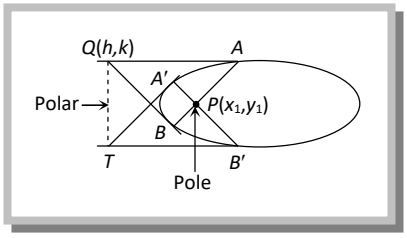
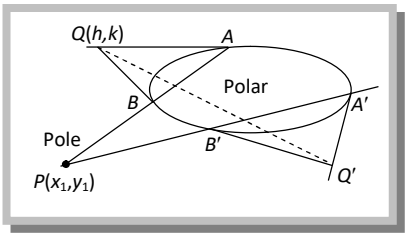
Pole and Polar.

Let $P(x_1,y_1)$ be any point inside or outside the ellipse. A chord through P intersects the ellipse at A and B respectively. If tangents to the ellipse at A and B meet at Q (h,k)then locus of Q is called polar of P with respect to ellipse and point P is called pole.



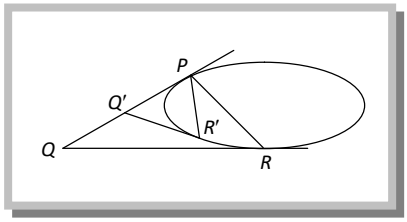


Equation of polar: Equation of polar of the point (x_1,y_1) with respect to ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is given by

$\frac{xx_1}{a^2}+\frac{yy_1}{b^2}=1$ (i.e. $T=0$)

Coordinates of pole: The pole of the line $lx+my+n=0$ with respect to ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is

$P\left(\frac{-a^2l}{n},\frac{-b^2m}{n}\right)$



Note: The polar of any point on the directrix, passes through the focus.
Any tangent is the polar of its own point of contact.

Properties of pole and polar

(1) If the polar of $P(x_1,y_1)$ passes through $Q(x_2,y_2)$, then the polar of $Q(x_2,y_2)$ goes through $P(x_1,y_1)$ and such points are said to be conjugate points.

(2) If the pole of a line $l_1x + m_1y + n_1 = 0$ lies on the another line $l_2x + m_2y + n_2 = 0$, then the pole of the second line will lie on the first and such lines are said to be conjugate lines.

(3) Pole of a given line is same as point of intersection of tangents at its extremities.