Core 1 - Circles

Challenge 1

A circle has equation $x^2 + y^2 + 2x - 6y = 0$.

(a) Find the radius of the circle, and the coordinates of its centre. *(4 marks)*

(b) Find the equation of the tangent to the circle at the point (2, 4). *(5 marks)*

Challenge 2

A circle has the equation

$$(x-3)^2+(y-4)^2=16.$$

The point A has coordinates $\left(\frac{3}{5},\frac{4}{5}\right)$.

(a) Show that A lies on the circle. *(1 mark)*

(b) Sketch the circle. *(2 marks)*

(c) Show that the normal to the circle at A passes through the origin. *(3 marks)*

(d) Find the equation of the tangent to the circle at A, giving your answer in the form

$$ax+by=c,$$

where a, b and c are integers. *(4 marks)*

Challenge 3

A circle has the equation

$$x^2 + y^2 + 4x - 14y + 4 = 0.$$

(a) Find the radius of the circle and the coordinates of its centre. *(5 marks)*

(b) Sketch the circle. *(2 marks)*

(c) Find the length of a tangent from the point $P(6, 8)$ to the circle. *(4 marks)*

Final Challenge

A circle has equation

$$x^2 + y^2 - 4x + 4y - 12 = 0.$$

(a) Find:

(i) the coordinates of the centre of the circle;

(ii) the radius of the circle. *(5 marks)*

(b) Find the coordinates of the **two** points where the circle crosses the x-axis. *(3 marks)*

(c) Find the equation of the tangent to the circle at the point $(4, 2)$. *(4 marks)*