

Special Sequences

KS3 Maths · Follows the national curriculum

Name _____ Class _____ Date _____

1. Worked example

Find the next two terms: 1, 4, 9, 16, ...

Step 1 · Spot the pattern

$1^2, 2^2, 3^2, 4^2$ — the square numbers

Step 2 · Next two terms

$5^2 = 25$ and $6^2 = 36$

Answer: 25, 36

Check: Differences 3, 5, 7, then 9 and 11 ✓

2. Now try one with the steps

Find the next two terms: 2, 5, 7, 12, ...

Step 1 · Check differences: 3, 2, 5 — not constant

Step 2 · Try adding the two previous terms

Step 3 · Continue

Answer:

3. Practice

Show your working. The marks tell you how much is expected.

1. Find the next term: 1, 4, 9, 16, 25, ... [1]

2. Find the next term: 1, 3, 6, 10, 15, ... [1]

3. Find the next term: 1, 8, 27, 64, ... [1]

4. Find the next term: 2, 6, 18, 54, ... [1]

5. Find the next term: 1, 1, 2, 3, 5, 8, ... [1]

6. What is the common ratio of 80, 40, 20, 10, ...? [1]

7. Is 4, 8, 12, 16, ... arithmetic or geometric? [1]

8. Find the next two terms: 3, 4, 7, 11, 18, ... [2]

9. What is the 12th square number? [1]

10. Find the next term: 100, 10, 1, 0.1, ... [1]

11. Find the 8th triangular number. [1]

12. A geometric sequence has first term 5 and common ratio 3. Find the 5th term. [2]

13. A Fibonacci-type sequence starts a , b , ... Write the 4th term in terms of a and b . [2]

14. In a Fibonacci-type sequence, the 4th term is 11 and the 5th term is 18. Find the 3rd term. [2]

15. Apart from 1, which number less than 50 is both a square number and a triangular number? [2]

4. Before you hand it in

Continuing 1, 4, 9, 16 with 23, 30 (adding 7 each time)

Check more than one difference: 3, 5, 7 are not equal. These are the squares, so the next terms are 25 and 36.

For 3, 6, 12, 24 writing the next term as 26 ('the ratio is 2')

In a geometric sequence you MULTIPLY by the ratio: $24 \times 2 = 48$.

Thinking the 5th square number is 10

The 5th square number is $5 \times 5 = 25$. Picture a 5 by 5 square of dots.

For 1, 1, 2, 3, 5 writing the next term as 7 (5 + 2)

Add the two terms immediately before: $3 + 5 = 8$.