Trapezium Rule

Question Paper 2

Level	A Level
Subject	Maths
Exam Board	OCR
Module	Core 2
Topic	Integration
Sub Topic	Trapezium Rule
Booklet	Question Paper - 2

Time Allowed: **51 minutes**

Score: **/42**

Percentage: **/100**

Grade Boundaries:

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

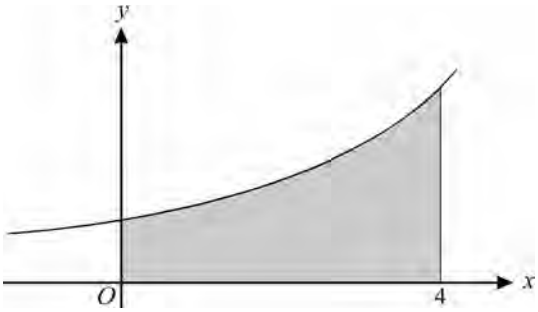
1 **(i)** Sketch the curve $y = \left(\frac{1}{2}\right)^x$, and state the coordinates of any point where the curve crosses an axis. [3]

(ii) Use the trapezium rule, with 4 strips of width 0.5, to estimate the area of the region bounded by the curve $y = \left(\frac{1}{2}\right)^x$, the axes, and the line $x = 2$. [4]

(iii) The point P on the curve $y = \left(\frac{1}{2}\right)^x$ has y-coordinate equal to $\frac{1}{6}$. Prove that the x-coordinate of P may be written as

$$1 + \frac{\log_{10} 3}{\log_{10} 2}.$$ [4]

2



The diagram shows the curve $y = 1.25^x$.

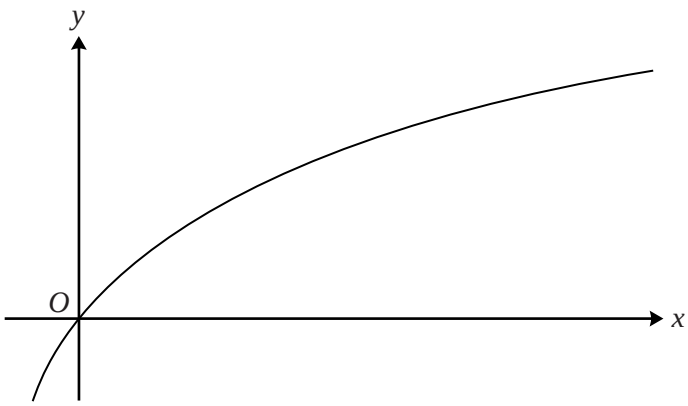
(i) A point on the curve has y-coordinate 2. Calculate its x-coordinate. [3]

(ii) Use the trapezium rule with 4 intervals to estimate the area of the shaded region, bounded by the curve, the axes, and the line $x = 4$. [4]

(iii) State, with a reason, whether the estimate found in part **(ii)** is an overestimate or an underestimate. [2]

(iv) Explain briefly how the trapezium rule could be used to find a more accurate estimate of the area of the shaded region. [1]

3

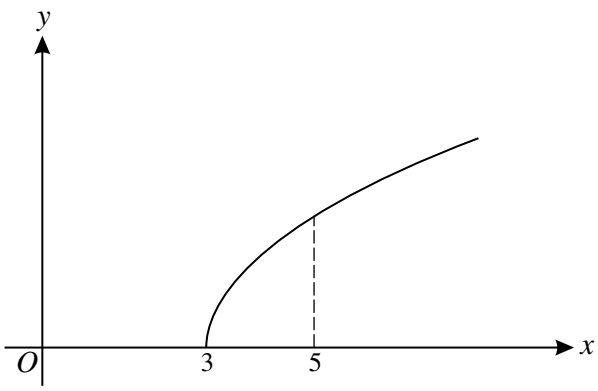


The diagram shows the curve $y = \log_{10}(2x + 1)$.

(i) Use the trapezium rule with 4 strips each of width 1.5 to find an approximation to the area of the region bounded by the curve, the x-axis and the lines $x = 4$ and $x = 10$. Give your answer correct to 3 significant figures. **[4]**

(ii) Explain why this approximation is an under-estimate. **[1]**

4



The diagram shows the curve $y = \sqrt{x - 3}$.

(i) Use the trapezium rule, with 4 strips each of width 0.5, to find an approximate value for the area of the region bounded by the curve, the x-axis and the line $x = 5$. Give your answer correct to 3 significant figures. **[4]**

(ii) State, with a reason, whether this approximation is an underestimate or an overestimate. **[2]**

5 **(i)** Use the trapezium rule, with 4 strips each of width 0.5, to find an approximate value for

$$\int_3^5 \log_{10}(2+x)\,\mathrm{d}x,$$

giving your answer correct to 3 significant figures. **[4]**

(ii) Use your answer to part **(i)** to deduce an approximate value for $\int_3^5 \log_{10}\sqrt{2+x}\,\mathrm{d}x$, showing your method clearly. **[2]**

6 Use the trapezium rule, with 3 strips each of width 2, to estimate the value of

$$\int_1^7 \sqrt{x^2+3}\,\mathrm{d}x.$$ [4]