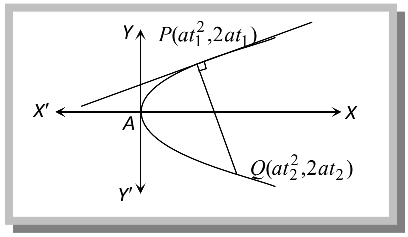
Relation between 't$_1$' and 't$_2$' if Normal at 't$_1$' meets the Parabola again at 't$_2$'

If the normal at the point $P(at_1^2, 2at_1)$ meets the parabola $y^2 = 4ax$ again at $Q(at_2^2, 2at_2)$, then

$$t_2 = -t_1 - \frac{2}{t_1}$$



Important Tips

- If the normals at points $(at_1^2, 2at)$ and $(at_2^2, 2at_2)$ on the parabola $y^2 = 4ax$ meet on the parabola then $t_1 t_2 = 2$
- If the normal at a point $P(at^2, 2at)$ to the parabola $y^2 = 4ax$ subtends a right angle at the vertex of the parabola then $t^2 = 2$.
- If the normal to a parabola $y^2 = 4ax$, makes an angle ϕ with the axis, then it will cut the curve again at an angle $\tan^{-1}\left(\frac{1}{2}\tan\phi\right)$.
- The normal chord to a parabola $y^2 = 4ax$ at the point whose ordinate is equal to abscissa subtends a right angle at the focus.
    - If the normal at two points P and Q of a parabola $y^2 = 4ax$ intersect at a third point R on the curve. Then the product of the ordinate of P and Q is $8a^2$.