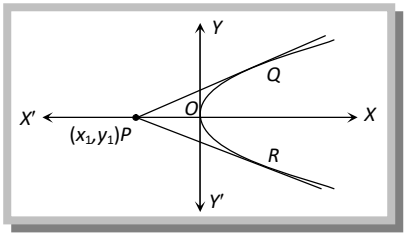
Equation of Pair of Tangents from a point to a Parabola.

If $y_1^2 - 4ax_1 > 0$, then any point $P(x_1, y_1)$ lies out side the parabola and a pair of tangents PQ, PR can be drawn to it from P

The combined equation of the pair of the tangents drawn from a point to a parabola is $SS' = T^2$ where $S = y^2 - 4ax; S' = y_1^2 - 4ax_1$ and $T = yy_1 - 2a(x + x_1)$



Note: The two tangents can be drawn from a point to a parabola. The two tangent are real and distinct or coincident or imaginary according as the given point lies outside, on or inside the parabola.

Important Tips

- Tangents at the extremities of any focal chord of a parabola meet at right angles on the directrix.
- Area of the triangle formed by three points on a parabola is twice the area of the triangle formed by the tangents at these points.
- If the tangents at the points P and Q on a parabola meet in T, then ST is the geometric mean between SP and SQ, i.e. $ST^2 = SP.SQ$
- Tangent at one extremity of the focal chord of a parabola is parallel to the normal at the other extremity.
- The angle of intersection of two parabolas $y^2 = 4ax$ and $x^2 = 4by$ is given by $\tan^{-1}\frac{3a^{1/3}b^{1/3}}{2(a^{2/3} + b^{2/3})}$