

Warmup:

$$y = mx + b$$

Given the following sequence: $\overset{1}{a_0}$, $\underset{a_1}{8}$, 15, 22, 29, 36, 43, ...

- 1) Determine if it is an arithmetic sequence Yes; adding $\textcircled{7}$
- 2) Write a recursive formula to represent the sequence
- 3) Write an explicit formula to represent the sequence
- 4) Find the 50th term of the sequence

$$2) \begin{cases} a_1 = 8 \\ a_n = a_{n-1} + 7 \end{cases}$$

$$3) \begin{cases} a_n = \textcircled{7n + 1} \\ \text{or} \\ a_n = \boxed{7(n-1) + 8} \\ a_n = 7n - 7 + 8 \\ \underline{7n + 1} \end{cases}$$

$$a_{50} = 7(50) + 1$$

$$a_{50} = 351$$

$$\text{or } a_{50} = 7(50-1) + 8$$

$$a_{50} = 7(49) + 8$$

$$= 343 + 8$$

$$= 351$$

E.Q.:

Why are sequences functions?

How do I write recursive and explicit formulas for arithmetic sequences?

How do we solve equations for a variable (Literal equations)?

An **arithmetic sequence** is a sequence where the difference between consecutive terms is *constant*.

The difference between consecutive terms of an arithmetic sequence is called the **common difference**.

Writing Arithmetic Sequences

Recursive Formula

$$\begin{cases} a_1 = \text{first term} \\ a_n = a_{n-1} + d \end{cases}$$

Explicit Formula

$$a_n = dn + a_0$$

or

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

Writing and Using Formulas for Arithmetic Sequences

Given the arithmetic

sequence $-3, -1, 1, 3, \dots$

a) write a recursive formula

for the sequence.

$$\begin{cases} a_1 = -3 \\ a_n = a_{n-1} + 2 \end{cases}$$

b) write an explicit formula

for the sequence

$$a_n = dn + a_0$$

$$a_n = 2n + -5$$

c) what is the 56th term of the sequence?

$$a_{56} = 2(56) + -5$$

$$a_{56} = 107$$

~~$$a_n = a_{n-1} - 5$$~~

Given the arithmetic

sequence $10, 5, 0, -5, \dots$

a) write a recursive formula

for the sequence.

$$\begin{cases} a_1 = 10 \\ a_n = a_{n-1} - 5 \end{cases}$$

b) write an explicit formula

for the sequence

$$\rightarrow a_n = -5n + 15$$

$$\text{or } a_n = -5(n-1) + 10$$

c) what is the 20th term of the sequence?

$$a_{20} = -5(20) + 15$$

$$a_{20} = -100 + 15 = -85$$

Writing and Using Formulas for Arithmetic Sequences

wrong!

$$a_{n-1} + -5$$

$$a_{n-1} + -5$$

Given the arithmetic sequence 20, 15, 10, 5, ...

a) write a recursive formula for the sequence.

$$\begin{cases} a_1 = 20 \\ a_n = a_{n-1} + -5 \end{cases}$$

b) write an explicit formula for the sequence

$$a_n = -5n + 25$$

c) what is the 20th term of the sequence?

$$a_{20} = -5(20) + 25$$

$$a_{20} = -75$$

d) -135 is which term in this sequence?

$$a_n = -5n + 25$$

$$-135 = -5n + 25$$

$$-160 = -5n$$

$$32 = n$$

What are the second and third terms of the sequence

$$100, \underline{94}, \underline{88}, 82, \dots ?$$

1 -6 -6 4

$$d = \frac{100 - 82}{1 - 4} = \frac{18}{-3} = -6$$

Given the following sequence: $4, 9, 14, 19, 24, 29, \dots$

$\frac{\Delta y}{\Delta x} = \frac{15}{3}$

1) Find the common difference between terms

$$d = 5$$

2) Write an explicit formula for the sequence

$$a_n = 5n + -1$$

$$a_n = 5n + a_0$$

$$14 = 5(3) + a_0$$

3) Find the 20th term of the sequence

$$a_{20} = 5(20) + -1 = 99$$

$$14 = 15 + a_0$$

$$-15 = -15$$

4) 129 represents which term in the sequence?

$$129 = 5n + -1$$

$$-1 = a_0$$

$$\frac{130}{5} = \frac{5n}{5}$$

$$26 = n$$

Given:

The 10th term of an arithmetic sequence is 40 and the 14th term is 28

1) Find the common difference between terms

-3

~~Efficient~~

2) Write an explicit formula for the sequence

$$a_n = 3n + a_0$$

3) Find the 20th term of the sequence 10

$$a_n = -3n + 70$$

$$40 = -3(10) + a_0$$

$$40 = -30 + a_0$$

$$+30 \quad +30$$

4) 58 represents which term in the sequence? 4

$$70 = a_0$$

Practice with Sequences

HW #11

Arithmetic Sequences