

## Lesson 10 – Term to Term Rules for Linear Sequences

### Starter

Work out:

1)  $7 - 9$

2)  $-3 + 8$

3)  $2 - -4$

4)  $3 + -5$

5)  $-3 + -4$

6)  $-7 - 8$

7)  $-4 + -2$

8)  $-3 - -9$

9)  $2 - -10$

10)  $-8 - -5$

### Starter Answers

1) -2

2) 5

3) 6

4) -2

5) -7

6) -15

7) -6

8) 6

9) 12

10) -3

A sequence is **linear** if you **add or subtract** the **same number** each time to get from one term to the next.

For example, the following sequence **is linear**: 4, 7, 10, 13, 16, ...

This is because we are adding 3 every time to get to the next term.

The sequence 1, 3, 6, 10, 15, ... is **not linear** because we are adding different numbers to each term to get the next one.

### Example 1

Which of these sequences are **linear**?

1) 3, 5, 7, 9, 11, ...

2) 10, 8, 6, 4, 2, ...

3) 1, 1, 2, 3, 5, 8, ...

4) 1, 4, 9, 16, ...

5) 2, 4, 8, 16, ...

### Answers

1) Yes

2) Yes

3) No

4) No

5) No

The **term-to-term rule** for a sequence is the rule that takes you from one term to the next.

### Example 2

Find the term-to-term rule for each of these sequences and write down the next three terms.

1) 2, 5, 8, 11, 14, ...

The term-to-term rule is "add 3"

The next three terms are 17, 20, 23

2) 8, 4, 0, -4, -8, ...

The term-to-term rule is "subtract 4"

The next three terms are -12, -16, -20

3) 2.3, 2.42, 2.54, 2.66, ...

The term-to-term rule is "add 0.12"

The next three terms are 2.78, 2.9, 3.02

### **Example 3**

Find the missing terms in these linear sequences

1) 3, \_\_, \_\_, \_\_, 23

This is a linear sequence so the gaps between each term must be equal.

3, \_\_, \_\_, \_\_, 23  
     $\underbrace{\quad}$   $\underbrace{\quad}$   $\underbrace{\quad}$   $\underbrace{\quad}$   
    +? +? +? +?

Find the difference between 3 and 23:  $23 - 3 = 20$

We have to add four times to get from 3 to 23, so split 20 into four:  $20 \div 4 = 5$

The term-to-term rule is "add 5"

3, 8, 13, 18, 23

2) 4, \_\_, \_\_, \_\_, \_\_, \_\_, 22

$22 - 4 = 18$

We have to add six times to get from 4 to 22. Split 18 into six:  $18 \div 6 = 3$

The sequence is going up in 3's.

4, 7, 10, 13, 16, 19, 22

3) 1.24, \_\_, \_\_, \_\_, \_\_, 2.04

Find the difference:  $2.04 - 1.24 = 0.8$  (use a column method)

We have to add five times to get between 1.24 and 2.04.

Split 0.8 into five:  $0.8 \div 5 = 0.16$

The sequence is going up by 0.16 each time

1.24, 1.4, 1.56, 1.72, 1.88, 2.04