AQA, Edexcel, OCR, MEI

A Level

A Level Mathematics

C1 Coordinate Geometry (Curves)

Name:

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Total Marks: /55

C1 - Coordinate Geometry - Curves
MEI

1. Sketch the following quadratic functions, clearly indicating the points of any intersections with the axes and the locations of any minimum/maximum points:

   (a) $y = x^2 + 2x + 1$. [2]

   (b) $y = -(x^2 + x)$. [2]

   (c) $4x^2 + 14x + 12$. [2]

2. Find the point(s) of intersection between the following curves:

   (a) $y = x^2 + 2x$ and $y = -1$. [2]

   (b) $y = x^2 - 10$ and $y = -3x$. [2]

   (c) $y = x^2 - 4x + 1$ and $y = 4x - 11$. [2]

   (d) $y = 3x^2 + 3x - 5$ and $y = 3x^2 + x - 3$. [3]

   (e) $y = 4x^2 - 10x - 13$ and $y = 3x^2 - 8x - 10$. [3]

   (f) $y = 8x^2 + 6x + 7$ and $y = 6x^2 + 2x + 10$. [3]

3. Describe the following curves:

   (a) $y = 3x + 2$. [1]

   (b) $y = x^2 + 2x + 1$. [2]

   (c) $y = x^2 + 20x$. [2]

   (d) $3x - y = 1$. [1]

   (e) $x = \frac{y}{2}$. [1]

   (f) $x^2 + y^2 = 1$. [1]

   (g) $x^2 + y^2 = 25$. [1]

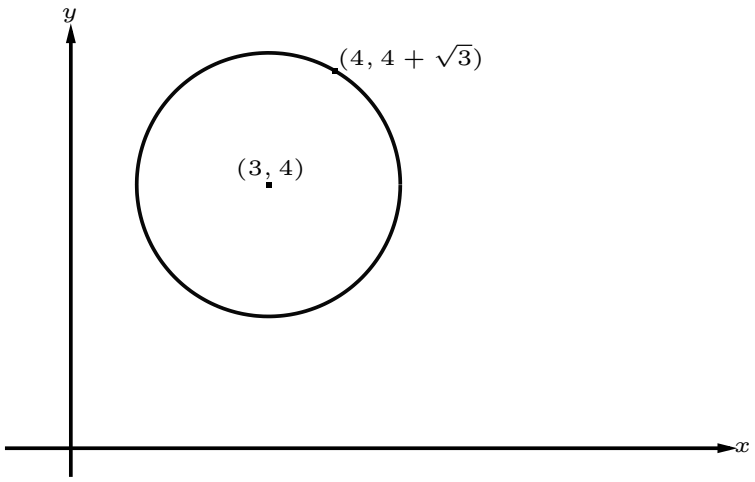
   (h) $(x - 2)^2 + (y - 5)^2 = 4$. [2]

   (i) $x^2 + (y - 1)^2 = 5$. [2]

   (j) $x^2 + y^2 - 2x - 4y + 1 = 0$. [3]

   (k) $y^2 = 24 + 10x - x^2$. [3]

4. The figure below gives a plot of a circle with unknown equation. You are given that the centre of the circle is $(3, 4)$ and that the point $(4, 4 + \sqrt{3})$ lies on the circle.



(a) Find the equation of the circle. [5]

(b) Verify that the point $(3, 2)$ lies on the circle. [2]

(c) Let L be the diameter of the circle that has endpoint $(4, 4 + \sqrt{3})$. Find the other endpoint.
(Hint: find the equation of the line passing through $(3, 4)$ *and* $(4, 4 + \sqrt{3})$ *and find the points where this intersects the circle).* [4]

(d) Calculate the equation of the line tangent to the circle at the point $(4, 4 + \sqrt{3})$. [3]

(e) Suppose that the circle is now translated by $\begin{pmatrix} -3 \\ 0 \end{pmatrix}$. Write down the equation of the translated circle. [1]