1.3 Pure: Coordinate Geometry (Lines and Circles): 30-minute Pack

Total Marks

EDEXCEL 9MA0 · Calculator allowed · about 30 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

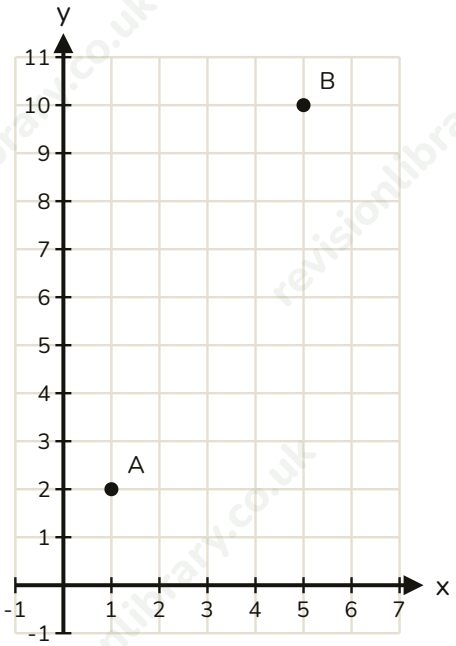
1 Write down the y-intercept of the line with equation $y = -2x + 9$.

(Total for Question 1 is 1 mark)

2 Find the midpoint of the points (-5, 3) and (1, -9).

(Total for Question 2 is 1 mark)

3 The points A(1, 2) and B(5, 10) are shown on a coordinate grid.



(a) Calculate the gradient of the line AB. **(2)**

(b) Find an equation of the line AB, giving your answer in the form $y = mx + c$. **(2)**

(c) The line l is parallel to AB and passes through the point (0, -3). Find an equation of l. **(2)**

(Total for Question 3 is 6 marks)

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4 A circle C has equation $x^2 + y^2 = 20$. The point A has coordinates (6, 2), which lies outside C.

(a) Find the exact length of the tangent from A to the circle. **(3)**

(b) Find the equations of the two tangents from A to the circle, giving your answers in the form $y = mx + c$. **(7)**

(Total for Question 4 is 10 marks)

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5 Determine, showing your working, whether the point (8, -5) lies inside, on, or outside the circle with equation $(x - 2)^2 + (y + 1)^2 = 50$.

(Total for Question 5 is 3 marks)

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6 The line l has equation $3x + 4y = 75$ and the circle C has equation $x^2 + y^2 = 225$.

(a) Show that l is a tangent to C. **(4)**

(b) Find the coordinates of the point where l touches C. **(3)**

(Total for Question 6 is 7 marks)

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Mark scheme · 1.3 Pure: Coordinate Geometry (Lines and Circles): 30-minute Pack

Question 1

(0, 9) oe cao **B1**

Answer: (0, 9)

Question 2

(-2, -3) cao **B1**

Answer: (-2, -3)

Question 3

(a) uses (y2 - y1)/(x2 - x1) with correct values, e.g. (10 - 2)/(5 - 1) **M1**

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

(a) Answer: Gradient = 2

(b) uses y - 2 = 2(x - 1) or substitutes a point into y = 2x + c **M1**

(b) y = 2x oe, cao **A1**

(b) Answer: y = 2x

(c) identifies gradient of l is 2 (parallel lines have equal gradient) **M1**

(c) y = 2x - 3 cao **A1**

(c) Answer: y = 2x - 3

Question 4

(a) finds $OA^2 = 6^2 + 2^2 = 40$, where O is the centre of C **M1**

(a) uses tangent length = $\sqrt{OA^2 - r^2}$ **M1**

(a) tangent length = $2\sqrt{5}$ exact, oe $\sqrt{20}$ **A1**

(a) Answer: Tangent length = $2\sqrt{5}$

(b) sets up a line through A with gradient m: y - 2 = m(x - 6), i.e. c = 2 - 6m **M1**

(b) substitutes y = mx + c into $x^2 + y^2 = 20$ to form $(1+m^2)x^2 + 2mcx + (c^2-20) = 0$ **M1**

(b) applies the tangency condition $b^2 - 4ac = 0$ to this quadratic **M1**

(b) obtains the correct equation in m: $2m^2 - 3m - 2 = 0$ oe **A1**

(b) m = 2 **A1**

(b) m = -1/2 **A1**

(b) tangents are y = 2x - 10 and y = -(1/2)x + 5, both correct, ft from their m values **A1**

(b) Answer: y = 2x - 10 and y = -(1/2)x + 5

Question 5

substitutes (8,-5) into $(x-2)^2 + (y+1)^2$, i.e. $(8-2)^2 + (-5+1)^2$ **M1**

compares the result to 50 **M1**

52 > 50 so the point lies outside the circle, cao **A1**

Answer: Outside the circle (52 > 50)

Question 6

(a) eliminates y between the two equations (substitutes y = (75 - 3x)/4 into the circle) **M1**

(a) substitutes into $x^2 + y^2 = 225$ and simplifies to $25x^2 - 450x + 2025 = 0$ (or equivalent) **M1**

(a) evaluates the discriminant **M1**

(a) discriminant = 0, so there is one repeated root and l is a tangent (cso) **A1**

(a) Answer: discriminant = 0, so l is a tangent

(b) repeated root x = -b/(2a) of the quadratic, or the foot of the perpendicular from the origin **M1**

(b) x = 9 **A1**

(b) y = 12 **A1**

(b) Answer: (9, 12)

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