Sequence and series – A2 Mathematics P1

1. June/2022/Paper_7357/01/No.2

The curve

$$y = \log_4 x$$

is transformed by a stretch, scale factor 2, parallel to the y-axis.

State the equation of the curve after it has been transformed.

Circle your answer.

[1 mark]

$y = \frac{1}{2}\log_4 x$ $\quad$ $y = 2\log_4 x$ $\quad$ $y = \log_4 2x$ $\quad$ $y = \log_8 x$

2. June/2022/Paper_7357/01/No.6

(a) Find the first two terms, in ascending powers of x, of the binomial expansion of

$$\left(1-\frac{x}{2}\right)^{\frac{1}{2}}$$

[2 marks]

(b) Hence, for small values of x, show that

$$\sin 4x + \sqrt{\cos x} \approx A + Bx + Cx^2$$

where A, B and C are constants to be found.

[4 marks]

3. June/2022/Paper_7357/01/No.9

The first three terms of an arithmetic sequence are given by

$$2x + 5 \qquad 5x + 1 \qquad 6x + 7$$

(a) Show that $x = 5$ is the only value which gives an arithmetic sequence.

[3 marks]

(b) (i) Write down the value of the first term of the sequence.

[1 mark]

(b) (ii) Find the value of the common difference of the sequence.

[1 mark]

(c) The sum of the first N terms of the arithmetic sequence is S_N where

$$S_N < 100\,000$$

$$S_{N+1} > 100\,000$$

Find the value of N.

[4 marks]

4. June/2022/Paper_7357/01/No.12

(a) A geometric sequence has first term 1 and common ratio $\frac{1}{2}$

(a) (i) Find the sum to infinity of the sequence.

[2 marks]

(a) (ii) Hence, or otherwise, evaluate

$$\sum_{n=1}^{\infty} (\sin 30°)^n$$

[2 marks]

(b) Find the smallest positive exact value of θ, in **radians**, which satisfies the equation

$$\sum_{n=0}^{\infty} (\cos\theta)^n = 2 - \sqrt{2}$$

[4 marks]