

11

$$\frac{dy}{dx} = \frac{8}{x^2} - \frac{10}{(2x-3)^2}.$$

- (a) Find the equation of the normal to the curve at P . Give your answer in the form $y = mx + c$. [3]

[illegible]

- (b)** Find the rate of change of the gradient of the curve when $x = 4$. [3]

[illegible]

(c) Given that the curve also passes through the point $(-1, q)$, find the value of q . [5]

Handwriting practice sheet with 20 rows of dotted lines for tracing and writing.

Additional page

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

[illegible]

4 The equation of a curve is such that $\frac{dy}{dx} = kx^5 + \frac{4}{x^2}$, where k is a constant. The curve passes through the point $S(2, 20)$ and the gradient of the curve at S is $\frac{65}{2}$.

(a) Find the value of k .

[1]

[illegible]

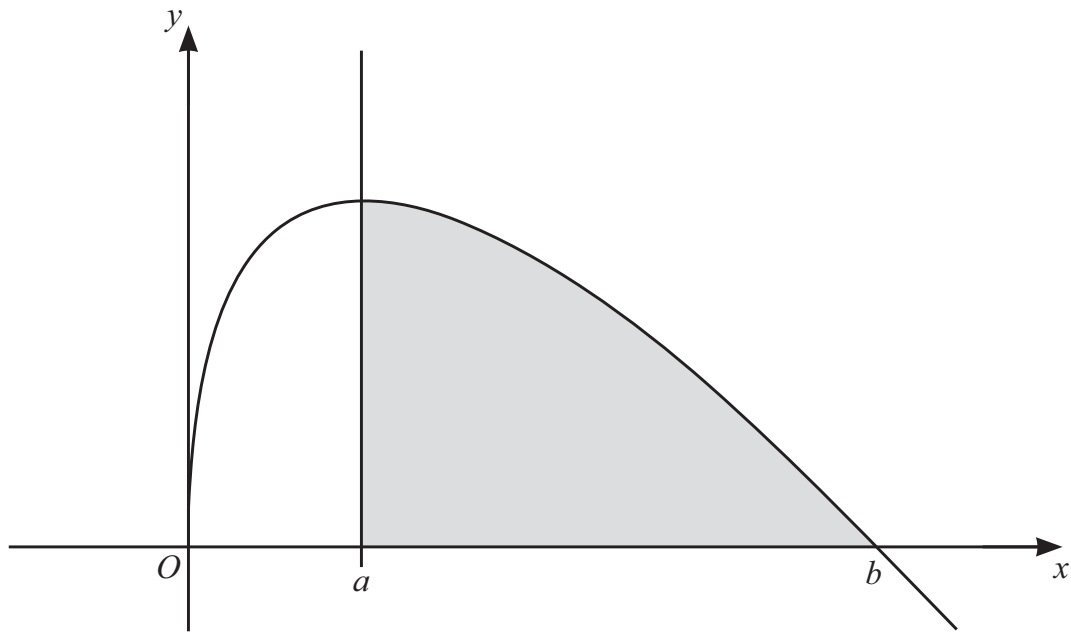
(b) The coordinates of a point T on the curve are $(1, t)$.

Find the value of t .

[5]

[illegible]

5



The equation of a curve is $y = 4x^{\frac{1}{2}} - x$. The curve has a maximum point when $x = a$ and crosses the x -axis at the point with coordinates $(b, 0)$, where $b > 0$. The shaded region is bounded by the curve, the line $x = a$ and the x -axis (see diagram).

(a) Find the value of a .

[3]

[illegible]

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

[5]

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

9

- (a) Find an expression for $f'(x)$ and hence determine whether f is an increasing function, a decreasing function or neither. [4]

[illegible]

- (b) State whether f^{-1} exists. Give a reason for your answer. [1]

[illegible]

The function g is defined by $g(x) = 4x - 3$ for $x > a$.

- (c)** Find the range of g in terms of the constant a .

[1]

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 are no margins, text, or other markings on the paper.

- (d)** Find the set of values of a for which the composite function fg exists.

[2]

Blank lined paper for writing.

2 The equation of a curve is such that $\frac{dy}{dx} = 4(2x-5)^5 - 9x^{\frac{1}{2}}$. The curve passes through the point $A\left(4, -\frac{11}{2}\right)$.

(a) Find the gradient of the normal to the curve at the point A . [2]

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

(b) Find the equation of the curve. [4]

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.

7 The equation of a curve is $y = 4x^2 + \frac{7}{x^2} - 8$.

- (a) A point P is moving along the curve in such a way that its y -coordinate is decreasing at 5 units per second.

Find the rate at which the x -coordinate of point P is changing when $x = 2$. [4]

[4]

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

(b) Find the coordinates of the stationary points of the curve and determine their nature. [5]

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

- 4

- (a)

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.

- (b)

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

- 9 The equation of a curve is such that $\frac{d^2y}{dx^2} = -\frac{4}{x^3}$. It is given that the curve has a stationary point at $(-2, 19)$.

(a) Find an expression for $\frac{dy}{dx}$.

[3]

This image shows a full page of a handwriting practice worksheet. It consists of multiple sets of three horizontal dashed lines, providing a guide for letter height and placement. The lines are evenly spaced across the entire page, which is otherwise blank.

- (b)** Find the x -coordinate of the other stationary point of the curve, and determine the nature of this stationary point. [2]

This image shows a blank sheet 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.

(c) Find the equation of the curve.

[3]

(d) Find the equation of the normal to the curve at the point where $\frac{dy}{dx} = -\frac{9}{4}$ and x is positive. Express your answer in the form $px + qy + r = 0$, where p , q and r are integers.

[4]