

2 . 1 Connecting the Dots:

Piggies and Pools

A Develop Understanding Task



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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. Create a mathematical model for the number of pennies in the piggy bank on day n .

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. Create a mathematical model for the number of gallons of water in the pool at t minutes.

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. Create a mathematical model of the amount of money I will have in the account after m months.

4. At the end of the summer, I decide to drain the 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 it was draining at a rate of 3% every minute. Create a mathematical model of the gallons of water in the pool at t minutes.

Both talking about \$
Both are discrete
Sim: Both are increasing

#1 is linear but
Diff: #3 is exponential

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?

Sim: Same y-intercept
Both are increasing Both linear Diff: #1 is discrete but #2 is continuous

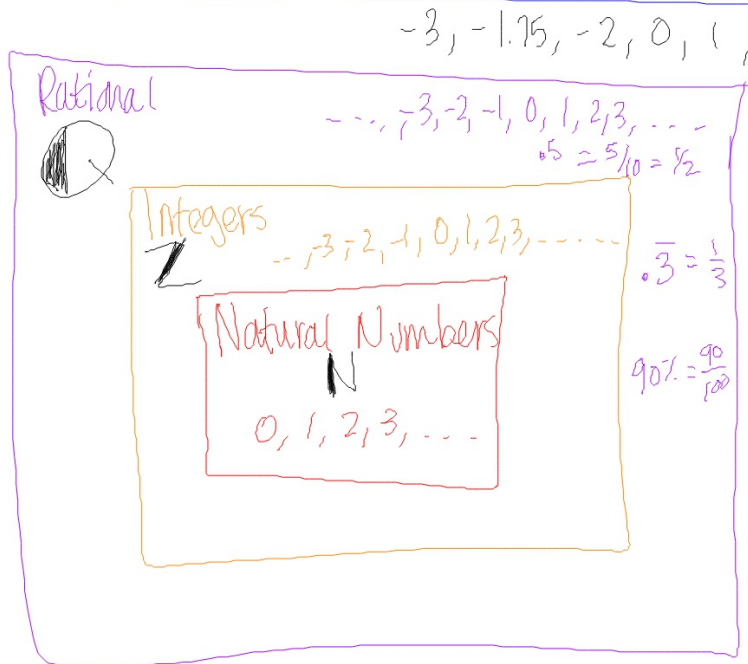
7. Compare problems 3 and 4. What similarities do you see? What differences do you notice?

Sim: Both exponential
Both are a % change

Diff: #3 increasing but
#4 is decreasing

#3 is discrete
#4 is continuous

Real
 \mathbb{R}



$-3, -1.75, -2, 0, 1, \frac{1}{3},$

$..., -3, -2, -1, 0, 1, 2, 3, ...$
 $0.5 = \frac{5}{10} = \frac{1}{2}$

$..., -3, -2, -1, 0, 1, 2, 3, ...$

$0, 1, 2, 3, ...$

$0.\bar{3} = \frac{1}{3}$

$90\% = \frac{90}{100}$

Irrational $\mathbb{R} - \mathbb{Q}$
 $\pi = 3.1415 \dots$
 $\sqrt{3}, \sqrt{5}, \dots$

