

MATHEMATICS FORMULA BOOK

CLASS 6

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 Knowing Our Numbers

Place Value System (Indian)

Ones, Tens, Hundreds, Thousands, Ten Thousands, Lakhs, Ten Lakhs, Crores

International System

Ones, Tens, Hundreds, Thousands, Ten Thousands, Hundred Thousands, Millions

Successor

Successor of $n = n + 1$

Predecessor

Predecessor of $n = n - 1$

Estimation (Rounding)

Round to nearest 10, 100, 1000 as required

2 Whole Numbers

Whole Numbers

$W = \{0, 1, 2, 3, 4, \dots\}$

Natural Numbers

$N = \{1, 2, 3, 4, \dots\}$

Closure Property

$a + b$ and $a \times b$ are whole numbers

Commutative Property

$a + b = b + a$; $a \times b = b \times a$

Associative Property

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

Distributive Property

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

Identity for Addition

$a + 0 = a$

Identity for Multiplication

$a \times 1 = a$

3 Playing with Numbers

Factor

A number that divides another number exactly

Multiple

Product of a number with any natural number

Prime Number

Exactly 2 factors: 1 and itself

Composite Number

More than 2 factors

HCF (Highest Common Factor)

Greatest common factor of given numbers

LCM (Lowest Common Multiple)

Smallest common multiple of given numbers

Relation between HCF & LCM

$HCF \times LCM = \text{Product of two numbers}$

Divisible by	Rule
2	Last digit is 0, 2, 4, 6, or 8
3	Sum of digits divisible by 3
4	Last two digits divisible by 4
5	Last digit is 0 or 5
6	Divisible by both 2 and 3
8	Last three digits divisible by 8
9	Sum of digits divisible by 9
10	Last digit is 0
11	Difference of sum of alternate digits divisible by 11

4 Basic Geometrical Ideas

- Line Segment

Part of a line with 2 endpoints
- Ray

Has one endpoint, extends infinitely one way
- Angle

Formed by two rays with common endpoint (vertex)
- Polygon sides & vertices

Triangle-3, Quadrilateral-4, Pentagon-5, Hexagon-6, Octagon-8

5 Understanding Elementary Shapes

Types of Angles

Angle	Measure
Acute Angle	$0^\circ < \theta < 90^\circ$
Right Angle	$\theta = 90^\circ$
Obtuse Angle	$90^\circ < \theta < 180^\circ$
Straight Angle	$\theta = 180^\circ$
Reflex Angle	$180^\circ < \theta < 360^\circ$
Complete Angle	$\theta = 360^\circ$

- Complementary Angles

Sum = 90°
- Supplementary Angles

Sum = 180°

6 Integers

- Integers

$\mathbb{Z} = \{..., -2, -1, 0, 1, 2, ...\}$
- Addition of Integers

Same sign: add & keep sign. Different sign: subtract & take sign of bigger
- Subtraction

$a - b = a + (-b)$
- Absolute Value

$|a| = a$ if $a \geq 0$; $|a| = -a$ if $a < 0$

7 Fractions

Proper Fraction
Numerator < Denominator

Improper Fraction
Numerator ≥ Denominator

Mixed Fraction
Whole number + Proper Fraction

Equivalent Fractions
 $a/b = (a \times k)/(b \times k)$

Addition/Subtraction (same denom.)
 $a/c \pm b/c = (a \pm b)/c$

Multiplication
 $(a/b) \times (c/d) = (a \times c)/(b \times d)$

Division
 $(a/b) \div (c/d) = (a/b) \times (d/c)$

8 Decimals

Place Value (Decimal)
Tenths (1/10), Hundredths (1/100), Thousandths (1/1000)

Converting Fraction to Decimal
Divide numerator by denominator

Addition/Subtraction
Align decimal points, then add/subtract

9 Data Handling

Range
Highest value – Lowest value

Arithmetic Mean
Sum of observations ÷ Number of observations

Bar Graph
Bars of uniform width represent frequency

10 Mensuration

Perimeter

Shape	Perimeter
Rectangle	$2 \times (l + b)$
Square	$4 \times \text{side}$
Triangle	Sum of all sides ($a + b + c$)
Equilateral Triangle	$3 \times \text{side}$

Area

Shape	Area
Rectangle	length $\times$ breadth
Square	side $\times$ side

11 Algebra

Variable
A symbol (like x, y) with no fixed value

Expression

Combination of variables, numbers & operations

Equation

Statement of equality: e.g. $x + 5 = 10$

Perimeter of square (algebraic)

$P = 4l$

Perimeter of rectangle (algebraic)

$P = 2(l + b)$

12 Ratio and Proportion

Ratio

$a : b = a/b$

Proportion

$a : b = c : d \Rightarrow a \times d = b \times c$

Unitary Method

Find value of 1 unit, then multiply for required units

13 Symmetry

Line of Symmetry

Line dividing figure into 2 identical mirror halves

Regular Polygon Lines of Symmetry

Number of lines = number of sides

14 Practical Geometry

- Construction of a circle using compass with given radius
- Construction of line segment equal to a given segment
- Construction of perpendicular bisector
- Construction of angles: 60° , 120° , 30° , 90° using compass
- Angle bisector construction