

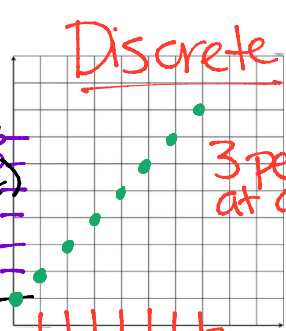
2.1 Connecting the Dots: Piggies and Pools



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 .

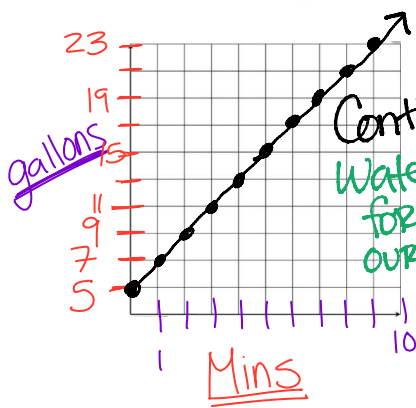
x	y
0	5
1	8
2	11
3	14
4	17
5	20
6	23
7	26



Linear straight
slope $\rightarrow +3$
Common diff \rightarrow every day, the piggy bank gets 3 pennies
Equation Arithmetic
Explicit: $A_n = 5 + 3n$
 $100 = 5 + 3n$

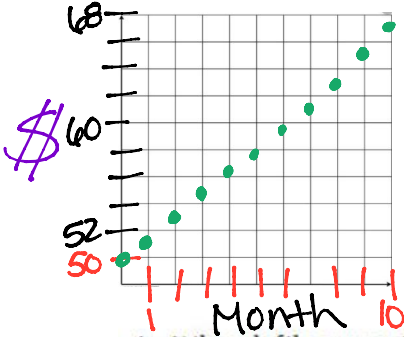
2. Our family has a small pool for relaxing in the summer that holds 1500 gallons of water. I decided to fill the pool for the summer. When I had 5 gallons of water in the pool, I decided that I didn't want to stand outside and watch the pool fill, so I had to figure out how long it would take so that 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.

x	y
0	5
1	7
2	9
3	11
4	13
5	15
6	17
7	19
8	21
9	23
10	25



Explicit
 $A_n = 5 + 2n$
 $f(n) = 2n + 5$
holds 1500 gallons
 $1500 = 5 + 2n$
 $1495 = \frac{2n}{2}$
 $n = 747.5$ mins
hours? $\leftarrow \frac{60}{12.45 \text{ hrs}}$

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.



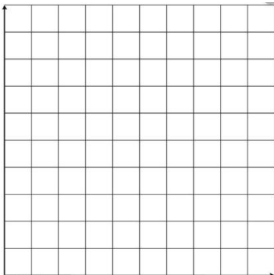
3% earning $100\% + 3\% = \frac{103}{100} = 1.03 \rightarrow r$
 * geo
 * exponential

Discrete \rightarrow one a month

Equation
 $A_n = 50(1.03)^n$

X	Y
0	50
1	51.51
2	53.05
3	54.63
4	56.27
5	57.96
6	59.20
7	61.49
8	63.33
9	65.23
10	67.19

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.



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

X	Y
0	1500
1	1455
2	1411.35
3	1369.01
4	1327.94
5	1288.10
6	1249.46

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

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

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