Planner

Generating sequences

- Generating a sequence from a term-to-term rule
- Using algebra to find missing terms in an arithmetic sequence
- Generating sequences like the Fibonacci sequence

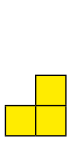
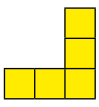
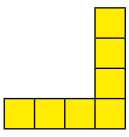
Keywords

You should know

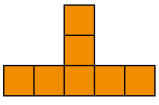
explanation 1 — online

1 Each table shows patterns in a sequence. Copy and complete each table.

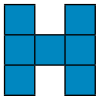
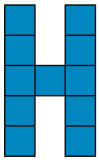
a

Pattern					
Position	1	2	3		
Term	3	5			

b

Pattern					
Position	1	2	3		
Term	1	4			

c

Pattern					
Position	1	2	3		
Term	3	7			

explanation 2a — explanation 2b — explanation 2c — online

2 What is the term-to-term rule for each sequence in question **1**?
State the value of the common differnce, d.

3 Write the term-to-term rule for each sequence.

a 2 4 6 8 10

b 1 4 7 10 13

c 3 0 −3 −6 −9

d $\frac{1}{3}$ 0 $-\frac{1}{3}$ $-\frac{2}{3}$

e $\frac{3}{4}$ 1 $\frac{5}{4}$ $\frac{3}{2}$ $\frac{7}{4}$

f 4 1.5 −1 −3.5 −6

4 Write the next two terms in each sequence in question **3**.

5 Copy and complete the table.

	1st term	Term-to-term rule	First five terms
	0	+ 3	0, 3, 6, 9, 12
a	2	+ 5	
b	3	$+\frac{1}{2}$	
c	−13	+ 3	
d	8	− 5	
e	4	− 1.5	
f	1	− 0.3	
g	−0.5	+ 0.2	
h	−0.5	− 0.4	
i	$\frac{1}{2}$	$+\frac{1}{3}$	
j	$-\frac{1}{2}$	$+\frac{1}{5}$	

6 Copy and complete the table.

	1st term	Term-to-term rule	2nd, 3rd, 4th and 5th terms
a	7	+ 5	
b		+ 4	9, 13, 17, 21
c			10, −1, −12, −23
d	−8		−5, −2, 1, 4
e			0.5, −1.5, −3.5, −5.5
f	$\frac{1}{2}$	$-\frac{1}{2}$	
g			$-\frac{1}{4}, -\frac{3}{4}, -1\frac{1}{4}, -1\frac{3}{4}$
h	0.1	+ 0.01	
i			1.10, 1.15, 1.20, 1.25

explanation 3a explanation 3b

7 Look at these arithmetic sequences. Some terms in each sequence are missing.

i What is the common difference, d, for each sequence?

ii Write the missing terms of each sequence.

a 3, □, □, 12

b 1, □, □, □, 17

c −3, □, □, □, 17

d □, □, 3, □, □, □, 11

e 5, □, □, □, −11

f □, □, 0, □, □, −12

g □, □, −8, □, □, □, −28

h □, □, $2\frac{1}{2}$, □, □, 4

i □, 3.2, □, □, □, 4

j □, □, 1.3, □, □, 0.1

8 Make up three sequences of your own, like those in question **7**.
Pass them to a friend to find the missing terms.
Make sure you have worked out the answers so you can check their answers!

explanation 4 online

9 These sequences are like the Fibonacci sequence: each term after the second is the sum of the previous two terms.

Work out the missing terms in each sequence.

a 1, 3, 4, □, □, □, □

b 2, 4, □, □, □, □, □

c 3, 6, □, □, □, □, □

10 Think about sequences like the Fibonacci sequence and the sequences in question **9**.

a If two consecutive terms in one of these sequences are even, what can you say about the terms in that sequence? Explain how you know.

b If two consecutive terms in a Fibonacci sequence are odd, what can you say about the terms in that sequence? Explain how you know.

11 **a** Hanif adds 1 to each term of the sequence in question **9a**.
Is his new sequence like the Fibonacci sequence? Explain how you know.

b Jenni multiplies each term of the sequence in question **9a** by 2.
Is her new sequence like the Fibonacci sequence? Explain how you know.

12 Joe wrote a sequence like the Fibonacci sequence.
The fourth term of the sequence was 10.

a He started with two positive integers. What could they be?

b How many possible values for the first two terms can you find?

13 Try to find a sequence like the Fibonacci sequence that starts with two positive whole numbers less than 10 and contains the number 100.
How close to 100 can you get? You can use a calculator or a computer to help.

14 Fibonacci was a famous Italian mathematician of the twelfth and thirteen centuries.

Find out what he did and make a mini-poster about him.