Fig. 11 shows a sketch of the circle with equation \((x-10)^2 + (y-2)^2 = 125\) and centre C. The points A, B, D and E are the intersections of the circle with the axes.

(i) Write down the radius of the circle and the coordinates of C. [2]

(ii) Verify that B is the point (21, 0) and find the coordinates of A, D and E. [4]

(iii) Find the equation of the perpendicular bisector of BE and verify that this line passes through C. [6]
2 Fig. 10 shows a sketch of a circle with centre C(4, 2). The circle intersects the x-axis at A(1, 0) and at B.

(i) Write down the coordinates of B. [1]

(ii) Find the radius of the circle and hence write down the equation of the circle. [4]

(iii) AD is a diameter of the circle. Find the coordinates of D. [2]

(iv) Find the equation of the tangent to the circle at D. Give your answer in the form $y = ax + b$. [4]

3 The circle $(x - 3)^2 + (y - 2)^2 = 20$ has centre C.

(i) Write down the radius of the circle and the coordinates of C. [2]

(ii) Find the coordinates of the intersections of the circle with the x- and y-axes. [5]

(iii) Show that the points A(1, 6) and B(7, 4) lie on the circle. Find the coordinates of the midpoint of AB. Find also the distance of the chord AB from the centre of the circle. [5]
4 A circle has diameter \( d \), circumference \( C \), and area \( A \). Starting with the standard formulae for a circle, show that \( Cd = kA \), finding the numerical value of \( k \). [3]

5 A circle has equation \((x - 2)^2 + y^2 = 20\).

(i) Write down the radius of the circle and the coordinates of its centre. [2]

(ii) Find the points of intersection of the circle with the \( y \)-axis and sketch the circle. [3]

(iii) Show that, where the line \( y = 2x + k \) intersects the circle,

\[
5x^2 + (4k - 4)x + k^2 - 16 = 0.
\] [3]

(iv) Hence find the values of \( k \) for which the line \( y = 2x + k \) is a tangent to the circle. [4]