



Additional Assessment Materials
Summer 2021

Pearson Edexcel GCE in Mathematics
9MA0 (Public release version)

Resource Set 1: Topic 3
Coordinate Geometry

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Additional Assessment Materials, Summer 2021
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General guidance to Additional Assessment Materials for use in 2021

Context

- Additional Assessment Materials are being produced for GCSE, AS and A levels (with the exception of Art and Design).
- The Additional Assessment Materials presented in this booklet are an optional part of the range of evidence teachers may use when deciding on a candidate's grade.
- 2021 Additional Assessment Materials have been drawn from previous examination materials, namely past papers.
- Additional Assessment Materials have come from past papers both published (those materials available publicly) and unpublished (those currently under padlock to our centres) presented in a different format to allow teachers to adapt them for use with candidate.

Purpose

- The purpose of this resource to provide qualification-specific sets/groups of questions covering the knowledge, skills and understanding relevant to this Pearson qualification.
- This document should be used in conjunction with the mapping guidance which will map content and/or skills covered within each set of questions.
- These materials are only intended to support the summer 2021 series.

1. A curve has parametric equations

$$x = 6t + 1, \quad y = 5 - \frac{4}{3t}, \quad t \neq 0.$$

Show that the Cartesian equation of the curve can be expressed in the form

$$y = \frac{ax + b}{x - 1}, \quad x \neq k,$$

where a , b and k are constants to be found.

(3)

(Total for Question 1 is 3 marks)

2. A circle C has equation

$$x^2 + y^2 - 4x + 10y = k,$$

where k is a constant.

(a) Find the coordinates of the centre of C .

(2)

(b) State the range of possible values for k .

(2)

(Total for Question 2 is 4 marks)

3.

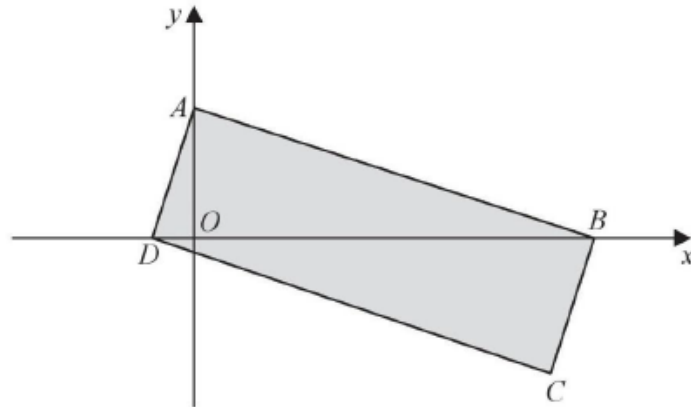


Figure 1

Figure 1 shows a rectangle $ABCD$.

The point A lies on the y -axis and the points B and D lie on the x -axis as shown in Figure 1.

Given that the straight line through the points A and B has equation $5y + 2x = 10$,

(a) show that the straight line through the points A and D has equation $2y - 5x = 4$, (4)

(b) find the area of the rectangle $ABCD$. (3)

(Total for Question 3 is 7 marks)

4. A curve C has parametric equations

$$x = 2t - 1, \quad y = 4t - 7 + \frac{3}{t}, \quad t \neq 0.$$

Show that the Cartesian equation of the curve C can be written in the form

$$y = \frac{2x^2 + ax + b}{x + 1}, \quad x \neq -1,$$

where a and b are integers to be found.

(3)

(Total for Question 4 is 3 marks)

5.

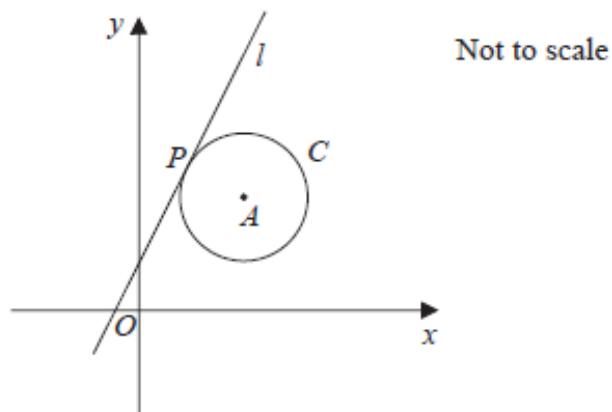


Figure 3

The circle C has centre A with coordinates $(7, 5)$.

The line l , with equation $y = 2x + 1$, is the tangent to C at the point P , as shown in Figure 3.

(a) Show that an equation of the line PA is $2y + x = 17$. (3)

(b) Find an equation for C . (4)

The line with equation $y = 2x + k$, $k \neq 1$, is also a tangent to C .

(c) Find the value of the constant k . (3)

(Total for Question 5 is 10 marks)

6.

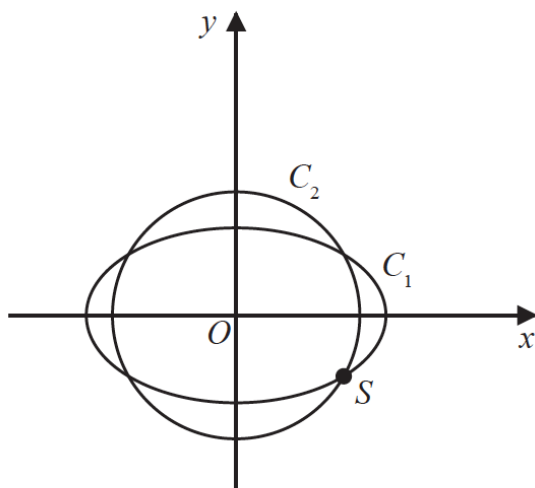


Figure 2

The curve C_1 with parametric equations

$$x = 10 \cos t, \quad y = 4\sqrt{2} \sin t, \quad 0 \leq t < 2\pi$$

meets the circle C_2 with equation

$$x^2 + y^2 = 66$$

at four distinct points as shown in Figure 2.

Given that one of these points, S , lies in the 4th quadrant, find the Cartesian coordinates of S .

(6)

(Total for Question 6 is 6 marks)

7.

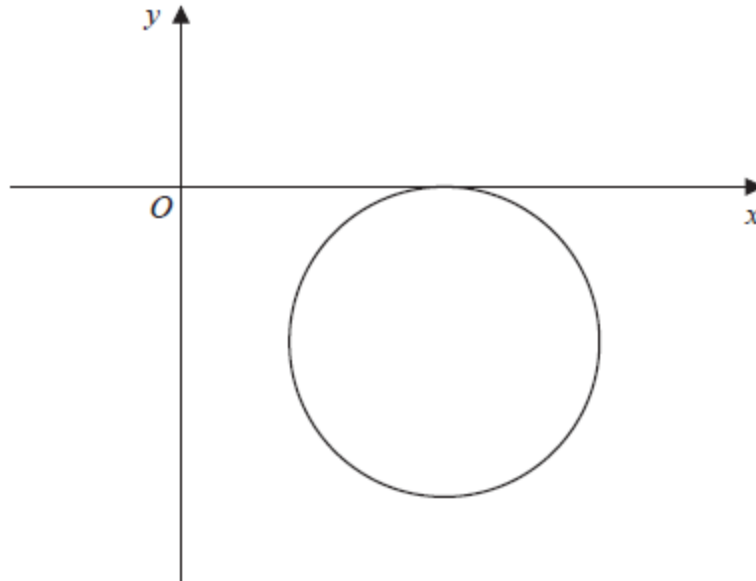


Figure 4

A circle with centre $(9, -6)$ touches the x -axis as shown in Figure 4.

(a) Write down an equation for the circle.

(3)

A line l is parallel to the x -axis. The line l cuts the circle at points P and Q .

Given that the distance PQ is 8,

(b) find the two possible equations for l .

(4)

(Total for Question 7 is 7 marks)

8. A curve C has parametric equations

$$x = 3 + 2 \sin t, \quad y = 4 + 2 \cos 2t, \quad 0 \leq t < 2\pi.$$

(a) Show that all points on C satisfy $y = 6 - (x - 3)^2$. (2)

(b) (i) Sketch the curve C .

(ii) Explain briefly why C does not include all points of $y = 6 - (x - 3)^2, x \in \mathbb{R}$. (3)

The line with equation $x + y = k$, where k is a constant, intersects C at two distinct points.

(c) State the range of values of k , writing your answer in set notation. (5)

(Total for Question 8 is 10 marks)
