YEAR 7 — ALGEBRAIC THINKING…
Sequences

What do I need to be able to do?

By the end of this unit you should be able to:

- Describe and continue both linear and non-linear sequences
- Explain term to term rules for linear sequence
- Find missing terms in a linear sequence

Keywords

Sequence: items or numbers put in a pre-decided order

Term: a single number or variable

Position: the place something is located

Rule: instructions that relate two variables

Linear: the difference between terms increases or decreases by the same value each time

Non-linear: the difference between terms increases or decreases in different amounts
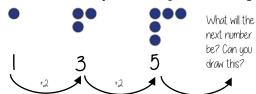
Difference: the gap between two terms

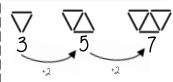**Arithmetic:** a sequence where the difference between the terms is constant

Geometric: a sequence where each term is found by multiplying the previous one by a fixed non zero number
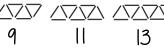
Describe and continue a sequence diagrammatically

Count the number of circles or lines in each image

1   3   5

+2   +2

What will the next number be? Can you draw this?

Predict and check terms

3   5   7

+2   +2

CHECK – draw the next terms

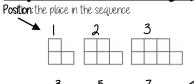9   11   13

Predictions:
Look at your pattern and consider how it will increase.

e.g. How many lines in pattern 6?
Prediction – 13
If it is increasing by 2 each time - in 3 more patterns there will be 6 more lines
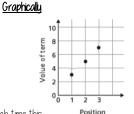
Sequence in a table and graphically

Position: the place in the sequence

1   2   3

3   5   7

"The **term** in position 3 has 7 squares"

Term: the number or variable (the number of squares in each image)

In a table

Position	1	2	3
Term	3	5	7

+2   +2

Graphically

Because the terms increase by the same addition each time this is **linear** – as seen in the graph

Linear and Non Linear Sequences

Linear Sequences – increase by addition or subtraction and the same amount each time

Non-linear Sequences – do not increase by a constant amount – quadratic, geometric and Fibonacci.

- Do not plot as straight lines when modelled graphically
- The differences between terms can be found by addition, subtraction, multiplication or division

Fibonacci Sequence – look out for this type of sequence

0   1   1   2   3   5   8 …

Each term is the sum of the previous two terms.

Continue Linear Sequences

7, 11, 15, 19…

How do I know this is a linear sequence?
It increases by adding 4 to each term

How many terms do I need to make this conclusion?
At least 4 terms – two terms only shows one difference not if this difference is constant. (a common difference).

How do I continue the sequence?
You continue to repeat the same difference through the next positions in the sequence.

Continue non-linear Sequences

1, 2, 4, 8, 16 …

How do I know this is a non-linear sequence?
It increases by multiplying the previous term by 2 – this is a geometric sequence because the constant is multiply by 2

How many terms do I need to make this conclusion?
At least 4 terms – two terms only shows one difference not if this difference is constant. (a common difference).

How do I continue the sequence?
You continue to repeat the same difference through the next positions in the sequence.

Explain term-to-term rule How you get from term to term

Try to explain this in full sentences not just with mathematical notation.
Use key maths language – doubles, halves, multiply by two, add four to the previous term etc.

To explain a whole sequence you need to include a term to begin at…

The next term is found by tripling the previous term
The sequence begins at 4.

4, 12, 36, 108…

x3   x3   x3

First term