

3. PARABOLA

1. Equation of standard parabola :

$y^2 = 4ax$, Vertex is $(0, 0)$, focus is $(a, 0)$, Directrix is $x + a = 0$ and Axis is $y = 0$
Length of the latus rectum = $4a$, ends of the latus rectum are $L(a, 2a)$ & $L'(a, -2a)$.

2. Parametric Representation: $x = at^2$ & $y = 2at$

3. Tangents to the Parabola $y^2 = 4ax$:

1. Slope form $y = mx + \frac{a}{m}$ ($m \neq 0$)

2. Parametric form $ty = x + at^2$

3. Point form $T = 0$

4. Normals to the parabola $y^2 = 4ax$:

$y - y_1 = -\frac{y_1}{2a} (x - x_1)$ at (x_1, y_1) ; $y = mx - 2am - am^3$ at $(am^2, -2am)$; $y + tx = 2at + at^3$ at $(at^2, 2at)$.