

Areas & Volumes

Question Paper 6

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Integration
Sub Topic	Areas & Volumes
Booklet	Question Paper 6

Time Allowed: 58 minutes

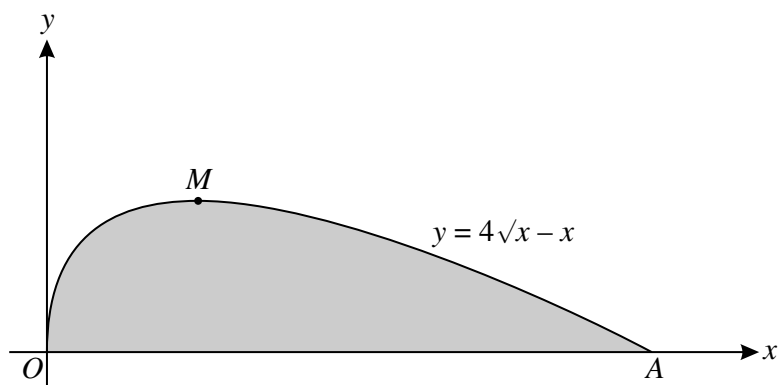
Score: /48

Percentage: /100

Grade Boundaries:

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

1



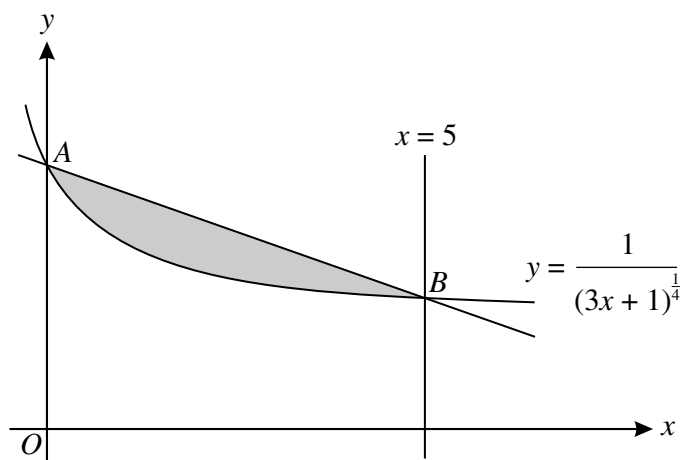
The diagram shows part of the curve $y = 4\sqrt{x} - x$. The curve has a maximum point at M and meets the x -axis at O and A .

- (i) Find the coordinates of A and M . [5]
- (ii) Find the volume obtained when the shaded region is rotated through 360° about the x -axis, giving your answer in terms of π . [6]

2 The equation of a curve is $y = \frac{9}{2-x}$.

- (i) Find an expression for $\frac{dy}{dx}$ and determine, with a reason, whether the curve has any stationary points. [3]
- (ii) Find the volume obtained when the region bounded by the curve, the coordinate axes and the line $x = 1$ is rotated through 360° about the x -axis. [4]
- (iii) Find the set of values of k for which the line $y = x + k$ intersects the curve at two distinct points. [4]

3

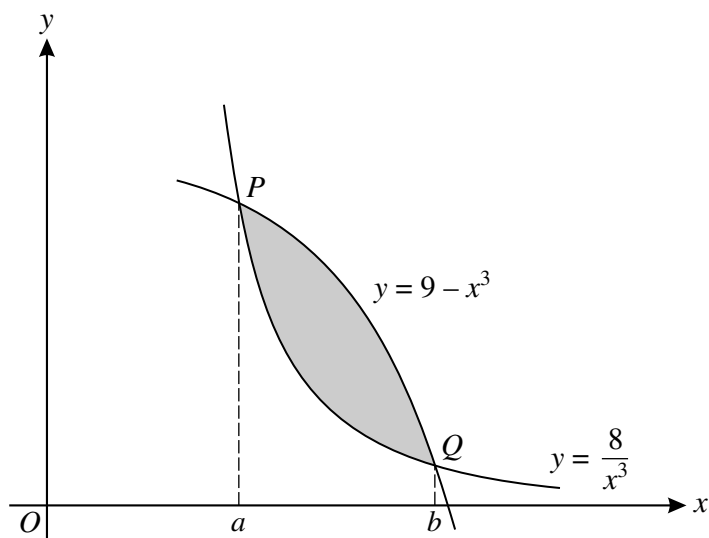


The diagram shows part of the curve $y = \frac{1}{(3x+1)^{\frac{1}{4}}}$. The curve cuts the y -axis at A and the line $x = 5$ at B .

(i) Show that the equation of the line AB is $y = -\frac{1}{10}x + 1$. [4]

(ii) Find the volume obtained when the shaded region is rotated through 360° about the x -axis. [9]

4



The diagram shows parts of the curves $y = 9 - x^3$ and $y = \frac{8}{x^3}$ and their points of intersection P and Q . The x -coordinates of P and Q are a and b respectively.

- (i) Show that $x = a$ and $x = b$ are roots of the equation $x^6 - 9x^3 + 8 = 0$. Solve this equation and hence state the value of a and the value of b . [4]
- (ii) Find the area of the shaded region between the two curves. [5]
- (iii) The tangents to the two curves at $x = c$ (where $a < c < b$) are parallel to each other. Find the value of c . [4]