

## Sequences

### Starter

1. (Review of last lesson) Solve the equation  $2^x - 3x = 32$  to 1 d.p.

### Notes

It is easy to find the next terms in a linear sequence because the same number is added (or subtracted) each time.

When the sequence is not linear we can use the *method of differences* to find subsequent terms. The important step is to write out the sequence with plenty of space between consecutive terms.

**E.g. 1** Find the next two terms in the sequence 2, 9, 20, 35, 54.

**Working:**

2	9	20	35	54	
	7	11	15	19	
		4	4	4	

The second difference are constant so we can continue them.

2	9	20	35	54	77	104
	7	11	15	19	23	27
		4	4	4	4	4

$19 + 4 = 23$                        $23 + 4 = 27$   
 $54 + 23 = 77$                      $77 + 27 = 104$

The next 2 terms are 77 and 104

*1st differences are different*  
*2nd differences are equal*

**N.B.** 1st differences are equal  $\Rightarrow$  linear sequence.  
2nd differences are equal  $\Rightarrow$  quadratic sequence.  
3rd differences are equal  $\Rightarrow$  cubic sequence

**E.g. 2** Find the next two terms in the sequence 0, 6, 14, 24, 36.

If the 2nd differences are not equal, use the 3rd differences, 4th differences

**E.g. 3** Find the next two terms in the sequence  $-2, 6, 30, 72, 134$ .

Video: [Describing rules](#)  
Video: [The nth term for linear sequences](#)

[Solutions to Starter and E.g.s](#)

### Exercise

9-1 class textbook: p385 M12.6 Qu 8-15, 1-7 odd, 20, 21  
A\*-G class textbook: p349 M12.6 Qu 8-15, 1-7 odd, 19, 20  
9-1 homework book: p129 M12.6 Qu 1-15  
A\*-G homework book: p97 M12.6 Qu 1-15

### Summary

1st differences are equal  $\Rightarrow$  linear sequence.  
2nd differences are equal  $\Rightarrow$  quadratic sequence.  
3rd differences are equal  $\Rightarrow$  cubic sequence

[Homework book answers \(only available during a lockdown\)](#)