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

(i) State the coordinates of the centre and the radius of this circle. **[2]**

(ii) State, with a reason, whether or not this circle intersects the y-axis. **[2]**

(iii) Find the equation of the line parallel to the line $y = 2x$ that passes through the centre of the circle. **[2]**

(iv) Show that the line $y = 2x + 2$ is a tangent to the circle. State the coordinates of the point of contact. **[5]**

11

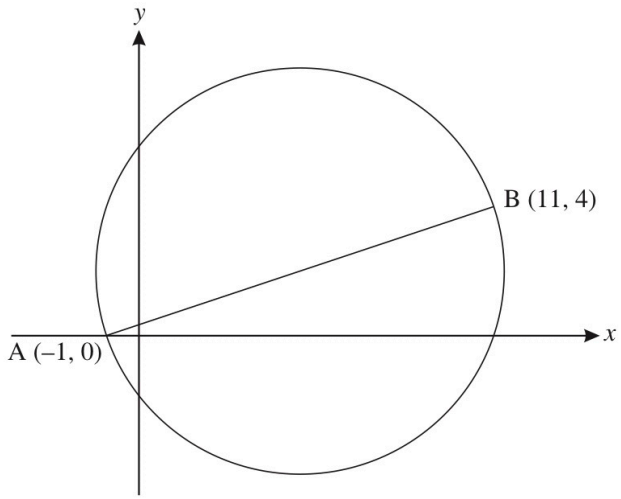

Fig. 11

Fig. 11 shows the points A and B, which have coordinates (−1, 0) and (11, 4) respectively.

(i) Show that the equation of the circle with AB as diameter may be written as

$$(x - 5)^2 + (y - 2)^2 = 40.$$ **[4]**

(ii) Find the coordinates of the points of intersection of this circle with the y-axis. Give your answer in the form $a \pm \sqrt{b}$. **[4]**

(iii) Find the equation of the tangent to the circle at B. Hence find the coordinates of the points of intersection of this tangent with the axes. **[6]**