

Numerical methods

Question Paper 1

Level	A Level
Subject	Mathematics (Pure)
Exam Board	AQA
Module	Core 2
Topic	Trigonometry
Sub Topic	Numerical methods
Booklet	Question Paper 1

Time Allowed: 32 minutes

Score: /27

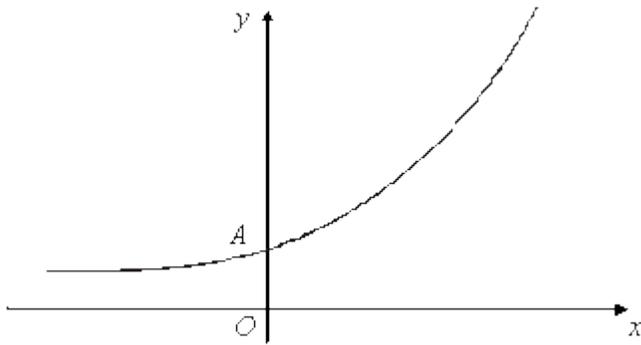
Percentage: /100

Grade Boundaries:

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

1

The diagram shows a sketch of the curve with equation $y = 3(2^x + 1)$.



The curve $y = 3(2^x + 1)$ intersects the y -axis at the point A .

(a) Find the y -coordinate of the point A .

(2)

(b) Use the trapezium rule with four ordinates (three strips) to find an approximate value for $\int_0^6 3(2^x + 1)dx$

(4)

(c) The line $y = 21$ intersects the curve $y = 3(2^x + 1)$ at the point P .

(i) Show that the x -coordinate of P satisfies the equation

$$2^x = 6$$

(1)

(ii) Use logarithms to find the x -coordinate of P , giving your answer to three significant figures.

(3)

(Total 10 marks)

2

- (a) Use the trapezium rule with five ordinates (four strips) to find an approximate value for

$$\int_0^4 \frac{1}{x^2 + 1} dx$$

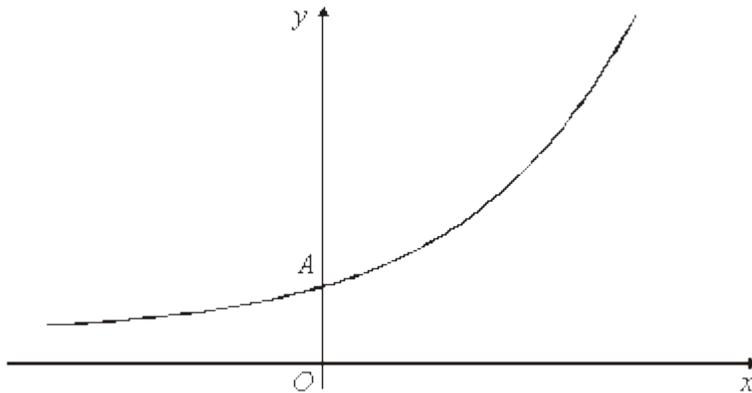
giving your answer to four significant figures.

(4)

- (b) State how you could obtain a better approximation to the value of the integral using the trapezium rule.

(1)**(Total 5 marks)****3**

The diagram shows a sketch of the curve with equation $y = 3^x + 1$.



The curve intersects the y -axis at the point A .

- (a) Write down the y -coordinate of point A .

(1)

- (b) (i) Use the trapezium rule with five ordinates (four strips) to find an approximation for

$$\int_0^1 (3^x + 1) dx, \text{ giving your answer to three significant figures.}$$

(4)

- (ii) By considering the graph of $y = 3^x + 1$, explain with the aid of a diagram whether your approximation will be an overestimate or an underestimate of the true value of

$$\int_0^1 (3^x + 1) dx$$

(2)

- (c) The line $y = 5$ intersects the curve $y = 3^x + 1$ at the point P . By solving a suitable equation, find the x -coordinate of the point P . Give your answer to four decimal places.

(4)

- (d) The curve $y = 3^x + 1$ is reflected in the y -axis to give the curve with equation $y = f(x)$. Write down an expression for $f(x)$.

(1)
(Total 12 marks)