

CIRCLE (Q 1, PAPER 2)

1999

1 (a) Find the Cartesian equation of the circle

$$x = 6 + \cos \theta, \quad y = 4 + \sin \theta,$$

where $0 \leq \theta \leq 2\pi$.

1 (b) The equation of a circle with radius length 7 is

$$x^2 + y^2 - 10kx + 6y + 60 = 0 \quad \text{where } k > 0.$$

(i) Find the centre of the circle in terms of k .

(ii) Find the value of k .

(iii) The line $3x + 4y + d = 0$ is a tangent to the circle, where $d \in \mathbf{Z}$.

Show that one value for d is 17.

Find the other value for d .

1 (c) Two circles intersect at the points $a(1, 2)$ and $b(7, -6)$. The line joining the centres of the circles is the perpendicular bisector of $[ab]$.

The distance from the centre of each circle to the midpoint of $[ab]$ is 10.

Find the midpoint of $[ab]$ and the radius length of each circle.

Find the equation of each circle.

ANSWERS

1 (a) $(x - 6)^2 + (y - 4)^2 = 1$

1 (b) (i) $(5k, -3)$ (ii) $k = 2$ (iii) $d = -53$

1 (c) $(4, -2), r = 5\sqrt{5}$

$$x^2 + y^2 - 24x - 8y + 35 = 0, \quad x^2 + y^2 + 8x + 16y - 45 = 0$$