B3 *Number Sequences* Data Sheets

Data Sheets

B3.1 Simple Number Patterns
B3.2 Recognising Patterns
B3.3 Flower Beds
B3.4 Formulae for Number Sequences
B3.5 General Laws

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Data Sheet B3.1 *Simple Number Patterns*

What are the next three terms?

5, 8, 11, 14, ☐, ☐, ☐

7, 11, 15, 19, ☐, ☐, ☐

9, 7, 5, 3, ☐, ☐, ☐

$1\frac{1}{2}$, 4, $6\frac{1}{2}$, 9, ☐, ☐, ☐

–6, –9, –12, –15, ☐, ☐, ☐

1, 4, 9, 16, ☐, ☐, ☐

Extension Find the *n*th term for each sequence.

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Data Sheet B3.2 *Recognising Patterns*

For some sequences, you need to find the pattern in the differences.

Example

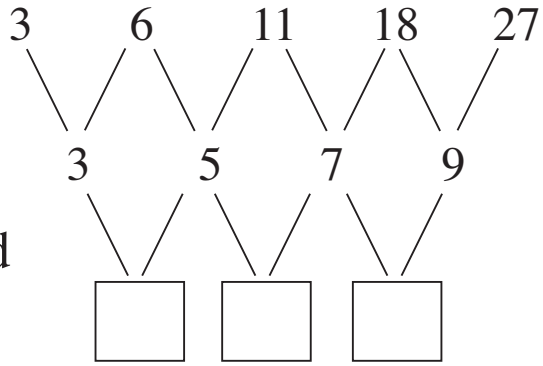
What are the next two numbers in the sequence

3, 6, 11, 18, 27, ..., ?

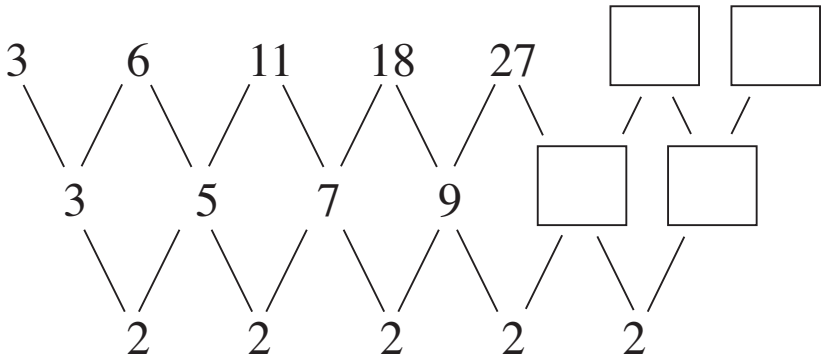
Solution

Find the first difference

and the second difference



You can now work back to find the next two numbers.



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Data Sheet B3.3

Flower Beds

A

	$n = 1$	$n = 2$	$n = 3$
No. of paving stones?	10		

B

	$n = 1$	$n = 2$	$n = 3$
No. of paving stones?	6		

C If there are 200 ☐ slabs, how many flower beds of type A can be made?

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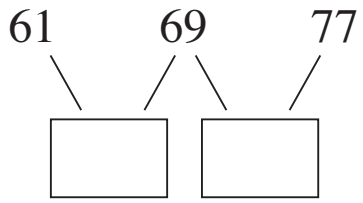
Data Sheet B3.4 *Formulae for Number Sequences*

Example

The 7^{th}, 8^{th} and 9^{th} terms of a sequence are 61, 69 and 77.
Find the formula to describe this sequence.
Hence find the 100^{th} term.

Solution

Consider the differences:



So the formula must be of the form

$$U_n = an + b$$

The value of a is the constant difference, i.e. $a =$ ☐

You can find b by using, for example, the value of U_7.

$$U_7 = 61 = \square \times 7 + b$$

Hence $b =$ ☐ and

$$U_n = \square\, n + \square$$

To find the 100th term, put $n = 100$ in the formula to give

$$U_{100} = \square \times 100 + \square = \square$$

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Data Sheet B3.5 *General Laws*

Example

Study the number pattern below and complete lines (i), (ii) and (iii).

	2^3	$(0 \times 3^2) + (3 \times 2) + 2$	8
	3^3	$(1 \times 4^2) + (3 \times 3) + 2$	27
	4^3	$(2 \times 5^2) + (3 \times 4) + 2$	64
	5^3	$(3 \times 6^2) + (3 \times 5) + 2$	125
(i)	6^3	$(\square \times \square^{\,2}) + (3 \times \square) + 2$	$\square$
(ii)	10^3	$(\square \times \square^{\,2}) + (3 \times \square) + 2$	$\square$
(iii)	n^3	$((n-2) \times \square^{\,2}) + (3 \times \square) + 2$	n^3

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