

Special Sequences - Higher

For Pearson Edexcel GCSE Mathematics (1MA1) • Higher tier

Name _____

Total marks: **30**

Answer **all** questions in the spaces provided. Show your working: marks are given for correct method.

- 1** The n th term of a sequence is $3^n - 1$
Find the 4th term.

.....
(1)

(Total for Question 1 is 1 mark)

- 2** Here are the first five terms of a Fibonacci sequence.

1 4 5 9 14

In a Fibonacci sequence, each term after the first two is the sum of the two terms before it.

- (a) Find the 8th term of this sequence.

.....
(1)

- (b) The first two terms of a different Fibonacci sequence are x and y .
Show that the sum of the first six terms of this sequence is 4 times the 5th term.

(2)

(Total for Question 2 is 3 marks)

- 3 The first four terms of a geometric sequence are

$$2 \quad 2\sqrt{3} \quad 6 \quad 6\sqrt{3}$$

Find the 7th term.

.....
(2)

(Total for Question 3 is 2 marks)

- 4 A sequence has terms $u_1, u_2, u_3, \dots$ with $u_{n+2} = u_{n+1} + u_n$
 $u_2 = 3$ and $u_5 = 13$
Find u_1 .

$u_1 =$
(3)

(Total for Question 4 is 3 marks)

- 5 Here are the first four terms of a Fibonacci sequence.

$$5 \quad x \quad y \quad 29$$

In a Fibonacci sequence, each term after the first two is the sum of the two terms before it.

Find the value of x and the value of y .

$$x = \dots\dots\dots y = \dots\dots\dots (3)$$

(Total for Question 5 is 3 marks)

- 6 Here are the first four terms of a geometric sequence.

$$81 \quad 27\sqrt{3} \quad 27 \quad 9\sqrt{3}$$

- (a) Work out the 7th term of the sequence.

$$\dots\dots\dots (2)$$

- (b) The 3rd term of a different geometric sequence is 2
The 5th term of this sequence is 6
All the terms of this sequence are positive.
Work out the 8th term of this sequence.
Give your answer in the form $a\sqrt{3}$ where a is an integer.
You must show all your working.

$$\dots\dots\dots (2)$$

(Total for Question 6 is 4 marks)

- 7 Here are the first two terms of a geometric sequence.

$$3 - \sqrt{2} \quad 7 \quad \dots$$

Work out the next term.

Give your answer in the form $a + b\sqrt{2}$ where a and b are integers.

You must show all your working.

.....
(3)

(Total for Question 7 is 3 marks)

- 8 Here are the first three terms of a geometric sequence.

$$2 \quad x \quad 3x + 8$$

All the terms of the sequence are positive.

Work out the 4th term of the sequence.

.....
(4)

(Total for Question 8 is 4 marks)

- 9 A ball is dropped from a height of 250 cm.
After each bounce, the ball reaches a height that is 60% of its previous height.
- (a) Show that the heights the ball reaches after each bounce form a geometric sequence.

(2)

- (b) After which bounce does the ball first reach a height of less than 20 cm?
You must show all your working.

.....
(2)

(Total for Question 9 is 4 marks)

- 10 The n th triangular number is $\frac{n(n+1)}{2}$
Prove that 9 times any triangular number, plus 1, is always a triangular number.

(3)

(Total for Question 10 is 3 marks)
