Opener for January 16, 2019

Write an equation of a line containing the following points:

a. (2, 5) and (7, -5)

$$\frac{-10}{5} = -2 \qquad y = -2x + b$$
$$5 = -4 + b$$
$$9 = b \qquad y = -2x + 9$$

b. (-4, 3) and (-1, 9)

$$y = 2x + 11$$

$$6/3 = 2$$

$$9 = +2(-1) + b$$
$$9 = -2 + b$$
$$\underline{+2 \quad +2}$$
$$11 = b$$

Sequence: A set of numbers , or terms, in a specific order. (i.e. a pattern)

8	9	10	11	12	13	14	_____
22	24	26	_____	30	32	34	36
45	_____	51	54	57	60	63	66
70	74	78	82	_____	90	94	98
29	34	_____	44	49	54	59	64
11	17	23	29	35	41	_____	53

What are the next three terms of this sequence?

26, 22, 18, 14, _10_, _6_, _2_

How do you know?

~ 4

What are the next three terms of this sequence?

15, 9, 3, -3, __-9__, __-15__, __-21__

How do you know?

−6

What do you notice about these patterns?

These sequences are what we call,
Arithmetic Sequence.
How would you define an arithmetic sequence?

(they increases or decreases at a constant rate)

How did you know? Is called the
"Common Difference".
(difference between terms of an arithmetic sequence).
We represent by d.

Is the sequence arithmetic?

1, 4, 9, 16, 25...

3 5 7 9

If so, what is the common
difference (d)?

Is the sequence arithmetic?

-18, -8, 2, 12, 22...
   1   2 3   4 5   (0, 28)

If so, what is d? +10

What are the next three terms?
32, 42, 52

Can you write an equation?
previous term + 10

$$f(x) = f(x-1) + 10$$
$$f(6) = f(5) + 10$$
$$22 + 10$$
$$f(6) = 32$$

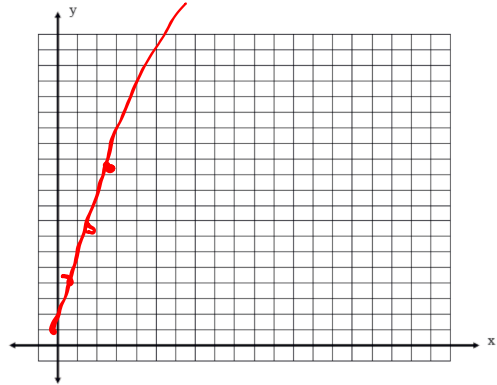What does the graph of an arithmetic sequence look like?

3, 6, 9, 12...

1 2 3 4

What is the slope?

3

What is the y-intercept?

(0, 0)

How do we find the equations of an arithmetic sequence?

Let's look at the arithmetic sequence

26, 22, 18, 14, _____, _____, _____

We already found that d = -4 and the next three terms are 10, 6, 2.

Can you write TWO equation for this sequence?

$$f(x) = f(x-1) - 4 \leftarrow$$

previous term

$$f(x) = -4x + 30 \leftarrow$$

How do we find the equations of an arithmetic sequence?
There are two different kinds.

Recursive formula:
Depends on the previous term.
It's the previous term or f(n-1) plus the common difference

$$f(n) = f(n-1) + d$$

Think "What it is = what it was + the difference"

$$f(n) = f(n-1) + - 4$$

This is what we did in our heads to find the next term

$$f(9) = f(8) - 4$$

$$f(100) = f(99) - 4$$

How do we find the equations of an arithmetic sequence?
There are two different kinds.

Explicit formula:
Find the nth term without knowing the previous term.
It will tell us the outcome for any input n.
You will need to know the initial value or *f(0)*.

$$f(n) = \boxed{f(0)} + dn$$

$$f(n) = 30 + -4n$$

Hmmm....looks like $\boxed{y = mx + b}$

$$f(9) = 30 + -4(9)$$
$$f(9) = -6$$
$$f(100) = 30 + -4(100)$$
$$= -370$$

Explicit Equation

Used to find any term

f(x) =

x	f(x)
0	-7
1	2
2	11
3	20

$f(x) = 9x - 7$

3, 4, 5

1, 2, 3, 4, 5, 6, 7,

Recursive Equation

Uses the previous term, what we do in our heads

$$f(x) = f(x-1) + 9$$

x	f(x)
0	-7
1	2
2	11
3	20

$$f(9) = f(9-1) + 9$$

$$f(8)$$

4   29

$$f(6) = f(6-1) + 9$$

$$f(6) = f(5) + 9 \quad 10$$

$$f(4) = f(3) + 9$$