Planner

Sequences

- Using symbols to represent numbers
- Increasing and decreasing sequences
- How to use a term-to-term rule
- How to use a position-to-term rule

Keywords

You should know

explanation 1 — online

1 Each symbol stands for a number. What is each number?

a △ + 3 = 5 **b** ★ − 6 = 4 **c** ⬢ × 2 = 8 **d** 3 + ◆ = 15

e 9 − ♥ = 2 **f** 5 × ■ = 55 **g** ▼ ÷ 3 = 4 **h** ◇ ÷ 10 = 3

i 11 − ◀ = 3 **j** 14 + ♣ = 21 **k** ◗ + ◗ = 10 **l** ✸ + ✸ + ✸ = 60

2 ▲ = 7 and ● = 5. Find the value of these expressions.

a ▲ + 2 **b** 2 × ▲ **c** ▲ − 4 **d** 3 + ▲

e ● + 6 **f** 10 − ● **g** 3 × ● **h** ● − 4

i ▲ + ● **j** ▲ − ● **k** ● × ▲ **l** ▲ × ▲

m ● × ● **n** ● ÷ ● **o** ▲ ÷ ▲ **p** ▲ + ● + 6

3 ★ = 6 and ♠ = 8. Find the value of these expressions.

a ★ + ★ **b** 2 × ★ **c** ♠ + ♠ **d** 2 × ♠

e ♠ + ♠ + ♠ **f** 3 × ♠ **g** ★ + ★ + ★ **h** 3 × ★

4 Repeat question **3** using ★ = 10 and ♠ = 4.

Write down anything that you notice about your answers.

5 ✱ = 9. Find a quick way to work this out.

✱ + ✱ + ✱ + ✱ + ✱ + ✱ + ✱ + ✱ + ✱ + ✱

Explain how you got your answer.

6 ♥ = 20. Write the value of each of these.

a 4 more than ♥ **b** twice ♥ **c** 3 less than ♥

d half of ♥ **e** ♥ less than 31 **f** ♥ more than 4

g 5 times ♥ **h** ♥ more than ♥

7 Repeat question **6**, using ♥ = 24. Which of the answers is smaller when ♥ = 24 than when ♥ = 20?

8 ★ + △ = 5. Write down three pairs of values of ★ and △.

explanation 2

9 Copy and complete the table. One has been done for you.

	Start number	Change	Result
	3	Increase by 5	3 + 5 = 8
a	7	Increase by 11	
b	12		12 + 6 = 18
c		Increase by 10	21 + 10 = 31
d	▲		▲ + 5
e	♥	Increase by 8	
f	◀	Increase by 17	
g		Decrease by 4	16 − 4 = 12
h		Decrease by 20	□ − 20
i	◗	Decrease by 36	
j	✸		✸ − 9
k		Double	2 × ■
l	✖	Double	
m	▼	Treble	

10 Each letter stands for a number. What is each number?

a $a + 1 = 7$ **b** $b - 2 = 12$ **c** $c \times 3 = 21$ **d** $5 + d = 14$

e $8 - e = 3$ **f** $4 \times f = 32$ **g** $g \div 3 = 11$ **h** $h \div 10 = 8$

i $23 - i = 3$ **j** $1 + j = 21$ **k** $k + k = 54$ **l** $l + l + l = 75$

11 $m = 12$ and $n = 8$. Find the value of these expressions.

a $m + 3$ **b** $n - 6$ **c** $4 \times m$ **d** $6 + n$

e $30 - m$ **f** $24 \div n$ **g** $m \div 3$ **h** $m \times n$

12 Copy and complete the table.

Start number	Change	Result
n	Increase by 5	$n + 5$
k	Increase by 47	
p	Decrease by 12	
q	Decrease by 20	
w	Double	
r		$r + 6$
t	Halve	
m		$m + n$

explanation 3a explanation 3b explanation 3c online

13 Write down the next two terms of each sequence. State whether the sequence is increasing or decreasing.

a 12, 14, 16, 18, ... **b** 27, 24, 21, 18, ... **c** 812, 712, 612, 512, ...

d 24, 40, 56, 72, ... **e** 318, 338, 358, 378, ... **f** 79, 68, 57, 46, ...

g 4, 8, 12, 16, ... **h** 4, 8, 16, 32, ... **i** 1, 10, 100, 1000, ...

***j** 256, 128, 64, 32, ... ***k** 243, 81, 27, 9, ... ***l** 1, 1, 2, 3, 5, ...

14 Copy and complete these sequences.

a 1, 6, 11, ☐, 21, ☐

b 4, 7, ☐, 13, 16, ☐

c 2, ☐, 8, ☐, 14, 17, ☐

d 8, ☐, 18, ☐, 28, ☐

e 40, 31, ☐, 13, ☐

f 52, ☐, 44, ☐, 36, ☐

***g** 2.5, 3, ☐, 4, ☐, ☐

***h** 10, ☐, 9, ☐, 8, 7.5, ☐

***i** 16, ☐, 19, ☐, ☐, 23.5

15 Copy and complete the table.

	Term	Term-to-term rule	First five terms
a	1st: 10	Add 4	
b	1st: 7	Double and then take away 5	
c	2nd: 21	Subtract 0.5	
d	2nd: 4	Divide by 2	
e	2nd: 13	Multiply by 3 and then add 1	
f	6th:		4, 9, 19, 39, 79
g	7th:		2.5, 5, 7.5, 10, 12.5

16 Most babies grow taller 2.5 cm each month in their first six months. Ben's height was 53 cm at birth.

a Write a sequence that shows Ben's height each month until he is 6 months old.

b Would you expect the sequence to continue in the same way? Explain your answer.

17 Here is a partly completed train timetable. Assume each journey takes the same time. Copy the timetable and fill in the missing times.

Exeter Central	14:14	15:33			
Pinhoe	14:19				
Whimple	14:26		16:26		
Feniton	14:31				
Honiton	14:37			17:07	
Axminster	14:48				18:18

18 Halley's Comet last appeared in 1986. The years of its previous appearances make a sequence. The difference between consecutive terms isn't fixed. It varies between 75 and 79 years.

a Copy and complete the table.

		79	77	79	77	78	75	76
Year							1531	
		75	76	77	75	76	75	
Year					1910	1986		

b When will the comet next appear?

explanation 4 — online

19 The number of dots in the pattern makes a sequence.

Pattern			
Position	1	2	3
Term	3	6	9

Copy and complete.

4th term = 3 × ☐ = ☐

50th term = ☐ × ☐ = ☐

10th term = 3 × ☐ = ☐

nth term = ☐ × ☐

20 These are the position-to-term rules of some sequences. Write the first four terms of each sequence.

a $n + 5$ **b** $n + 10$ **c** $n + 100$ **d** $n - 1$

e $2 \times n$ **f** $5 \times n$ **g** $10 \times n$ **h** $11 \times n$

i $n + 0.5$ **j** $n + 2.5$ **k** $n - 0.5$ **l** $n + 9.5$

21 Copy and complete the tables.

Even numbers	**Position**	1	2	3	n
	Term				

Odd numbers	**Position**	1	2	3	n
	Term				