MATHEMATICS Unit 2: Pattern spotting	Year Group: 8 set 1-3

Key Vocabulary

Sequence	A set of numbers which all obey a rule.
Term	A single number or variable
Difference	The difference between two quantities or values, found by subtraction
Descending	Largest to smallest
Ascending	Smallest to Biggest
Linear	The highest power is 1 in the expression, x or y etc
Quadratic	The highest power is 2 in the expression, there is a squared, eg x^2, y^2 etc
Term-to-term rule E.g. +2 or x3	The rule that takes you from one term in a sequence to the next
Position-to-term rule E.g. 5n + 3	The rule that lets you find the 1st, 2nd, or any position term in a sequence
nth term E.g. 5n + 2	The same as the position-to-term rule, allowing you to find any term in the sequence
Fibonacci sequence	Starts with 1, 1 and the next term in the sequence is found by adding the two previous terms

Key facts / Diagrams

Example
Find the nth term rule.
8, 10, 12, 14

Therefor: 2n (2 being the difference between terms (n))

Term (n)	1	2	3	4
2n	2	4	6	8

What do I need to add to (2n) to get to the original sequence?

	+6	+6	+6	+6
Original sequence	8	10	12	14

Nth term = 2n + 6

For Quadratic Sequences

If the 2nd difference is 2	The sequence starts n^2
If the 2nd difference is 4	The sequence starts $2n^2$
If the 2nd difference is 6	The sequence starts $3n^2$

To find the number of n^2's needed in the *nth* term rule, halve the second difference.

Common misconceptions

- Some pupils will think that the nth term of the sequence 2, 5, 8, 11, … is n + 3.
- Some pupils may think that the (2n)th term is double the nth term of a linear sequence.
- Some pupils may think that sequences with nth term of the form 'ax ± b' must start with 'a'.

Worked examples

1. Find the first 3 terms of

a) 6n + 1

n = 1, n = 2, n = 3
6x1+1=7 6x2+1=13 6x3+1=19 **7, 13, 19**

b) $n^2 + 2n + 5$

n = 1 n=2 n=3
1^2+2x1+5=8 2^2+2x2+5= 13 3^2+2x3+5=20 **8, 13, 20**

QUADRATIC SEQUENCES

4	7	12	19	28

Find the first difference:

4	7	12	19	28

3	5	7	9

Find the second difference:

3	5	7	9

2	2	2

Second difference is 2, so … = **n^2**