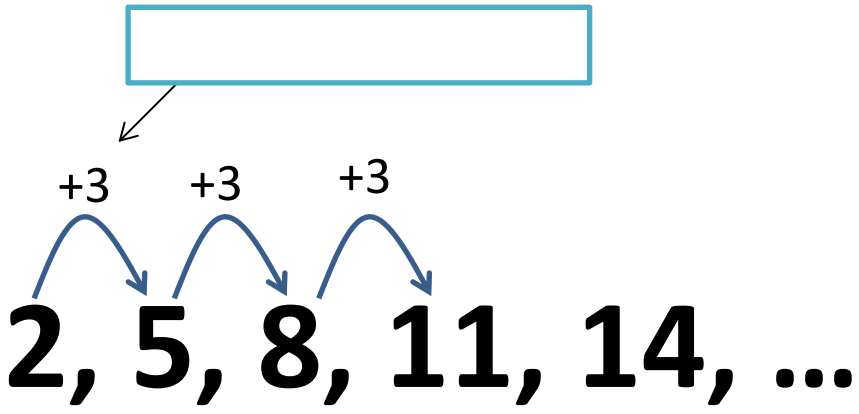
Arithmetic Series

Types of sequences



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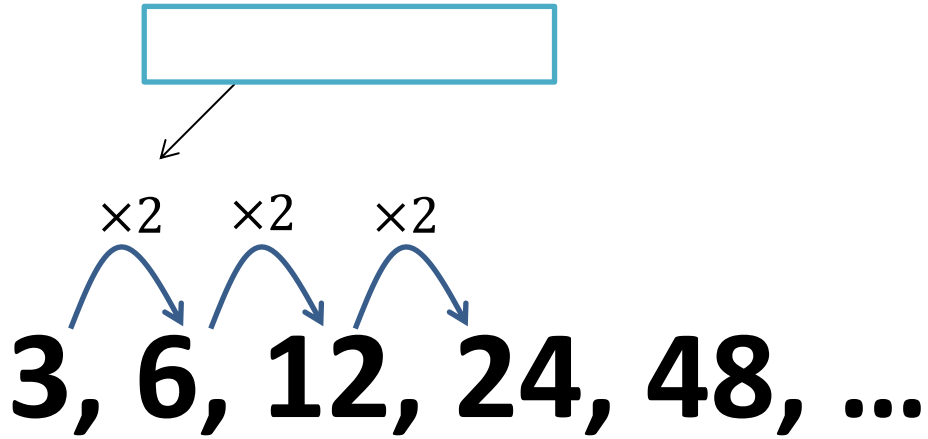

1, 1, 2, 3, 5, 8, …

n^{th} term of an arithmetic sequence

TOP Maths IGCSE

We often use a to denote the first term. Recall that d is the difference between terms, and n is the position of the term we're interested in.

1st Term	2nd Term	3rd Term	. . .	n^{th} term
			. . .	

$$U_n = a + (n-1)d$$

n^{th} term of an arithmetic sequence

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Find the requested term of the following sequences.

$2, 5, 8, 11, 14, 17, \ldots$ 100^{th} term $a = \square \; d = \square \; n = \square$ $U_{100} = \square$

$5x, x, -3x, -7x, \ldots$ 20^{th} term $a = \square, d = \square, n = \square$ $U_{20} = \square$

n^{th} term of an arithmetic sequence

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Give that the 3rd term of an arithmetic series is 20 and the 7th term is 12. Find

a) The first term.
b) The 20th term.

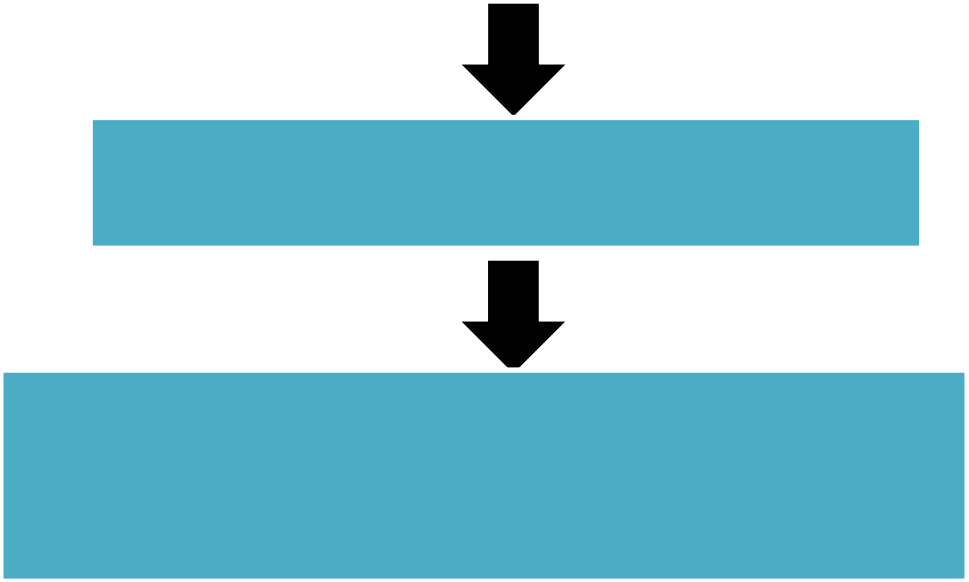
Exercises

X The first term of an arithmetic sequence is 14. If the fourth term is 32, find the common difference.

Y For which values of x would the expression $-8, x^2$ and $17x$ form the first three terms of an arithmetic series.

The number of terms

$1, 3, 5, 7, 9, \ldots, 111$



The number of terms

How many terms?

1. 5, 10, 15, 20, … , 200 $\quad n =$ ☐
2. 11, 16, 21, 26, … , 151 $\quad n =$ ☐
3. 5, 9, 13, 17, … , 409 $\quad n =$ ☐

Sum of the first n terms of a sequence.

n^{th} term

$$U_n = a + (n-1)d$$

sum of first n terms

Let's prove it!

Sum of the first n terms of a sequence.

Find the sum of the first 30 terms of the following arithmetic sequences…

1 $2 + 5 + 8 + 11 + 13 \ldots$ $S_{30} =$ ☐

2 $100 + 98 + 96 + \cdots$ $S_{30} =$ ☐

3 $p + 2p + 3p + \cdots$ $S_{30} =$ ☐

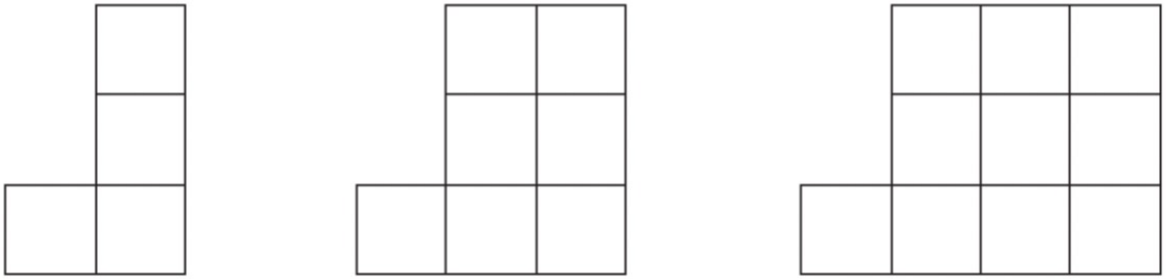
Sum of the first n terms of a sequence.

Find the least number of terms for the sum of

$4 + 9 + 14 + \cdots$ to exceed 2000.

Question 1

Here is a sequence of patterns made from centimetre squares.



Pattern number 1 | Pattern number 2 | Pattern number 3

(a) Find an expression, in terms of n, for the total number of centimetre squares in Pattern number n.

.....

(2)

A pattern in this sequence has 88 centimetre squares.

(b) Work out the Pattern number of this pattern.

.....

(2)

Question 2

The 3rd term of an arithmetic series, A, is 19
The sum of the first 10 terms of A is 290

Find the 10th term of A.

.....

Question 3

An arithmetic series has first term a and common difference d.

The sum of the first $2n$ terms of the series is four times the sum of the first n terms of the series.

Find an expression for a in terms of d.
Show your working clearly.

a = ...

Question 4

The first four terms of an arithmetic sequence are

5 9 13 17

(a) Write down an expression, in terms of n, for the nth term.

.....

(2)

(b) Write down an expression, in terms of n, for the $(n + 1)$th term.

.....

(1)