

MATHEMATICS FORMULA BOOK

# CLASS 8

Complete Formula & Concept Book (CBSE/NCERT)

**Covers:** Complete syllabus formulas

**Use:** Quick revision & exam preparation

**Format:** Chapter-wise formula reference

All formulas, identities, theorems & results in one place

## 1 Rational Numbers

Additive Inverse

$$\mathbf{a/b + (-a/b) = 0}$$

Multiplicative Inverse

$$\mathbf{(a/b) \times (b/a) = 1}$$

Closure, Commutative, Associative

**Hold for addition & multiplication of rationals**

Distributive Property

$$\mathbf{a(b+c) = ab + ac}$$

## 2 Linear Equations in One Variable

General Form

$$\mathbf{ax + b = c}$$

Solving

**Transpose terms, simplify, isolate variable**

## 3 Understanding Quadrilaterals

Angle Sum of Polygon

$$\mathbf{Sum = (n - 2) \times 180^\circ}$$

Exterior Angle Sum

$$\mathbf{Sum\ of\ exterior\ angles = 360^\circ}$$

Each Interior Angle (Regular)

$$\mathbf{[(n-2)\times 180^\circ]/n}$$

Each Exterior Angle (Regular)

$$\mathbf{360^\circ/n}$$

Sum of Quadrilateral Angles

$$\mathbf{360^\circ}$$

## 4 Practical Geometry

- Construction of quadrilaterals given 4 sides & 1 diagonal
- Construction given 2 diagonals & 3 sides
- Construction given 3 sides & 2 included angles

## 5 Data Handling

Probability

$$\mathbf{P(E) = \text{favourable outcomes} / \text{total outcomes}}$$

Pie Chart Angle

$$\mathbf{(Value/Total) \times 360^\circ}$$

## 6 Squares and Square Roots

Perfect Square

$$\mathbf{n^2\ for\ integer\ n}$$

Sum of first n odd numbers

$$\mathbf{n^2 = 1+3+5+...+(2n-1)}$$

Square Root by Prime Factorization

**Pair prime factors, take one from each pair**

Pythagorean Triplet

**For  $m > 1$ :  $(2m, m^2 - 1, m^2 + 1)$**

## 7 Cubes and Cube Roots

Perfect Cube

**$n^3$  for integer  $n$**

Cube Root by Prime Factorization

**Group factors in triplets, take one from each**

## 8 Comparing Quantities

Compound Interest

**$A = P(1 + R/100)^n$**

CI

**$CI = A - P$**

Discount

**$Discount = MP - SP$**

Discount %

**$(Discount/MP) \times 100$**

Sales Tax/GST

**$Tax = (Rate/100) \times Bill\ Amount$**

CI Compounded Half-Yearly

**$A = P(1 + (R/2)/100)^{(2n)}$**

## 9 Algebraic Expressions and Identities

| Identity         | Expansion                           |
|------------------|-------------------------------------|
| $(a + b)^2$      | $a^2 + 2ab + b^2$                   |
| $(a - b)^2$      | $a^2 - 2ab + b^2$                   |
| $(a + b)(a - b)$ | $a^2 - b^2$                         |
| $(x + a)(x + b)$ | $x^2 + (a+b)x + ab$                 |
| $(a + b + c)^2$  | $a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$ |

## 10 Visualising Solid Shapes

Euler's Formula

**$F + V - E = 2$**

## 11 Mensuration

| Shape                     | Formula                                                                  |
|---------------------------|--------------------------------------------------------------------------|
| Area of Trapezium         | $\frac{1}{2} \times (\text{sum of parallel sides}) \times \text{height}$ |
| Area of Rhombus           | $\frac{1}{2} \times d_1 \times d_2$                                      |
| Area of Polygon (general) | Sum of areas of component shapes                                         |
| Surface Area of Cube      | $6a^2$                                                                   |
| Surface Area of Cuboid    | $2(lb+bh+hl)$                                                            |
| Surface Area of Cylinder  | $2\pi r(r+h)$                                                            |
| Volume of Cube            | $a^3$                                                                    |
| Volume of Cuboid          | $l \times b \times h$                                                    |
| Volume of Cylinder        | $\pi r^2 h$                                                              |

12 Exponents and Powers

|                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------|
| Negative Exponent<br><b><math>a^{-n} = 1/a^n</math></b>                                                                               |
| Laws of Exponents<br><b><math>a^m \times a^n = a^{m+n}</math>; <math>a^m \div a^n = a^{m-n}</math>; <math>(a^m)^n = a^{mn}</math></b> |
| Standard Form<br><b><math>a \times 10^n</math> where <math>1 \leq a &lt; 10</math></b>                                                |

13 Direct and Inverse Proportions

|                                                                                             |
|---------------------------------------------------------------------------------------------|
| Direct Proportion<br><b><math>x/y = k</math> (constant); <math>x_1/y_1 = x_2/y_2</math></b> |
| Inverse Proportion<br><b><math>xy = k</math> (constant); <math>x_1y_1 = x_2y_2</math></b>   |

14 Factorisation

|                                                                                              |
|----------------------------------------------------------------------------------------------|
| Common Factor<br><b><math>ab + ac = a(b+c)</math></b>                                        |
| Difference of Squares<br><b><math>a^2 - b^2 = (a+b)(a-b)</math></b>                          |
| Perfect Square Trinomial<br><b><math>a^2+2ab+b^2 = (a+b)^2</math></b>                        |
| Division of Polynomial<br><b>Dividend = Divisor <math>\times</math> Quotient + Remainder</b> |

15 Introduction to Graphs

|                                                                           |
|---------------------------------------------------------------------------|
| Coordinates<br><b>Point represented as (x, y)</b>                         |
| Linear Graph<br><b>Straight line for equation <math>y = mx + c</math></b> |