



Introduction to A-Level Sequences



C1

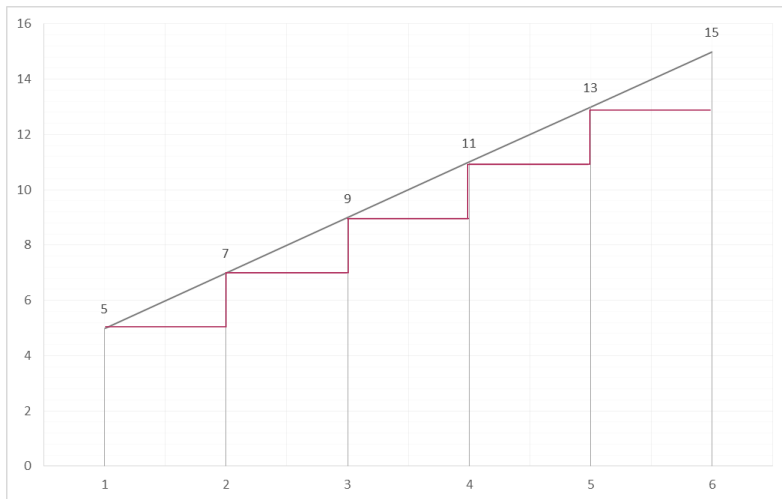
GCSE RECAP

What is the n th term of this sequence? 5, 7, 9, 11 ...

Easy: $2n+3$

A DIFFERENT VIEWPOINT

- What happens if you plot the position number against the sequence?



- Between each term the difference is constant, giving a straight line, so the gradient is constant.
- Each term corresponds to the original number plus a number of steps.

Point 1: Starts on 5, no steps	$5 + 0 \times 2$
Point 2: Starts on 5, 1 step	$5 + 1 \times 2$
Point 3: Starts on 5, 2 steps	$5 + 2 \times 2$
Point 4: Starts on 5, 3 steps	$5 + 3 \times 2$
Point 5: Starts on 5, 4 steps	$5 + 4 \times 2$
- There is a simple link:

	$5 + (n - 1) \times 2$
This expression simplifies to	$2n + 3$

The general form of an arithmetic sequence is:

$$\text{First term} + (n - 1) \times \text{common difference}$$

Which can be written as:

$$\mathbf{a + (n - 1) \times d}$$

Arithmetic sequences always have a common difference
Eg First term = 8, Difference = 3 gives 8, 11, 14, 17, 20 ...

QUESTIONS

EXERCISE A

1. Find the general form $(a + (n - 1) \times d)$ of the arithmetic progression 6, 10, 14, 18 ...
2. Find the general form of the arithmetic progression 99, 98, 97, 96 ...
3. Find the general form of the arithmetic progression 0.5, 0.75, 1, 1.25 ...
4. An arithmetic progression has first term -2 and common difference 4. Find the first three terms and the general term
5. An arithmetic progression has first term 16 and common difference -2. Find the first three terms and the general term
6. An arithmetic progression has third term 25 and common difference 7. What was the first term?
7. An arithmetic progression has fourth term 31 and common difference -3. What was the first term?
8. An arithmetic progression has $u_3 = 12$ and $u_4 = 16$. What was the first term? What is the general form?
9. An arithmetic progression has $u_2 = 3$ and $u_5 = 18$. What was the first term? What is the general form?
10. Write $5n - 4$ in the form $a + (n - 1) \times d$

EXERCISE B

1. Jake is training for an extreme run. His first run covers 7km. His plan is to run 2km more in each training session. After how many sessions will he reach his target of 75km?
2. Sally is trying to save money. She has a severe coffee and bacon buttie habit. On the first day she quits the bacon butties and saves £2.50. Each day she cuts back on a £1.20 coffee. After how many days will she have saved £10 in a day?
3. Gerald has been challenged to learn pi to as many places as he can. After six days he has memorized it to 52 places, after eleven days he has memorized to 87 places. After how many days will he know it to 250 places?

EXAM QUESTION

Now to put your skills to work:

EDEXCEL JANUARY 2012

A company offers two salary schemes for a 10-year period, Year 1 to Year 10 inclusive.

Scheme 1: Salary in Year 1 is $\text{£}P$.

Salary increases by $\text{£}(2T)$ each year, forming an arithmetic sequence.

Scheme 2: Salary in Year 1 is $\text{£}(P + 1800)$.

Salary increases by $\text{£}T$ each year, forming an arithmetic sequence.

(a) Show that the total earned under Salary Scheme 1 for the 10-year period is $\text{£}(10P + 90T)$

(2)

For the 10-year period, the total earned is the same for both salary schemes.

(b) Find the value of T .

(4)

For this value of T , the salary in Year 10 under Salary Scheme 2 is $\text{£}29\,850$

(c) Find the value of P .

(3)

(FULL EXAM PAPER AVAILABLE FREE FROM WWW.EDEXCEL.COM)