Strain A	Strain B
Each minute, the original zombie "infects" 3 new people, but the new zombies cannot infect anyone.	Each minute, every zombie is able to infect 1 person. New zombies are able to infect people.

Make a prediction!
Which strain will create more zombies after 10 minutes? Explain your thinking.

Zombie Attack!
Let's begin the simulation. If you get infected with the zombie virus you must ***report your name to the CDC*** (Center for Disease Control) on the minute you were infected, so they can track the virus.

Tracking the virus.
Use the CDC minute reports from the board to complete the tables below to track the number of zombies after each minute.

$y = mx + b$

$y = 3x + 1$

Strain A	
Minutes	# Zombies
y-int 0	1
1	4 (+3)
2	7 (+3)
3	10 (+3)
4	13 (+3)
5	16 (+3)
6	19 (+3)
7	22

$y = a \cdot b^x$

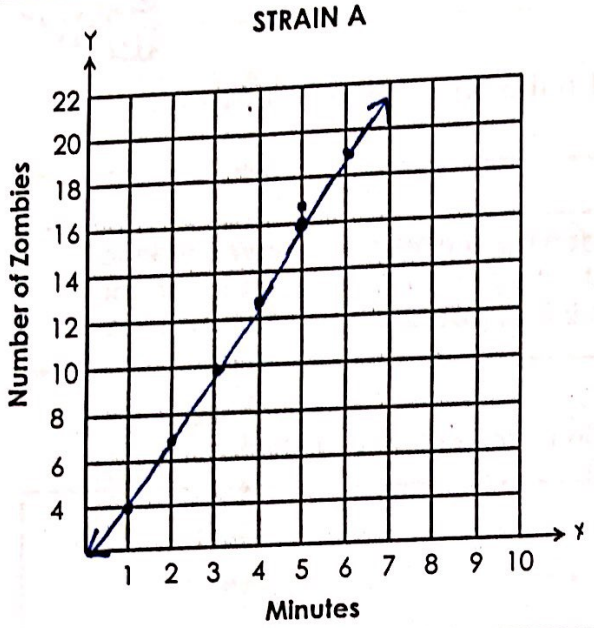
$y = 1 \cdot 2^x$

Strain B	
Minutes	# Zombies
0	1
1	2 (×2)
2	4 (×2)
3	8 (×2)
4	16 (×2)
5	32 (×2)
6	64 (×2)
7	128 (×2)

NOW, graph the data from the tables!

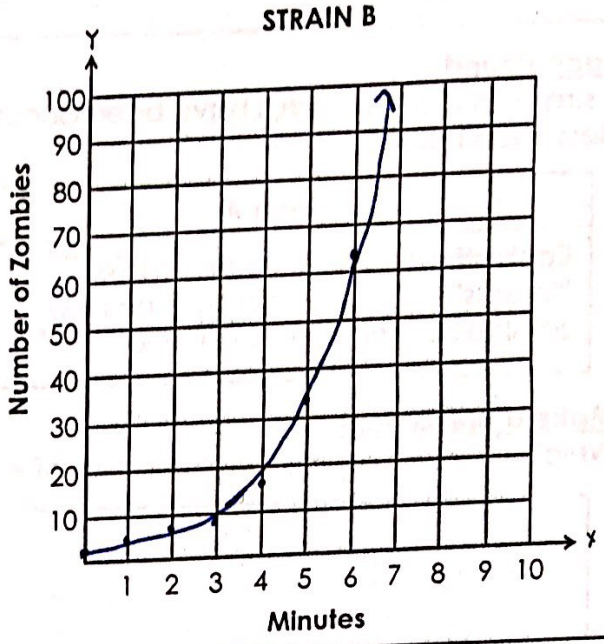
Tracking the virus (continued).
Use data from the tables to sketch the graphs of each strain of the zombie virus.

STRAIN A



Type of function: linear

STRAIN B



Type of function: exponential

Extension.
What if a zombie entered Century Link Stadium in Seattle, WA? The capacity of the stadium is 67,000 people. → y-value

Estimate **how many minutes it will take for the whole Century Link stadium to be infected IF...** → x-value

- The original strain A zombie walks into the stadium. $y = 3x + 1$ 22,333 min. $67000 = 3x + 1$, $66999 = 3x$, $\frac{66999}{3} = \frac{3x}{3}$
- One strain B zombie walks into the stadium. $y = 2^x$ $67000 = 2^x$ ≈ 16.03 min.

Now, ***determine*** **how many minutes it will take for the whole Century Link stadium to be infected IF...**

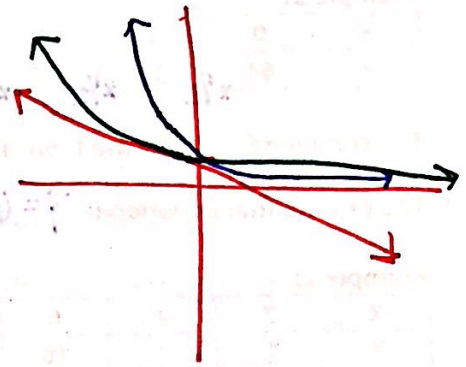
Strain A zombie walks into the stadium	Strain B zombie walks into the stadium
	$67000 = 2^x$ (y_1, y_2) Y= window Ymax: 70,000 Xmax: 50 2nd Trace intersect move cursor Enter x 3 x = 16.03 y = 67000

EXPONENTIAL FUNCTIONS

Graph these three equations using www.desmos.com

Consider these equations:

$y = 0.75^x$ $y = 0.25^x$ $y = -0.5x + 1$



a. Which equations are exponential relationships?

Explain how you know. x is in the power

b. Sketch a graph with all three lines to the right.

c. What point do all three lines have in common?

all intersect at (0,1)

d. Which line decreases the fastest?

$y = .25^x$ smallest decimal → decreasing faster

An exponential function is written in the form: $y = a(b)^x$ where a is the initial (y-intercept) value and b is the growth/decay rate.

Find the growth factor associated with the percent change.

Percent Change	.45 45%	.3 30%	.9 90%	.2 20%	2 200%
Growth Factor	1+.45 1.45	1.3	1.9	1.2	3

Explain in general, how you turn a percent change, into a growth factor.

change to decimal + add 1!

Find the percent change associated with the given growth factor.

Percent Change	50%	75%	5%	100%	180%
Growth Factor	1.5 -1 .5	1.75	1.05	2 -1 1	2.8 -1 1.8

Explain in general, how you find the the percent change, from a growth factor.

subtract 1 + change to percent!

For Exercises 9–12, find the growth factor and the y-intercept of the equation's graph.

9. $y = 300(3^x)$ a b y-int: (0,300) growth factor: 3 %. growth = 200%.

10. $y = 300(3)^x$ y-int: (0,300) growth factor: 3 %. growth = 200%.

11. $y = 6{,}500(2)^x$ y-int: (0,6500) growth factor: 2 %. growth = 100%.

12. $y = 2(7)^x$ y-int: (0,2) growth factor: 7 %. growth = 600%.

Using a Table to Write Exponential Functions

If the domain (x-values) are changing at a regular interval, then the range (y-values) will multiply by a common factor.