

2.3.2 Sequence Patterns

Name: _____ Class: _____ Date: _____

KEY WORDS recursive rule

<!-- Session 2 native-skill companion -->

Objective

Practise sequence patterns within the labelled native lessons. Public original tasks; locally authored answer guidance.

1 Key knowledge and worked examples

■ Figurate, geometric and Fibonacci-type sequences • Foundation

Record positions and terms separately. Triangular numbers add 1,2,3,...; square and cube numbers use n^2 and n^3 . A geometric sequence multiplies by a common positive ratio. A Fibonacci-type sequence starts with stated terms and then adds its two predecessors. A supplied recursive rule must include enough initial values.

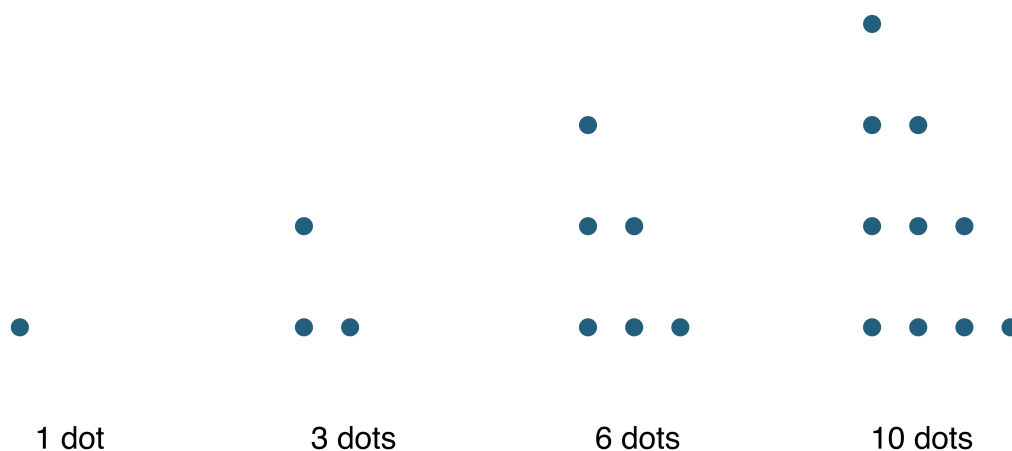
$$u_n = 2 \times 3^{n-1}$$

Triangular terms are 1,3,6,10,15; square terms 1,4,9,16,25; cube terms 1,8,27,64,125. The geometric sequence 2,6,18,54,... has ratio 3 and n th term $2 \times 3^{(n-1)}$. Starting 2,3 and adding the previous two gives 2,3,5,8,13. For $u_{\text{next}} = 2u + 1$ from $u_1 = 1$, the next terms are 3,7,15.

A nonconstant first difference does not mean a pattern is random. A geometric ratio is not a common difference. Check the starting index when writing a position rule.

AQA A23/A24 Foundation includes these patterns and positive rational geometric ratios. Higher also permits surd ratios and derives quadratic n th terms in the next lesson. Infinite-series sums are not part of this GCSE lesson.

Triangular patterns add a new row each time



Original native-lesson illustration; labels belong to its worked example.

2 Practice

2.1 (Foundation) Find the fifth triangular number.

2.2 (Foundation) Find the next term after 2,6,18.

2.3 (Foundation) Find the next term after 2,3,5,8 in a Fibonacci-type sequence.

3 Exam-style questions

3.1 Decide whether this claim is true. Justify with a concrete calculation or counterexample: Every sequence with increasing terms has a constant difference.

Solutions

2.1 $1+2+3+4+5=15$.

2.2 Multiply 18 by the common ratio 3.

2.3 Add the previous two: $5+8=13$.

3.1 False. The squares 1,4,9,16 increase but have differences 3,5,7. Increasing does not imply arithmetic.

Local review guidance: show the chosen method; give the checked result; explain the condition or failed shortcut. This is authored classroom guidance.