Y9 Maths Knowledge Organiser Topic 7: Sequences 2

What must I be able to do?

You may need to revise the following:
- Year 8 Topic 12: Sequences 1

Recap content:
- ☐ Generate sequences given the nth term
  - ➤ Sparx M166
- ☐ Find the nth term of a linear sequence
  - ➤ Sparx M991
- ☐ Find the nth term from practical problems involving sequences
  - ➤ Sparx M866

Key vocabulary

Arithmetic sequence	A sequence made by <u>adding</u> (or subtracting) the <u>same amount</u> each time. The amount added each time is called the difference.
Fibonacci sequence	A sequence starting with 0 and 1 where each term in the sequence is the <u>sum of the 2 terms before</u> it.

Fibonacci sequence

The classic Fibonacci sequence starts 0, 1, 1, 2, 3, 5, 8, 13, 21 …

After the first 2 terms, the next one is the sum of the 2 previous terms. So the next term would be 13 + 21 = 34.

Exam style question

The first term of a sequence is 12.

Other terms of the sequence are found by using the rule "double the previous term and subtract 3"

(a) Work out the second term and the third term of this sequence.

Answer: 12 x 2 – 3 = 21.   21 x 2 – 3 = 39

Here are the first three terms of an arithmetic sequence.

        7   4   1

(b) Find an expression, in terms of n, for the nth term of this sequence.

Answer: The sequence goes down in 3s, so must be related to the -3x table and starts with -3n.

Sequence   7   4   1
-3x table   -3   -6   -9

+10 +10 +10   Always plus 10 so the nth term is -3n + 10

The nth term of a different arithmetic sequence is given by the expression 2n + 5

(c) (i) Find the 15th term of the sequence.

Answer: n = 15, so 2 x 15 + 5 = 35

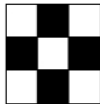
(ii) Is 87 a term of this sequence? Give a reason for your answer.

Answer: 2n + 5 = 87

           2n   = 82

           n = 41   Yes it is in the sequence as n is an integer.
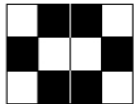
Unusual questions

A sequence of patterns uses black squares and white squares.
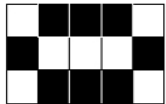
        Here are the first three patterns.

Pattern 1   Pattern 2   Pattern 3

a) Write an expression for the number of black squares in Pattern n.

Answer: The black squares go in the sequence

        4,   6,   8,   …

This goes up by 2 each time. So the nth term is related to the 2x table and starts with 2n.

Sequence   4,   6,   8
2x table   2   4   6
                +2   +2   +2

Always plus 2 so the nth term is 2n + 2

b) Will the number of black squares always be even?
   Give a reason for your answer

Answer: As the sequence of black squares starts with 4 it starts with an even number. If I add 2 to an even number it will always make another even number so, yes the number of black squares is always even.