

Problem of the Week: Week 2 (Sum2): Year 7: Algebra

- Generate terms of a sequence from either a term-to-term or a position-to-term rule
- Recognise arithmetic sequences and find the nth term

What a Coincidence!

An arithmetic sequence grows by the same amount each time (so, you add or subtract from one term to find the next term)

Consider the arithmetic sequences:

1998,2005, 2012... and

1996,2005,2014, ...

Which is the next number after 2005 that appears in both sequences?

<https://nrich.maths.org/9431>

Solution

The sequences have common differences of 7 and 9 respectively.

The lowest common multiple of 7 and 9 is 63, so the next term after 2005 to appear in both sequences is $2005+63$ that is 2068

You could do this by continuing the sequences going up in steps of 7 and 9

Shifting Times Tables

The numbers in the four times table are
 4,8,12,16...36,40,44...100,104,108.

I could shift the four times table up by 3 and end up with

7,11,15,19...39,43,47...103,107,111...

What do you notice about the differences between consecutive terms in each sequence?

You could draw out a number-line to help you

Sequences are $4n$ and $4n + 3$

<https://nrich.maths.org/shifting>

If we call the four times table '4n'

4×1 , 4×2 , 4×3 , 4×4 , $4 \times n$

We can describe the sequence 7,11,15,19..... As $4n + 3$, since the terms are always 3 more than the four times table.

Solution

Write out the three times table (let's call this $3n$)

3, 6, 9, 12, 15, 18, $3n$

Now write out the sequences $3n + 1$; $3n + 4$ and $3n - 2$

4, 7, 10, 13, 16, 19, $3n + 1$

7, 10, 13, 16, 19, 22, $3n + 4$

1, 4, 7, 10, 13, $3n - 2$

Try the sequence $3n + 3$ ~ what do you notice ?

6, 9, 12, 15, 18 $3n+3$

It is the multiples of 3, just starting at 2×3 rather than 1×3