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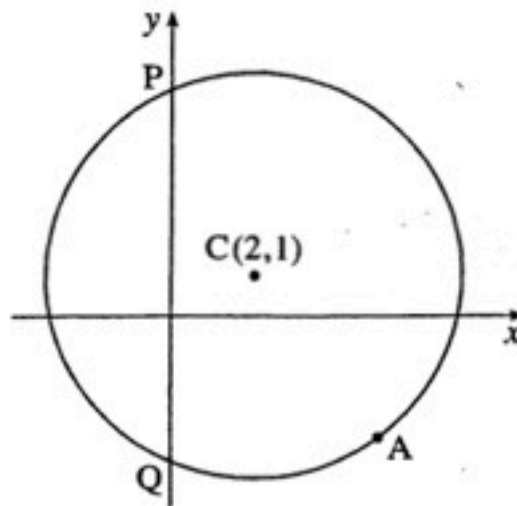


Fig. 10

Fig. 10 shows a circle with centre $C(2, 1)$ and radius 5.

- (i) Show that the equation of the circle may be written as

$$x^2 + y^2 - 4x - 2y - 20 = 0. \quad [3]$$

- (ii) Find the coordinates of the points P and Q where the circle cuts the y-axis. Leave your answers in the form $a \pm \sqrt{b}$. [3]

- (iii) Verify that the point $A(5, -3)$ lies on the circle.

Show that the tangent to the circle at A has equation $4y = 3x - 27$. [6]

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- 2 The points $A(0, 2)$, $B(7, 9)$ and $C(6, 10)$ lie on the circumference of a circle, as shown in Fig.11.

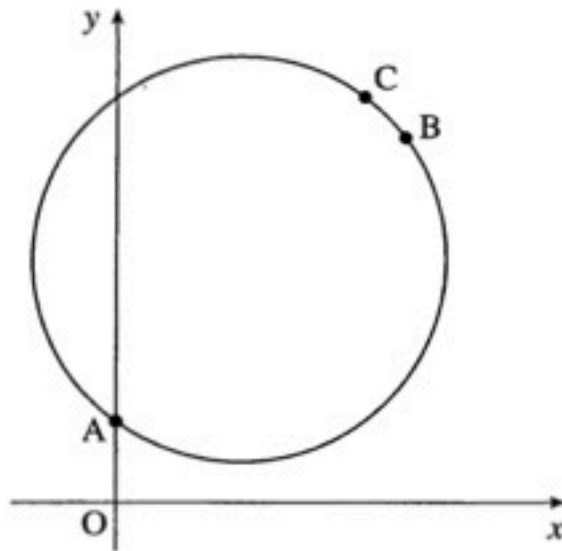


Fig. 11

- (i) Find the length of AC.

Prove that triangle ABC is right-angled at B.

[4]

- (ii) Hence show that the centre of the circle is $(3, 6)$ and its radius is 5.

Find the equation of the circle.

[4]

- (iii) Find an equation for the tangent to the circle at C.

Find the coordinates of the points where this tangent crosses the axes.

[5]

- 3 A circle has equation $x^2 + y^2 = 45$.

- (i) State the centre and radius of this circle.

[2]

- (ii) The circle intersects the line with equation $x + y = 3$ at two points, A and B. Find algebraically the coordinates of A and B.

Show that the distance AB is $\sqrt{162}$.

[8]

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4 A(9, 8), B(5, 0) and C(3, 1) are three points.

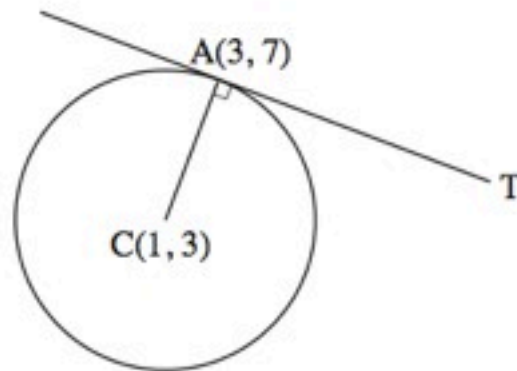
(i) Show that AB and BC are perpendicular. [3]

(ii) Find the equation of the circle with AC as diameter. You need not simplify your answer.

Show that B lies on this circle. [6]

(iii) BD is a diameter of the circle. Find the coordinates of D. [3]

5



Not to scale

Fig. 11

A circle has centre C(1, 3) and passes through the point A(3, 7) as shown in Fig. 11.

(i) Show that the equation of the tangent at A is $x + 2y = 17$. [4]

(ii) The line with equation $y = 2x - 9$ intersects this tangent at the point T.

Find the coordinates of T. [3]

(iii) The equation of the circle is $(x - 1)^2 + (y - 3)^2 = 20$.

Show that the line with equation $y = 2x - 9$ is a tangent to the circle. Give the coordinates of the point where this tangent touches the circle. [5]