| MATHEMATICS Unit 9: Pattern spotting (Sequences)	Year Group: 8 set 4-5

Key Vocabulary

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Pattern	A repeating rule
Sequence	A set of numbers which all obey a rule.
Term (n)	The position the number appears in the sequence. If a number is the 20th term, it is the 20th number in a sequence.
Arithmetic sequence	is made by adding the same value each time.
Geometric Sequences	is made by multiplying by the same value each time.
Fibonacci sequence	is found by adding the two numbers before it together
Difference	The difference between two values, found by subtraction
Descending	Largest to smallest
Ascending	Smallest to Biggest
Linear	A number pattern which increases (or decreases) by the same amount each time is called a linear sequence.
Term-to-term rule E.g. +2 or x3	The rule that takes you from one term in a sequence to the next

Key facts / Diagrams

Generate a linear sequence using the term-to-term rule:
- Start at 5 and add 3 each time

$$5 , 8, 11, 14, 17 \ldots$$
$$+3 \quad +3 \quad +3 \quad +3$$
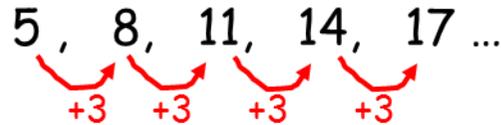
Generate a non-linear sequence using the term-to-term rule:
- Start at 3 multiply by 2 each time

$$3 , 6, 12, 24, 48 \ldots$$
$$\times 2 \quad \times 2 \quad \times 2 \quad \times 2$$
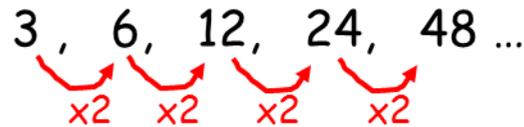
What is the term-to-term rule for the sequence
- 5, 9, 13, 17, 21

Start at 5 and add 4 each time

Continue the non-numeric sequence:
✓☺☺✓☺☺☺✓☺☺☺☺ …

(A non-numeric sequence is that which doesn't contain numbers)

Common misconceptions

- When describing a number sequence some students may not appreciate the fact that the starting number is required as well as a term-to-term rule
- Some pupils may think that all sequences are ascending
- Some pupils may think the (2n)th term of a sequence is double the nth term of a (linear) sequence

Worked examples

1) Find the missing terms in each sequence

    i) 2, 8, [14], 20, [26], 32
    ii) [-6], -2, 2, [6], 10, [14]

2) Mike says
'5, 10, 20, 40, … is a linear sequence'
Do you agree? Explain your answer.

    This is not a linear sequence. A linear sequence increases by the same number. This goes up by multiplying by 2 each time so it is a Geometric Sequence.

3) Write two different linear sequences with a second term of 5.

    1, [5], 9, 13, 17…
    3, [5], 7, 9, 11…