

Equations of Circles

ANSWERS

Calculator | 30 minutes | Total marks: 22

Name _____ Class _____

- 1 (a) Write down the equation of the circle with centre (0, 0) and radius 5

Answer $x^2 + y^2 = 25$ (1) [1 mark]

- (b) Write down the radius of the circle $x^2 + y^2 = 81$

Answer 9 (1) [1 mark]

- (c) Write down the exact radius of the circle $x^2 + y^2 = 20$

Answer $\sqrt{20}$ or $2\sqrt{5}$ (1) [1 mark]

- 2 (a) Show that the point (3, 4) lies on the circle $x^2 + y^2 = 25$

$$3^2 + 4^2 = 9 + 16 = 25 \text{ (1)}$$

[1 mark]

- (b) Is the point (5, 2) inside or outside the circle $x^2 + y^2 = 30$?

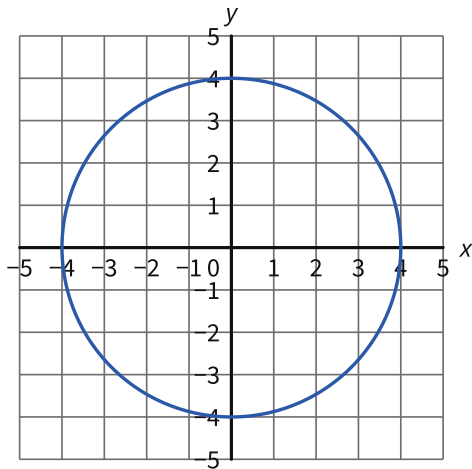
You **must** show your working.

$$5^2 + 2^2 = 29 \text{ (1)}$$

29 is less than 30, so inside (1)

[2 marks]

3



On the grid, draw the graph of $x^2 + y^2 = 16$

Radius 4 (1) Centre (0, 0) (1)

[2 marks]

4

The point (3, 4) lies on the circle $x^2 + y^2 = 25$

(a) Write down the gradient of the radius from (0, 0) to (3, 4)

Answer $\frac{4}{3}$ (1)

[1 mark]

(b) Write down the gradient of the tangent to the circle at (3, 4)

Answer $-\frac{3}{4}$ (1)

[1 mark]

(c) Work out the equation of the tangent to the circle at (3, 4)

Give your answer in the form $y = mx + c$

$$4 = -\frac{3}{4} \times 3 + c \quad (1)$$

$$c = \frac{25}{4} \quad (1)$$

Answer $y = -\frac{3}{4}x + \frac{25}{4}$ (1)

[3 marks]

5

The point (-2, 4) lies on the circle $x^2 + y^2 = 20$

Work out the equation of the tangent to the circle at (-2, 4)

$$\text{gradient of radius} = \frac{4}{-2} = -2 \quad (1)$$

$$\text{gradient of tangent} = \frac{1}{2} \quad (1)$$

$$4 = \frac{1}{2} \times -2 + c, \text{ so } c = 5 \quad (1)$$

Answer $y = \frac{1}{2}x + 5$ (1)

[4 marks]

6

The point $(1, 3)$ lies on the circle $x^2 + y^2 = 10$

The tangent to the circle at $(1, 3)$ crosses the x -axis at the point P .

Work out the coordinates of P .

$$\text{gradient of radius} = 3, \text{ so gradient of tangent} = -\frac{1}{3} \quad (1)(1)$$

$$3 = -\frac{1}{3} \times 1 + c, \text{ so } c = \frac{10}{3} \quad (1)$$

$$0 = -\frac{1}{3}x + \frac{10}{3} \quad (1)$$

Answer $(10, 0) \quad (1)$

[5 marks]

Question	Topic	RAG
1	I know the equation of a circle centred on the origin	
2	I can test whether a point is on, inside or outside a circle	
3	I can draw a circle from its equation	
4	I can find the gradient and equation of a tangent	
5	I can find the equation of a tangent to a circle	
6	I can solve a problem with a tangent to a circle	