x) + d	Vertical translation up d units	$(x, y) \to (x, y + d)$
f(x) - d	Vertical translation down d units	$(x, y) \to (x, y - d)$
f(x + c)	Horizontal translation left c units	$(x, y) \to (x - c, y)$
f(x - c)	Horizontal translation right c units	$(x, y) \to (x + c, y)$
-f(x)	Reflection over x-axis	$(x, y) \to (x, -y)$
f(-x)	Reflection over y-axis	$(x, y) \to (-x, y)$
af(x)	Vertical stretch for $\|a\| > 0$	$(x, y) \to (x, ay)$
af(x)	Vertical compression for $0 < \|a\| < 1$	$(x, y) \to (x, ay)$
f(bx)	Horizontal compression for $\|b\| > 0$	$(x, y) \to \left(\frac{x}{b}, y\right)$
f(bx)	Horizontal stretch for $0 < \|b\| < 1$	$(x, y) \to \left(\frac{x}{b}, y\right)$

Whats Next

Congratulations! You have completed the Math Formulas Guide: Everything You Need To Know. By this point you should feel confident with your math formulas/skills and be able to implement them when attempting to find the best answers on test day.

Take practice tests and try your best to apply the content from this packet onto the questions and if you struggle, flag the question and at the end be sure to review the concepts that are associated with those questions.

If you want more resources head over to
www.finepointtutoring.com/studio

Wishing you the best on your testing journey,
Studio by FPT

The SAT is evolving and there are too many formulas for me to memorize. If there are any updates or changes feel free to scan and see the updates along with get access to the newer version.

Any questions? Feel free to reach out!
hello@finepointtutoring.com

fpt.

Similar V. Congruent

Similar:

The shape has the SAME *proportions* and *angles*. They have DIFFERENT *sizes*.

Congruent:

The shape has the SAME *shape* and *size*, along with the same *proportions*

Some Test Day Tips

ANSWER ALL THE QUESTIONS

Annotate the questions, what is being asked of you (x or y or 3x?)

If a question takes long MOVE ON

Come back and check your work

Don't overthink

Cross out bad options

Plug and Chug when you can

Don't DO MENTAL MATH. People are stupider when testing.

Sometimes its helpful to start fresh on a question.

Bring an eraser (a whole one)

Copy your question parts into the formulas carefully

Make sure your answer is the one you select

NO LETTERS OF DAY, know the content and pick a logical answer after crossing out the bad ones

DO NOT WASTE TIME. PLEASE

When on a break between sections, think about the next one and don't stress what's in the past

Review your weak areas before you walk in

CHARGE YOUR CALCULATOR

Good luck!