

Sequences and the nth Term

GCSE Mathematics • Foundation Tier • Grades 4–5 • Non-calculator

WORKED SOLUTIONS

Name: _____ *worked example* _____

Class: _____

Total: _____ *49* _____ / 49

Show all your working. Marks are given for correct method as well as the final answer.

1. Write down the next two terms of 4, 7, 10, 13, ... [2 marks]

adding 3 each time

Answer: _____ *16, 19* _____

2. Write down the next two terms of 20, 16, 12, ... [2 marks]

subtracting 4 each time

Answer: _____ *8, 4* _____

3. Find the nth term of 5, 8, 11, 14, ... [2 marks]

difference is 3, so $3n$

$3(1) = 3$, but the first term is 5

so $3n + 2$

Answer: _____ *$3n + 2$* _____

4. Find the nth term of 7, 12, 17, 22, ... [2 marks]

difference 5

$5(1) = 5$, first term 7

$5n + 2$

Answer: _____ *$5n + 2$* _____

5. Find the nth term of 2, 9, 16, 23, ... [2 marks]

difference 7

$7(1) = 7$, first term 2

$7n - 5$

Answer: _____ *$7n - 5$* _____

6. Find the nth term of 19, 15, 11, 7, ... [3 marks]

difference -4, so $-4n$

$-4(1) = -4$, first term 19

decreasing = negative n term

$-4n + 23$

Answer: _____ *$-4n + 23$* _____

7. The nth term of a sequence is $6n - 1$. Write down the first three terms. [2 marks]

$n = 1: 5$

$n = 2: 11$

$n = 3: 17$

Answer: _____ *5, 11, 17* _____

8. The nth term is $4n + 3$. Work out the 20th term. [2 marks]

$4(20) + 3 = 83$

Answer: _____ 83 _____

9. The n th term is $50 - 3n$. Work out the 12th term. [2 marks]

$$50 - 36 = 14$$

Answer: _____ 14 _____

10. Is 61 a term of the sequence $3n + 1$? Show your working. [3 marks]

$$3n + 1 = 61$$

$$3n = 60$$

$$n = 20$$

n is a whole number, so yes

Answer: yes, the 20th term

11. Is 100 a term of the sequence $4n + 3$? Show your working. [3 marks]

$$4n + 3 = 100$$

$$4n = 97$$

$$n = 24.25$$

not a whole number, so no

Answer: _____ no _____

12. Find the first term of $7n - 2$ that is greater than 100. [3 marks]

$$7n - 2 > 100$$

$$7n > 102$$

$$n > 14.57$$

$$n = 15 \text{ gives } 103$$

Answer: _____ 103 ($n = 15$) _____

13. Write down the next two terms of 1, 1, 2, 3, 5, ... [2 marks]

add the previous two terms

Fibonacci

Answer: _____ 8, 13 _____

14. Write down the next two terms of 3, 6, 12, 24, ... [2 marks]

doubling each time

geometric, not linear

Answer: _____ 48, 96 _____

15. Write down the next two terms of 1, 4, 9, 16, ... [2 marks]

square numbers: n^2

Answer: _____ 25, 36 _____

16. Write down the next two terms of 1, 3, 6, 10, ... [2 marks]

differences go up by 1 each time

triangular numbers

Answer: _____ 15, 21 _____

17. Write down the n th term of the sequence of square numbers. [1 mark]

$$1, 4, 9, 16 = 1^2, 2^2, \dots$$

Answer: _____ n^2 _____

18. A sequence starts 2, 6, 18, 54. Describe the rule. [2 marks]

$$6 \div 2 = 3, 18 \div 6 = 3$$

Answer: _____ multiply by 3 _____

19. A pattern is made from matchsticks. Pattern 1 uses 4, pattern 2 uses 7, pattern 3 uses 10.

- (a) Find the n th term for the number of matchsticks. [3 marks]

difference 3, so $3n$

$$3(1) = 3, \text{ first is } 4$$

$$3n + 1$$

- (b) Work out how many matchsticks pattern 50 uses. [2 marks]

$$3(50) + 1 = 151$$

Answer: $3n + 1$; 151 matchsticks

20. A sequence has n th term $2n + 5$.

- (a) Work out the sum of the first four terms. [3 marks]

terms: 7, 9, 11, 13

$$\text{sum} = 40$$

- (b) Explain why every term of this sequence is odd. [2 marks]

$2n$ is always even

$$\text{even} + 5 (\text{odd}) = \text{odd}$$

Answer: ~~40~~; $2n$ is even, +5 makes it odd