

$\frac{12}{1^{st}}$, $\frac{15}{2^{nd}}$, $\frac{18}{3^{rd}}$, $\frac{21}{4^{th}}$, $\frac{24}{5^{th}}$, $\frac{27}{6^{th}}$, $\frac{30}{7^{th}}$
 $n=1$ $n=2$

Input / x / "n" - term #

Output / y / "a_n" - term

$a_0 = 9$
 $a_3 = 18$
 $a_5 = 24$
 $a_8 = 33$

Arithmetic Sequence

A sequence of terms that have a common difference between them

* Adding or Subtracting same # everytime *
 $d = \text{common difference}$

Arithmetic or Not?

Example:

-22, -15, -8, -1, ...
+7 +7 +7
 $d = 7$

Arithmetic or Not?

Example:

1, 8, 27, 64,
+7 +19

Arithmetic or Not?

Example:

7, 4, 1, -2, -5
-3 -3 -3 -3

$$d = -3$$

Arithmetic or Not?

Example:

1, 1, 2, 3, 5, 8,
+0 +1 +1 +2

To Find Common difference: Pick 2 #'s that are next to each other:
 $2^{\text{nd}} \# - 1^{\text{st}} \#$

Recursive Formula

Formula used to find the next term of the sequence

Recursive Formula for Arithmetic Sequence

$$a_1 = \#$$

$$a_n = a_{n-1} + d$$

Find the common difference, the recursive formula, and the fourth term.

3, 9, 15, 21, ...

$$a_1 =$$

$$a_n = a_{n-1} + d$$

Find the common difference, the recursive formula, and the fourth term.

5, 11, 17, 23 ...

$$a_1 =$$

$$a_n = a_{n-1} + d$$

Use the recursive formula to find the 6th term of the sequence.

$$a_1 = 5$$

$$a_n = a_{n-1} + 4$$

5 9 13 17 21 25

$$a_6 = 25$$

Use the recursive formula to find the 1st term and the 10th term of the sequence.

$$a_6 = 2$$

$$a_n = a_{n-1} - 3$$

17 14 11 8 5 2 -1 -4 -7 -10

$$a_1 = 17$$

$$a_{10} = -10$$

Explicit (Closed Formula)

Formula used to find the n^{th} term of a sequence

Explicit (Closed) Formula for Arithmetic Sequence

$$a_n = dn + a_0$$

$a_n = a_1 + d(n-1)$

↑ Plug in # for 1st term

↑ Plug in a # for common difference

Find the common difference, the explicit formula, and the tenth term.

3, 9, 15, 21, ...

$$d = 6$$

$$a_n = 6n - 3$$

$$a_{10} = 57$$

[Plug 10 in for n]

$$= 6(10) - 3$$

$$a_n = 3 + 6(n-1)$$

$$= 3 + 6n - 6$$

Find the common difference, the explicit formula, and the 25th term.

10, 8, 6, ...

$$d = -2$$

$$a_n = -2n + 12$$

$$a_{25} = -38$$

[Plug in 25 for n]

$$= -2(25) + 12$$

$$a_n = 10 + -2(n-1)$$

$$= 10 + -2n + 2$$

~~0, 0, 0~~ -31, -27, -23, ...

$$d = 4$$

$$a_n = 4n - 35$$

$$a_n = -31 + 4(n-1)$$

$$= -31 + 4n - 4$$

$$a_{30} = 85$$

$$4(30) - 35$$