Maths Formula Sheet

Chapter by chapter, topic by topic. Written by the PadhoNa team for quick revision.

Unlock the full PadhoNa Test Series
Every chapter-wise JEE Main test on the real exam screen, with full solutions and automatic analysis. Plans from ₹99 a month.
padhona.com/go/test-series →

CHAPTER 23

Straight Lines

Distance, section and locus

DISTANCE

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

SECTION FORMULA

$$\left(\frac{mx_2 + nx_1}{m+n},\ \frac{my_2 + ny_1}{m+n}\right) \text{ internal;} \qquad m \to -m \text{ for external}$$

AREA OF A TRIANGLE

$$\Delta = \frac{1}{2}\left|x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)\right|$$

Centres of a triangle

CENTROID

$$G = \left(\frac{x_1 + x_2 + x_3}{3},\ \frac{y_1 + y_2 + y_3}{3}\right)$$

INCENTRE

$$I = \left(\frac{ax_1 + bx_2 + cx_3}{a+b+c},\ \frac{ay_1 + by_2 + cy_3}{a+b+c}\right)$$

EULER LINE

$$O,\ G,\ H \text{ collinear;} \qquad HG : GO = 2 : 1$$

O circumcentre, H orthocentre.

Equations of a line

$$y = mx + c; \qquad y - y_1 = m(x - x_1); \qquad \frac{x}{a} + \frac{y}{b} = 1; \qquad x\cos\alpha + y\sin\alpha = p$$

TWO POINTS

$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$$

PARAMETRIC

$$\frac{x - x_1}{\cos\theta} = \frac{y - y_1}{\sin\theta} = r$$

Angle, distance and position

ANGLE BETWEEN LINES

$$\tan\theta = \left|\frac{m_1 - m_2}{1 + m_1 m_2}\right|; \qquad \parallel:\ m_1 = m_2; \qquad \perp:\ m_1 m_2 = -1$$

POINT TO LINE

$$d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

PARALLEL LINES

$$d = \frac{|c_1 - c_2|}{\sqrt{a^2 + b^2}}$$

FOOT AND IMAGE

$$\frac{x - x_1}{a} = \frac{y - y_1}{b} = -\frac{ax_1 + by_1 + c}{a^2 + b^2}\ \text{(foot)}, \qquad = -\frac{2(ax_1 + by_1 + c)}{a^2 + b^2}\ \text{(image)}$$

SAME SIDE

$$P, Q \text{ on the same side of } ax + by + c = 0 \iff (ax_1 + by_1 + c)(ax_2 + by_2 + c) > 0$$

Family of lines and pair of lines

FAMILY

$$L_1 + \lambda L_2 = 0 \text{ passes through } L_1 \cap L_2$$

CONCURRENCY

$$\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} = 0$$

ANGLE BISECTORS

$$\frac{a_1x + b_1y + c_1}{\sqrt{a_1^2 + b_1^2}} = \pm\frac{a_2x + b_2y + c_2}{\sqrt{a_2^2 + b_2^2}}$$

PAIR OF LINES

$$ax^2 + 2hxy + by^2 = 0:\ \ \tan\theta = \frac{2\sqrt{h^2 - ab}}{|a + b|}; \qquad \perp \text{ if } a + b = 0$$

REPRESENTS A PAIR

$$ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0 : \quad abc + 2fgh - af^2 - bg^2 - ch^2 = 0$$

Unlock the full PadhoNa Test Series

Every chapter-wise JEE Main test on the real exam screen, with full solutions and automatic analysis. Plans from ₹99 a month.

padhona.com/go/test-series →

Keep going with PadhoNa

Unlock the full PadhoNa Test Series

Every chapter-wise JEE Main test on the real exam screen, with full solutions and automatic analysis. Plans from ₹99 a month.

padhona.com/go/test-series →

PadhoNa Pro Maths notes

Complete, exam-focused Maths notes by the PadhoNa team: ₹99 for a year.

padhona.com/go/notes/maths →

Physics, Chemistry and Maths notes together

PadhoNa Pro · JEE: all three subjects for ₹249 a year, for JEE Main and Advanced.

padhona.com/go/pro →

© PadhoNa · padhona.com · This sheet is for personal study.