Maths Formula Sheet

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

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CHAPTER 24

Circle

Equations

CENTRE–RADIUS

$$(x-h)^2+(y-k)^2=r^2$$

GENERAL

$$x^2+y^2+2gx+2fy+c=0:\ \text{centre}\ (-g,-f),\ r=\sqrt{g^2+f^2-c}$$

DIAMETER FORM

$$(x-x_1)(x-x_2)+(y-y_1)(y-y_2)=0$$

PARAMETRIC

$$x=h+r\cos\theta,\ \ y=k+r\sin\theta$$

Point, line and power

POWER OF A POINT

$$S_1=x_1^2+y_1^2+2gx_1+2fy_1+c:\ \ S_1<0\ \text{inside},\ =0\ \text{on},\ >0\ \text{outside}$$

LINE AND CIRCLE

$$\text{perpendicular distance from centre}\ <,=,>\ r:\ \text{secant, tangent, misses}$$

TANGENT CONDITION

$$y=mx+c\ \text{touches}\ x^2+y^2=a^2\iff c^2=a^2(1+m^2)$$

Tangent, normal and chord

TANGENT AT A POINT

$$T=0:\ \ xx_1+yy_1+g(x+x_1)+f(y+y_1)+c=0$$

LENGTH OF TANGENT

$$\sqrt{S_1}$$

CHORD WITH GIVEN MIDPOINT

$$T = S_1$$

CHORD OF CONTACT

$$T = 0 \text{ (from an outside point)}$$

PAIR OF TANGENTS

$$SS_1 = T^2$$

NORMAL

always passes through the centre

Two circles

COMMON TANGENTS

$$d > r_1 + r_2 : 4;\ \ d = r_1 + r_2 : 3;\ \ |r_1 - r_2| < d < r_1 + r_2 : 2;\ \ d = |r_1 - r_2| : 1;\ \ d < |r_1 - r_2| : 0$$

ORTHOGONAL CIRCLES

$$2g_1g_2 + 2f_1f_2 = c_1 + c_2$$

RADICAL AXIS / COMMON CHORD

$$S_1 - S_2 = 0$$

FAMILY

$$S + \lambda L = 0, \qquad S_1 + \lambda S_2 = 0$$

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