5. The table below shows values of x and y for the curve C with equation $y = f(x)$.

x	0.9	1.5	2.1	2.7	3.3	3.9	4.5	5.1
y	1.5	0.48	0.30	0.26	0.26	0.30	0.48	1.5

(a) Using the trapezium rule with all the y values in the table, find an estimate for the area of the region bounded by C and the x-axis between the lines with equations $x = 0.9$ and $x = 5.1$

(3)

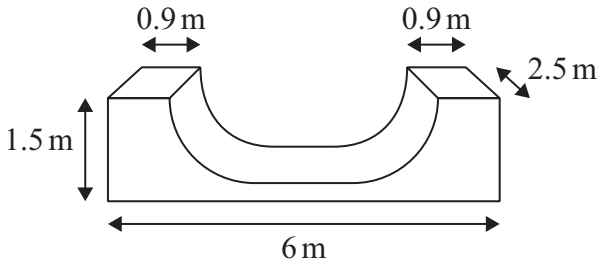


Figure 1

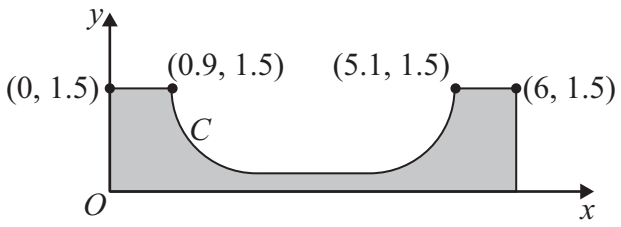


Figure 2

Figure 1 shows a sketch of a solid concrete skateboard ramp.
Figure 2 shows a graph of the cross-section of the same ramp.

The ramp

- has a total length of 6 m
- has a platform at each end at a height of 1.5 m and with a length of 0.9 m
- has a curved section C with equation $y = f(x)$, where x and y are in metres
- has a uniform cross-section and is 2.5 m wide

as shown in Figure 1 and/or Figure 2.

(b) Using the answer to part (a), find an estimate for the volume of concrete in the **whole** of the ramp.

(3)

(c) State, giving a reason for your answer, whether the answer for part (b) is an overestimate or an underestimate of the true volume of concrete in the whole of the skateboard ramp.

(1)

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Question 5 continued

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Question 5 continued

(Total for Question 5 is 7 marks)

6. (i) (a) Sketch a graph of the curve with equation

$$y = \frac{1}{5^x} + 3 \qquad x \in \mathbb{R}$$

Show on your sketch

- the coordinates of any points at which the curve crosses the axes
- the equation of any asymptotes

(3)

(b) Using logarithms and making your method clear, solve the equation

$$\frac{1}{5^x} + 3 = 23$$

giving the answer to 3 significant figures.

(2)

(ii) Given that $\log_4 x = a$, find in simplest form in terms of a

(a) $\log_4(64x)$

(2)

(b) $\log_4\left(\frac{2}{x^2}\right)$

(3)

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