Be sure you grabbed a homework outside - due Friday!

Last day for quiz #2 retake from last week is this Wednesday!

Create the recursive and explicit equations for each
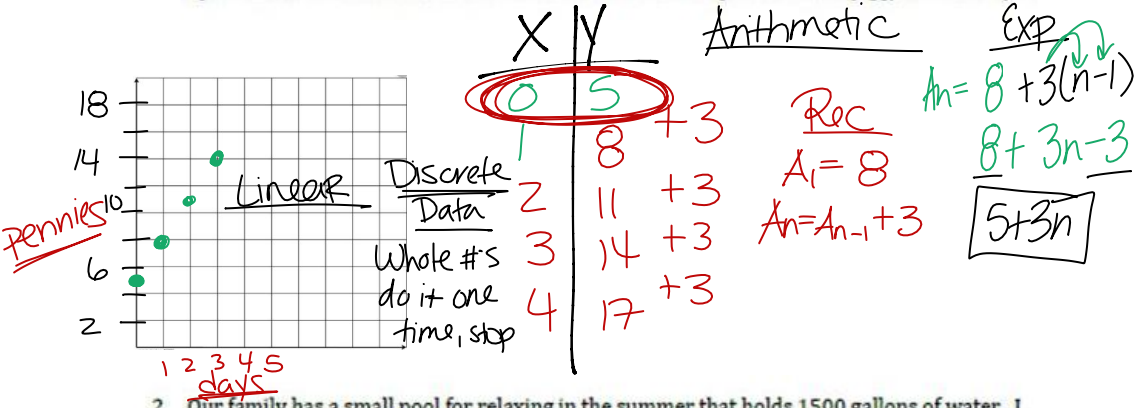
1) 5, -25, 125, -625...   2) 10, 3, -4, -11...

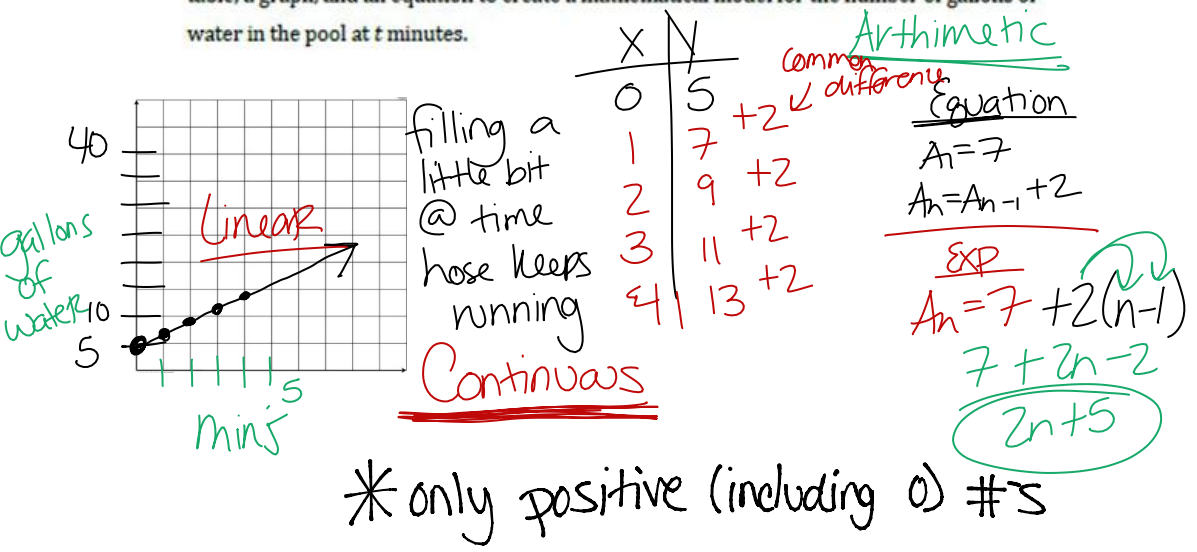# 2.1 Connecting the Dots: Piggies and Pools

A Develop Understanding Task

1. My little sister, Savannah, is three years old. She has a piggy bank that she wants to fill. She started with five pennies and each day when I come home from school, she is excited when I give her three pennies that are left over from my lunch money. Use a table, a graph, and an equation to create a mathematical model for the number of pennies in the piggy bank on day n.

Pennies (y-axis: 18, 14, 10, 6, 2) vs **days** (x-axis: 1 2 3 4 5)

Linear — Discrete Data — Whole #'s do it one time, stop

X	Y	
0	5	
1	8	+3
2	11	+3
3	14	+3
4	17	+3

Arithmetic

Rec
$A_1 = 8$
$A_n = A_{n-1} + 3$

Exp
$A_n = 8 + 3(n-1)$
$8 + 3n - 3$
$\boxed{5 + 3n}$

2. Our family has a small pool for relaxing in the summer that holds 1500 gallons of water. I decided to fill the pool for the summer. When I had 5 gallons of water in the pool, I decided that I didn't want to stand outside and watch the pool fill, so I had to figure out how long it would take so that I could leave, but come back to turn off the water at the right time. I checked the flow on the hose and found that it was filling the pool at a rate of 2 gallons every minute. Use a table, a graph, and an equation to create a mathematical model for the number of gallons of water in the pool at t minutes.

gallons of water (y-axis: 40, 10, 5) vs **mins** (x-axis: 5)

Linear

filling a little bit @ time hose keeps running

Continuous

X	Y	
0	5	
1	7	+2 ← common difference
2	9	+2
3	11	+2
4	13	+2

Arithmetic

Equation
$A_1 = 7$
$A_n = A_{n-1} + 2$

Exp
$A_n = 7 + 2(n-1)$
$7 + 2n - 2$
$\boxed{2n + 5}$

✳ only positive (including 0) #'s

Warmup

1) Is the domain x or y values?

X-values

3) Is the range x or y values?

y values

4) Substitute: f(x) = $2x^2 - 4x + 1$

plug it $f(3) = 2(3)^2 - 4(3) + 1$
in for
X

$\boxed{7}$

2) Fill in the table below:

X	Y
0	2
1	9
2	16
3	23
4	30

+7

+7

$\dfrac{23-2}{3-0} = \dfrac{21}{3} =$

+7

3. I'm more sophisticated than my little sister so I save my money in a bank account that pays me 3% interest on the money in the account at the end of each month. (If I take my money out before the end of the month, I don't earn any interest for the month.) I started the account with $50 that I got for my birthday. Use a table, a graph, and an equation to create a mathematical model of the amount of money I will have in the account after m months.

money goes ↑
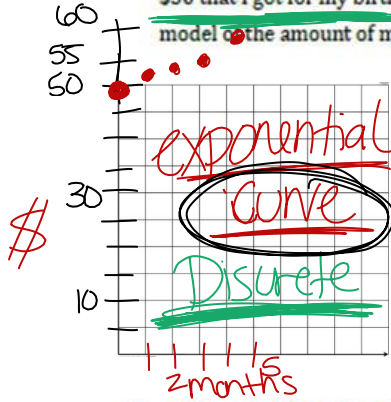
Geo

Equation

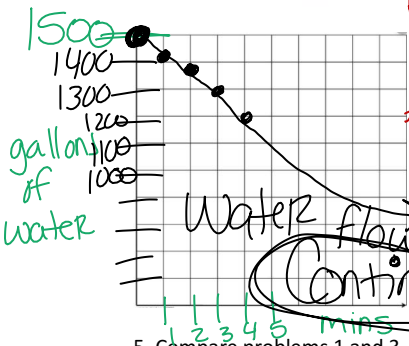$$A_n = 51.5(1.03)^{n-1}$$

Rec

$$A = 51.5$$
$$A_n = 1.03(a_{n-1})$$

X	Y
0	50 → ×1.03
1	51.50 → ×1.03
2	53.05 → ×1.03
3	54.64 → ×1.03
4	56.28 → ×1.03

months → positive

$$100 + 3 = \frac{103}{100} = 1.03$$

↑ ratio

every month once a month

exponential Curve
Discrete

60 55 50
30
10
$
2 months

4. At the end of the summer, I decide to drain the 1500 gallon swimming pool. I noticed that it drains faster when there is more water in the pool. That was interesting to me, so I decided to measure the rate at which it drains. I found that 3% was draining out of the pool every minute. Use a table, a graph, and an equation to create a mathematical model of the gallons of water in the pool at t minutes.

losing 3%

Geo

Eq

$$A_n = 1455(0.97)^{n-1}$$
$$A = 1455$$
$$A_n = 0.97(A_{n-1})$$

Decreasing

$$100 - 3 = \frac{97\%}{100} = 0.97$$

↑ r

X	Y
0	1500 → ×0.97
1	1455 → ×0.97
2	1411.35 → ×0.97
3	1369.07 → ×0.97
4	1327.93 → ×0.97
5	1288.10 → ×0.97

1500 1400 1300 1200 1100 1000
gallons of water
Water flows Continuous
1 2 3 4 5 mins

5. Compare problems 1 and 3. What similarities do you see? What differences do you notice?

Both $
Both Discrete (dots)

One Linear
One exponential

6. Compare problems 1 and 2. What similarities do you see? What differences do you notice?

Both Linear

one Discrete
one Continuous

7. Compare problems 3 and 4. What similarities do you see? What differences do you notice?

Both exponential

One discrete
one Continuous