

Special Sequences - Higher

For AQA GCSE Mathematics (8300) • Higher tier

Name _____

Total marks: **24**

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

- 1** Which of these is a geometric progression?
Circle your answer.

[1 mark]

1, 4, 9, 16

2, 5, 8, 11

5, 10, 20, 40

1, 1, 2, 3

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

The 1st term is 6 and the 3rd term is -1

Work out the 2nd term and the 4th term.

[2 marks]

Answer 2nd term _____ 4th term _____

3 Here is a geometric progression.

3 6 12 24 ...

(a) Write down the common ratio.

[1 mark]

Answer _____

(b) Work out the 8th term.

[1 mark]

Answer _____

4 A geometric progression has 1st term 2 and 3rd term 18
Every term in the progression is positive.
Work out the sum of the first four terms.

[2 marks]

Answer _____

5 The first two terms of a geometric progression are $\sqrt{2}$ and 2
Work out the 5th term.

[2 marks]

Answer _____

- 6** The n th term of a geometric progression is $48 \times \left(\frac{1}{2}\right)^n$
Work out the first term of the progression that is less than 1
Give your answer as a fraction.

[2 marks]

Answer _____

- 7** The n th term of a sequence is $(1 + \sqrt{2})^n$
Show that the third term is $7 + 5\sqrt{2}$

[3 marks]

- 8** In a Fibonacci-type sequence, each term after the first two is the sum of the two terms before it.
The 1st term is 3 and the 6th term is 44
Work out the 2nd term.

[3 marks]

Answer _____

- 9** An arithmetic progression and a geometric progression both have 1st term 3
The two progressions also have the same 2nd term.
The 3rd term of the arithmetic progression is 15
Work out the difference between the 4th term of the geometric progression and the 4th term of the arithmetic progression.

[4 marks]

Answer _____

- 10** The n th triangular number is $\frac{n(n+1)}{2}$
Prove that 8 times any triangular number, plus 1, is always a square number.

[3 marks]