

Basic Math Formulas Cheat Sheet

Basic Algebra

Algebraic Transposition

$$\begin{aligned} a + b &= c \\ a &= c - b \\ b &= c - a \\ a + b - c &= 0 \end{aligned}$$

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

$$\frac{a}{b} = \frac{c}{d} \implies \frac{a}{c} = \frac{b}{d}$$

$$\frac{a}{b} = \frac{c}{d} \implies \frac{a}{c} = \frac{b}{d}$$

Quadratic Equation

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

Common Conversions

Metric to Metric

Length: meter (m)

Area: meter² (m²)

Volume: liter (L), meter³ (m³)

Mass: gram (g)

English to Metric/English

Length: 1 in = 2.54 cm, 1 ft = 12 in

Area: 1 ft² = 144 in², 1 acre = 43,560 ft²

Mass: 1 lb = 454 g, 1 lb = 16 oz

Volume: 1 ft³ = 1728 in³, 1 yd³ = 27 ft³

Abbrev: inch (in), feet (ft), pound (lb), yard (yd), ounce (oz)

Number System Equivalent

Decimal	Binary	Octal	Hex.
0	0	0	0
1	1	1	1
2	10	2	2
3	11	3	3
4	100	4	4
5	101	5	5
6	110	6	6
7	111	7	7
8	1000	10	8
9	1001	11	9
10	1010	12	A
11	1011	13	B
12	1100	14	C
13	1101	15	D
14	1110	16	E
15	1111	17	F
16	1 0000	20	10
17	1 0001	21	11
18	1 0010	22	12
19	1 0011	23	13
20	1 0100	24	14
32	10 0000	40	20
64	100 0000	100	60
96	110 0000	140	60
99	110 0011	143	63

Decimal to Binary

Binary to Decimal

Binary, Octal & Hex

Group binary to 3 to convert to Octal

Group binary to 4 to convert to Hex

Convert back by doing the reverse (ungrouping).

Exponents & Logarithms

Laws of Exponent

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

$$\frac{a^x}{a^y} = a^{x-y}$$

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

$$(a^x)^y = a^{xy}$$

$$(a^x)^y = a^{xy}$$

Laws of Logarithm

$$y = \log_b x \implies b^y = x$$

$$\log_b b = 1$$

$$\log_b 1 = 0$$

$$\log_b b^x = x$$

$$\log_b (x^y) = y \log_b x$$

$$\log_b (xy) = \log_b x + \log_b y$$

$$\log_b \left(\frac{x}{y}\right) = \log_b x - \log_b y$$

Trigonometry

sin A = $\frac{a}{c}$ = Opposite / Hypotenuse

cos A = $\frac{b}{c}$ = Adjacent / Hypotenuse

tan A = $\frac{a}{b}$ = Opposite / Adjacent

csc A = $\frac{1}{\sin A}$, sec A = $\frac{1}{\cos A}$, cot A = $\frac{1}{\tan A}$

Boolean Algebra

Basic Rules

$$\begin{aligned} A + 0 &= A & A + 1 &= 1 & \bar{\bar{A}} &= A \\ A + A &= A & A + \bar{A} &= 1 & A + AB &= A \\ A + \bar{A} &= 1 & A + A &= A & A + \bar{A} &= 1 \end{aligned}$$

$$(A + B)(A + C) = A + BC$$

De Morgan's

$$\overline{(AB)} = (\bar{A} + \bar{B}) \quad \overline{(A + B)} = (\bar{A})(\bar{B})$$

Temperature

Lead melting pt. 328°C 622°F

Water boiling pt. 100°C 212°F

Conversions

$$^{\circ}\text{F} = \left(^{\circ}\text{C} \times \frac{9}{5}\right) + 32$$

$$^{\circ}\text{C} = \frac{5}{9} (^{\circ}\text{F} - 32)$$

Human body temp. 37°C 98°F

Room temp. 22°C 72°F

Water freezing pt. 0°C 40°F

Decibel Table

dB	Power Ratio	V/I Ratio	dB	Power Ratio	V/I Ratio
0	1.00	1.00	10	10	3.2
0.5	1.12	1.06	15	31.6	5.6
1	1.26	1.12	20	100	10
2	1.58	1.26	30	1k	32
3	2.00	1.41	40	10k	100
4	2.51	1.58	50	10 ⁵	316
5	3.16	1.78	60	10 ⁶	1k
6	3.98	2.00	70	10 ⁷	3.16k
7	5.01	2.24	80	10 ⁸	10k
8	6.31	2.51	90	10 ⁹	31.6k
9	7.94	2.82	100	10 ¹⁰	10 ⁵

Math Formulas and Constants

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Basic math formulas cheat sheet provides a quick reference for students and professionals alike who need to recall essential mathematical concepts quickly. Whether you're a high school student preparing for exams, a college student tackling complex equations, or a professional who occasionally needs to perform calculations, having a handy cheat sheet can save you time and effort. This article will cover various fundamental areas of mathematics, including arithmetic, algebra, geometry, and statistics, providing you with a comprehensive overview of essential formulas.

Arithmetic Formulas

Arithmetic is the foundation of all mathematics, and understanding basic arithmetic operations is crucial. Here are some essential formulas and concepts.

1. Basic Operations

- Addition (+): The sum of two numbers.
- Example: $(a + b)$
- Subtraction (-): The difference between two numbers.
- Example: $(a - b)$
- Multiplication (\times): The product of two numbers.
- Example: $(a \times b)$ or $(a \cdot b)$
- Division (\div): The quotient of two numbers.
- Example: $(a \div b)$ or $(\frac{a}{b})$

2. Order of Operations

To correctly solve mathematical expressions, remember the order of operations:

1. Parentheses
2. Exponents
3. Multiplication and Division (from left to right)
4. Addition and Subtraction (from left to right)

A common acronym to remember this is PEMDAS (Parentheses, Exponents, Multiplication and Division, Addition and Subtraction).

Algebraic Formulas

Algebra involves variables and constants and is essential for solving equations and understanding relationships between quantities.

1. Basic Algebraic Identities

- Square of a binomial:
- $(a + b)^2 = a^2 + 2ab + b^2$
- $(a - b)^2 = a^2 - 2ab + b^2$

- Difference of squares:

$$a^2 - b^2 = (a + b)(a - b)$$
- Sum of cubes:

$$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$
- Difference of cubes:

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

2. Quadratic Formula

To solve a quadratic equation of the form $ax^2 + bx + c = 0$, use the quadratic formula:

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

3. Factorization Techniques

- Factoring trinomials:
 $ax^2 + bx + c$ can often be factored into $(px + q)(rx + s)$.
- Common factor:
 Factor out the GCF (Greatest Common Factor) from each term.

Geometry Formulas

Geometry deals with shapes, sizes, and properties of space. Knowing the key formulas for various geometric figures is essential, especially in fields like architecture, engineering, and physics.

1. Area and Perimeter

- Rectangle:
 Area: $A = l \times w$ (length \times width)
 Perimeter: $P = 2(l + w)$
- Square:
 Area: $A = s^2$ (side \times side)
 Perimeter: $P = 4s$
- Triangle:
 Area: $A = \frac{1}{2}bh$ (base \times height)

- Perimeter: $(P = a + b + c)$ (sum of all sides)
- Circle:
- Area: $(A = \pi r^2)$ (π times radius squared)
- Circumference: $(C = 2\pi r)$ (2 times π times radius)

2. Volume and Surface Area

- Cube:
- Volume: $(V = s^3)$
- Surface Area: $(SA = 6s^2)$
- Rectangular Prism:
- Volume: $(V = l \times w \times h)$
- Surface Area: $(SA = 2(lw + lh + wh))$
- Sphere:
- Volume: $(V = \frac{4}{3}\pi r^3)$
- Surface Area: $(SA = 4\pi r^2)$

Trigonometry Formulas

Trigonometry studies the relationships between the angles and sides of triangles, particularly right triangles. Understanding its key formulas is essential for various applications in science and engineering.

1. Basic Trigonometric Ratios

For a right triangle, with angle (θ) :

- Sine: $(\sin(\theta) = \frac{\text{opposite}}{\text{hypotenuse}})$
- Cosine: $(\cos(\theta) = \frac{\text{adjacent}}{\text{hypotenuse}})$
- Tangent: $(\tan(\theta) = \frac{\text{opposite}}{\text{adjacent}})$

2. Pythagorean Theorem

In a right triangle, the relationship between the lengths of the sides is given by:

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

where (c) is the length of the hypotenuse.

3. Trigonometric Identities

- Reciprocal identities:
 - $\csc(\theta) = \frac{1}{\sin(\theta)}$
 - $\sec(\theta) = \frac{1}{\cos(\theta)}$
 - $\cot(\theta) = \frac{1}{\tan(\theta)}$
- Pythagorean identities:
 - $\sin^2(\theta) + \cos^2(\theta) = 1$
 - $1 + \tan^2(\theta) = \sec^2(\theta)$

Statistics Formulas

Statistics involves the collection, analysis, interpretation, and presentation of data. Here are some fundamental formulas.

1. Measures of Central Tendency

- Mean (Average):
$$\text{Mean} = \frac{\sum x_i}{n}$$
where x_i represents each data point and n is the total number of data points.
- Median: The middle value of a data set when arranged in ascending order.
- Mode: The value that occurs most frequently in a data set.

2. Measures of Dispersion

- Range:
$$\text{Range} = \text{Max} - \text{Min}$$
- Variance:
$$\sigma^2 = \frac{\sum (x_i - \mu)^2}{n}$$
where μ is the mean of the data set.
- Standard Deviation:
$$\sigma = \sqrt{\sigma^2}$$

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\sigma = \sqrt{\text{Variance}}
\]
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Conclusion

Having a basic math formulas cheat sheet at your disposal can greatly enhance your ability to solve problems efficiently and accurately. Whether you're studying for a test, completing homework, or simply need to perform calculations at work, understanding these essential formulas will provide a solid foundation in mathematics. Keep this guide handy, and refer to it whenever you need a quick reminder!

Frequently Asked Questions

What is a basic math formulas cheat sheet?

A basic math formulas cheat sheet is a concise reference document that lists essential mathematical formulas, equations, and concepts for quick access and review.

What are some common formulas included in a basic math cheat sheet?

Common formulas include the area and perimeter of shapes, the Pythagorean theorem, quadratic formula, and basic arithmetic operations.

How can a cheat sheet help students in math?

A cheat sheet helps students by providing quick access to important formulas, aiding in study and exam preparation, and reducing the need to memorize every detail.

Are there different types of math cheat sheets for different levels?

Yes, cheat sheets can vary for different educational levels, including elementary, middle school, high school, and college mathematics.

What is the formula for the area of a rectangle?

The formula for the area of a rectangle is $A = \text{length} \times \text{width}$.

What is the quadratic formula?

The quadratic formula is $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$, used to find the roots of a quadratic equation $ax^2 + bx + c = 0$.

How do you calculate the circumference of a circle?

The circumference of a circle can be calculated using the formula $C = 2\pi r$, where r is the radius.

What is the Pythagorean theorem?

The Pythagorean theorem states that in a right triangle, the square of the length of the hypotenuse (c) is equal to the sum of the squares of the lengths of the other two sides (a and b), expressed as $a^2 + b^2 = c^2$.

Can I create my own math formulas cheat sheet?

Yes, you can create your own cheat sheet by compiling formulas you find most useful or that you struggle to remember.

Where can I find printable math formulas cheat sheets?

Printable math formulas cheat sheets can be found online through educational websites, tutoring resources, and study guide platforms.

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