CBSE Class 10 Mathematics Formula Sheet

68 formulas across 14 chapters — 2025-26 CBSE board exams

Ch 1. Real Numbers

Fundamental Theorem of Arithmetic

Every composite number can be expressed as a product of primes in a unique way (order apart)

Tip: Used to find HCF and LCM via prime factorisation

Irrationality proof method

Assume $\sqrt{p} = a/b$ (in lowest terms) → p divides a^2 → p divides a → p divides b → contradiction

Tip: Applies to √2, √3, √5 and combinations like 3 + 2√5

Ch 2. Polynomials

Sum of zeros (quadratic)

$\alpha + \beta = -b/a$

$ax^2 + bx + c = 0$

Product of zeros (quadratic)

$\alpha\beta = c/a$

Tip: 2025-26 syllabus covers quadratic polynomials only

Ch 3. Pair of Linear Equations in Two Variables

General form

$a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$

Tip: Two equations, two unknowns

Unique solution (consistent)

$a_1/a_2 \neq b_1/b_2$

Tip: Lines intersect at exactly one point

Infinitely many solutions

$a_1/a_2 = b_1/b_2 = c_1/c_2$

Tip: Lines coincide (dependent equations)

No solution (inconsistent)

$a_1/a_2 = b_1/b_2 \neq c_1/c_2$

Tip: Lines are parallel — no point of intersection

Ch 4. Quadratic Equations

Quadratic formula

$x = [-b \pm \sqrt{(b^2-4ac)}] / 2a$

b^2-4ac is the discriminant D

Tip: D > 0: two distinct real roots; D = 0: equal roots; D < 0: no real roots

Discriminant
$D = b^2 - 4ac$

Sum of roots
$x_1 + x_2 = -b/a$

Product of roots
$x_1 \times x_2 = c/a$

Ch 5. Arithmetic Progressions

nth term of AP
$a_n = a + (n-1)d$

a = first term, d = common difference, n = term number

Sum of n terms
$S_n = n/2 \times [2a + (n-1)d]$

Tip: Also written as $S_n = n/2 \times (a + l)$ where l is the last term

Common difference
$d = a_{n+1} - a_n$ (any consecutive pair)

Number of terms
$n = [(l - a)/d] + 1$

l = last term

Ch 6. Triangles

Basic Proportionality Theorem (BPT)
If DE ∥ BC, then AD/DB = AE/EC

Pythagoras Theorem
$AC^2 = AB^2 + BC^2$

In right triangle, AC = hypotenuse

Tip: Converse: if $AC^2 = AB^2 + BC^2$, then angle B = 90°

Area ratio of similar triangles
$\text{Area}(\triangle ABC)/\text{Area}(\triangle PQR) = (AB/PQ)^2 = (BC/QR)^2 = (CA/RP)^2$

Ch 7. Coordinate Geometry

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

Section formula (internal)
$P = [(mx_2+nx_1)/(m+n), (my_2+ny_1)/(m+n)]$

P divides AB in ratio m:n

Midpoint formula
$M = [(x_1+x_2)/2, (y_1+y_2)/2]$

Area of triangle
$\text{Area} = \frac{1}{2}|x_1(y_2-y_3) + x_2(y_3-y_1) + x_3(y_1-y_2)|$

Tip: If area = 0, points are collinear

Ch 8. Introduction to Trigonometry

Basic ratios
$\sin\theta = \text{opp/hyp}$, $\cos\theta = \text{adj/hyp}$, $\tan\theta = \text{opp/adj}$

Reciprocal ratios
$\text{cosec}\,\theta = 1/\sin\theta$, $\sec\theta = 1/\cos\theta$, $\cot\theta = 1/\tan\theta$

Pythagorean identity 1
$\sin^2\theta + \cos^2\theta = 1$

Pythagorean identity 2
$1 + \tan^2\theta = \sec^2\theta$

Pythagorean identity 3
$1 + \cot^2\theta = \text{cosec}^2\theta$

Standard angle values
$\sin 30° = ½$, $\sin 45° = 1/\sqrt{2}$, $\sin 60° = \sqrt{3}/2$, $\sin 90° = 1$

Tip: cos values: reverse order. tan 0°=0, 30°=1/√3, 45°=1, 60°=√3, 90°=undefined

Complementary angles
$\sin(90°-\theta) = \cos\theta$, $\cos(90°-\theta) = \sin\theta$, $\tan(90°-\theta) = \cot\theta$

Ch 9. Heights and Distances

Angle of elevation
$\tan\theta = \text{height} / \text{horizontal distance}$

Tip: Angle measured upward from horizontal to line of sight

Angle of depression
$\tan\theta = \text{height} / \text{horizontal distance}$

Tip: Angle measured downward from horizontal to line of sight; angle of depression = angle of elevation (alternate interior angles)

tan values for standard angles
$\tan 30° = 1/\sqrt{3}$ | $\tan 45° = 1$ | $\tan 60° = \sqrt{3}$

Tip: CBSE 2025-26 restricts angles to 30°, 45°, 60° only in problems

Shadow length
$\tan\theta = \text{height of object} / \text{length of shadow}$

θ = angle of elevation of sun

Tip: Longer shadow → smaller angle of elevation (sun is lower in sky)

Two-triangle problems
Set up two equations using tan for both angles; solve simultaneously

Tip: CBSE limits problems to max two right triangles

Ch 10. Circles

Tangent-radius angle
The tangent at any point of a circle is perpendicular to the radius through the point of contact → an

Equal tangents from external point
PA = PB (tangents from external point P to points A and B on circle are equal)

Tip: Derived from congruent triangles OAP and OBP

Tangent length
$PT = \sqrt{(d^2 - r^2)}$

P = external point, d = distance from P to centre, r = radius

Ch 11. Areas Related to Circles

Area of circle (cm²)
$A = \pi r^2$

Circumference of circle (cm)
$C = 2\pi r$

Length of arc
$l = (\theta/360°) \times 2\pi r$

θ = central angle in degrees

Area of sector
$A = (\theta/360°) \times \pi r^2$

Tip: Sector = 'pizza slice'

Area of minor segment
Area = Area of sector − Area of triangle

Tip: Triangle formed by the two radii and the chord

Area of major segment
Area = Area of circle − Area of minor segment

Ch 12. Surface Areas and Volumes

Sphere: Volume (cm³)
$V = (4/3)\pi r^3$

Sphere: Surface area (cm²)
$SA = 4\pi r^2$

Hemisphere: Volume
$V = (2/3)\pi r^3$

Hemisphere: Curved SA
$CSA = 2\pi r^2$

Cylinder: Volume
$V = \pi r^2 h$

Cylinder: Curved SA
$CSA = 2\pi rh$

Cone: Volume
$V = (1/3)\pi r^2 h$

Cone: Slant height
$l = \sqrt{(r^2 + h^2)}$

Cone: Curved SA
$CSA = \pi rl$

Cube: Volume
$V = a^3$

a = side length

Cube: Total SA
$TSA = 6a^2$

Cuboid: Volume
$V = l \times b \times h$

l = length, b = breadth, h = height

Cuboid: Total SA
$TSA = 2(lb + bh + lh)$

Ch 13. Statistics

Mean (direct method)
$\bar{x} = \Sigma f_i x_i / \Sigma f_i$

Mean (assumed mean)
$\bar{x} = a + (\Sigma f_i d_i / \Sigma f_i)$

$d_i = x_i - a$, a = assumed mean

Mean (step deviation)
$\bar{x} = a + h \times (\Sigma f_i u_i / \Sigma f_i)$

$u_i = (x_i - a)/h$, h = class width, a = assumed mean

Tip: Most efficient method for equal class widths — use when numbers are large

Median
$M = l + [(n/2 - cf)/f] \times h$

l = lower limit of median class, cf = cumulative frequency before median class, f = frequency of median class, h = class size

Mode
$Mode = l + [(f_1 - f_0)/(2f_1 - f_0 - f_2)] \times h$

f_1 = modal class frequency, f_0 = preceding class frequency, f_2 = succeeding class frequency

Empirical relationship
$Mode = 3(Median) - 2(Mean)$

Ch 14. Probability

Probability of event
$P(E) = \text{Number of favourable outcomes} / \text{Total outcomes}$

Complement rule
$P(\bar{E}) = 1 - P(E)$

Impossible event
$P(\text{impossible event}) = 0$

Sure event
$P(\text{sure event}) = 1$

Range

$0 \leq P(E) \leq 1$