



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

4 9 14 19

Write down the next two terms.

(2 marks)

Add 5 each time

$$19 + 5 = 24$$

$$24 + 5 = 29$$

24, 29

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

3 6 12 24

a. Write down the next term of the sequence.

b. 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

- 3 In this sequence, each term is found by adding the two terms before it.

2 3 5 8 13

Write down the next two terms.

(2 marks)

Add the two terms before

$$8 + 13 = 21$$

$$13 + 21 = 34$$

21, 34

4 Here are the first five square numbers.

1 4 9 16 25

a. Write down the next square number after 25.

b. Write down the 8th square number.

(2 marks)

The square numbers are 1×1 , 2×2 , 3×3 and so on

The next one after 25 is $6 \times 6 = 36$

The 8th square number is $8 \times 8 = 64$

5 Matchsticks are used to make a row of squares.

Pattern 1 (one square) uses 4 matchsticks.

Pattern 2 (two squares) uses 7 matchsticks.

Pattern 3 (three squares) uses 10 matchsticks.

How many matchsticks are used in pattern 6?

(2 marks)

4, 7, 10 - add 3 each time

Pattern 4 = 13

Pattern 5 = 16

Pattern 6 = 19

19

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

2 3 5 8 13

a. Write down the next term of the sequence.

b. 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 $8 + 13 = 21$

7 Here are the first five triangular numbers.

1 3 6 10 15

Write down the next two triangular numbers.

(2 marks)

Differences: 2, 3, 4, 5, ...

Next: 6 then 7

$$15 + 6 = 21$$

$$21 + 7 = 28$$

21, 28

8 Here are the first four cube numbers.

1 8 27 64

- Write down the next cube number after 64.
- Write down the 10th cube number.
- Explain why 200 is not a cube number.

(3 marks)

The cube numbers are 1^3 , 2^3 , 3^3 and so on

The next one after 64 is $5^3 = 125$

The 10th cube number is $10^3 = 1000$

$5^3 = 125$ and $6^3 = 216$, so 200 falls between two consecutive cube numbers and cannot be one

9 Here are the first four terms of a sequence.

50 44 38 32

- Write down the next two terms.
- Work out the first term in the sequence that is negative.

(3 marks)

a)

Subtract 6 each time

$$32 - 6 = 26$$

$$26 - 6 = 20$$

26, 20

b)

20, 14, 8, 2, -4

-4

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

14 11 8 5

- a. Work out the next two terms of the sequence.
b. Write down the term-to-term rule of the sequence.

(3 marks)

The terms go down by 3 each time: 14, 11, 8, 5

Next term

$$5 - 3 = 2$$

The term after that

$$2 - 3 = -1$$

The term-to-term rule is subtract 3

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

3 8 13 18

- a. Zara says 83 is in the sequence. Is she right? Give a reason.
b. Zara says 100 is in the sequence. Is she right? Give a reason.

(3 marks)

a)

Add 5 each time from 3

Terms end in 3 or 8

Yes - 83 ends in 3

b)

100 ends in 0

No - it does not end in 3 or 8

- 12 Here is a sequence.

6 10 14 18 22

Ben says 50 will be in the sequence. Is Ben right? Give a reason.

(2 marks)

Add 4 each time

22, 26, 30, 34, 38, 42, 46, 50

Yes - 50 is in the sequence

- 13 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

- 14 The first triangular numbers are 1, 3, 6, 10, 15, 21, ...

Is 45 a triangular number? Show how you know.

(2 marks)

$$21 + 7 = 28$$

$$28 + 8 = 36$$

$$36 + 9 = 45$$

Yes - 45 is in the sequence

- 15 The first two terms of a sequence are 3 and x .

Each term after that is the sum of the two terms before it.

The 4th term is 17.

- a. Work out the value of x .
b. Work out the 5th term.

(3 marks)

a)

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

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

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

$$x = 7$$

b)

3, 7, 10, 17, ...

$$10 + 17 = 27$$

$$27$$

- 16 Here are the first five triangular numbers.

1 3 6 10 15

- a. Describe how the sequence continues from one term to the next.
b. Work out the next two terms of the sequence.

(3 marks)

The differences between terms are 2, 3, 4, 5, so the amount added goes up by 1 each time

Next term

$$15 + 6 = 21$$

The term after that

$$21 + 7 = 28$$

- 17 Here are three sequences.

Sequence A: 7 11 15 19

Sequence B: 2 6 18 54

Sequence C: 1 4 5 9 14

- a. Write down the letter of the geometric sequence.
b. Work out the next term of sequence C.
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 $7 + 9 \times 4 = 7 + 36 = 43$

- 18 The even numbers form the pattern

2, 4, 6, 8, ...

Write down the 12th number in this pattern.

(1 mark)

The n th even number is $2 \times n$

The 12th even number is $2 \times 12 = 24$

24

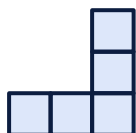
19

Here are the first three patterns in a sequence made from grey square tiles.

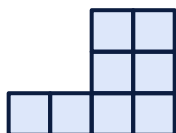
Pattern 1 uses 5 tiles. Pattern 2 uses 8 tiles. Pattern 3 uses 11 tiles.

The number of tiles goes up by the same amount from each pattern to the next.

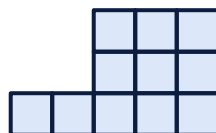
- Work out the number of tiles in pattern 5.
- Write down an expression, in terms of n , for the number of tiles in pattern n .
- Explain why there is no pattern in this sequence that uses exactly 100 tiles.



Pattern 1



Pattern 2



Pattern 3

(5 marks)

a) The pattern goes up by 3 tiles each time

pattern 4 uses $11 + 3 = 14$ tiles, pattern 5 uses $14 + 3 = 17$ tiles

b) The common difference is 3, so the expression starts $3n$. For $n = 1$, $3n = 3$, but pattern 1 has 5 tiles, so add 2: $3n + 2$

b) Check

$n = 2$ gives 8 and $n = 3$ gives 11, both correct

c) If $3n + 2 = 100$ then $3n = 98$. $98 \div 3$ is not a whole number, so no pattern uses exactly 100 tiles