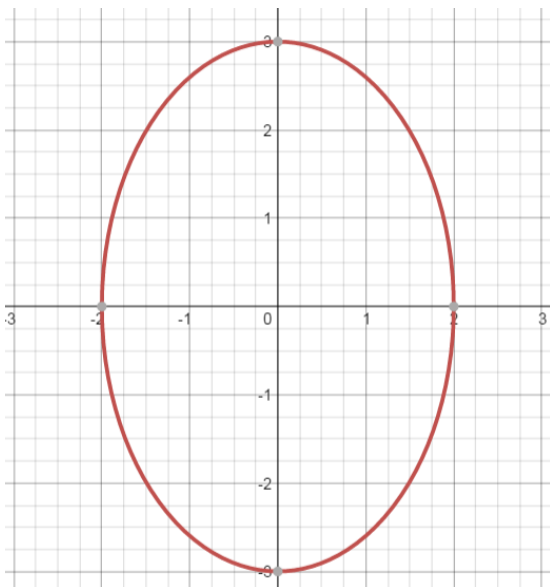# The Ellipse

1) State the parametric equations of the ellipse and derive the Cartesian equation for the ellipse.

2) By putting into standard form sketch the ellipse E given by the equation
$$4x^2 + 9y^2 = 36$$

3) Identify the values for a and b for the ellipse below and hence state the equation.

4) Find the general form for the equation of a tangent to the ellipse at the point $P(a \cos(t), \ b \sin(t))$.

5) Similarly to question 4, find the general form for the equation of the normal to the ellipse at the point $P(\ a \cos(t), b \sin(t))$.

6) Find a condition such that the line $y = mx + c$ is a tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

7) The point $P\left(2, 3\frac{\sqrt{3}}{2}\right)$ lies on the ellipse E with parametric equations $x = 4\cos(\theta)$, $y = 3\sin(\theta)$. The normal to the ellipse at P cuts the $x - axis$ at the point A. Find the coordinates of the point A.