

SAT: Back to Basics Formulas

Arithmetic Formulas

Sum of n Consecutive Integers: $\frac{n}{2}(a_1 + a_n)$ where n = the total number of terms, a_1 = the first term, and a_n = the last term

Sum of n Consecutive Odd Integers: $\frac{n}{2}(a + l)$ where n = the total number of terms, a = the first term, and l equals the last term

Sum of Natural Numbers (Sequence begins from 1): $\frac{n(n+1)}{2}$ where n = the total number of terms

Sum/Multiplication of Odd and Even Integers:

Even + Even = Even Even × Even = Even
 Odd + Odd = Even Odd × Odd = Odd
 Odd + Even = Odd Odd × Even = Even

Cross-multiplication:

$$\frac{a}{b} = \frac{c}{d} \Leftrightarrow ad = bc$$

Arithmetic Properties

Commutative : $a + b = b + a$

$$a \times b = b \times a$$

Associative : $a + (b + c) = b + (a + c)$

$$a \times (b \times c) = b \times (a \times c)$$

Distributive : $a \times (b + c) = (a \times b) + (b \times c)$

Identity : $a + 0 = a$

$$a \times 1 = a$$

Rules of Exponents

$$a^0 = 1$$

$$a^1 = a$$

$$a^{-m} = \frac{1}{a^m}$$

$$a^{\frac{1}{n}} = \sqrt[n]{a}$$

$$a^{\frac{m}{n}} = \sqrt[n]{a^m}$$

$$a^m \cdot a^n = a^{m+n}$$

$$\frac{a^m}{a^n} = a^{m-n}$$

$$(a^m)^n = a^{mn}$$

$$a^n b^n = (ab)^n$$

$$\frac{a^n}{b^n} = \left(\frac{a}{b}\right)^n$$

SAT: Algebra Formulas

Linear Functions

Finding the Slope:

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

Point-Slope Formula:

$$(y - y_1) = m(x - x_1)$$

 m : slope (x_1, y_1) : point

Slope-Intercept Form:

$$y = mx + b$$

 m : slope b : y-intercept

Parallel & Perpendicular Lines:

Parallel : $m_1 = m_2$ Perpendicular : $m_1 = -\frac{1}{m_2}$

Factoring Properties

Difference of Two Squares:

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

Perfect Square Trinomial:

$$(a \pm b)^2 = a^2 \pm 2ab + b^2$$

Sum & Difference of Cubes:

$$a^3 \pm b^3 = (a \pm b)(a^2 \mp ab + b^2)$$

Distance Formulas

Distance Formula:

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

Midpoint Formula:

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

Intercepts

x-intercept:

 x when $y = 0$
crosses the x -axis

y-intercept:

 y when $x = 0$
crosses the y -axis

Interest Rates

Simple:

$$A = P(1 + rt)$$

Compound:

$$A = P(1 + r/n)^{nt}$$

SAT: Problem Solving and Data & Analysis

Rate Problems:

Distance, Speed, and Time:

$$\begin{aligned} \text{Distance} &= \text{Speed} \times \text{Time} \\ \text{Speed} &= \frac{\text{Distance}}{\text{Time}} \\ \text{Time} &= \frac{\text{Distance}}{\text{Speed}} \end{aligned}$$

Percentage

Percent, Part, and Whole:

$$\begin{aligned} \text{Part} &= \frac{\text{Percent}}{100} \times \text{Whole} \\ \text{Whole} &= \text{Part} \div \frac{\text{Part}}{100} \\ \text{Percent} &= \frac{\text{Part}}{\text{Whole}} \times 100\% \end{aligned}$$

Statistics (Mean, Mode, and Median)

Mean:

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

Mode:

Most frequent number to appear.

Range:

$$\text{Max Value} - \text{Min Value}$$

Median:

Central number when list is arranged from least to greatest.

Probability

Probability:
$$\text{Probability} = \frac{\text{Desired Outcomes}}{\text{Total Number of Outcomes}}$$

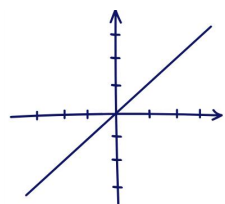
$$\begin{aligned} P(\text{event happens}) + P(\text{event doesn't happen}) &= 1 \\ P(A \text{ and } B) &= P(A) \times P(B) \end{aligned}$$

Study Tip!

Establish a study schedule that fits your daily routine and allows for consistent practice. Allocate specific time slots for each SAT section (Reading & Writing and Math) based on your strengths and weaknesses.

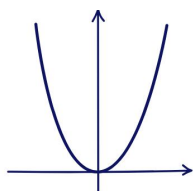
SAT: Linear and Quadratic Functions

Common Types of Graphs



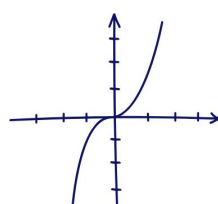
Linear

$$y = ax + b$$



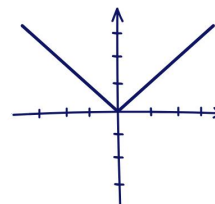
Quadratic

$$y = ax^2 + bx + c$$



Cubic

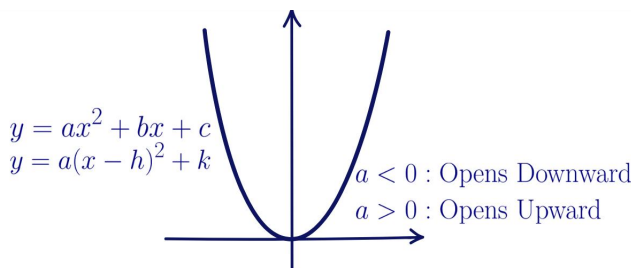
$$y = ax^3 + bx^2 + cx + d$$



Absolute Value

$$y = |x - h| + k$$

Quadratic Functions



Quadratic Formula:

Given : $ax^2 + bx + c = 0$

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

Vertex Formula:

$$\begin{aligned}
 (h, k) &= \left(-\frac{b}{2a}, \frac{4ac - b^2}{4a} \right) \\
 &= \left(-\frac{b}{2a}, f(h) \right)
 \end{aligned}$$

Discriminant:

$$D = b^2 - 4ac$$

$D > 0$: 2 Real Solutions

$D = 0$: 1 Real Solution

$D < 0$: 2 Imaginary Solutions

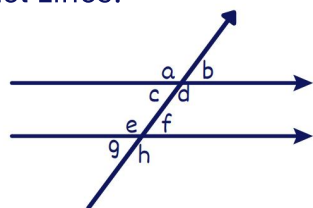
SAT: Geometry & Trigonometry Formulas

Angles and Lines

Complementary : $\angle a + \angle b = 90^\circ$

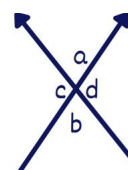
Supplementary : $\angle a + \angle b = 180^\circ$

Parallel Lines:



$$\begin{aligned} a &= d = e = h \\ b &= c = f = g \\ c + e &= 180^\circ, d + f = 180^\circ \end{aligned}$$

Intersecting Lines:



$$\begin{aligned} a &= b, c = d \\ a + c &= 180^\circ \\ b + d &= 180^\circ \end{aligned}$$

Triangles

Sum of Angles:

$$\angle a + \angle b + \angle c = 180^\circ$$

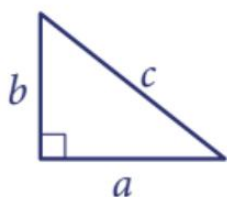
Area:

$$A = \frac{1}{2}bh$$

Perimeter:

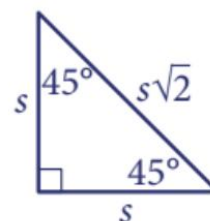
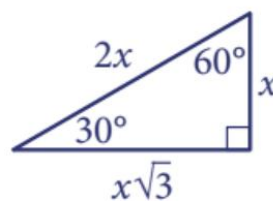
$$P = s_1 + s_2 + s_3$$

Pythagorean Theorem:



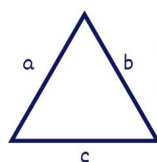
$$c^2 = a^2 + b^2$$

Special Right Angles



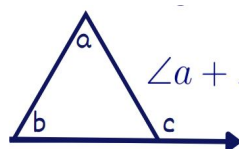
Triangle Properties

Triangle Inequality:



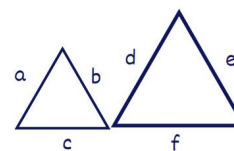
$$\begin{aligned} a &< b + c, a > |b - c| \\ b &< a + c, b > |a - c| \\ c &< a + b, c > |a - b| \end{aligned}$$

Exterior Angle Theorem:



$$\angle a + \angle b = \angle c$$

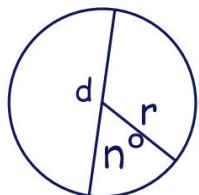
Similar Triangles:



$$\frac{a}{d} = \frac{b}{e} = \frac{c}{f}$$

SAT: Geometry & Trigonometry Formulas

Circles and Properties



Circumference & Area:

$$\begin{aligned}\text{Circumference} &= 2\pi r \\ &= \pi d \\ \text{Area} &= \pi r^2\end{aligned}$$

Arc Length & Sector:

$$\begin{aligned}\text{Arc Length} &= \frac{n^\circ}{360^\circ} \times 2\pi r \\ \text{Sector Area} &= \frac{n^\circ}{360^\circ} \times \pi r^2\end{aligned}$$

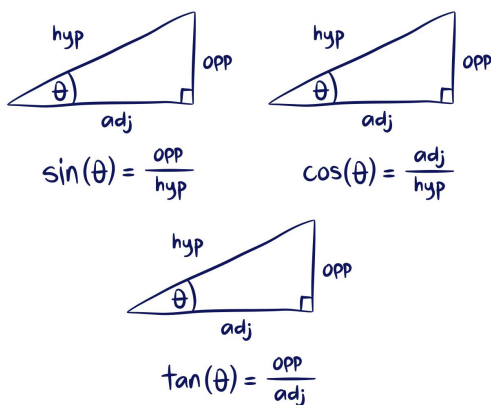
Equation of Circles:

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

(h, k) : center
 r : radius

Trigonometry

Mnemonic: SOH CAH TOA



Cofunctions:

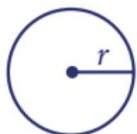
$$\begin{aligned}\sin(90 - x) &= \cos x \\ \cos(90 - x) &= \sin x \\ \sec(90 - x) &= \csc x \\ \csc(90 - x) &= \sec x \\ \tan(90 - x) &= \cot x \\ \cot(90 - x) &= \tan x\end{aligned}$$

Study Tip!

Work on eliminating answer choices when you're unsure. The SAT doesn't penalize you for guessing, so it's better to make an educated guess than to leave questions unanswered.

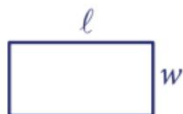
SAT: Reference Page Formulas

These Are the Formulas Found in the First Page of the Math Section

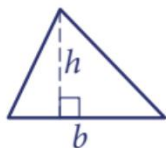


$$A = \pi r^2$$

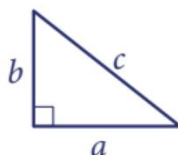
$$C = 2\pi r$$



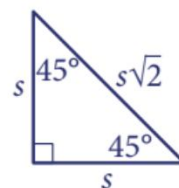
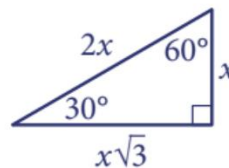
$$A = \ell w$$



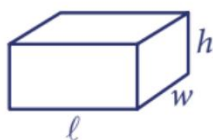
$$A = \frac{1}{2}bh$$



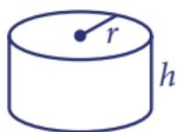
$$c^2 = a^2 + b^2$$



Special Right Triangles



$$V = \ell wh$$



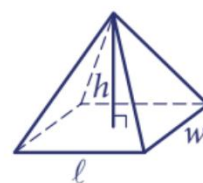
$$V = \pi r^2 h$$



$$V = \frac{4}{3}\pi r^3$$



$$V = \frac{1}{3}\pi r^2 h$$



$$V = \frac{1}{3}\ell wh$$

The number of degrees of arc in a circle is 360.

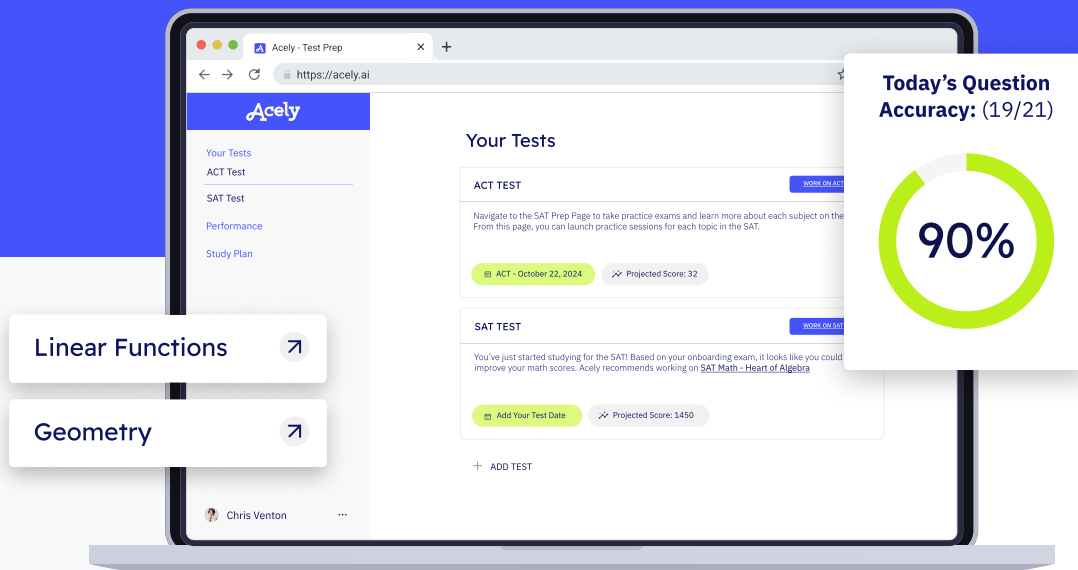
The number of radians of arc in a circle is 2π .

The sum of the measures in degrees of the angles of a triangle is 180.

Study Tip!

Take several full-length practice tests under timed conditions to simulate the actual test day experience. Review your answers and understand your mistakes to identify areas where you need improvement. You can take practice exams at Acely.ai

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