



1 Here are the first four terms of a sequence.

3 6 12 24

- Write down the next term of the sequence.
- Write down the term-to-term rule of the sequence.

(2 marks)

Each term is double the term before

$$3 \times 2 = 6, 6 \times 2 = 12, 12 \times 2 = 24$$

The next term is $24 \times 2 = 48$

The term-to-term rule is multiply by 2

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

2 3 5 8 13

- Write down the next term of the sequence.
- Describe the rule for finding the next term of the sequence.

(2 marks)

In a Fibonacci sequence each term is the sum of the two terms before it

Check

$$2 + 3 = 5, 3 + 5 = 8, 5 + 8 = 13$$

The next term is $8 + 13 = 21$

3 Here are the first four terms of a geometric sequence.

3 12 48 192

- Write down the common ratio.
- Work out the next term.

(2 marks)

a)

$$12 \div 3 = 4$$

$$\text{check: } 48 \div 12 = 4$$

$$\boxed{\text{common ratio} = 4}$$

b)

$$192 \times 4 = 768$$

$$\boxed{768}$$

- 4 Here are the first four terms of a sequence.

96 48 24 12

- a. Write down the next term of the sequence.
b. Work out the 8th term of the sequence.

(3 marks)

Each term is half the term before, so the 5th term is $12 \div 2 = 6$

Keep halving

6th term = 3, 7th term = 1.5, 8th term = 0.75

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

243 81 27 9

- a. Write down the common ratio.
b. Work out the 5th term and the 6th term.

(3 marks)

a)

$$81 \div 243 = \frac{1}{3}$$

$$\text{common ratio} = \frac{1}{3}$$

b)

divide by 3 each time

$$9 \div 3 = 3$$

$$3 \div 3 = 1$$

5th term 3, 6th term 1

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

3 6 12 24

- a. Write an expression for the n th term of the sequence.
b. Work out the 8th term.

(3 marks)

a)

first term 3, common ratio 2

$$\text{2nd term} = 3 \times 2^1$$

$$\text{3rd term} = 3 \times 2^2$$

$$n\text{th term} = 3 \times 2^{n-1}$$

b)

$$3 \times 2^7 = 3 \times 128$$

$$384$$

7

Here are three sequences.

Sequence A: 7 11 15 19

Sequence B: 2 6 18 54

Sequence C: 1 4 5 9 14

- Write down the letter of the geometric sequence.
- Work out the next term of sequence C.
- Work out the 10th term of sequence A.

(3 marks)

Sequence B multiplies by 3 each time, so it is geometric

Sequence C is Fibonacci-type

each term is the sum of the two before it ($1 + 4 = 5$, $4 + 5 = 9$, $5 + 9 = 14$), so the next term is $9 + 14 = 23$

Sequence A goes up by 4 each time. The 10th term is $7 + 9 \times 4 = 7 + 36 = 43$

8

The first two terms of a Fibonacci-type sequence are 4 and 7. Each term after the second is the sum of the two terms before it.

- Write down the next three terms.
- Another Fibonacci-type sequence starts x , 3, ... Show that its 4th term is $x + 6$.

(4 marks)

a)

$$4 + 7 = 11$$

$$7 + 11 = 18$$

$$11 + 18 = 29$$

11, 18, 29

b)

$$3\text{rd term} = x + 3$$

$$\begin{aligned} 4\text{th term} &= 3 + (x + 3) \\ &= x + 6 \end{aligned}$$

4th term = $x + 6$

9

Here are the first five terms of a Fibonacci-type sequence. Each term after the second is the sum of the two terms before it.

3 x — 17 —

Find the value of x and the 5th term.

(3 marks)

$$\text{3rd term} = 3 + x$$

$$\text{4th term} = x + (3 + x) = 3 + 2x$$

$$\begin{array}{rcl} 3 + 2x & = & 17 \\ -3 & & \\ \hline 2x & = & 14 \\ \div 2 & & \\ x & = & 7 \end{array}$$

$$\text{3rd term} = 3 + 7 = 10$$

$$\text{5th term} = 10 + 17 = 27$$

$$\boxed{x = 7, \text{ 5th term} = 27}$$

10

In a Fibonacci sequence, each term after the second is the sum of the two previous terms.

The first term of a Fibonacci sequence is p .

The second term of the sequence is 5.

The fourth term of the sequence is 22.

Work out the value of p .

(3 marks)

$$\text{Third term} = p + 5$$

$$\text{Fourth term} = (p + 5) + 5 = p + 10$$

$$\text{So } p + 10 = 22, \text{ giving } p = 12$$

Check

the sequence is 12, 5, 17, 22 and $5 + 17 = 22$

$$\boxed{p = 12}$$

11 The first two terms of a geometric sequence are

$$5 \quad 5\sqrt{2}$$

a. Work out the 4th term of the sequence.

Give your answer in the form $a\sqrt{2}$ where a is an integer.

b. Find the first term of the sequence that is greater than 100.

(5 marks)

The common ratio is $5\sqrt{2} \div 5 = \sqrt{2}$

a) 3rd term = $5\sqrt{2} \times \sqrt{2} = 10$. 4th term = $10 \times \sqrt{2} = 10\sqrt{2}$

b) The terms are $5, 5\sqrt{2}, 10, 10\sqrt{2}, 20, 20\sqrt{2}, 40, 40\sqrt{2}, 80, 80\sqrt{2}, \dots$

b) 80 100

b) The first term greater than 100 is $80\sqrt{2}$

12 The first two terms of a Fibonacci-type sequence are 2 and n . Each term after the second is the sum of the two terms before it.

a. Write expressions, in terms of n , for the 3rd, 4th and 5th terms.

b. The 5th term is 31. Work out the value of n .

(4 marks)

a)

3rd term = $2 + n$

4th term = $n + (2 + n) = 2 + 2n$

5th term = $(2 + n) + (2 + 2n) = 4 + 3n$

$2 + n, 2 + 2n, 4 + 3n$

b)

$$\begin{array}{rcl} 4 + 3n & = & 31 \\ -4 & & \\ \hline 3n & = & 27 \quad -4 \\ \div 3 & & \\ n & = & 9 \quad \div 3 \end{array}$$

$n = 9$

13

The first term of a geometric sequence is 2 and the 3rd term is 50. The common ratio is positive.

- Work out the common ratio.
- Work out the 6th term.

(4 marks)

a)

terms are 2, $2r$, $2r^2$

$$\begin{array}{ccc} & 2r^2 = 50 & \\ \div 2 & | & \div 2 \\ & r^2 = 25 & \\ \sqrt{} & | & \sqrt{} \\ & r = 5 & \end{array}$$

common ratio = 5

b)

$$2 \times 5^5 = 2 \times 3125$$

6250