

Augustus Gloop is struggling to get his homework done. Since he loves candy so much, his parents offer him a couple of deals, but he has to choose which one to take. His mom offers no candies on the day she explains the deal (day 0), and offers to give him 20 the next day, 40 the next day, then 60, then 80, continuing that pattern each day as long as he gets his homework done.

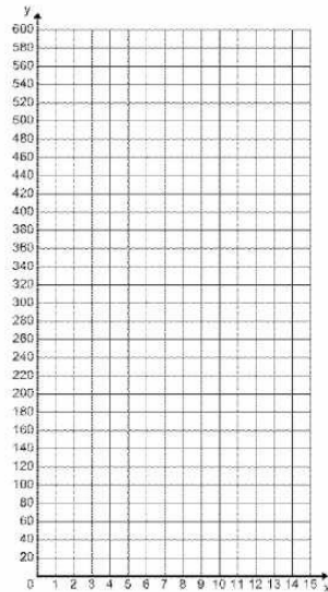
His dad offers one candy on the day he explains it (day 0), will give him 2 on the first day, 4 on the second day, and 8 on the third day. He'll continue the pattern as long as Augustus gets his homework done.

1. Augustus is confident he can get his homework done for two weeks. **Without making any calculations**, predict which deal will get him the most candy on day 14. Why?

2. Calculate how many candies Augustus will get with each deal for each of the first 14 days. (**You are calculating how much he will get each day, not how much he would have received total.**)

Day	Mom's Deal	Dad's Deal
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		

3. Graph how many candies will be received each day for each deal on the grid below.



4. Use your work from 1-3 to answer the following.

a. What patterns did you see as you looked at the number of candies for each deal? Write down any patterns that you found.

mom - add 20      dad - multiply by 2  
 doubled

5. a. Augustus is thinking about choosing his mom's deal. Write an equation that will help him calculate how many candies he will receive on any given day; then calculate how many candies he would receive with her deal on day 30.

$y = 0 + 20x$        $y = 20x$       ↓ 600

b. How many would he get with his dad's deal on day 30?

$1,073,741,824 = 2^{30}$

c. Write a rule that describes how you found dad's amount on day 30.

$y = 2^x = 1 \cdot 2^x$

6. **Jealous Jacob:** Augustus chooses his Dad's deal and immediately calls and brags to his friends. His friend Jacob is jealous and talks his dad into giving him a candy and then three times the previous amount each day.

a. How many candies does Jacob get on day 5? Day 10?

b. Write a rule to express the number of candies Jacob receives on the  $n$ th day.

$y = 3^x = 1 \cdot 3^x$

c. What is the difference between Jacob's dad's deal and Augustus's dad's deal? How does it affect the number of candies they get each day?

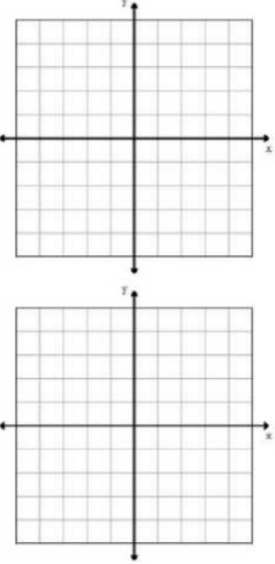
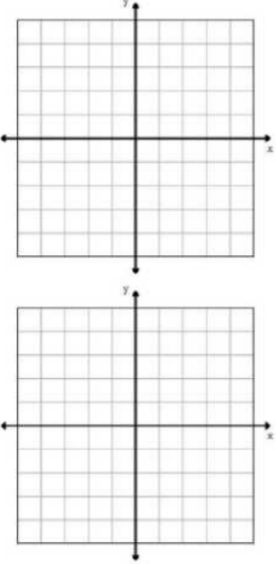
7. **Envious Edward** pleads his case to his dad. Wanting to outdo his friends, he convinces his dad to start him out with 100 candies and then double that amount every day (200 on day 1).

a. Write a rule to express the number of candies Edward receives on the  $n$ th day.

day 0 = 100  
 $y = 2^x + 100$        $y = 100^x$        $y = 100 \cdot 2^x$   
 day 1:  $100 \cdot 2 = 200$

b. What is the difference between Edward's dad's deal and Augustus's dad's deal? How does it affect the number of candies they get each day?

8. Who's deal would you pick? (Augustus's Mom, Augustus's Dad, Jacob's Dad, or Edward's Dad) Why? Please write in full sentences.

LINEAR	EXPONENTIAL
Rate of Change: <i>common difference</i> $m$	Rate of Change: <i>Common ratio</i>
Initial Starting Point: $b$	Initial Starting Point: $b$
Equation: $y = mx + b$ $y = b + mx$	Equation: $y = b \cdot a^x$ $y = a^x \cdot b$
Graph: 	Graph: 

$$\begin{array}{r|l}
 0 & 0 \\
 \hline
 1 & 0+20 = 20 \\
 \hline
 2 & 20+20 = 40 \\
 \hline
 3 & 40+20 = 60 \\
 \hline
 4 & 60+20 = 80 \\
 \hline
 & y = 0 + 20x
 \end{array}$$

$$\begin{array}{r|ll}
 0 & 1 & 2^0 & x^2 = x \cdot x \\
 \hline
 1 & 1 \times 2 = 2 & 2^1 & 2^x \\
 \hline
 2 & 1 \times 2 \times 2 = 4 & 2^2 & \\
 \hline
 3 & 1 \times 2 \times 2 \times 2 = 8 & 2^3 & \\
 \hline
 4 & 1 \times 2 \times 2 \times 2 \times 2 = 16 & 2^4 & \\
 \hline
 & & & y = 1 \cdot 2^x
 \end{array}$$

