

Areas & Volumes

Question Paper 3

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Integration
Sub Topic	Areas & Volumes
Booklet	Question Paper 3

Time Allowed: 65 minutes

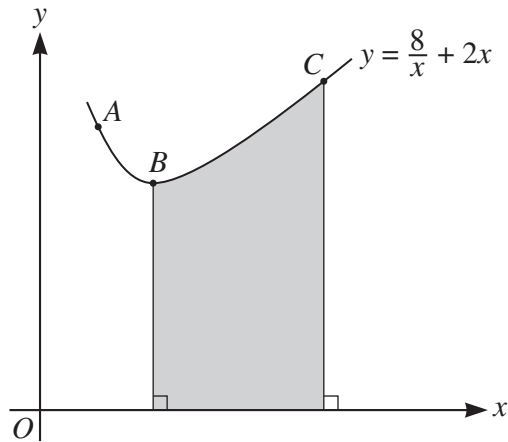
Score: /54

Percentage: /100

Grade Boundaries:

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

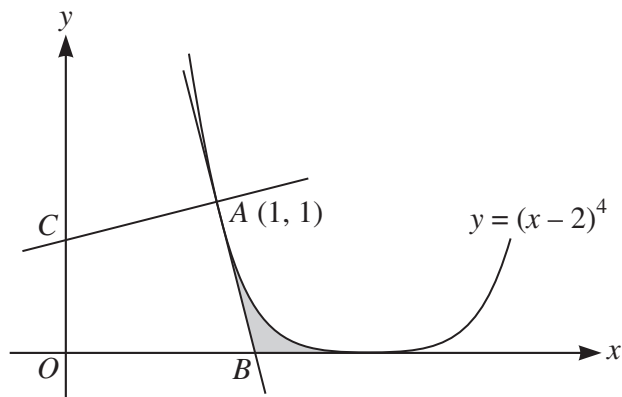
1



The diagram shows part of the curve $y = \frac{8}{x} + 2x$ and three points A , B and C on the curve with x -coordinates 1, 2 and 5 respectively.

- (i) A point P moves along the curve in such a way that its x -coordinate increases at a constant rate of 0.04 units per second. Find the rate at which the y -coordinate of P is changing as P passes through A . [4]
- (ii) Find the volume obtained when the shaded region is rotated through 360° about the x -axis. [6]

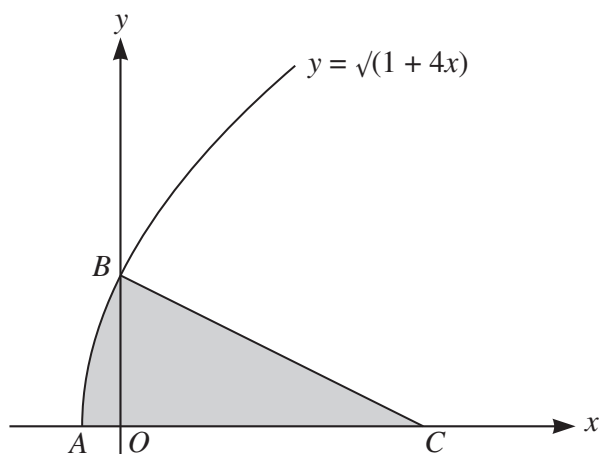
2



The diagram shows part of the curve $y = (x - 2)^4$ and the point $A(1, 1)$ on the curve. The tangent at A cuts the x -axis at B and the normal at A cuts the y -axis at C .

- (i) Find the coordinates of B and C . [6]
- (ii) Find the distance AC , giving your answer in the form $\frac{\sqrt{a}}{b}$, where a and b are integers. [2]
- (iii) Find the area of the shaded region. [4]

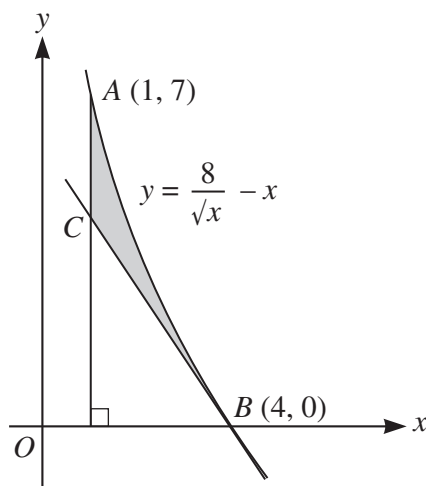
3



The diagram shows the curve $y = \sqrt{1 + 4x}$, which intersects the x -axis at A and the y -axis at B . The normal to the curve at B meets the x -axis at C . Find

- (i) the equation of BC , [5]
- (ii) the area of the shaded region. [5]

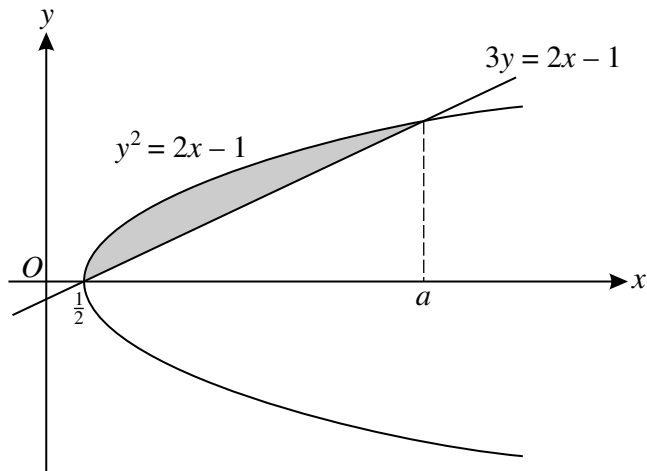
4



The diagram shows part of the curve $y = \frac{8}{\sqrt{x}} - x$ and points $A(1, 7)$ and $B(4, 0)$ which lie on the curve. The tangent to the curve at B intersects the line $x = 1$ at the point C .

- (i) Find the coordinates of C . [4]
- (ii) Find the area of the shaded region. [5]

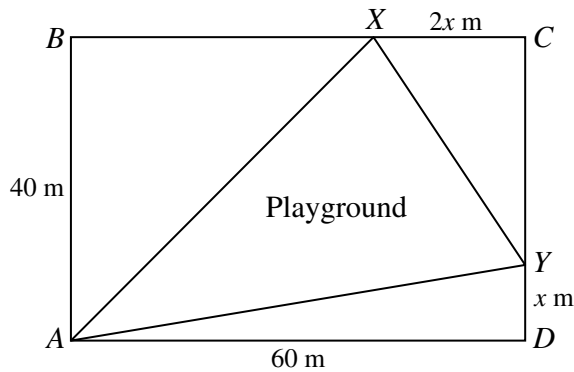
5



The diagram shows the curve $y^2 = 2x - 1$ and the straight line $3y = 2x - 1$. The curve and straight line intersect at $x = \frac{1}{2}$ and $x = a$, where a is a constant.

- (i) Show that $a = 5$. [2]
- (ii) Find, showing all necessary working, the area of the shaded region. [6]

6



The diagram shows a plan for a rectangular park $ABCD$, in which $AB = 40$ m and $AD = 60$ m. Points X and Y lie on BC and CD respectively and AX , XY and YA are paths that surround a triangular playground. The length of DY is x m and the length of CX is $2x$ m.

- (i) Show that the area, A m², of the playground is given by
$$A = x^2 - 30x + 1200.$$
 [2]
- (ii) Given that x can vary, find the minimum area of the playground. [3]