

# Areas & Volumes

## Question Paper 7

<b>Level</b>	International A Level
<b>Subject</b>	Maths
<b>Exam Board</b>	CIE
<b>Topic</b>	Integration
<b>Sub Topic</b>	Areas & Volumes
<b>Booklet</b>	Question Paper 7

**Time Allowed:** 54 minutes

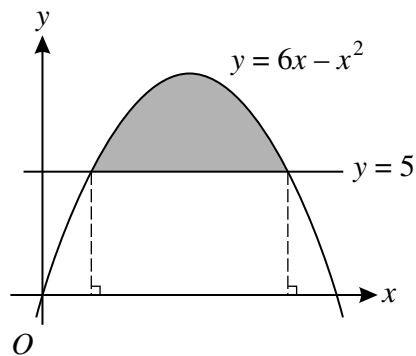
**Score:** /45

**Percentage:** /100

**Grade Boundaries:**

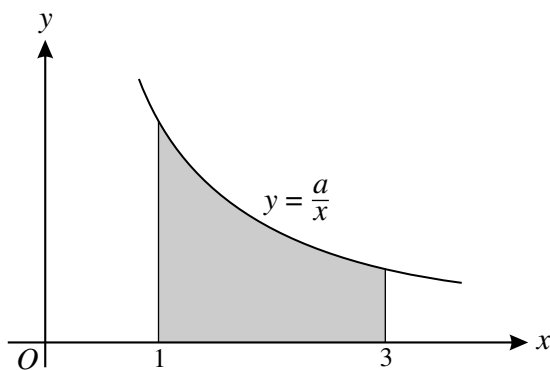
A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

1



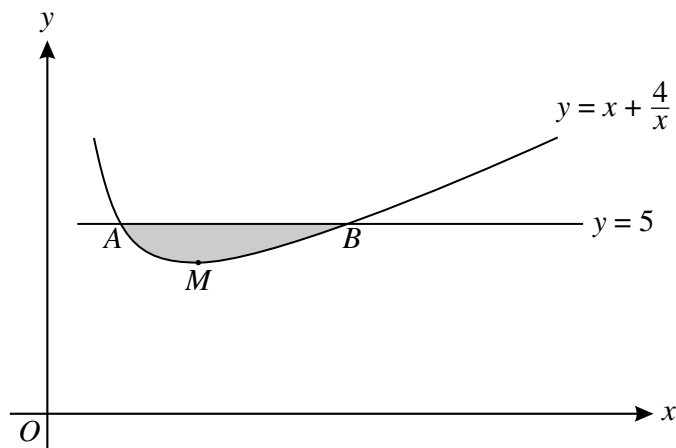
The diagram shows the curve  $y = 6x - x^2$  and the line  $y = 5$ . Find the area of the shaded region. [6]

2



The diagram shows part of the curve  $y = \frac{a}{x}$ , where  $a$  is a positive constant. Given that the volume obtained when the shaded region is rotated through  $360^\circ$  about the  $x$ -axis is  $24\pi$ , find the value of  $a$ . [4]

3



The diagram shows part of the curve  $y = x + \frac{4}{x}$  which has a minimum point at  $M$ . The line  $y = 5$  intersects the curve at the points  $A$  and  $B$ .

- (i) Find the coordinates of  $A$ ,  $B$  and  $M$ . [5]
- (ii) Find the volume obtained when the shaded region is rotated through  $360^\circ$  about the  $x$ -axis. [6]

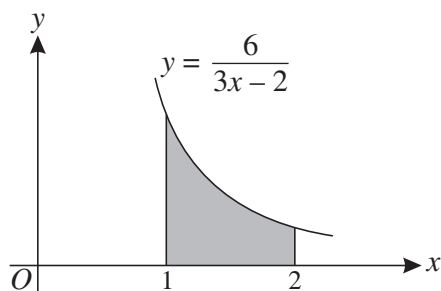
4 The equation of a curve is  $y = x^4 + 4x + 9$ .

- (i) Find the coordinates of the stationary point on the curve and determine its nature. [4]
- (ii) Find the area of the region enclosed by the curve, the  $x$ -axis and the lines  $x = 0$  and  $x = 1$ . [3]

5 The function  $f$  is such that  $f(x) = \frac{3}{2x+5}$  for  $x \in \mathbb{R}$ ,  $x \neq -2.5$ .

- (i) Obtain an expression for  $f'(x)$  and explain why  $f$  is a decreasing function. [3]
- (ii) Obtain an expression for  $f^{-1}(x)$ . [2]
- (iii) A curve has the equation  $y = f(x)$ . Find the volume obtained when the region bounded by the curve, the coordinate axes and the line  $x = 2$  is rotated through  $360^\circ$  about the  $x$ -axis. [4]

6



The diagram shows part of the curve  $y = \frac{6}{3x - 2}$ .

- (i) Find the gradient of the curve at the point where  $x = 2$ . [3]
- (ii) Find the volume obtained when the shaded region is rotated through  $360^\circ$  about the  $x$ -axis, giving your answer in terms of  $\pi$ . [5]