How to Study Math Flash Cards

All of the formulas from The SAT Math Bible are provided in the following flash cards. Review each card, and remove any formulas that you already know. Study only the cards with formulas that you have not yet memorized. To increase your retention of the formulas, try these study methods:

1. **Write out the formulas and their components.**
   Transferring the formulas to paper helps transfer the information into your long-term memory.

2. **Group formulas by content area.**
   By placing the cards in groups, such as “Circles” or “Transformations,” you can begin to see connections between formulas that may help with memorization.

(Continued on back of card)

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Order of Operations

A fundamental principle of all math is the order of operations. This rule sets precedence for which operations are performed first when solving or simplifying expressions and equations. The six operations are addition, subtraction, multiplication, division, exponentiation, and grouping, and their order of precedence is often remembered using the acronym PEMDAS.

Each of the letters in PEMDAS represents an operation and its order of priority:

- **P**arentheses (grouping)  
  1st
- **E**xponents  
  2nd
- **M**ultiply  
  3rd
- **D**ivide  
  4th
- **A**dd  
  5th
- **S**ubtract  
  6th

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How to Study Math Flash Cards

3. Write sample questions that require each formula.
   You can find existing questions from The Official SAT Study Guide grouped by content in the Blue Book Database on the book owner's website. Use these questions to write your own example questions, along with detailed solutions to your questions. The most effective strategy for learning information is to teach the information to someone else.

4. Have someone quiz you.
   Enlist a family member or friend to quiz you on each flash card. If you correctly identify or explain a formula, place a check mark in the target on the flash card. Once a formula is completely memorized, remove it from your stack of flash cards.

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Order of Operations

PEMDAS
Let’s look at an example of an expression in which the order of operations is required:

5(1 + 4)² – 10

Begin with operation in the parentheses (P):

5(1 + 4)² – 10 = 5(5)² – 10

Now remove the exponents (E):

5(5)² – 10 = 5(25) – 10

Multiplication and division are next (M/D):

5(25) – 10 = 125 – 10

Finally, addition and subtraction are performed (A/S):

125 – 10 = 115

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**integer**

Any number in the set of positive and negative whole numbers and zero:

\{…-4, -3, -2, -1, 0, 1, 2, 3, 4…\}

- Integers do not include fractions or decimals
- Integers are the most commonly used numbers on the SAT
- It is important to remember that 0 is an integer

**set**

A collection of numbers marked by brackets:

\{4, 6, 9, 13\}

- Sets can contain any amount of numbers
- Sets may have rules, such as “all even integers”

**digit**

The numbers 0 through 9:

\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}

- Place is used to represent where in a number a digit occurs
- The ones digit or units digit in 3748 is 8
- The tens digit in 3748 is 4
- The hundreds digit in 3748 is 7

**sum**

The amount obtained by adding numbers

- The sum of 2, 3, and 4 is 9: \((2 + 3 + 4 = 9)\)
- The sum of \(x\) and \(y\) is \(x + y\)

**product**

The amount obtained by multiplying numbers

- The product of 2, 3, and 4 is 24: \((2 \times 3 \times 4 = 24)\)
- The product of \(x\) and \(y\) is \(xy\)

**multiple**

An integer that is divisible by another integer without a remainder

- Multiples of 3 include \{-6, -3, 3, 6, 9, 12\}
- Multiples of 4 include \{-8, -4, 4, 8, 12, 16\}
DEFINITION

set

integer

DEFINITION

sum

digit

DEFINITION

multiple

product
**divisible**

Describes a number capable of being divided without a remainder. A number that is divisible by $x$ is also said to be a multiple of $x$.

- 18 is divisible by 1, 2, 3, 6, 9, and 18
- $xy$ is divisible by 1, $x$, $y$, and $xy$

**factor**

One of two or more numbers that divides into a larger number without a remainder

- Factors of 18 are 1 and 18, 2 and 9, and 3 and 6
- Factors of $xy$ include 1 and $xy$, plus $x$ and $y$

**10 prime numbers**

{2, 3, 5, 7, 11, 13, 17, 19, 23, 29, ...}

Additional prime numbers under 100:

{31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97}

**prime number**

An integer that does not have any factors besides itself and 1

{2, 3, 5, 7, 11, 13, 17, 19, 23, 29, ...}

- One (1) is not a prime number
- When prime numbers are multiplied together, the product’s factors are limited to itself, one, and the prime numbers themselves

**prime factor**

Prime numbers that divide into a larger number without a remainder

- Factors of 18 are 1 and 18, 2 and 9, and 3 and 6; the prime factors are 2 and 3

**common factor**

A factor shared by two numbers

- Factors of 18 are 1 and 18, 2 and 9, and 3 and 6.
- Factors of 15 are 1 and 15 and 3 and 5.
- The common factors of 15 and 18 are 1 and 3.
DEFINITION

factor

divisible

DEFINITION

prime number

ARITHMETIC

What are the first 10 prime numbers?

DEFINITION

common factor

DEFINITION

prime factor
Rules of Divisibility

2: If the last digit of a number is even, it is a multiple of 2.
3: If the sum of the digits is divisible by 3, the entire integer is a multiple of 3.
4: If the last two digits are a multiple of 4, the entire number is a multiple of 4.
5: If the last digit ends in 0 or 5, the entire number is divisible by 5.
6: If the number is both divisible by 2 and 3, it is divisible by 6.
9: If the sum of the digits is divisible by 9, the entire integer is a multiple of 9.

Addition of Integers

even + even = even
odd + odd = even
odd + even = odd

positive + positive = positive
negative + negative = negative
positive + negative = can be either

Multiplication of Integers

even × even = even
odd × odd = odd
odd × even = even

positive × positive = positive
negative × negative = positive
positive × negative = negative

Fraction Equivalent

0.125

Fraction Equivalent

0.16\bar{6}

Fraction Equivalent

0.2
### ARITHMETIC

#### Addition of Integers

- even + even =
- odd + odd =
- odd + even =
- positive + positive =
- negative + negative =
- positive + negative =

### SHORTCUT

#### Rules of Divisibility

### ARITHMETIC

#### Multiplication of Integers

- even + even =
- odd + odd =
- odd + even =
- positive + positive =
- negative + negative =
- positive + negative =

### DECIMAL EQUIVALENT

- \[ \frac{1}{8} \]
- \[ \frac{1}{5} \]
- \[ \frac{1}{6} \]
Fraction Equivalent

0.25

0.33

0.5

0.4

0.66

0.75
### Rate Formula

\[ r = \frac{d}{t} \]

- \( r \) = rate
- \( d \) = distance
- \( t \) = time

### What Percent?

\[ \frac{x}{100} \quad \text{or} \quad \frac{?}{100} \]

### Average Rate of Speed

\[ \frac{2 \times \text{rate}_1 \times \text{rate}_2}{\text{rate}_1 + \text{rate}_2} \]

### Combined Work

\[ \frac{1}{t_1} + \frac{1}{t_2} + \frac{1}{t_3} = \frac{1}{t_T} \]

- \( t_1 \) = time of first person
- \( t_2 \) = time of second person
- \( t_3 \) = time of third person
- \( t_T \) = time together

### Plus, More Than, Added To, Increased By, Sum

\[ + \]

### What? What Number?

- \( x \), \( n \), ?, \( or \)
- other variable
TRANSLATE

How do you represent the phrase “what percent”?

WORK AND RATES

What is the rate formula?

WORK AND RATES

What is the formula for combined work problems?

WORK AND RATES

What is the formula for average rate of speed?

TRANSLATE

How do you represent “what” or “what number”?

TRANSLATE

How do you represent “plus,” “more than,” “added to,” “increased by,” and “sum”?
minus, less than, subtracted from, decreased by, reduced by, difference

of, times, product

per, out of, quotient

is, equals, result

90° angle

60° angle
TRANSLATE

How do you represent “of,” “times,” or “product?”

TRANSLATE

How do you represent “minus,” “less than,” “subtracted from,” “decreased by,” “reduced by,” and “difference?”

TRANSLATE

How do you represent “is,” “equals,” or “result?”

TRANSLATE

How do you represent “per,” “out of,” or “quotient?”

BENCHMARKS

Illustrate a 60° angle.

BENCHMARKS

Illustrate a 90° angle.
45° angle

\[ \text{divide by same base} \]

\[ x^n \div x^m = x^{n-m} \]

30° angle

\[ \text{multiply by same base} \]

\[ (x^n)(x^m) = x^{n+m} \]

\[ \text{multiply by same power} \]

\[ (x^n)(y^n) = (xy)^n \]

\[ \text{divide by same power} \]

\[ x^n \div y^n = (x \div y)^n \]
BENCHMARKS

Illustrate a 30° angle.

BENCHMARKS

Illustrate a 45° angle.

EXPONENTS AND ROOTS

Multiplication of the same base:

\( (x^n)(x^m) \)

EXPONENTS AND ROOTS

Division of the same base:

\( x^n \div x^m \)

EXPONENTS AND ROOTS

Division with the same power:

\( x^n \div y^n \)

EXPONENTS AND ROOTS

Multiplication with the same power:

\( (x^n)(y^n) \)
**base**\(^{-\text{negative}}\)

\[
\frac{1}{x^n}
\]

**base**\(^0\)

\[
3^0 = 1 \text{ and } x^0 = 1
\]

**single base with powers**

\[
(x^n)^m = x^{n\times m}
\]

**fractional exponents**

\[
x^\frac{n}{m} = \sqrt[m]{x^n}
\]

**classic form #2**

\[
(x + y)^2 = x^2 + 2xy + y^2
\]

Examples:

\[
(t + 5)^2 \rightarrow t^2 + 2t(5) + 5^2 \rightarrow t^2 + 10t + 25 \\
(3a + b)(3a + b) \rightarrow 9a^2 + 6ab + b^2 \\
y^2 + 16y + 64 \rightarrow y^2 + 2(y)(8) + 8^2 \rightarrow (y + 8)^2 \\
36 + 12n + n^2 \rightarrow 6^2 + 2(n)(6) + n^2 \rightarrow (6 + n)^2
\]

**classic form #1**

\[
(x + y)(x - y) = x^2 - y^2
\]

Examples:

\[
(t - 5)(t + 5) \rightarrow t^2 - 5^2 \rightarrow t^2 - 25 \\
(3a + b)(3a - b) \rightarrow (3a)^2 - b^2 \rightarrow 9a^2 - b^2 \\
y^2 - 64 \rightarrow y^2 - 8^2 \rightarrow (y + 8)(y - 8) \\
36 - n^2 \rightarrow 36^2 - n^2 \rightarrow (6 + n)(6 - n)
\]
EXPONENTS AND ROOTS

When a base is raised to the power of 0, what is the result?

For example, what is $3^0$ or $x^0$?

$\boxed{x^{-n}}$

EXPONENTS AND ROOTS

Fractional exponents:

$\boxed{x^{\frac{n}{m}}}$

EXPONENTS AND ROOTS

Multiplication of a single base with multiple powers:

$\boxed{(x^n)^m}$

CLASSIC QUADRATIC FORM

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

CLASSIC QUADRATIC FORM

$(x + y)^2 =$
**classic form #3**

\[(x - y)^2 = x^2 - 2xy + y^2\]

Examples:
- \((t - 5)^2 \rightarrow t^2 - 2(t)(5) + 5^2 \rightarrow t^2 - 10t + 25\)
- \((3a - b)(3a - b) \rightarrow 9a^2 - 6ab + b^2\)
- \(y^2 - 16y + 64 \rightarrow y^2 - 2(y)(8) + 8^2 \rightarrow (y - 8)^2\)
- \(36 - 12n + n^2 \rightarrow 6^2 - 2(n)(6) + n^2 \rightarrow (6 - n)^2\)

**direct variation**

\[y = cx\]

**area of a circle**

\[A = \pi r^2\]

**indirect variation**

\[c = xy\]

**circumference of a circle**

\[C = 2\pi r\]

**area of a rectangle**

\[A = \ell w\]
### DIRECT VARIATION

What is the formula for direct variation?

### CLASSIC QUADRATIC FORM

\[(x - y)^2 = \]

### INDIRECT VARIATION

What is the formula for indirect variation?

### FORMULA BOX

What is the formula for the area of a circle?

### FORMULA BOX

What is the formula for the area of a rectangle?

### FORMULA BOX

What is the formula for the circumference of a circle?
area of a triangle

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

volume of a rectangular solid

$$V = \ell \, wh$$

volume of a cylinder

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

Pythagorean Theorem

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

30°:60°:90° triangle

$$\begin{align*}
x & = 2x \\
30° & = x \\
60° & = x \sqrt{3} \\
\end{align*}$$

45°:45°:90° triangle

$$\begin{align*}
s & = s \\
45° & = s \sqrt{2} \\
\end{align*}$$
FORMULA BOX
What is the formula for the volume of a rectangular solid?

FORMULA BOX
What is the formula for the area of a triangle?

FORMULA BOX
What is the Pythagorean Theorem?

FORMULA BOX
What is the formula for the volume of a right circular cylinder?

FORMULA BOX
What are the assigned side ratios in a $45^\circ$:45$^\circ$:90$^\circ$ triangle?

FORMULA BOX
What are the assigned side ratios in a $30^\circ$:60$:90^\circ$ triangle?
degrees of arc in a circle

360°

sum of the angles in a triangle

180°

\[ x° + 50° + 35° = 180° \]
\[ x = 95° \]

intersected parallel lines

perpendicular lines

right angle

bisect

bisect = to divide in two equal parts

perimeter of a triangle

perimeter = \( s_1 + s_2 + s_3 \)
FORMULA BOX

What is the sum of the measures in degrees of the angles of a triangle?

FORMULA BOX

How many degrees of arc are in a circle?

LINES AND ANGLES

What angle is created by the intersection of perpendicular lines?

LINES AND ANGLES

What relationship results when two or more parallel lines are intersected by a transversal?

BASIC TRIANGLES

What is the formula for finding the perimeter of a triangle?

LINES AND ANGLES

What is the definition of "bisect?"
**sum of the lengths of 2 sides**

The sum of the lengths of any two sides of a triangle is always greater than the length of the remaining side.

**Pythagorean Triples**

- 3 : 4 : 5
- 5 : 12 : 13
- 7 : 24 : 25
- 8 : 15 : 17
- 9 : 40 : 41
- 12 : 35 : 37
- 20 : 21 : 29

**similar triangles**

Triangles that have the exact same shape but different area. The corresponding angle measurements of similar triangles are equal, and the corresponding side lengths are proportionate:

**hidden triangles**

Two 30º:60º:90º triangles are hidden in every equilateral triangle:

Two 45º:45º:90º triangles are hidden in every square:
BASIC TRIANGLES

What is the sum of the measures in degrees of the angles of a triangle?

The sum of the lengths of any two sides of a triangle is always greater than ________________.

BASIC TRIANGLES

What are similar triangles?

SPECIAL TRIANGLES

Name the most common Pythagorean Triples.

SPECIAL TRIANGLES

What is hidden in a square?

SPECIAL TRIANGLES

What is hidden in an equilateral triangle?
isosceles triangles

An isosceles triangle has two sides of equal length and two angles of equal size. The two equal angles are opposite the two equal-length sides:

Equilateral triangles have equal side lengths and equal angle measurements. Since the interior angles of a triangle add up to 180°, the three angles of an equilateral triangle must each equal 60°:

perimeter of a rectangle

\[ P = 2\ell + 2w \]

Area of a square

\[ A = \ell w \text{ or } s^2 \]

Area of a parallelogram

\[ A = \ell h \]

Perimeter of a square

\[ P = 4s \]
**SPECIAL TRIANGLES**

What is an equilateral triangle?

**BASIC TRIANGLES**

What is an isosceles triangle?

**QUADRILATERALS**

What is the formula for the perimeter of a rectangle?

**QUADRILATERALS**

What is the formula for the area of a square?

**QUADRILATERALS**

What is the formula for the perimeter of a square?

**QUADRILATERALS**

What is the formula for the area of a parallelogram?
regular polygons

Polygons that have equal side lengths and equal angle measurements are called regular polygons.

Regular Pentagon  Regular Hexagon

interior angles of a quadrilateral

360°

90° + 90° + 90° + 90° = 360°

50° + 130° + 50° + 130° = 360°

interior angles of a hexagon

720°

120° + 120° + 120° + 120° + 120° + 120° = 720°

interior angles of a pentagon

540°

108° + 108° + 108° + 108° + 108° = 540°

interior angles of an octagon

1080°

135° + 135° + 135° + 135° + 135° + 135° + 135° + 135° = 1080°

circumference of a circle

\[ C = 2\pi r \]
POLYGONS

What is the sum of the interior angles of a quadrilateral?

What is a regular polygon?

What is the sum of the interior angles of a pentagon? What is the measure of each angle in a regular pentagon?

What is the sum of the interior angles of a hexagon? What is the measure of each angle in a regular hexagon?

What is the sum of the interior angles of a octagon? What is the measure of each angle in a regular octagon?

CIRCLES

What is the formula for the circumference of a circle?
tangent

A tangent is a line that touches a circle at only one point. A radius or diameter drawn to that point is perpendicular to the tangent.

area of a circle

\[ A = \pi r^2 \]

length of an arc

The length of an arc = \( \frac{x^\circ}{360^\circ} (2\pi r) \)

area of a sector

The area of a sector = \( \frac{x^\circ}{360^\circ} (\pi r^2) \)

volume of a cube

\[ V = S^3 \]

surface area of a cube

\[ SA = 6S^2 \]
CIRCLES

What is the formula for the area of a circle?

What is a tangent?

What is the formula for finding the length of an arc?

What is the formula for finding the area of a sector?

GEOMETRIC SOLIDS

What is the formula for the surface area of a cube?

What is the formula for the volume of a cube?
**volume of a rectangular solid**

\[ V = \ell wh \]

**surface area of a rectangular solid**

\[ SA = 2\ell w + 2\ell h + 2wh \]

**volume of a cylinder**

\[ V = \pi r^2 h \]

**length of a diagonal in a rectangular solid**

Length of the diagonal =

\[ \sqrt{l^2 + w^2 + h^2} \]

**distance formula**

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

**midpoint formula**

Midpoint = \( \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) \)
GEOMETRIC SOLIDS

What is the formula for the surface area of a rectangular solid?

What is the formula for the volume of a rectangular solid?

What is the formula for the length of a diagonal in a rectangular solid?

What is the formula for the volume of a right circular cylinder?

COORDINATE GEOMETRY

What is the Midpoint Formula?

What is the Distance Formula?
**slope formula**

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

**positive slope**

Parallel lines have equal slopes.

Slope of line \( \ell = \frac{2}{3} \)

Slope of line \( m = \frac{2}{3} \)

**negative slope**

**equation of a line**

Equation of a line: \( y = mx + b \)

Where:

\( m \) = slope

\( b \) = \( y \)-intercept

\( x \) and \( y \) = the \( x \)- and \( y \)-coordinate \( (x, y) \) of any point on the line

**perpendicular lines have slopes that are negative reciprocals**

Slope of line \( \ell = \frac{2}{3} \)

Slope of line \( m = -\frac{3}{2} \)
COORDINATE GEOMETRY

Lines with a positive slope tilt _____ when moving from left to right.

What is the Slope Formula?

COORDINATE GEOMETRY

Lines with a negative slope tilt _____ when moving from left to right.

How are the slopes of parallel lines related?

COORDINATE GEOMETRY

What is the equation of a line?

How are the slopes of perpendicular lines related?
### Standard Equation of a Parabola

Standard equation of a parabola: \( y = ax^2 + bx + c \)

- \( a, b, \) and \( c \) are constants
- \( x \) and \( y \) = the \( x \)- and \( y \)-coordinate \((x, y)\) of any point on the parabola
- \((0, c)\) is the \( y \)-intercept
- When \( a \) is positive, the parabola opens upward
- When \( a \) is negative, the parabola opens downward
- When \( b = 0 \), the parabola is centered on the \( y \)-axis
- When \( b > 0 \), the parabola moves to the left of the \( y \)-axis
- When \( b < 0 \), the parabola moves to the right of the \( y \)-axis

### Equation of a Linear Function

Equation of a line: \( y = mx + b \)

Equation of a linear function: \( f(x) = mx + b \)

Where:
- \( m \) = slope
- \( b \) = \( y \)-intercept
- \( x \) and \( f(x) \) = the \( x \)- and \( y \)-coordinate \((x, y)\) of any point on the line

### Standard Equation of a Quadratic Function

Standard equation of a parabola: \( y = ax^2 + bx + c \)

- \( a, b, \) and \( c \) are constants
- \( x \) and \( y \) = the \( x \)- and \( y \)-coordinate \((x, y)\) of any point on the parabola
- \((0, c)\) is the \( y \)-intercept
- When \( a \) is positive, the parabola opens upward
- When \( a \) is negative, the parabola opens downward
- When \( b = 0 \), the parabola is centered on the \( y \)-axis
- When \( b > 0 \), the parabola moves to the left of the \( y \)-axis
- When \( b < 0 \), the parabola moves to the right of the \( y \)-axis

### Vertex Equation of a Parabola

Vertex equation of a parabola: \( y = a(x - h)^2 + k \)

- \((h, k)\) is the vertex of the parabola
- \( x \) and \( y \) = the \( x \)- and \( y \)-coordinate \((x, y)\) of any point on the parabola
- When \( a \) is positive, the parabola opens upward
- When \( a \) is negative, the parabola opens downward

### Vertex Equation of a Quadratic Function

Vertex equation of a parabola: \( y = a(x - h)^2 + k \)

Vertex equation of a quadratic function: \( f(x) = a(x - h)^2 + k \)
COORDINATE GEOMETRY

Lines with a positive slope tilt _____ when moving from left to right.

What is the standard equation of a parabola?

What is the standard equation of a quadratic function?

What is the vertex equation of a quadratic function?

Translation:

\[ y = f(x) + 1 \]
y = f(x) – 1
Shifts down 1 unit

y = f(x + 1)
Shifts left 1 unit

y = f(2x)
The parabola becomes "skinnier"

y = f(x – 1)
Shifts right 1 unit

y = f(½x)
The parabola becomes "fatter"

y = 2f(x)
The parabola becomes "longer"
COORDINATE GEOMETRY

Translation:

\[ y = f(x + 1) \]

Translation:

\[ y = f(x) - 1 \]

Translation:

\[ y = f(x - 1) \]

Transformation:

\[ y = f(2x) \]

Transformation:

\[ y = 2f(x) \]

Transformation:

\[ y = f\left(\frac{1}{2}x\right) \]
The median is the number that appears in the middle of a set of ascending numbers.

In the following set, the median is 5:

\{2, 4, 5, 7, 7\}

The mode is the number that appears most frequently in a set.

In the following set, the mode is 7:

\{2, 4, 5, 7, 7\}
COORDINATE GEOMETRY

Reflection:
\[ y = -f(x) \]

COORDINATE GEOMETRY

Transformation:
\[ y = \frac{1}{2} f(x) \]

STATISTICS

What is the formula for finding the average of a set of numbers?

What is the mode?

What is the median?
**probability formula**

Probability = \[
\frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}
\]

**probability of a non-occurrence**

Probability of event not occurring = \[
1 - \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}
\]

**geometric sequence**

In a geometric sequence, each term increases by a constant ratio.

\[a_n = a_1 \times r^{n-1}\]

Where:
- \(a_1\) = the first term
- \(n\) = the number of terms
- \(r\) = constant ratio

**arithmetic sequence**

In an arithmetic sequence, each term increases by a constant difference.

\[a_n = a_1 + (n-1)d\]

Where:
- \(a_1\) = the first term
- \(n\) = the number of terms
- \(d\) = constant difference

**geometric sequence sum**

Sum of the first \(n\) terms in a geometric sequence = \[
\frac{a_1(1 - r^n)}{1 - r}
\]

**arithmetic sequence sum**

Sum of the first \(n\) terms in an arithmetic sequence = \[
\frac{n}{2} \left( a_1 + a_n \right)
\]
**PROBABILITY**

What is the formula for the probability of something not happening?

**PROBABILITY**

What is the formula for probability?

**SEQUENCES**

What is an arithmetic sequence and how do you find the \( n \)th term?

**SEQUENCES**

What is a geometric sequence and how do you find the \( n \)th term?

**SEQUENCES**

How do you find the sum of the first \( n \) terms in an arithmetic sequence?

**SEQUENCES**

How do you find the sum of the first \( n \) terms in a geometric sequence?
**geometric probability**

Geometric Probability = 
\[
\frac{\text{shaded area}}{\text{total possible area}}
\]

**overlapping groups**

- Group A
- + Group B
- + Neither Group
- – Both Groups
- Total

**probability of two events**

Find the probability of each independent event and then find their product.

**combinations**

Multiply the elements together:

\[
2 \text{ shirts } \times 3 \text{ pants } \times 2 \text{ shoes} = 12 \text{ outfit combinations}
\]

**visualization**

I will be successful because I am good at SAT math.

**permutations**

Determine the number of elements for each position and then multiply the elements together:

\[
\begin{align*}
\text{First Place} & \quad 4 \quad \Delta \quad B, \ C, \ D \\
\text{Second Place} & \quad 3 \quad \Delta \quad B, \ C, \ D \\
\text{Third Place} & \quad 2 \quad \Delta \quad B, \ C, \ D \\
\text{Fourth Place} & \quad 1 \quad \Delta \quad B, \ C, \ D \\
\end{align*}
\]

\[
= 24
\]
OVERLAPPING GROUPS

What is the formula for finding a population in an overlapping groups question?

COUNTING PROBLEMS

In a combination, how do you find the total number of arrangements?

COUNTING PROBLEMS

In a permutation, how do you find the total number of arrangements?

PROBABILITY

What is the formula for geometric probability?

PROBABILITY

How do you find the probability of two independent events both occurring?

VISUALIZATION

How will I do on the math section of the SAT?