

6

$$x = \tan \theta, \quad y = \sin \theta - 2 \sin^3 \theta,$$

for $0 < \theta < \frac{1}{2}\pi$.

(a) Show that $\frac{dy}{dx} = 6 \cos^5 \theta - 5 \cos^3 \theta$.

[4]

- (b)** Find the equation of the normal to the curve at the point where it crosses the x -axis. Give your answer in the form $y = mx + c$, where m and c are exact constants. [5]

[illegible]

8 The equation of a curve is $y = 4e^{1-2x}\sqrt{3x-1}$.

Find the exact coordinates of the stationary point of the curve.

[6]

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

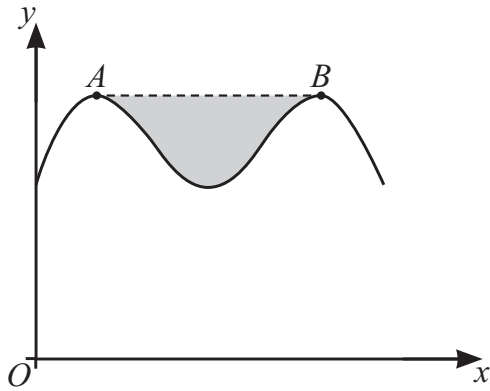
This image shows a full page of white paper with horizontal dashed lines, typical of primary school writing paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Additional page

If you use the following page to complete the answer to any question, the question number must be clearly shown.

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5



The diagram shows the curve with equation $y = 4 \cos 2x + 8 \sin x$ for $0 \leq x \leq \pi$. The maximum points on the curve are denoted by A and B , and the shaded region is bounded by the line segment AB and the curve.

- (a)** Find the coordinates of A and B .

[5]

Handwriting practice lines (dotted lines) for the letter 'a'.

(b) Find the exact area of the shaded region.

[6]

Handwriting practice lines (dotted lines) for the letter '7'.

7

- (a)**

[illegible]

- (b)

[illegible]

Additional page

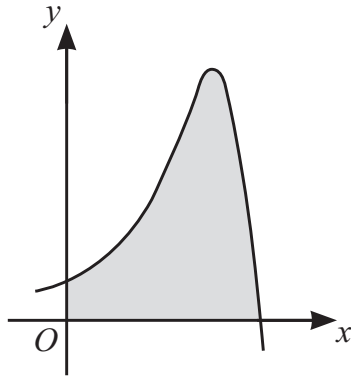
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[illegible]

[2]

[illegible]

4



The diagram shows the curve with equation $y = 6e^{2x} - e^{3x}$. The shaded region is bounded by the axes and the curve.

- (a) Find the exact x -coordinate of the maximum point. [3]

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There is no handwriting or other markings on the paper.

(b) Find the area of the shaded region. Give your answer in the form $\frac{p}{q}$, where p and q are integers. [4]

[illegible]

6 The parametric equations of a curve are

$$x = \frac{2t+1}{3t+4}, \quad y = 2\ln(3t+4),$$

where $t > -\frac{4}{3}$.

(a) Show that $\frac{dy}{dx}$ can be expressed in the form $c(3t+4)$ and state the value of the constant c . [5]

[illegible]

A-Level Mathematics: 9709 Mathematics June 2025 Question Paper 21

- (b)** It is given that the gradient of the curve at the point $(a, \ln 100)$ is m .

Find the values of a and m .

[4]

[illegible]

- (c) State whether the curve represents a decreasing function or an increasing function or neither. Give a reason for your answer. [1]

[illegible]

3

Find the coordinates of the stationary points of the curve with equation $y = \frac{0.1}{2x+3} - 6x + 5$.

[5]

15

22 _____

6

(a)

[3]

This image shows a full page of white paper with horizontal dotted lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting practice. There are no margins, text, or other markings on the page.

(b)

$y = mx + c$, where m and c are exact constants.

[6]

This image shows a full page of white paper with ten horizontal dashed lines, typical of primary-ruled notebook paper. The lines are evenly spaced and extend across the width of the page. There is no handwriting or other markings on the paper.

