HIGHER ONLY
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Name ..... Class .....

A16: Equation of a circle

Circles centred at the origin; tangents

20 marks · 25 minutes · Non-calculator

1) A circle has equation $x^2 + y^2 = 49$

(a) State the coordinates of its centre.

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(1)

(b) Write down its radius.

.....

(1)

[Question 1: 2 marks]

2) Write down the equation of the circle with centre $(0, 0)$ and radius 5

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[Question 2: 1 marks]

3) Does the point $(6, -3)$ lie on the circle $x^2 + y^2 = 45$? Show your working.

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[Question 3: 2 marks]

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

Find the equation of the tangent to the circle at P.

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[Question 4: 4 marks]

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5) Find the coordinates of the points where $x^2 + y^2 = 20$ crosses the x-axis. Give your answers as surds in simplest form.

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[Question 5: 1 marks]

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6) A circle has equation $x^2 + y^2 = 36$

(a) Write down its radius.

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(1)

(b) Is the point (4, 5) inside, on or outside the circle? Show your working.

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(2)

[Question 6: 3 marks]

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7) A circle has centre (0, 0) and passes through (5, 12). Find its equation.

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[Question 7: 2 marks]

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8) The point $(1, 3)$ lies on the circle $x^2 + y^2 = 10$. Find the equation of the tangent at this point.

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[Question 8: 3 marks]

9) Find the points on the circle $x^2 + y^2 = 25$ where $x = 3$

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[Question 9: 2 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	(a) $(0, 0)$ (b) 7	B1 each.
2	$x^2 + y^2 = 25$	B1.
3	Yes	$6^2 + (-3)^2 = 36 + 9$ (M1); $= 45$ so yes (A1).
4	$y = -\frac{3}{4}x + \frac{25}{4}$	Gradient of $OP = \frac{4}{3}$ (M1); tangent gradient $-\frac{3}{4}$ (M1); $y - 4 = -\frac{3}{4}(x - 3)$ (M1); A1 (accept $3x + 4y = 25$).
5	$(2\sqrt{5}, 0)$, $(-2\sqrt{5}, 0)$	B1.
6	(a) 6 (b) outside	(a) B1. (b) $16 + 25 = 41$ (M1); $41 > 36$ so outside (A1).
7	$x^2 + y^2 = 169$	$r^2 = 25 + 144$ (M1); A1.
8	$y = -\frac{1}{3}x + \frac{10}{3}$	Radius gradient 3 (M1); tangent gradient $-\frac{1}{3}$ (M1); A1 (accept $x + 3y = 10$).
9	$(3, 4)$ and $(3, -4)$	$y^2 = 16$ (M1); A1.