

Write your name here	
Surname	Other names
Pearson Edexcel GCE	Centre Number Candidate Number
A level Mathematics Practice Paper Pure Mathematics - Sequences and series	
You must have: Mathematical Formulae and Statistical Tables (Pink)	Total Marks

Instructions

- Use black ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- Fill in the boxes at the top of this page with your name, centre number and candidate number.
- Answer all the questions and ensure that your answers to parts of questions are clearly labelled.
- Answer the questions in the spaces provided – there may be more space than you need.
- You should show sufficient working to make your methods clear. Answers without working may not gain full credit.
- Inexact answers should be given to three significant figures unless otherwise stated.

Information

- A booklet ‘Mathematical Formulae and Statistical Tables’ is provided.
- There are 8 questions in this question paper. The total mark for this paper is 50.
- The marks for each question are shown in brackets – use this as a guide as to how much time to spend on each question.
- Calculators must not be used for questions marked with a * sign.

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.
- If you change your mind about an answer, cross it out and put your new answer and any working underneath.

1. A sequence $a_1, a_2, a_3, \dots$ is defined by

$$a_1 = 1$$
$$a_{n+1} = \frac{k(a_n + 1)}{a_n}, \quad n \geq 1$$

where k is a positive constant.

- (a) Write down expressions for a_2 and a_3 in terms of k , giving your answers in their simplest form.

(3)

Given that $\sum_{r=1}^3 a_r = 10$

- (b) find an exact value for k .

(3)

(Total 6 marks)

2. A sequence $a_1, a_2, a_3, \dots$ is defined by

$$a_{n+1} = 4a_n - 3, \quad n \geq 1$$

$$a_1 = k, \quad \text{where } k \text{ is a positive integer.}$$

- (a) Write down an expression for a_2 in terms of k .

(1)

Given that $\sum_{r=1}^3 a_r = 66$

- (b) find the value of k .

(4)

(Total 5 marks)

3. (i) A sequence $U_1, U_2, U_3, \dots$ is defined by

$$U_{n+2} = 2U_{n+1} - U_n, \quad n \geq 1,$$

$$U_1 = 4 \text{ and } U_2 = 4.$$

Find the value of

(a) U_3 , (1)

(b) $\sum_{n=1}^{20} U_n$. (2)

- (ii) Another sequence $V_1, V_2, V_3, \dots$ is defined by

$$V_{n+2} = 2V_{n+1} - V_n, \quad n \geq 1,$$

$$V_1 = k \text{ and } V_2 = 2k, \text{ where } k \text{ is a constant.}$$

(a) Find V_3 and V_4 in terms of k . (2)

Given that $\sum_{n=1}^5 V_n = 165$,

(b) find the value of k . (3)

(Total 8 marks)

4. A sequence $x_1, x_2, x_3, \dots$ is defined by

$$x_1 = 1,$$

$$x_{n+1} = a x_n + 5, \quad n \geq 1,$$

where a is a constant.

- (a) Write down an expression for x_2 in terms of a .

(1)

- (b) Show that $x_3 = a^2 + 5a + 5$.

(2)

Given that $x_3 = 41$

- (c) find the possible values of a .

(3)

(Total 6 marks)

5. A sequence of numbers $a_1, a_2, a_3, \dots$ is defined by

$$a_{n+1} = 5a_n - 3, \quad n \geq 1.$$

Given that $a_2 = 7$,

- (a) find the value of a_1 .

(2)

- (b) Find the value of $\sum_{r=1}^4 a_r$.

(3)

(Total 5 marks)

6. A sequence of numbers $a_1, a_2, a_3, \dots$ is defined by

$$a_1 = 3,$$

$$a_{n+1} = 2a_n - c, \quad (n \geq 1),$$

where c is a constant.

- (a) Write down an expression, in terms of c , for a_2 .

(1)

- (b) Show that $a_3 = 12 - 3c$.

(2)

Given that $\sum_{i=1}^4 a_i \geq 23$,

- (c) find the range of values of c .

(4)

(Total 7 marks)

7. A sequence $a_1, a_2, a_3, \dots$ is defined by

$$a_1 = 4,$$

$$a_{n+1} = k(a_n + 2), \quad \text{for } n \geq 1$$

where k is a constant.

- (a) Find an expression for a_2 in terms of k .

(1)

Given that $\sum_{i=1}^3 a_i = 2$,

- (b) find the two possible values of k .

(6)

(Total 7 marks)

8. A sequence $a_1, a_2, a_3, \dots$ is defined by

$$a_1 = 4,$$

$$a_{n+1} = 5 - ka_n, \quad n \geq 1,$$

where k is a constant.

- (a) Write down expressions for a_2 and a_3 in terms of k .

(2)

Find

- (b) $\sum_{r=1}^3 (1 + a_r)$ in terms of k , giving your answer in its simplest form,

(3)

- (c) $\sum_{r=1}^{100} (a_{r+1} + ka_r).$

(1)

(Total 6 marks)

TOTAL FOR PAPER: 50 MARKS