

# 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.

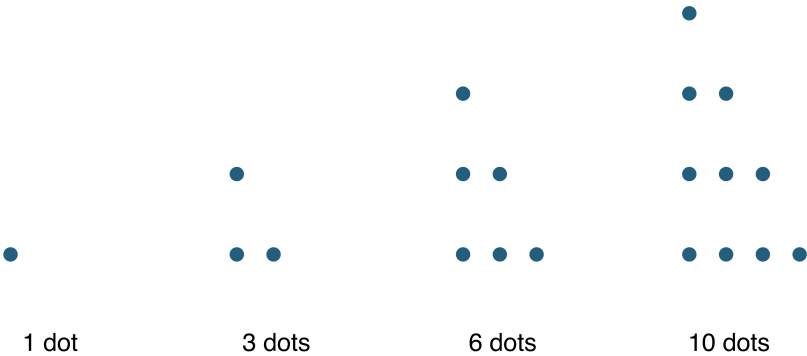
$$u_n = 2 \times 3^{n-1}$$

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

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

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