1 The line with equation $y + x = 5$ meets the circle with equation $x^2 + y^2 - 8x + 2y - 3 = 0$ at the points P and Q.

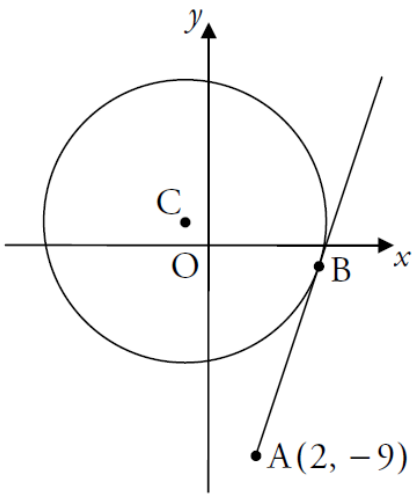
(a) Find the coordinates of P and Q. **4**

(b) Find the equation of the circle which has PQ as its diameter. **3**

2 For what values of k is the line with equation $y = \frac{3}{4}x + k$ a tangent to the circle with equation $x^2 + y^2 = 16$? **5**

3 The circle with centre $(8, a)$ passes through the points $(3, 3)$ and $(5, 1)$. Find the value of a and hence find the equation of the circle. **3**

4 The circle with equation $(x+1)^2 + (y-1)^2 = 36$ is shown in the diagram below.



The line through A and B is a tangent to the circle at B.

A is the point $(2, -9)$.

Find the area of triangle ABC. **5**

20 Marks