



THIRD SPACE  
LEARNING

# Diagnostic Questions

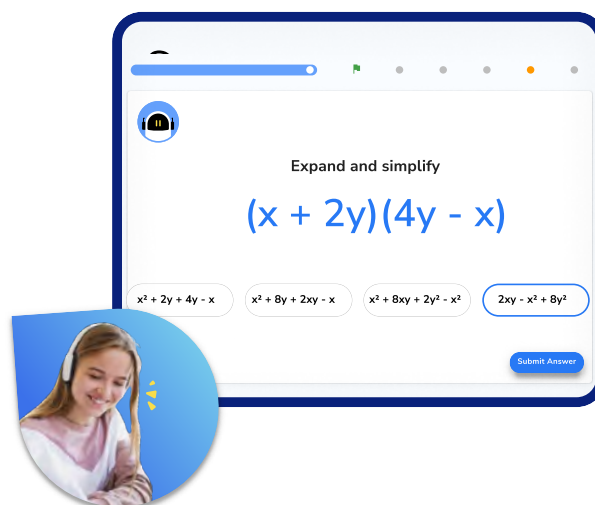
$N^{\text{th}}$  term of a Sequence | Algebra

## This resource in a nutshell

Diagnostic questions are a quick and easy way of assessing your students' knowledge and understanding of a particular topic.

Students may be struggling with **N<sup>th</sup> term of a Sequence** for a number of different reasons. Diagnostic questions can help to identify the particular misconception that the student has and help to determine the specific support they will need in order to improve.

They are low stakes and support students developing metacognition around how their learning is progressing and what they need to do to improve further.



At Third Space Learning, we use diagnostic questions before and after online tutoring sessions to identify gaps and track progress, an example of this is shown above.

## How to use the questions in this resource

There are 14 multiple choice questions, each designed to assess each of the key skills required to master **n<sup>th</sup> term of a sequence**. Each question has **one correct answer** and **three carefully chosen incorrect answers** that are designed to identify and highlight fundamental misconceptions including: **Substitution, Order of operations, Ordering decimals and Calculations with negative numbers**.

When answering these questions, students should be **encouraged to explain why they have chosen a particular answer**, and why the other three answers are incorrect. This can be done verbally in small groups, or written down on the worksheet or in their books.

This resource has been designed to be as **flexible** as possible with questions that can be easily chopped up and reordered, and come with a separate answer sheet that details all of the misconceptions highlighted in the answers.

## Diagnostic Questions: Nth term of a sequence

1. Find the first three terms of the sequence with  $n^{\text{th}}$  term:

$$4n + 1$$

A) 4, 8, 12	B) 5, 9, 13
C) 5, 10, 15	D) 8, 12, 16

2. Find the first three terms of the sequence with  $n^{\text{th}}$  term:

$$7 - 3n$$

A) 7, 4, 1	B) 10, 13, 16
C) -3, 4, 11	D) 4, 1, -2

3. Find the first three terms of the sequence with  $n^{\text{th}}$  term:

$$8n - 3$$

A) 11, 19, 27	B) -3, 5, 13
C) 5, 13, 21	D) 8, 5, 2

## Diagnostic Questions: Nth term of a sequence

4. Find the first three terms of the sequence with  $n^{\text{th}}$  term:

$$\frac{n}{2} + 5$$

A) $3, 3\frac{1}{2}, 4$	B) $\frac{1}{2}, 1, 1\frac{1}{2}$
C) 6, 7, 8	D) $5\frac{1}{2}, 6, 6\frac{1}{2}$

5. Find the first three terms of the sequence with  $n^{\text{th}}$  term:

$$9.5 - 1.5n$$

A) 11, 12.5, 14	B) 8, 16, 24
C) 4.5, -0.5, -5.5	D) 8, 6.5, 5

6. Find the first three terms of the sequence with  $n^{\text{th}}$  term:

$$0.7n + 0.2$$

A) 9, 16, 23	B) 0.9, 1.6, 2.3
C) 2.7, 3.4, 2.1	D) 0.7, 0.9, 1.1

## Diagnostic Questions: Nth term of a sequence

7. Find the  $n^{\text{th}}$  term rule for the sequence with the first five terms:

4, 7, 10, 13, 16

A) $4n + 3$	B) $4n$
C) $3n + 1$	D) $3n$

8. Find the  $n^{\text{th}}$  term rule for the sequence with the first five terms:

19, 12, 5,  $-2$ ,  $-9$

A) $19 - 7n$	B) $19n$
C) $-7n$	D) $26 - 7n$

9. Find the  $n^{\text{th}}$  term rule for the sequence with the first five terms:

$-6$ ,  $-1$ , 4, 9, 14

A) $5n - 11$	B) $5n - 6$
C) $-5n - 1$	D) $-6n$

## Diagnostic Questions: Nth term of a sequence

10. Find the  $n^{\text{th}}$  term rule for the sequence with first five terms:

**1.7, 2.2, 2.7, 3.2, 3.7**

A) $0.5n + 1.7$	B) $1.7n + 0.5$
C) $0.5n + 1.2$	D) $1.2n + 0.5$

11. Find the  $n^{\text{th}}$  term rule for the sequence with first five terms:

**1.1, 0.5, -0.1, -0.7, -1.3**

A) $1.7 - 0.6n$	B) $0.6n + 0.5$
C) $1.1 - 0.6n$	D) $-0.6n - 0.5$

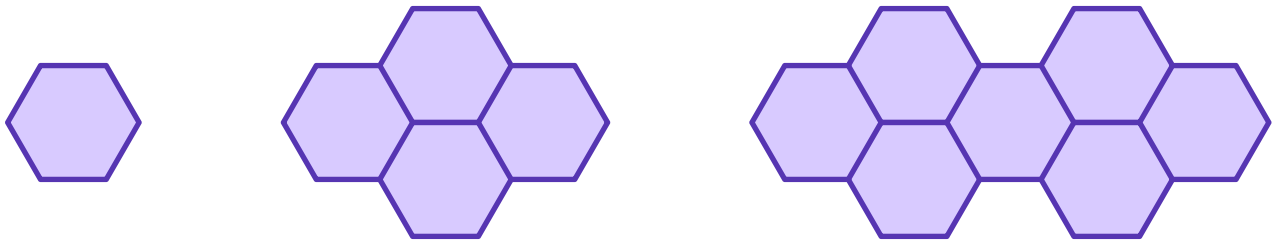
12. Find the  $n^{\text{th}}$  term rule for the sequence with first five terms:

**$\frac{1}{2}, 1\frac{1}{4}, 2, 2\frac{3}{4}, 3\frac{1}{2}$**

A) $\frac{1}{2}n + \frac{3}{4}$	B) $\frac{3}{4}n - \frac{1}{4}$
C) $\frac{1}{4}n + \frac{1}{4}$	D) $\frac{3}{4}n + \frac{1}{4}$

Diagnostic Questions: Nth term of a sequence

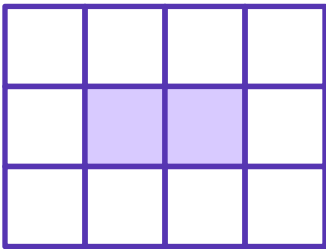
13. Find the  $n^{\text{th}}$  term rule for the number of hexagons in the sequence of patterns:



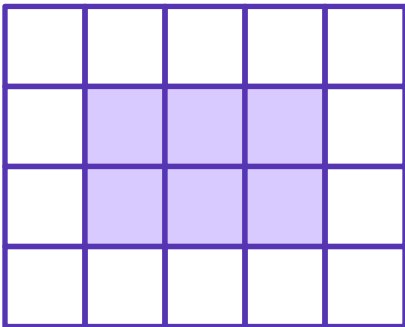
A) $1 + 3n$	B) $3n$
C) $n + 3$	D) $3n - 2$

14. By finding the  $n^{\text{th}}$  term, predict how many white tiles will be in pattern 10:

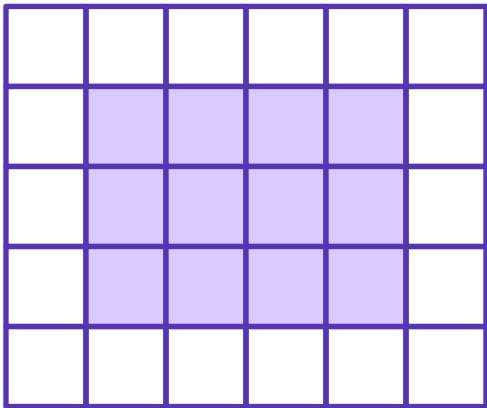
Pattern 1



Pattern 2



Pattern 3



A) 100	B) 50
C) 46	D) 40

## Diagnostic Questions: Nth term of a sequence Answers

1. Find the first three terms of the sequence with  $n^{\text{th}}$  term:

$$4n + 1$$

A) 4, 8, 12 Student forgot add 1 after multiplying by 4

B) 5, 9, 13 Correct answer

C) 5, 10, 15 Student multiplied each position by 5

D) 8, 12, 16 Student worked out  $4 \times (n + 1)$

2. Find the first three terms of the sequence with  $n^{\text{th}}$  term:

$$7 - 3n$$

A) 7, 4, 1 Student began the sequence using  $n = 0$

B) 10, 13, 16 Student added (rather than subtracted)  $3n$

C) -3, 4, 11 Student started sequence with -3 and added 7 (twice)

D) 4, 1, -2 Correct answer

3. Find the first three terms of the sequence with  $n^{\text{th}}$  term:

$$8n - 3$$

A) 11, 19, 27 Student added 3, instead of subtracting 3

B) -3, 5, 13 Student started sequence with -3 and added 8 (twice)

C) 5, 13, 21 Correct answer

D) 8, 5, 2 Student started sequence with 8 and subtracted 3 (twice)



## Diagnostic Questions: Nth term of a sequence Answers

4. Find the first three terms of the sequence with  $n^{\text{th}}$  term:

$$\frac{n}{2} + 5$$

A)  $3, 3\frac{1}{2}, 4$  Student added 5 to  $n$  before dividing by 2

B)  $\frac{1}{2}, 1, 1\frac{1}{2}$  Student forgot to add 5

C) 6, 7, 8 Student forgot to divide  $n$  by 2

D)  $5\frac{1}{2}, 6, 6\frac{1}{2}$  Correct answer

5. Find the first three terms of the sequence with  $n^{\text{th}}$  term:

$$9.5 - 1.5n$$

A) 11, 12.5, 14 Student performed addition instead of subtraction

B) 8, 16, 24 Student simplified to  $8n$  before calculating

C) 4.5, -0.5, -5.5 Student subtracted  $5n$  rather than  $1.5n$

D) 8, 6.5, 5 Correct answer

6. Find the first three terms of the sequence with  $n^{\text{th}}$  term:

$$0.7n + 0.2$$

A) 9, 16, 23 Student found terms using the rule  $7n + 2$

B) 0.9, 1.6, 2.3 Correct answer

C) 2.7, 3.4, 2.1 Student added 2 instead of 0.2

D) 0.7, 0.9, 1.1 Student used 0.7 as first term and 0.2 as common difference

## Diagnostic Questions: Nth term of a sequence Answers

7. Find the  $n^{\text{th}}$  term rule for the sequence with first five terms:

4, 7, 10, 13, 16

- A)  $4n + 3$  Student used common difference incorrectly
- B)  $4n$  Student incorrectly attempted to simplify the  $n^{\text{th}}$  term rule
- C)  $3n + 1$  Correct answer
- D)  $3n$  Student found the common difference but not the constant

8. Find the  $n^{\text{th}}$  term rule for the sequence with first five terms:

19, 12, 5,  $-2$ ,  $-9$

- A)  $19 - 7n$  Student found the value of the constant incorrectly
- B)  $19n$  Student incorrectly attempted to simplify the  $n^{\text{th}}$  term rule
- C)  $-7n$  Student found the common difference but not the constant
- D)  $26 - 7n$  Correct answer

9. Find the  $n^{\text{th}}$  term rule for the sequence with first five terms:

$-6$ ,  $-1$ , 4, 9, 14

- A)  $5n - 11$  Correct answer
- B)  $5n - 6$  Student found the value of the constant incorrectly
- C)  $-5n - 1$  Student only considered the first term
- D)  $-6n$  Student incorrectly attempted to simplify the  $n^{\text{th}}$  term rule

## Diagnostic Questions: Nth term of a sequence Answers

10. Find the  $n^{\text{th}}$  term rule for the sequence with first five terms:

**1.7, 2.2, 2.7, 3.2, 3.7**

- A)  $0.5n + 1.7$  Student found the value of the constant incorrectly
- B)  $1.7n + 0.5$  Student misinterpreted the common difference
- C)  $0.5n + 1.2$  Correct answer
- D)  $1.2n + 0.5$  Student interchanged common difference with constant

11. Find the  $n^{\text{th}}$  term rule for the sequence with first five terms:

**1.1, 0.5,  $-0.1$ ,  $-0.7$ ,  $-1.3$**

- A)  $1.7 - 0.6n$  Correct answer
- B)  $0.6n + 0.5$  Student does not understand how to use the common difference for a decreasing sequence
- C)  $1.1 - 0.6n$  Student found the value of the constant incorrectly
- D)  $-0.6n - 0.5$  Student found the value of the constant incorrectly

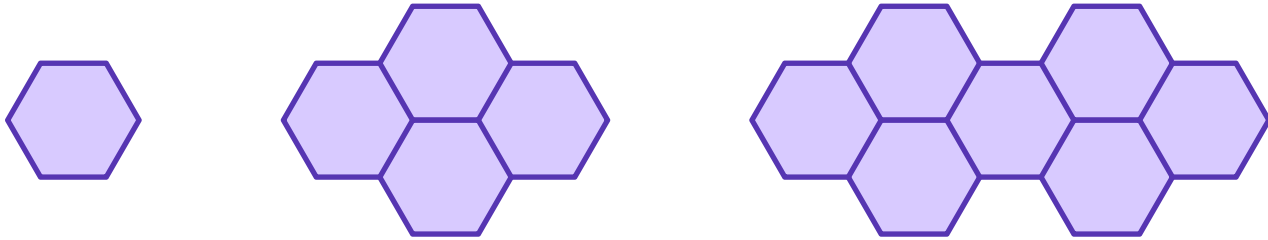
12. Find the  $n^{\text{th}}$  term rule for the sequence with first five terms:

**$\frac{1}{2}$ ,  $1\frac{1}{4}$ , 2,  $2\frac{3}{4}$ ,  $3\frac{1}{2}$**

- A)  $\frac{1}{2}n + \frac{3}{4}$  Student does not understand how to use the common difference
- B)  $\frac{3}{4}n - \frac{1}{4}$  Correct answer
- C)  $\frac{1}{4}n + \frac{1}{4}$  Student does not understand how to find the common difference
- D)  $\frac{3}{4}n + \frac{1}{4}$  Student forgot to subtract the constant

## Diagnostic Questions: Nth term of a sequence Answers

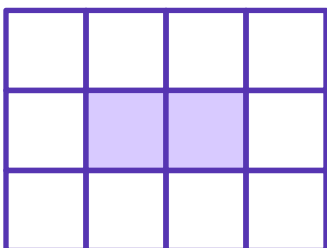
13. Find the  $n^{\text{th}}$  term rule for the number of hexagons in the sequence of patterns:



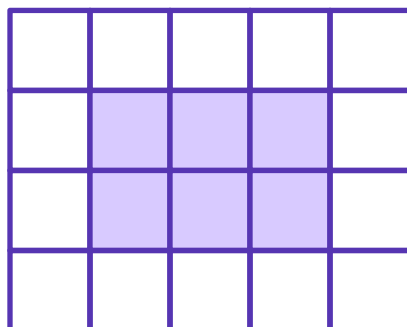
- A)  $1 + 3n$  Student found the value of the constant incorrectly
- B)  $3n$  Student forgot to find the constant
- C)  $n + 3$  Student does not understand how to use the common difference
- D)  $3n - 2$  Correct answer

14. By finding the  $n^{\text{th}}$  term, predict how many white tiles will be in pattern 10:

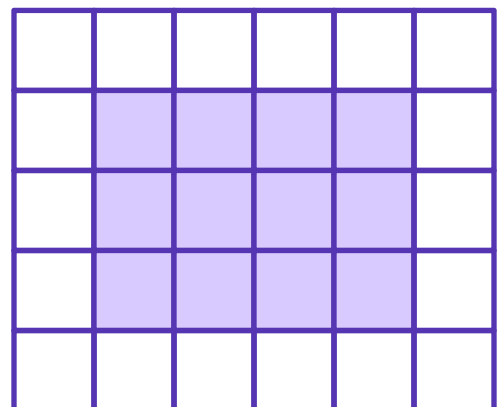
Pattern 1



Pattern 2



Pattern 3



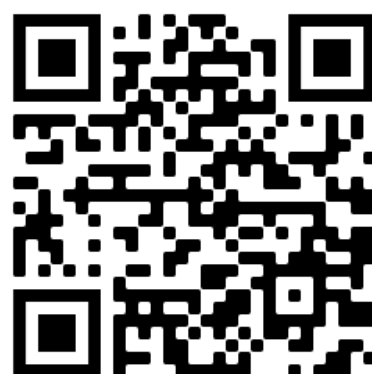
- A) 100 Student multiplied number of tiles in pattern 1 by 10
- B) 50 Student multiplied common difference by 10 and added to number of tiles in pattern 1
- C) 46 Correct answer
- D) 40 Student multiplied 10 by the common difference

# Where to go next?

For more diagnostic questions, and GCSE maths revision resources and worksheets to support students in fixing any misconceptions take a look at the free Third Space Learning [GCSE maths revision](#) pages.

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