Areas & Volumes

Question Paper 4

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Integration
Sub Topic	Areas & Volumes
Booklet	Question Paper 4

Time Allowed: **58 minutes**

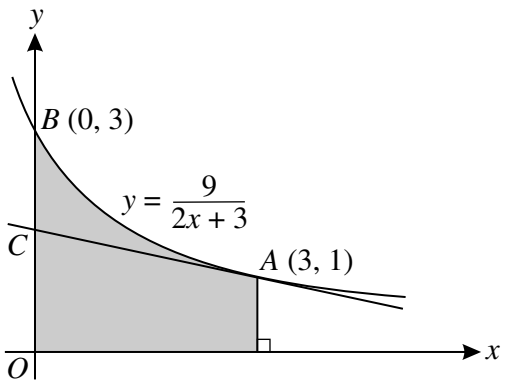
Score: **/48**

Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

1



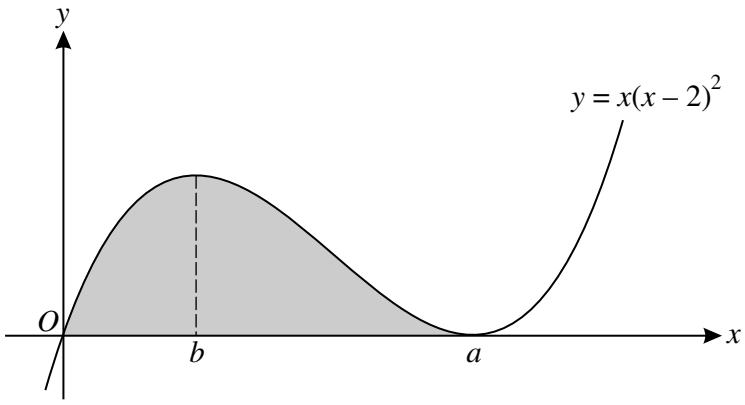
The diagram shows part of the curve $y = \frac{9}{2x+3}$, crossing the y-axis at the point $B\,(0, 3)$. The point A on the curve has coordinates $(3, 1)$ and the tangent to the curve at A crosses the y-axis at C.

(i) Find the equation of the tangent to the curve at A. [4]

(ii) Determine, showing all necessary working, whether C is nearer to B or to O. [1]

(iii) Find, showing all necessary working, the exact volume obtained when the shaded region is rotated through 360° about the x-axis. [4]

2



The diagram shows the curve with equation $y = x(x - 2)^2$. The minimum point on the curve has coordinates $(a, 0)$ and the x-coordinate of the maximum point is b, where a and b are constants.

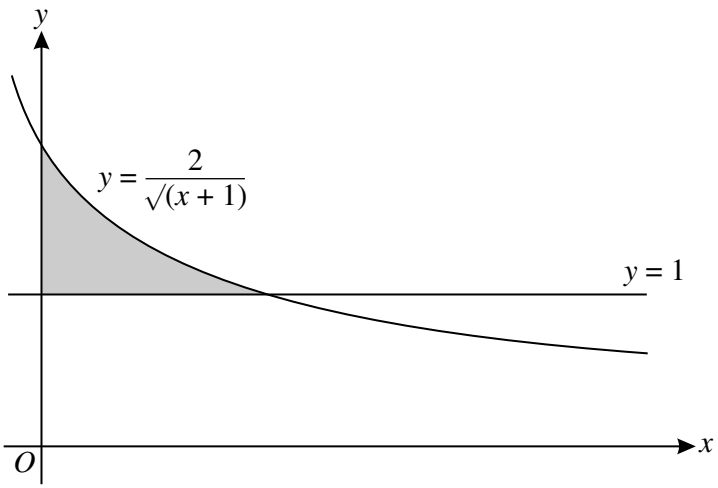
(i) State the value of a. [1]

(ii) Find the value of b. [4]

(iii) Find the area of the shaded region. [4]

(iv) The gradient, $\frac{dy}{dx}$, of the curve has a minimum value m. Find the value of m. [4]

3



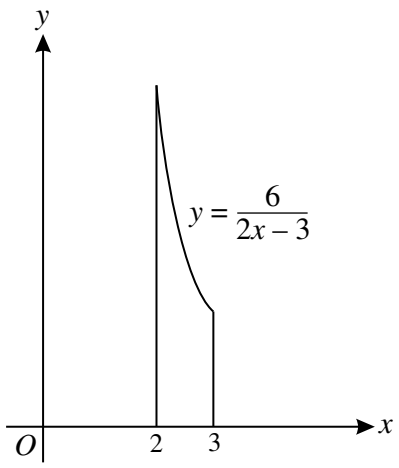
The diagram shows the line $y = 1$ and part of the curve $y = \frac{2}{\sqrt{(x+1)}}$.

(i) Show that the equation $y = \frac{2}{\sqrt{(x+1)}}$ can be written in the form $x = \frac{4}{y^2} - 1$. [1]

(ii) Find $\int \left(\frac{4}{y^2} - 1\right) dy$. Hence find the area of the shaded region. [5]

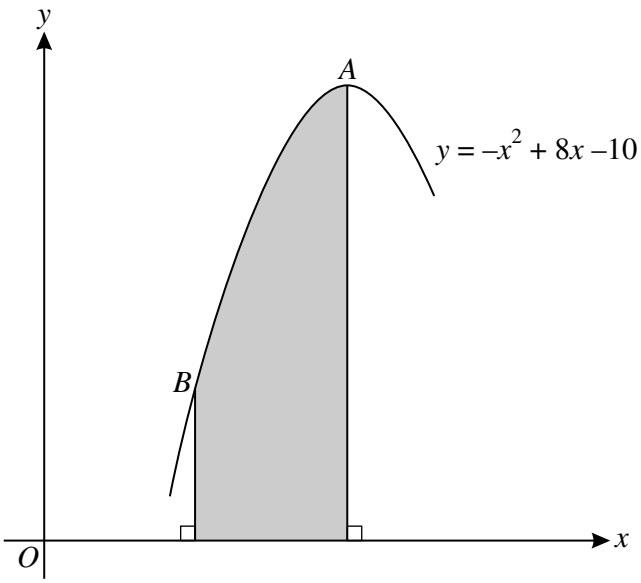
(iii) The shaded region is rotated through 360° about the ***y*-axis**. Find the exact value of the volume of revolution obtained. [5]

4



The diagram shows the region enclosed by the curve $y = \frac{6}{2x-3}$, the x-axis and the lines $x = 2$ and $x = 3$. Find, in terms of π, the volume obtained when this region is rotated through 360° about the x-axis. [4]

5



The diagram shows part of the curve $y = -x^2 + 8x - 10$ which passes through the points A and B. The curve has a maximum point at A and the gradient of the line BA is 2.

(i) Find the coordinates of A and B. [7]

(ii) Find $\int y \, dx$ and hence evaluate the area of the shaded region. [4]