Warmup:

Given the following sequence: 8, 15, 22, 29, 36, 43

a_1 a_2 a_3 ... a_{50}

$y = mx + b$

d

1) Determine if it is an arithmetic sequence Yes: adding 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) $a_n = 7n + 1$

or

$a_n = 7(n-1) + 8$

$7n - 7 + 8$

$7n + 1$

#4) $a_{50} = 7(50) + 1 = 350 + 1 = 351$

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

$7(49) + 8$

$343 + 8 = 351$

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

$$a_1 = first\ term$$

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

Explicit Formula

$$a_n = dn + a_0$$

Writing and Using Formulas for Arithmetic Sequences

Given the arithmetic sequence -3, -1, 1, 3, ...

-5 / a_0 { -3, -1, 1 / a_1, a_2, a_3

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?

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

$a_{56} = 107$

Given the arithmetic sequence 10, 5, 0, -5, ...

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

$$\begin{cases} a_n = -5n + 15 \\ \text{or} \\ a_n = -5(n-1) + 10 \end{cases}$$

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

$a_{20} = -5(20) + 15 = -85$

Writing and Using Formulas for Arithmetic Sequences

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

$a_n = -5n + 25$ or $-5(n-1) + 20$

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

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

$= -75$

d) -135 is which term in this sequence?

$-135 = -5n + 25$

$-160 = -5n$

$32 = n$

What are the second and third terms of the sequence

100, 94, 88, 82, ... ?

1 2 3 4

94 − 6 = 88

88 − 6 = 82

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

Given the following sequence: $\underset{1}{4}, \underset{2}{9}, \underset{3}{14}, \underset{4}{19}, \underset{5}{24}, \underset{6}{29}, \ldots$

1) Find the common difference between terms 5

2) Write an explicit formula for the sequence

$a_n = 5n - 1$

3) Find the 20th ~~term of~~ the sequence

$a_{20} = 99$

4) 129 represents ~~which~~ term in the sequence?

$129 = 5n - 1$

$130 = 5n$

$26 = n$

$a_n = 5(n-1)+4$

$a_n = 5n + a_0$

$14 = 5(3) + a_0$

$14 = 15 + a_0$

$-15 \quad -15$

$-1 = a_0$

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

1) Find the common difference between terms

$\frac{40-28}{10-14} = \frac{12}{-4} = -3$

2) Write an explicit formula for the sequence

#2)

$a_n = -3n + a_0$

$28 = -3(14) + a_0$

$28 = -42 + a_0$

$+42 \quad +42$

$70 = a_0$

$a_n = -3n + 70$

3) Find the 20th term of the sequence

$a_{20} = -3(20) + 70 = 10$

4) 58 represents which term in the sequence?

$58 = -3n + 70$

$-12 = -3n$

$+4 = n$

Practice with Sequences

HW #11

Arithmetic Sequences