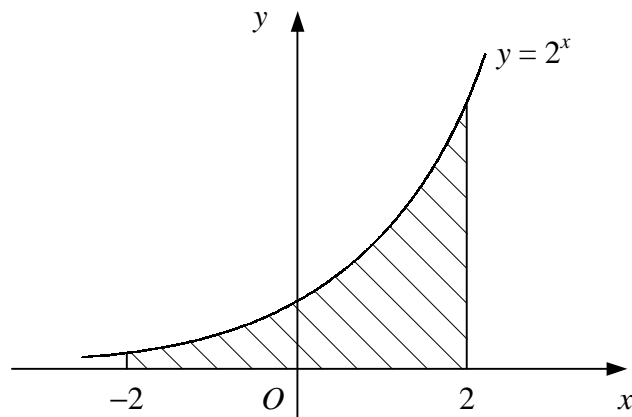


# Core Mathematics C2 Paper G

1. Expand  $(3 - 2x)^4$  in ascending powers of  $x$  and simplify each coefficient. [4]

2.



The diagram shows the curve with equation  $y = 2^x$ .

Use the trapezium rule with four intervals, each of width 1, to estimate the area of the shaded region bounded by the curve, the  $x$ -axis and the lines  $x = -2$  and  $x = 2$ . [4]

3. (i) Given that

$$5 \cos \theta - 2 \sin \theta = 0,$$

show that  $\tan \theta = 2.5$  [2]

- (ii) Solve, for  $0 \leq x \leq 180$ , the equation

$$5 \cos 2x^\circ - 2 \sin 2x^\circ = 0,$$

giving your answers to 1 decimal place. [4]

4. (a) Given that  $y = \log_2 x$ , find expressions in terms of  $y$  for

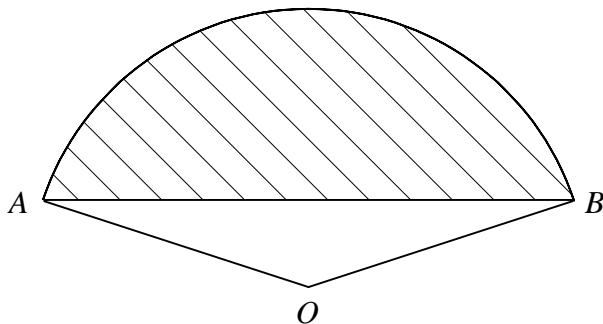
(i)  $\log_2 \left( \frac{x}{2} \right)$ , [2]

(ii)  $\log_2 (\sqrt{x})$ . [2]

- (b) Hence, or otherwise, solve the equation

$$2 \log_2 \left( \frac{x}{2} \right) + \log_2 (\sqrt{x}) = 8. [3]$$

5.

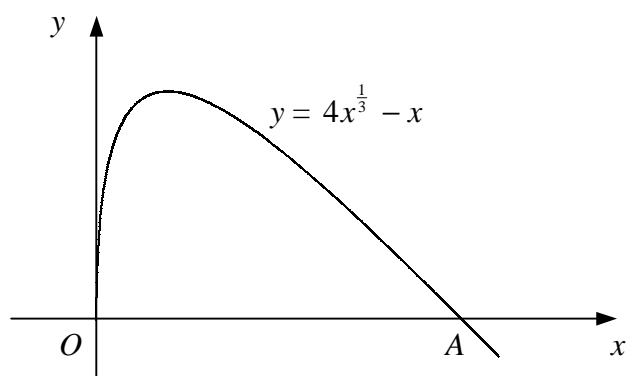


The diagram shows the sector  $OAB$  of a circle, centre  $O$ , in which  $\angle AOB = 2.5$  radians.

Given that the perimeter of the sector is 36 cm,

- (i) find the length  $OA$ , [2]
- (ii) find the perimeter and the area of the shaded segment. [6]

6.



The diagram shows the curve with equation  $y = 4x^{\frac{1}{3}} - x$ ,  $x \geq 0$ .

The curve meets the  $x$ -axis at the origin and at the point  $A$  with coordinates  $(a, 0)$ .

- (i) Show that  $a = 8$ . [3]
- (ii) Find the area of the finite region bounded by the curve and the positive  $x$ -axis. [5]

**Turn over**

7. (a) Evaluate

$$\sum_{r=10}^{30} (7 + 2r). \quad [4]$$

(b) (i) Write down the formula for the sum of the first  $n$  positive integers. [1]

(ii) Using this formula, find the sum of the integers from 100 to 200 inclusive. [3]

(iii) Hence, find the sum of the integers between 300 and 600 inclusive which are divisible by 3. [2]

8. The first three terms of a geometric series are  $(x - 2)$ ,  $(x + 6)$  and  $x^2$  respectively.

(i) Show that  $x$  must be a solution of the equation

$$x^3 - 3x^2 - 12x - 36 = 0. \quad (\text{I}) \quad [3]$$

(ii) Verify that  $x = 6$  is a solution of equation (I) and show that there are no other real solutions. [6]

Using  $x = 6$ ,

(iii) find the common ratio of the series, [1]

(iv) find the sum of the first eight terms of the series. [2]

9. (i) Evaluate

$$\int_1^3 (3 - \sqrt{x})^2 dx,$$

giving your answer in the form  $a + b\sqrt{3}$ , where  $a$  and  $b$  are integers. [6]

(ii) The gradient of a curve is given by

$$\frac{dy}{dx} = 3x^2 + 4x + k,$$

where  $k$  is a constant.

Given that the curve passes through the points  $(0, -2)$  and  $(2, 18)$ , show that  $k = 2$  and find an equation for the curve. [7]