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Notes - Parabola

- Parametric Eq^n of parabola :

$y^2 = 4ax \rightarrow x = at^2, \; y = 2at$

$y^2 = -4ax \rightarrow x = -at^2, \; y = 2at$

$x^2 = 4ay \rightarrow x = 2at, \; y = at^2$

$x^2 = -4ay \rightarrow x = 2at, \; y = -at^2$

$(y-k)^2 = 4a(x-h) \rightarrow x = h + at^2, \; y = k + 2at$

- Eq^n of tangents of Parabola in parametric form :

Eq^n of tangent of the parabola $y^2 = 4ax$ at the point $(at^2, 2at)$ is $\boxed{ty = x + at^2}$

- Eq^n of normal of Parabola in parametric form -

Eq^n of normal to the parabola $y^2 = 4ax$ at the point $(at^2, 2at)$ is given by $\boxed{y = at^3 + 2at - tx}$

- Eqⁿ of the chord joining P and Q point on parabola in parametric form :-

The equation of the chord joining the points t_1 and t_2 on the parabola $y^2 = 4ax$ is

$$\boxed{y(t_1+t_2) = 2x + 2at_1t_2}$$

- Point of intersection of tangents at two different points on the parabola $y^2 = 4ax$:-

let $P \equiv (at_1^2, 2at_1)$ & $Q \equiv (at_2^2, 2at_2)$

Point of intersection $= (at_1t_2, a(t_1+t_2))$