Generating sequences

- Identifying the term-to-term rule for an arithmetic sequence
- Generating a sequence from a term-to-term rule

Keywords

You should know

explanation 1

1 Here is a dot pattern.

a Draw the next two diagrams in the pattern.

b What is the rule to go from one diagram to the next?

c Write the number of dots in each diagram as a sequence.

d What is the name of this sequence of numbers?

e Will the number 21 ever be in this sequence? Explain how you know.

2 Here is a different dot pattern.

a Draw the next two diagrams in the pattern.

b What is the rule to go from one diagram to the next?

c Write the number of dots in each diagram as a sequence.

d What is the name of this sequence of numbers?

e Will the number 21 ever be in this sequence? Explain how you know.

3 **a** Draw a dot pattern for each sequence.

i 2, 3, 4, 5 ... **ii** 4, 8, 12 ,16 ... **iii** 1, 5, 9, 13 ...

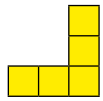
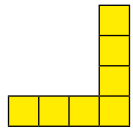
b For each pattern, write the rule to go from one diagram to the next.

***c** Will each sequence contain the number 21? Explain how you know?

explanation 2a | explanation 2b | online

4 This question is about different sequences.

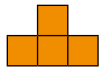
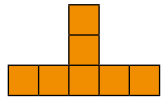
a

Pattern					
Position	1	2	3		
Term	3	5			

i Copy and complete the sequence table for this pattern.

ii What is the term-to-term rule for the sequence?

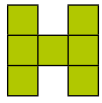
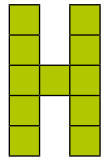
b

Pattern					
Position	1	2	3		
Term	1	4			

i Copy and complete the sequence table for this pattern.

ii What is the term-to-term rule for the sequence?

c

Pattern					
Position	1	2	3		
Term	3	7			

i Copy and complete the sequence table for this pattern.

ii What is the term-to-term rule for the sequence?

5 Look at the sequences below.

i Write the next two terms in each sequence.

ii What is the term-to-term rule for each sequence?

a 2 4 6 8 10 **b** 5 7 9 11 13

c 5 10 15 20 25 **d** 32 30 28 26 24

e 9 13 17 21 25 **f** 20 17 14 11 8

6 Which of the sequences in question **5** are increasing sequences?

7 Copy and complete the table. Use the first term and the term-to-term rule.

Term-to-term rule	1st term	Next four terms
+ 3	0	3, 6, 9, 12
+ 5	2	
+ 4	7	
− 2	5	
− 8	18	
+ 4	−6	
+ 0.2	0.5	
− 0.2	1	
− 4	−5	

8 Look at the sequences below.

i Copy and complete each sequence.

ii What is the term-to-term rule of each sequence?

a 1, 3, 5, ☐, 9, ☐ **b** 2, 4, ☐, 8, 10, ☐

c 5, 7, 9, ☐, ☐, 15, ☐ **d** 4, 8, 12, ☐, 20, ☐

e 33, 30, ☐, 24, ☐ **f** 60, 50, ☐, ☐, ☐, 10

g 1, 7, 13, ☐, 25, ☐ **h** 10, 7, ☐, 1, −2, ☐

i 2, ☐, 5, ☐, 8, 9.5, ☐ ***j** 17, ☐, 10, 6.5, 3, ☐, −4

9 Which of the sequences in question **8** are decreasing sequences?

10 Copy and complete the table.

Term-to-term rule	1st term	Next four terms
+ 5	7	
+ 4		9, 13, 17, 21
		10, 16, 22, 28
− 3	20	
	−8	−5, −2, 1, 4
		4.5, 7, 9.5, 12

***11** Look at this term-to-term rule.

If the number is even, divide by 2.

If the number is odd, multiply it by 3 and add 1.

Use this term-to-term rule to find the next ten terms of this sequence.

52 26 ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

12 **a** Copy and complete the table.

Term-to-term rule	First five terms	Increasing or decreasing?
multiply by 2	5, 10, ☐, ☐, ☐	increasing
divide by 2	48, ☐, ☐, ☐, 3	
multiply by 0.5	48, 24, ☐, ☐, ☐	
divide by 2	−48, −24, ☐, ☐, ☐	
multiply by 2	−5, −10, ☐, ☐, ☐	

b Nazim thinks of a sequence. Each term is three times the term before.

Jim says that it must be an increasing sequence. Explain why Jim is wrong.

c The term-to-term rule of a sequence is 'multiply by −2'.

The first term is 1. Write down the first five terms.