93. The circle C has centre A and equation

$$x^2 + y^2 - 8x + 2y + 7 = 0.$$

(a) Find the coordinates of A and the radius of C. [3]

(b) The point P has coordinates $(7, -2)$.

    (i) Verify that P lies on C.

    (ii) Given that the point Q is such that PQ is a diameter of C, find the coordinates of Q. [4]

(c) The line L has equation $y = 2x - 4$. Find the coordinates of the points of intersection of L and C. [4]

94. The circle C has centre A and equation

$$x^2 + y^2 - 2x + 6y - 15 = 0.$$

(a) (i) Write down the coordinates of A.

    (ii) The point P has coordinates $(4, -7)$ and lies on C. Find the equation of the tangent to C at P. [5]

(b) The line L has equation $y = x + 4$. Show that L and C do not intersect. [4]

95. The circle C_1 has centre A and equation

$$x^2 + y^2 - 4x + 2y - 20 = 0.$$

(a) Find the coordinates of A and the radius of C_1. [3]

(b) A second circle C_2 has centre $B(8, -9)$ and radius 15.

    (i) Show that C_1 and C_2 touch, justifying your answer.

    (ii) Given that the circles touch at the point $P(-1, 3)$, find the equation of the common tangent. [7]

96. The circle C has centre A and radius r. The points $P(3, -8)$ and $Q(5, 6)$ are at either end of a diameter of C.

(a) (i) Write down the coordinates of A.

    (ii) Show that $r = \sqrt{50}$.

    (iii) Write down the equation of C. [4]

(b) Verify that the point $R(9, -6)$ lies on C. [2]

(c) Find $P\hat{Q}R$. [3]