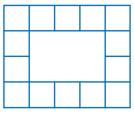
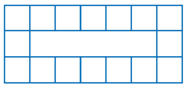
As outcomes, Year 8 pupils should, for example:

- Paving stones

  Investigate the number of square concrete slabs that will surround rectangular ponds of different sizes. Try some examples:





2 by 3 pond1 by 5 pond
needs 14 slabs needs 16 slabs

Collect a range of different sizes and count the slabs. Deduce that, for an l by w rectangle, you need 2l + 2w + 4 slabs.
Possible justification:
You always need one in each corner, so it's twice the length plus twice the width, plus the four in the corners.

Other ways of counting could lead to equivalent forms, such as 2(l + 2) + 2w or 2(l + 1) + 2(w + 1).

Confirm that these formulae give consistent values for the first few terms.

Check predicted terms for correctness.

Link to simplifying and transforming algebraic expressions (pages 116–19).

Begin to use linear expressions to describe the nth term of an arithmetic sequence, justifying its form by referring to the activity from which it was generated.

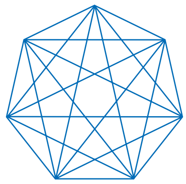
Develop an expression for the nth term of sequences such as:

• 7, 12, 17, 22, 27, …	2 + 5n
• 100, 115, 130, 145, 160, …	15n + 85
• 2.5, 4.5, 6.5, 8.5, 10.5, …	(4n + 1)/2
• $^{-}12$, $^{-}7$, $^{-}2$, 3, 8, …	5n – 17
• 4, $^{-}2$, $^{-}8$, $^{-}14$, $^{-}20$, …	10 – 6n

As outcomes, Year 9 pupils should, for example:

- Diagonals of polygons

  How many diagonals does a polygon have altogether (crossings allowed)?



No. of sides	1	2	3	4	5	6	7	…
No. of diagonals	–	–	0	2	5	9	14	…

Explain that, starting with 3 sides, the terms increase by 2, 3, 4, 5, …

Follow an explanation to derive a formula for the nth term, such as:
Any vertex can be joined to all the other vertices, except the two adjacent ones.
In an n-sided polygon this gives n – 3 diagonals, and for n vertices a total of n(n – 3) diagonals. But each diagonal can be drawn from either end, so this formula counts each one twice.
So the number of diagonals in an n-sided polygon is ½n(n – 3).

Confirm that this formula gives consistent results for the first few terms.

Know that for sequences generated from an activity or context:
- Predicted values of terms need to be checked for correctness.
- A term-to-term or position-to-term rule needs to be justified by a mathematical explanation derived from consideration of the context.

Use linear expressions to describe the nth term of an arithmetic sequence, justifying its form by referring to the activity or context from which it was generated.

Find the nth term of any linear (arithmetic) sequence. For example:

- Find the nth term of 21, 27, 33, 39, 45, …

  The difference between successive terms is 6, so the nth term is of the form T(n) = 6n + b.
  T(1) = 21, so 6 + b = 21, leading to b = 15.
  T(n) = 6n + 15
  Check by testing a few terms.

- Find the nth term of these sequences:
  54, 62, 70, 78, 86, …
  68, 61, 54, 47, 40, …
  2.3, 2.5, 2.7, 2.9, 3.1, …
  $^{-}5$, $^{-}14$, $^{-}23$, $^{-}32$, $^{-}41$, …