Y8 Maths Knowledge Organiser Topic 5: Sequences

What must I be able to do?

New content:

- ☐ Recognise and continue sequences
  - ➢ Mathswatch A11a
- ☐ Recognise and represent number patterns
- ☐ Find an algebraic expression for the n^{th} term
  - ➢ Mathswatch A11b and A11c
- ☐ Establish whether a number is a term in the sequence

Key vocabulary

Sequence	A pattern of numbers which fit a certain rule.
Term	A number in a sequence.
Position	Where a term is in a sequence.
Term to Term rule	The rule for how to get from one number to the next number in the sequence.
Position to term rule	The rule for how to work out a number in a sequence if you know its position.

Writing a sequence

e.g. The first term of a sequence is 2 and the term to term rule is add 8. What are the first 5 terms in the sequence?

First term → 2, 10, 18, 26, 34, ... (+8)

Using position to term rules

These are often described using the nth term rule. This is just a rule with a letter n in it. The n is replaced by the position of the number in the sequence.

e.g. The nth term rule of a sequence is 3n + 4. What are the first 4 numbers in the sequence?

For the first term, n = 1 as it is position 1 in the sequence. For the second term n = 2, the third term n = 3 and the 4^{th} term n = 4.

Remember 3n means n x 3, so if n = 1 that is 3 x 1

n = 1 3 x 1 + 4 = 7

n = 2 3 x 2 + 4 = 10

n = 3 3 x 3 + 4 = 13

n = 4 3 x 4 + 4 = 16

The first 4 terms are 7, 10, 13 and 16.

If we wanted the 100^{th} term we would use n = 100 and so on for any other position in the sequence.

Finding if a number is in a sequence

e.g. is 311 a term in the sequence 4n + 5

To decide with questions like this, first set it up as an equation and then solve. If n is an integer at the end it is in the sequence and that is its position:

$4n + 5 = 311$ (−5)

$4n = 306$ (÷4)

$n = \frac{306}{4} = 76.5$

No, 311 is not in the sequence as it is between the 76^{th} and 77^{th} term.

Finding position to term rules

e.g. Find the nth term rule of the sequence 5, 8, 11, 14.....

+3 +3 +3

5, 8, 11, 14 ....

The sequence goes up by 3 each time so must be related to the 3 times table. The nth term of the 3x table is 3n.

Sequence 5, 8, 11, 14

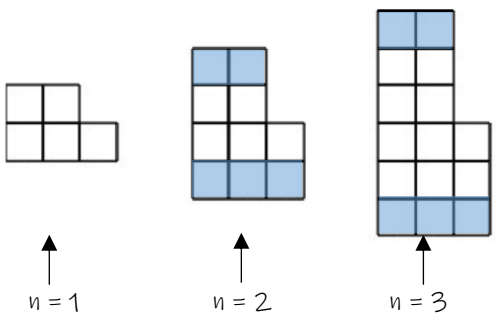
3x table 3, 6, 9, 12 (+2)

To go from the 3 times table to the sequence we always add 2. So the nth term is 3n + 2

Pattern Sequences

Often patterns of shapes can be simplified to a number sequence.

e.g.



Each extra term adds 2 squares to the top and 3 squares to the bottom. In total it goes up by 5 squares each time.

The sequence in this case is the number of squares in each shape so is the sequence 5, 10, 15 .....

The nth term of this sequence would be 5n.