Lesson 7   Sequences

Objectives

Generate and describe
sequences (Y7, 8)

Vocabulary

sequence, term, position,
term-to-term rule,
position-to-term rule

Oral and mental starter   10 minutes

Ask pupils to continue sequences such as:

    0.7, 0.4, 0.1, …   1005, 1003, 1001, …

    1, ⁻2, 4, ⁻8, …   1, 0.5, 0.25, 0.125, …

Make sure the level of difficulty matches examples in the Framework (pages
144–145).

Q   What is the rule to get the next term?

Explain that you have been using a term-to-term rule to describe these sequences.

Extend the activity: give pupils the first three terms and ask for the 4th, 5th, 10th
terms.

Make sure that pupils realise that there are pitfalls in continuing sequences. For
example, ask them to describe these sequences:

    1, 2, 4,   then   8, 16, …   1, 2, 4, then   7, 11, …

Now give pupils the first three terms of a sequence. Ask them to suggest what the
4th and subsequent terms might be. Point out that the same few given terms can
lead to several different sequences.

Spend a few minutes considering how the sequence 1, 4, 9, 16, … can be
described using term-to-term and position-to-term rules.

Objectives

Generate terms of a sequence
using term-to-term and position-
to-term definitions of the
sequence (Y8, 9)

Vocabulary

sequence, term,
*n*th term, general term,
position-to-term rule,
expression, justify, symbol,
pattern, generate

Resources

OHT of M7.1
OHT of M7.2 (for plenary)

Main teaching   40 minutes

Show the first set of shapes on **OHT M7.1** and ask a pupil to draw the next shape
in the pattern.

Q   How many rectangles will there be in pattern 7? How did you work it out?

Bring out through discussion that they have used the term-to-term rule (as in the
starter).

Q   How many rectangles are there in pattern 20?

Ask pupils to discuss this in pairs and record their values.

Organise the values in a table.

Pattern	1	2	3	…	7	…	20
No. of rectangles	5	8					

Ask pupils to explain how they got the 20th term.

Counteract the misconception that you multiply the 2nd term by 10 to obtain the
20th term by offering a counter-example from the table, e.g. the 1st and 3rd terms.

Ask pairs of pupils to work out how many rectangles there are in pattern 50, and
to explain their method.

Model how to write the correct general term in words and symbols, linking the
explanation to the diagrams. Make sure that links are made between the
numerical and spatial patterns. For example (referring to the lower diagram on
OHT M7.1):

    Think of the original two rectangles (on the left-hand end). Each time three
    rectangles are added to form the next pattern. So:

    Number of rectangles = 2 + pattern number × 3 (this is a position-to-term rule).

Further examples are available in the Framework supplement of examples, pages
155–157, and on previous Key Stage 3 test papers.

By the end of the lesson

pupils should be able to:

• understand sequences

• calculate terms in a sequence

• express a general term in
words and symbols

• explain how the elements of a
general term relate to the
original sequence

Framework supplement of
examples, pages 155–157
Levels 5 and 6

Plenary   10 minutes

Show **OHT M7.2**, developed from a 1996 test question. Recap key language by
asking pupils to make statements about this new sequence. For example:

    The 3rd term is …

    The term-to-term rule is …

    The position-to-term rule is …
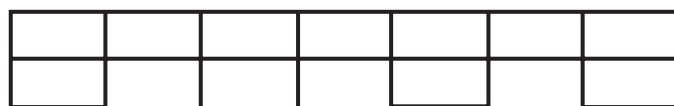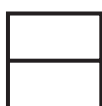
Year 9 booster kit: mathematics

pattern 1

pattern 2

pattern 3

Start with
2 rectangles

Add 3 rectangles
each time for next
pattern

Year 9 booster kit: mathematics

Windmills
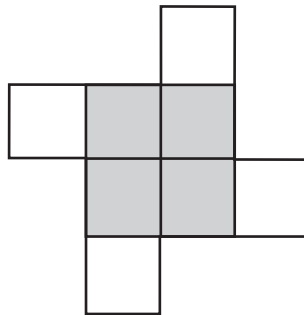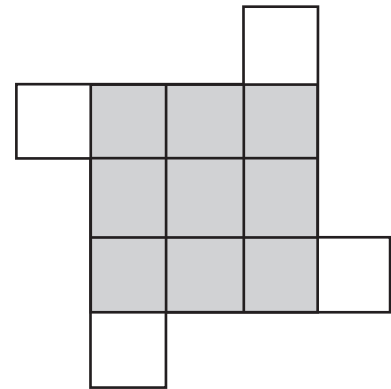
This series of patterns is made with grey and white tiles.
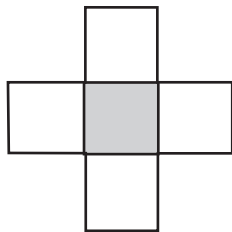
pattern 1   pattern 2   pattern 3

(a) How many grey tiles and white tiles will there be in pattern 8?

(b) How many grey tiles and white tiles will there be in pattern 16?

(c) How many white tiles will there be in pattern *n*?

(d) How many grey tiles will there be in pattern *n*?

(e) How many tiles altogether will there be in pattern *n*?

Year 9 booster kit: mathematics