

# 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:

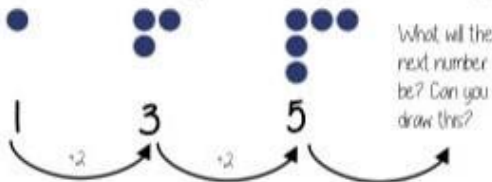
- Describe and continue both linear and non-linear sequences
- Explain term to term rules for linear sequence
- Find missing terms in a linear sequence

### Keywords

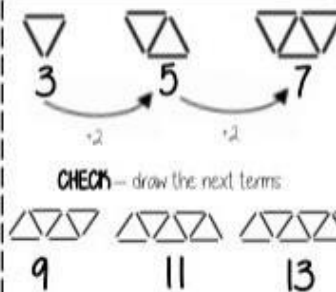
- Sequence:** items or numbers put in a pre-decided order  
**Term:** a single number or variable  
**Position:** the place something is located  
**Rule:** instructions that relate two variables  
**Linear:** the difference between terms increases or decreases by the same value each time  
**Non-linear:** 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



### Predict and check terms



#### Predictions:

Look at your pattern and consider how it will increase.

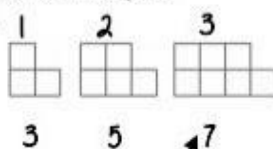
e.g. How many lines in pattern 6?

**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



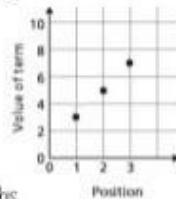
**Terms:** the number or variable (the number of squares in each image)

Position	1	2	3
Term	3	5	7

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

"The term in position 3 has 7 squares"

**Graphically**



### 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...

First term