

(a) Find the area of the shaded region. [3]

①

Find the exact volume of the solid produced. [4]

2

11 A curve passes through the point $P(4, 3)$ and is such that

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

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

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

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

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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- 4 The equation of a curve is such that $\frac{dy}{dx} = kx^3 + \frac{2}{x^2}$, 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 .

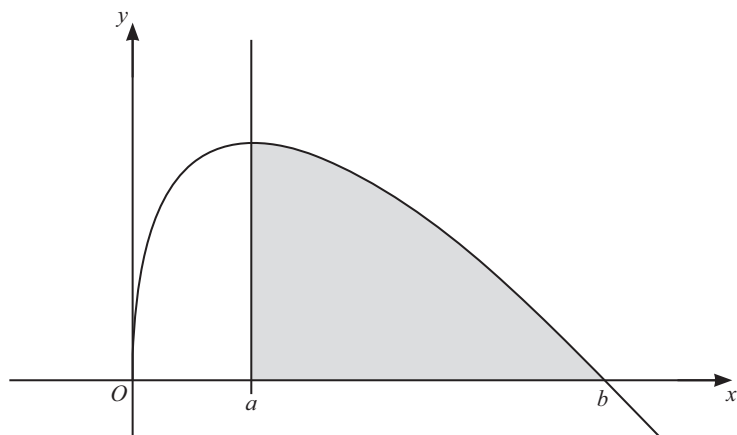
[1]

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

Find the value of t .

[5]

... ⑥



(a) Find the value of a .

[3]

7

[5]

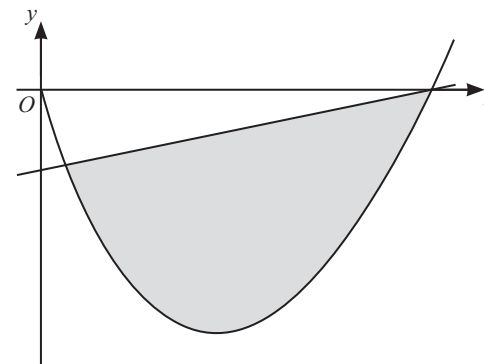
8

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]

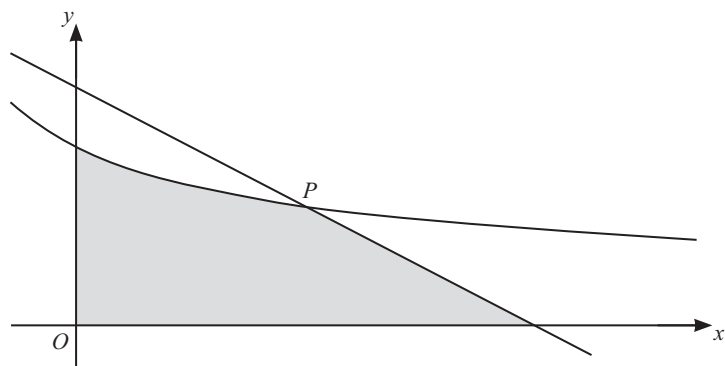
(b) Find the equation of the curve. [4]

4



The diagram shows the curve with equation $y = 5x^{\frac{3}{2}} - 20x$ and the line with equation $y = x - 16$. The x -coordinates of the points of intersection of the curve and line are 1 and 16.

Find the area of the shaded region between the curve and the line. [5]



Find the area of the shaded region.

[6]

- (a) Find an expression for $\frac{dy}{dx}$. [3]

[illegible]

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

[illegible]

[3]

[illegible]

[4]

[illegible]