

GCSE Maths: Arithmetic sequences and the nth term (Foundation): answers

GCSE Maths - Sequences and nth Term - Foundation - Lesson 11.4

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch11-sequences/foundation/arithmetic-sequences-and-the-nth-term/

Exercise 11D The nth term of an arithmetic sequence Non-calculator

1 Write down the common difference of each sequence.

(a) 4, 7, 10, 13, ...

Answer: 3

(b) 12, 17, 22, 27, ...

Answer: 5

(c) 30, 25, 20, 15, ...

Answer: -5

(d) 9, 7, 5, 3, ...

Answer: -2

2 Find the nth term of each sequence.

(a) 4, 7, 10, 13, ...

Answer: $3n + 1$

(b) 5, 7, 9, 11, ...

Answer: $2n + 3$

(c) 3, 8, 13, 18, ...

Answer: $5n - 2$

(d) 1, 5, 9, 13, ...

Answer: $4n - 3$

(e) 10, 20, 30, 40, ...

Answer: $10n$

(f) 2, 9, 16, 23, ...

Answer: $7n - 5$

3 Find the nth term of each decreasing sequence.

(a) 20, 17, 14, 11, ...

Answer: $-3n + 23$ (or $23 - 3n$)

(b) 30, 26, 22, 18, ...

Answer: $-4n + 34$ (or $34 - 4n$)

(c) 50, 45, 40, 35, ...

Answer: $-5n + 55$ (or $55 - 5n$)

(d) 9, 7, 5, 3, ...

Answer: $-2n + 11$ (or $11 - 2n$)

4 Write down the n th term of each of these sequences.

(a) The even numbers: 2, 4, 6, 8, ...

Answer: $2n$

(b) The odd numbers: 1, 3, 5, 7, ...

Answer: $2n - 1$

(c) The multiples of 10: 10, 20, 30, 40, ...

Answer: $10n$

(d) The multiples of 6: 6, 12, 18, 24, ...

Answer: $6n$

5 Find the n th term of each sequence, then work out the term asked for.

(a) 3, 5, 7, 9, ... Find the 50th term.

Answer: n th term = $2n + 1$; 50th term = 101

(b) 6, 11, 16, 21, ... Find the 30th term.

Answer: n th term = $5n + 1$; 30th term = 151

(c) 2, 8, 14, 20, ... Find the 100th term.

Answer: n th term = $6n - 4$; 100th term = 596

(d) 40, 36, 32, 28, ... Find the 12th term.

Answer: n th term = $-4n + 44$; 12th term = -4

6 Find the n th term of each arithmetic sequence from its first term and common difference.

(a) First term 7, common difference 3

Answer: $3n + 4$

(b) First term 2, common difference 5

Answer: $5n - 3$

(c) First term 20, common difference -4

Answer: $-4n + 24$ (or $24 - 4n$)

(d) First term 1, common difference 10

Answer: $10n - 9$

7 Ben says the n th term of 6, 10, 14, 18, ... is $6n + 4$. Show that he is wrong and find the correct n th term.

Answer: Ben is wrong. The n th term is $4n + 2$.

8 Ahmed saves £12 in week 1, £17 in week 2, £22 in week 3, and so on. Each week he saves £5 more than the week before. How much does he save in week 20?

Answer: £107

9 Tables are pushed together in a row. One table seats 6, two tables seat 10, three tables seat 14, and so on. Find the n th term and use it to work out how many people can sit at 25 tables.

Answer: n th term $4n + 2$; 25 tables seat 102

10 The cost, in pounds, of hiring a bike for 1, 2, 3, 4 hours is £9, £13, £17, £21. The costs form an arithmetic sequence. Find the n th term and the cost of hiring the bike for 10 hours.

Answer: n th term $4n + 5$; cost £45

11 Show that the n th term of the sequence 7, 11, 15, 19, ... is $4n + 3$.

Answer: Shown: the sequence goes up in 4s and $4n + 3$ gives 7, 11, 15, 19.

12 Ali says the n th term of 8, 11, 14, ... is $3n + 5$. Beth says it is $5 + 3n$. Who is right?

Answer: Both are right: $3n + 5$ and $5 + 3n$ mean the same.

13 The n th term of an arithmetic sequence is $4n - 1$. Write down the first term and the common difference.

Answer: First term 3; common difference 4

14 Show that every term of the sequence with n th term $3n + 2$ is 2 more than a multiple of 3. Use this to explain why 100 is not a term.

Answer: $3n$ is a multiple of 3, so every term leaves remainder 2 when divided by 3. 100 leaves remainder 1, so it is not a term.