3.2 Coordinate Geometry of the Circle: 30-minute Pack

AQA 8365 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A circle has equation $(x - 1)^2 + (y - 2)^2 = 25$. Is the point P(-2, 6) inside the circle, on the circle or outside the circle? You must show your working.

(Total for Question 1 is 3 marks)

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2 A circle has equation $(x + 3)^2 + (y + 3)^2 = 225$. The line $y = -12$ cuts the circle at two points, P and Q. Find the length of PQ.

(Total for Question 2 is 4 marks)

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3 Write down the equation of the circle with centre (-7, -7) and radius 3.

(Total for Question 3 is 2 marks)

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4 A circle has equation $x^2 + y^2 + 8x - 2y + 8 = 0$.

(a) Show that this equation can be written as $(x + 4)^2 + (y - 1)^2 = 9$. **(3)**

(b) Hence state the centre and radius of the circle. **(2)**

(Total for Question 4 is 5 marks)

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5 A and B are the endpoints of a diameter of a circle, where A has coordinates (-2, -1) and B has coordinates (6, 5).

(a) Find the coordinates of the centre of the circle. **(2)**

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(b) Find the radius of the circle. **(3)**

.....

(c) Write down the equation of the circle. **(1)**

.....

(Total for Question 5 is 6 marks)

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6 Determine whether the point (5, 12) lies on the circle $x^2 + y^2 = 169$.

(Total for Question 6 is 2 marks)

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7 Two mobile phone masts provide circular coverage areas. Mast A is at coordinates (0, 0), measured in kilometres, and has a coverage radius of 9 km. Mast B is at coordinates (12, 5), also in kilometres, and has a coverage radius of 4 km.

(a) Calculate the distance between the two masts. **(2)**

(b) By comparing the distance between the masts with the sum of the two coverage radii, determine whether the coverage areas overlap, touch at exactly one point, or do not meet at all. Justify your answer. **(3)**

(Total for Question 7 is 5 marks)

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Mark scheme · 3.2 Coordinate Geometry of the Circle: 30-minute Pack

Question 1

substitutes: $(-2 - 1)^2 + (6 - 2)^2$ **M1**

25 found **A1**

25 = 25: P is on the circle **B1**

Answer: on

Question 2

substitutes y = -12 into the circle equation **M1**

solves to find the two x values or uses a right-angled triangle **M1**

half chord = 12 **A1**

24 cao **A1**

Answer: 24

Question 3

$(x - a)^2 + (y - b)^2 = r^2$ with the centre correct **M1**

$(x + 7)^2 + (y + 7)^2 = 9$ oe cao **A1**

Answer: $(x + 7)^2 + (y + 7)^2 = 9$

Question 4

(a) completes the square for x: $x^2 + 8x = (x+4)^2 - 16$ **M1**

(a) completes the square for y: $y^2 - 2y = (y-1)^2 - 1$ **M1**

(a) combines constants correctly to give $(x+4)^2 + (y-1)^2 = 9$, cso, answer printed **A1**

(a) Answer: $(x + 4)^2 + (y - 1)^2 = 9$

(b) centre (-4, 1) **B1**

(b) radius = 3 **B1**

(b) Answer: Centre (-4, 1), radius 3

Question 5

(a) uses midpoint = ((-2+6)/2, (-1+5)/2) **M1**

(a) (2, 2) cao **A1**

(a) Answer: (2, 2)

(b) finds length AB = $\sqrt{(6-(-2))^2 + (5-(-1))^2}$ **M1**

(b) = $\sqrt{64 + 36}$ = $\sqrt{100}$ = 10 **M1**

(b) radius = 10 / 2 = 5 cao **A1**

(b) Answer: r = 5

(c) $(x - 2)^2 + (y - 2)^2 = 25$ ft their centre and radius **B1**

(c) Answer: $(x - 2)^2 + (y - 2)^2 = 25$

Question 6

substitutes to find $5^2 + 12^2 = 169$ **M1**

concludes the point lies on the circle, since 169 = 169 **A1**

Answer: Yes, the point lies on the circle

Question 7

(a) distance = $\sqrt{12^2 + 5^2}$ **M1**

(a) = 13 km cao **A1**

(a) Answer: 13 km

(b) sum of radii = 9 + 4 = 13, ft their distance **M1**

(b) compares 13 (distance) with 13 (sum of radii) and states they are equal **A1**

(b) correct conclusion: the coverage circles touch at exactly one point (externally tangent circles), cso **A1**

(b) Answer: The coverage circles touch at exactly one point

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