CIRCLE (Q 1, PAPER 2)

2002

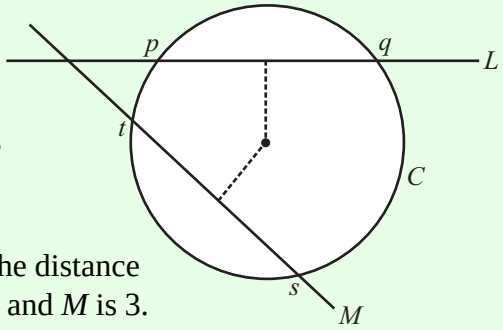
1 (a) The following parametric equations define a circle: $x = 4 + 3\cos\theta$, $y = -2 + 3\sin\theta$, where $\theta \in \mathbf{R}$. What is the Cartesian equation of the circle?

1 (b) The points $a(-2, 4)$, $b(0, -10)$ and $c(6, -2)$ are the vertices of a triangle.

(i) Verify the the triangle is right-angled at c.

(ii) Hence, or otherwise, find the equation of the circle that passes through the points a, b and c.

1 (c) The circle C has equation $x^2 + y^2 - 4x + 6y - 12 = 0$. L intersects C at the points p and q. M intersects C at the points t and s. $|pq| = |ts| = 8$.



(i) Find the radius of C and hence show that the distance from the centre of C to each of the lines L and M is 3.

(ii) Given that L and M intersect at the point $(-4, 0)$, find the equations of L and M.

ANSWERS

1 (a) $(x-4)^2 + (y+2)^2 = 9$

1 (b) (ii) $x^2 + y^2 + 2x + 6y - 40 = 0$

1 (c) (ii) L: $y = 0$; M: $4x + 3y + 16 = 0$