Areas & Volumes
Question Paper 5

Level	International A Level
Subject	Maths
Exam Board	CIE
Topic	Integration
Sub Topic	Areas & Volumes
Booklet	Question Paper 5

Time Allowed: **59 minutes**

Score: **/49**

Percentage: **/100**

Grade Boundaries:

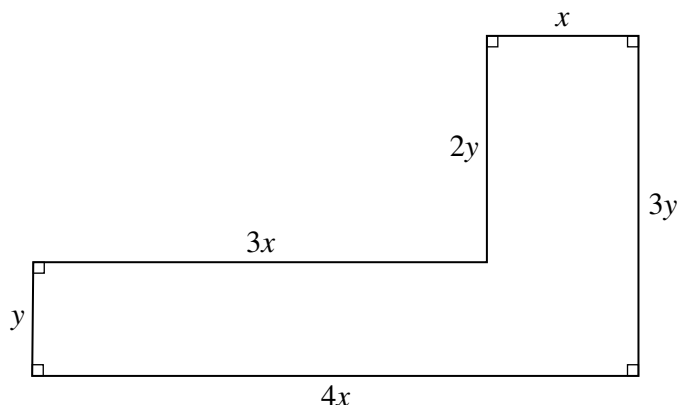| A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

1
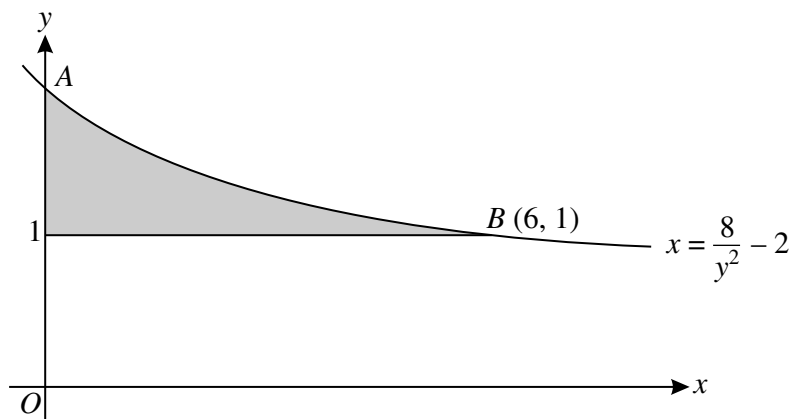
The diagram shows part of the curve $x = \dfrac{8}{y^2} - 2$, crossing the y-axis at the point A. The point B (6, 1) lies on the curve. The shaded region is bounded by the curve, the y-axis and the line $y = 1$. Find the exact volume obtained when this shaded region is rotated through $360°$ about the **y-axis**. [6]
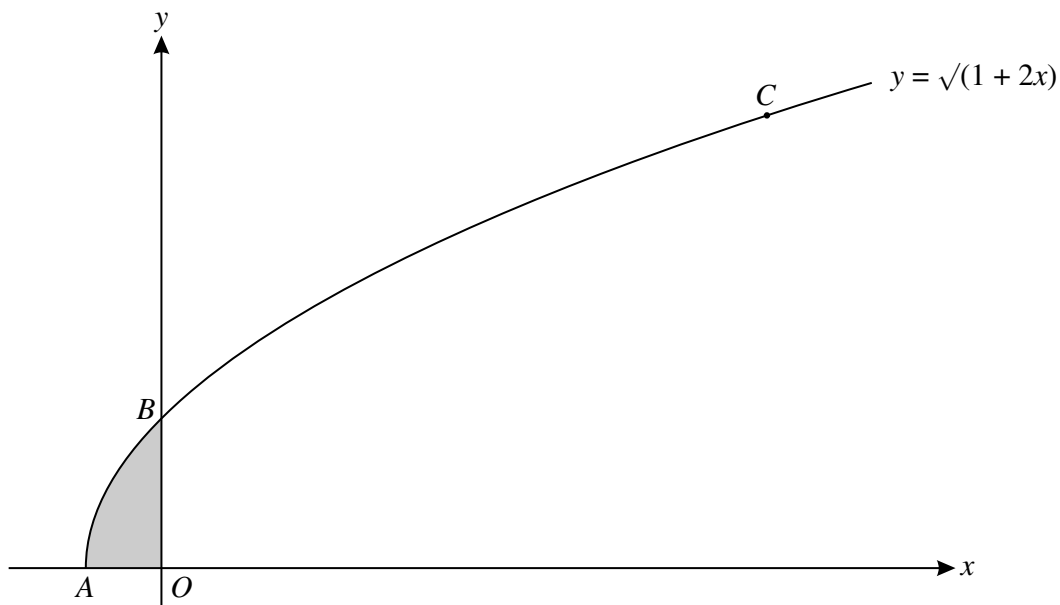
2

The diagram shows the dimensions in metres of an L-shaped garden. The perimeter of the garden is 48 m.

  (i) Find an expression for y in terms of x. [1]

  (ii) Given that the area of the garden is A m^2, show that $A = 48x - 8x^2$. [2]

  (iii) Given that x can vary, find the maximum area of the garden, showing that this is a maximum value rather than a minimum value. [4]

3

The diagram shows the curve $y = \sqrt{(1 + 2x)}$ meeting the x-axis at A and the y-axis at B. The y-coordinate of the point C on the curve is 3.

  (i) Find the coordinates of B and C.   [2]

  (ii) Find the equation of the normal to the curve at C.   [4]

  (iii) Find the volume obtained when the shaded region is rotated through $360°$ about the **y-axis**.   [5]

4   The equation of a curve is $y = \sqrt{(8x - x^2)}$. Find

  (i) an expression for $\dfrac{\mathrm{d}y}{\mathrm{d}x}$, and the coordinates of the stationary point on the curve,   [4]

  (ii) the volume obtained when the region bounded by the curve and the x-axis is rotated through $360°$ about the x-axis.   [4]

5
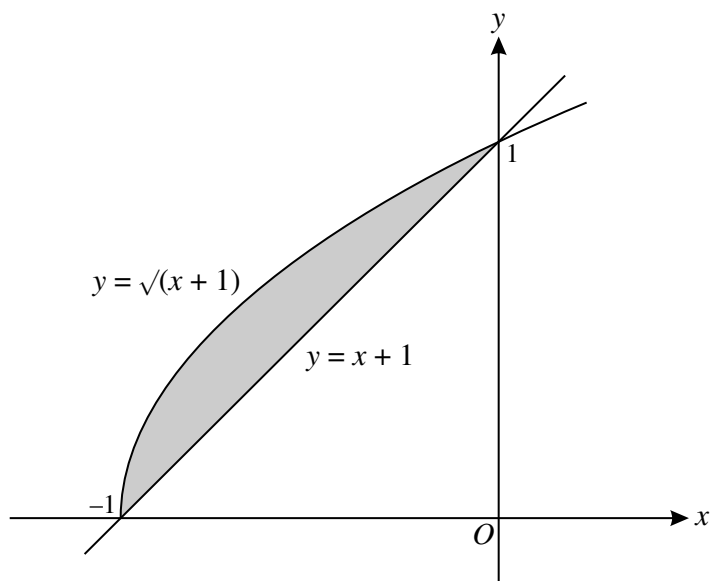
The diagram shows the line $y = x + 1$ and the curve $y = \sqrt{(x + 1)}$, meeting at $(-1, 0)$ and $(0, 1)$.

  (i) Find the area of the shaded region.   [5]

 (ii) Find the volume obtained when the shaded region is rotated through $360°$ about the **y-axis**.   [7]

6   **(i)** Sketch the curve $y = (x - 2)^2$.   [1]

    (ii) The region enclosed by the curve, the x-axis and the y-axis is rotated through $360°$ about the x-axis. Find the volume obtained, giving your answer in terms of π.   [4]