13 MySummary

Check out

You should now be able to ...

You should now be able to ...		Test it ➡ Questions
✓ Find a position-to-term (*n*th) rule for a linear sequence.	6	1, 2
✓ Explore triangular and square numbers.	7	3, 4
✓ Find a position-to-term (*n*th) rule for a quadratic sequence.	8	5, 6
✓ Explore the long-term behaviour of a sequence defined recursively.	8	7

Language	Meaning	Example
Position-to-term rule (*n*th term)	A rule that links each to its position in the sequence.	For the sequence 2, 4, 6, 8 the position-to-term rule 'multiply the position by 2' can be written $2n$.
Quadratic sequence	A sequence generated by a rule including a squared term.	1, 4, 9, 16, ... is generated by *n*th term n^2.
Triangular numbers	Numbers that can be shown as a triangular pattern of dots.	The first five triangular numbers are 1, 3, 6, 10, 15.
Recursive formula	Allows you to calculate any term of a sequence given the previous term.	$T(n + 1) = T(n) + 3$; $T(1) = 3$ generates the 3 times table.
Long-term behaviour	How a sequence looks after many terms.	Common behaviours are convergent, divergent and oscillatory.
Convergent	A sequence that gets closer and closer to a *limiting value*.	$1, -\frac{1}{2}, \frac{1}{4}, -\frac{1}{8}, \frac{1}{16}, -\frac{1}{32}$ converges to 0.
Divergent	A sequence that does *not* converge.	1, 2, 4, 8, 16, 32 1, -1, 1, -1, 1, -1
Oscillatory	A sequence in which alternate first differences change sign.	1.1, 0.99, 1.001, 0.9999, 1.00001 1, -2, 4, -8, 16, -32

13 MyReview

1 Find the *n*th term for each of these sequences.

- **a** 1, 6, 11, 16, ...
- **b** 4, 11, 18, 25, ...
- **c** 5.6, 6.5, 7.4, 8.3, ...
- **d** 18, 16, 14, 12, ...

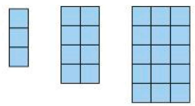
2 Generate the first 5 terms of these sequences.

- **a** $T(n) = 6n - 3$
- **b** $T(n) = \frac{1}{2}n - 5$
- **c** $T(n) = 4(6n + 1)$
- **d** $T(n) = 22 - 3n$.

3 The formula $T(n) = \frac{1}{2}n(n + 1)$ gives the sum of the first *n* whole numbers.

- **a** Use it to find the sum of the first 30 whole numbers.
- **b** Use it to find the 40th triangle number.

4



- **a** By considering the rows and columns find the *n*th term of this sequence.
- **b** How many squares will be in the 10th term?

5 Generate the first 5 terms of these quadratic sequences.

- **a** $T(n) = n^2 + 1$
- **b** $T(n) = 4n^2$
- **c** $T(n) = 3n(2n - 3)$
- **d** $T(n) = n^2 + 3n + 1$

6 Find the *n*th term of these quadratic sequences.

- **a** 6, 9, 14, 21, 30, ...
- **b** 5, 14, 27, 44, 65, ...
- **c** 3, 13, 31, 57, 91, ...
- **d** -2, -4, -4, -2, 2

7 By working out the first few terms, describe the long-term behaviour of each sequence.
In each case, take $T(1) = 0$.

- **a** $T(n + 1) = 2T(n) - 1$
- **b** $T(n + 1) = \frac{1}{2}T(n) - 1$
- **c** $T(n + 1) = \{T(n)\}^2 + 1$
- **d** $T(n + 1) = \{T(n)\}^2 - 1$

What next?

Score		
0 – 3		Your knowledge of this topic is still developing. To improve look at Formative test: 3C-13; MyMaths: 1165 and 1166
4 – 6		You are gaining a secure knowledge of this topic. To improve look at InvisiPen: 273 and 283
7		You have mastered this topic. Well done, you are ready to progress!