

Finding the equation of a circle

A LEVEL LINKS

Scheme of work: 2a. Straight-line graphs, parallel/perpendicular, length and area problems

Practice question

1

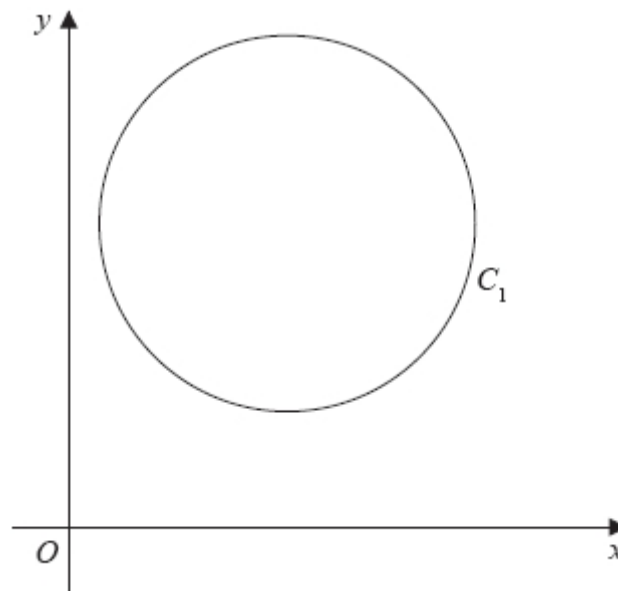


Figure 5

Figure 5 shows a sketch of the circle C_1

The points $A(1, 4)$ and $B(7, 8)$ lie on C_1

Given that AB is a diameter of the circle C_1

- (a) find the coordinates for the centre of C_1

- (b) find the exact radius of C_1 simplifying your answer.

Two distinct circles C_2 and C_3 each have centre $(0, 0)$.

Given that each of these circles touch circle C_1

- (c) find the equation of circle C_2 and the equation of circle C_3

- 2 The line joining the points $(-1,4)$ and $(3,6)$ is a diameter of the circle C .

Find an equation for C .

Answer

1 a $\left(\frac{1+7}{2}, \frac{4+8}{2}\right) = (4, 6)$

b $\frac{\sqrt{(7-1)^2 + (8-4)^2}}{2}$ Or $\sqrt{(4-1)^2 + (6-4)^2}$ Or $\sqrt{(7-4)^2 + (8-6)^2}$
 (Radius of circle) = $\sqrt{13}$

c Equation of C_1 is $x^2 + y^2 = r^2$
 Attempts either value of r as $\left(\sqrt{4^2 + 6^2} \pm \text{their } r\right)$
 When $r = \sqrt{52} - \sqrt{13} = \sqrt{13} \Rightarrow x^2 + y^2 = 13$
 When $r = \sqrt{52} + \sqrt{13} = 3\sqrt{13} \Rightarrow x^2 + y^2 = 117$

2 $(x - 1)^2 + (y - 5)^2 = 5$