
Thursday

What is a formula?

A mathematical relationship or rule that links variables.

What is a linear sequence?

To find the rule that links the numbers study the gaps.

1	3	5	7
3	0	−3	−6
$\frac{4}{9}$	$\frac{8}{9}$	$1\frac{3}{9}$	$1\frac{7}{9}$

The rule is:

The nth term is:

$-3 \quad -1 \quad 1 \quad 3 \quad 5 \quad 7$

Write the first six terms.

$20 - 4n$

$3n + 1$

$\frac{2n}{10}$

Finding the nth term

Sometimes, rather than finding the next number in a linear sequence, you want to find the 41^{st} number, or 110^{th} number, say.

Writing out 41 or 110 numbers takes a long time, so you can use a general rule.

To find the value of any term in a sequence, use the n^{th} term rule.

Question

What is the n^{th} term of this sequence?

Question

What are the n^{th} term and the 10^{th} term of this sequence: 2, 4, 6, ... ?

More on finding the nth term

So the sequence of numbers in the 5 times table has a common difference of 5 and an n^{th} term of 5n.

$$5, \overset{+5}{\quad} 10, \overset{+5}{\quad} 15 \ldots$$

But what happens if things get more complicated?

$$7, \overset{+5}{\quad} 12, \overset{+5}{\quad} 17 \ldots$$

Question

What is the n^{th} term of the Sequence: 8, 11, 14, ... ?

Hide

A

Write the first six numbers in each sequence.

	Start at	Rule
1	57	+9
2	$2\frac{1}{2}$	$-\frac{1}{4}$
3	3	+0·5
4	150	−20
5	−10	+3
6	10	−4

Complete each sequence.

7 1·5 1·75 2 ☐ ☐

8 $\frac{1}{2}$ ☐ $1\frac{1}{2}$ ☐ $2\frac{1}{2}$

9 −6 −4 −2 ☐ ☐

10 2 4 6 ☐ ☐

11 100 ☐ 302 403 ☐

12 ☐ 68 56 44 ☐

B

Fill in the boxes. Give the rule for the *n*th term.

1 −12 −7 −2 ☐ ☐

2 0·1 0·4 0·7 ☐ ☐

3 $\frac{1}{4}$ ☐ $\frac{3}{4}$ ☐ $1\frac{1}{4}$ ☐

4 −1 −3 ☐ ☐ −9 ☐

5 4 ☐ 42 61 80

6 38 28 18 8 ☐ ☐

Write the first six terms for each sequence.

7 $7 - 2n$

8 $\frac{2n}{6}$

9 $n - 5$

10 $3n + 2$

11 $\frac{5n}{10}$

12 $4 - 2n$

3 6 9 12 15 18

Look at the above pattern. Write down:

13 the 7th term

14 the 11th term

15 the 20th term

16 a rule for the *n*th term.

Look at the pattern of beads. What colour is:

13 the 15th bead

14 the 33rd bead

15 the 50th bead

16 the 100th bead?

C

Write the next 3 numbers. Give the rule for the *n*th term.

1. 2·75 3·8 4·85 5·9
2. 200 178 156 134
3. 10 7 4 1
4. 100 81 64 49
5. $1\ 1\frac{3}{5}\ 2\frac{1}{5}\ 2\frac{4}{5}$
6. 6·7 5·2 3·7 2·2

Write down a formula for the *n*th term of each pattern.

7. 11 22 33 44 55
8. 4 7 10 13 16
9. −5 −10 −15 −20 −25
10. −1 −3 −5 −7 −9
11. 0·1 0·6 1·1 1·6
12. $1\frac{1}{3}\ 2\frac{2}{3}\ 4\ 5\frac{1}{3}$

Look at the pattern of beads. What colour is:

13. the 20th bead
14. the 50th bead
15. the 80th bead
16. the 100th bead?

ANSWERS

A

1 57 66 75 84 93 102
2 $2\frac{1}{2}$ $2\frac{1}{4}$ 2 $1\frac{3}{4}$ $1\frac{1}{2}$ $1\frac{1}{4}$
3 3 3·5 4 4·5 5 5·5
4 150 130 110 90 70 50
5 −10 −7 −4 −1 2 5
6 10 6 2 −2 −6 −10
7 1·5 1·75 2 2·25 2·5
8 $\frac{1}{2}$ 1 $1\frac{1}{2}$ 2 $2\frac{1}{2}$
9 −6 −4 −2 0 2
10 2 4 6 8 10
11 100 201 302 403 504
12 80 68 56 44 32
13 21
14 33
15 60
16 $3n$

B

1 −12 −7 −2 3 8
2 0·1 0·4 0·7 1 1·3
3 $\frac{1}{4}$ $\frac{1}{2}$ $\frac{3}{4}$ 1 $1\frac{1}{4}$ $1\frac{1}{2}$
4 −1 −3 −5 −7 −9 −11
5 4 23 42 61 80
6 38 28 18 8 −2 −12
7 5 3 1 −1 −3 −5
8 $\frac{1}{3}$ $\frac{2}{3}$ 1 $1\frac{1}{3}$ $1\frac{2}{3}$ 2
9 −4 −3 −2 −1 0 1
10 5 8 11 14 17 20
11 0·5 1 1·5 2 2·5 3
12 2 0 −2 −4 −6 −8
13 yellow
14 red
15 red
16 yellow

C

1 6·95 8 9·05
2 112 90 68
3 −2 −5 −8
4 36 25 16
5 $3\frac{2}{5}$ 4 $4\frac{3}{5}$
6 0·7 −0·8 −2·3
7 $11n$
8 $1 + 3n$
9 $-5n$
10 $1 - 2n$
11 $\frac{5n}{10} - 0{\cdot}4$
$5n - 17$
$\frac{3n}{10} - 0{\cdot}2$
$\frac{n}{4}$
$1 - 2n$
$19n - 15$
$48 - 10n$
$\frac{105n}{100} + 1{\cdot}7$
$222 - 22n$
$13 - 3n$
$(11 - n)^2$
$\frac{3n}{5} + \frac{2}{5}$
$8{\cdot}2 - \frac{15n}{10}$
12 $\frac{4n}{3}$
13 red
14 blue
15 yellow
16 red