Finding the nth Term Rule

Starter

Q1) Find the first 5 terms:

a) $2n + 3$

b) $3n - 2$

c) $-4n + 2$

Q2) Find the 15th term of the sequence $3n - 5$

Starter Answers

1)a) $5, 7, 9, 11, 13, \ldots$ b) 1, 4, 7, 10, 13, … c) -2, -6, -10, -14, -18, …

2) 40

Last lesson, we looked at generating sequences using an nth term rule.
In this lesson, we will look at how to find the nth term rule of a sequence.

Example 1

Find the nth term rule of the sequence 2, 5, 8, 11, 14, …

First, figure out which times table the sequence is similar to.
We do this by counting from one term to the next.

2, 5, 8, 11, 14, …
+3 +3 +3 +3

Since the sequence is going up in 3's, it is similar to the 3 times tables.
So, we write the 3 times table ($3n$) above the sequence.

n	1	2	3	4	5
$3n$	3	6	9	12	15
	2	5	8	11	14

-1

Now figure out how we get from the $3n$ sequence to 2, 5, 8, 11, 14, …
We can see that we have to subtract 1 from the $3n$ sequence.

So the nth term rule is $3n - 1$

Example 2

Find the nth term rule of 8, 14, 20, 26, 32, ...

First count on from one term to the next

8, 14, 20, 26, 32, …
+6 +6 +6 +6

Since it is going up in 6's, it means it is similar to the 6 times table (the sequence $6n$).

n	1	2	3	4	5
$6n$	6	12	18	24	30
	8	14	20	26	32

+2

To get from the $6n$ sequence to 8, 14, 20, 26, 32 we add 2 to each number.

So the nth term rule is $6n + 2$

Your go

Find the nth term rules of these sequences

a) 7, 9, 11, 13, 15, ...

b) 1, 7, 13, 19, 25, ...

c) -8, -5, -2, 1, 4, ...

d) 1, 1.5, 2, 2.5, 3, ...

Answers

a) $2n + 5$ b) $6n - 5$ c) $3n - 11$ d) $0.5n + 0.5$

Next, we will look at sequences that **decrease**.

Example 3

Find the nth term rule of 8, 6, 4, 2, 0, ...

First, count down from one term to the next.

8, -2 6, -2 4, -2 2, -2 0, ...

Since it is going down in 2's, it is like the negative 2 times table.

n	1	2	3	4	5
$-2n$	-2	-4	-6	-8	-10
	8	6	4	2	0

+10

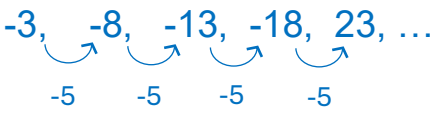
To get from the $-2n$ sequence to 8, 6, 4, 2, 0 we have to subtract 10.

So the nth term rule is $-2n + 10$.

Example 4

Find the nth term rule of -3, -8, -13, -18, -23, …

Count down from one term to the next



It is counting down in 5's, so it is similar to the negative 5 times table.

n	1	2	3	4	5
$-5n$	-5	-10	-15	-20	-25
	-3	-8	-13	-18	-23

+2

To get from the $-5n$ sequence to -3, -8, -13, -18, -23 we add 2 to each number.

So the nth term rule is $-5n + 2$.

Your go

Find the nth term rule of these sequences

a) 4, 1, -2, -5, -8, …

b) -10, -12, -14, -16, -18, …

c) 2, 0.5, -1, -2.5, -4, …

Answers

a) $-3n + 7$ b) $-2n - 8$ c) $-1.5n + 3.5$