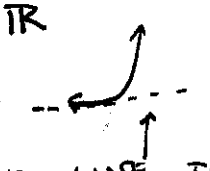
The zombie outbreak can be modeled by an exponential function because the rate of the outbreak changes on each day. For example on day 1- only one person could infect, by day 2, two people could infect, by day three 4 people could infect and so on. This means that exponential functions are **not linear** they have a changing **rate of change**.

Vocabulary:

Domain: ALL THE POSSIBLE X VALUES OF A FUNCTION. UNLESS IT IS A WORD PROBLEM (WHERE YOU CANNOT HAVE A NEGATIVE VALUE) THE DOMAIN IS ALWAYS ALL REAL NUMBERS. WRITTEN AS $(-\infty, \infty)$ OR $\mathbb{R}$

Range: ALL THE ~~POSS~~ POSSIBLE y-VALUES OF A FUNCTION



Asymptote: IN AN EXPONENTIAL GRAPH IT IS THE HORIZONTAL LINE THAT THE GRAPH WILL GET VERY CLOSE TO BUT NEVER TOUCH

Growth: AN EXPONENTIAL FUNCTION THAT STARTS WITH A SMALL RATE OF CHANGE (STARTS AT THE ASYMPTOTE) THEN CHANGES RAPIDLY

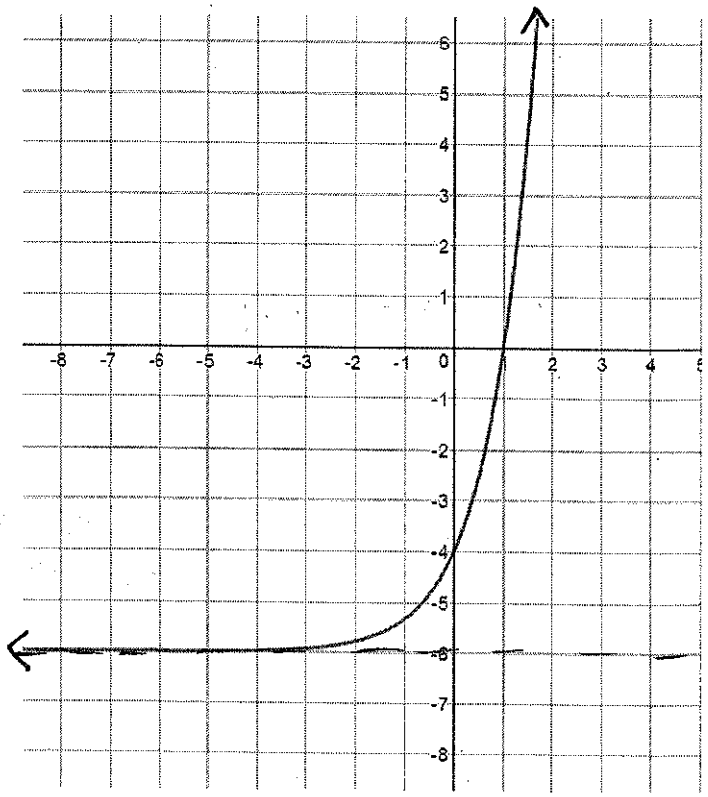
Decay: AN EXPONENTIAL FUNCTION THAT CHANGES RAPIDLY THEN HAS A SMALL RATE OF CHANGE (ENDS AT THE ASYMPTOTE)

OR

End Behavior: WHAT THE FUNCTION (GRAPH) DOES AS IT EXTENDS TO THE LEFT ($-\infty$) OR TO THE RIGHT (∞)

Interpreting parts of an exponential graph

Growth/Decay?	GROWTH
Increasing or decreasing?	INCREASING
x-intercept	1 or (1, 0)
y-intercept	-4 or (0, -4)
Asymptote	$y = -6$
Range	$(-6, \infty)$
Left end behavior $x \to -\infty$	AS $x \to -\infty$ $y \to 6$
Right end behavior $x \to \infty$	AS $x \to \infty$ $y \to \infty$
Domain	$(-\infty, \infty)$ or $\mathbb{R}$



Introduction into exponential functions

Functions are used to model real world situations so we can predict what might happen. For example, a **linear function** can be used to model how much money you can make per hour and a **quadratic function** can model the distance and time of an object when it is thrown due to gravity. **Exponential functions** can be used to model situations where the amount changes rapidly.

Imagine this situation. Kendra was going out for a walk and was attacked by some kind of animal. When she inspected her wounds she thought that it was just a scratch but little did she know that she was just infected with a virus that would turn her into a *zombie*. The next day zombie Kendra infected Trent and now Trent was turned into a zombie as well. Each day, a zombie can infect one other person and so even though they are slow the zombie virus quickly spreads. How many days will it take for our class to be completely infected?

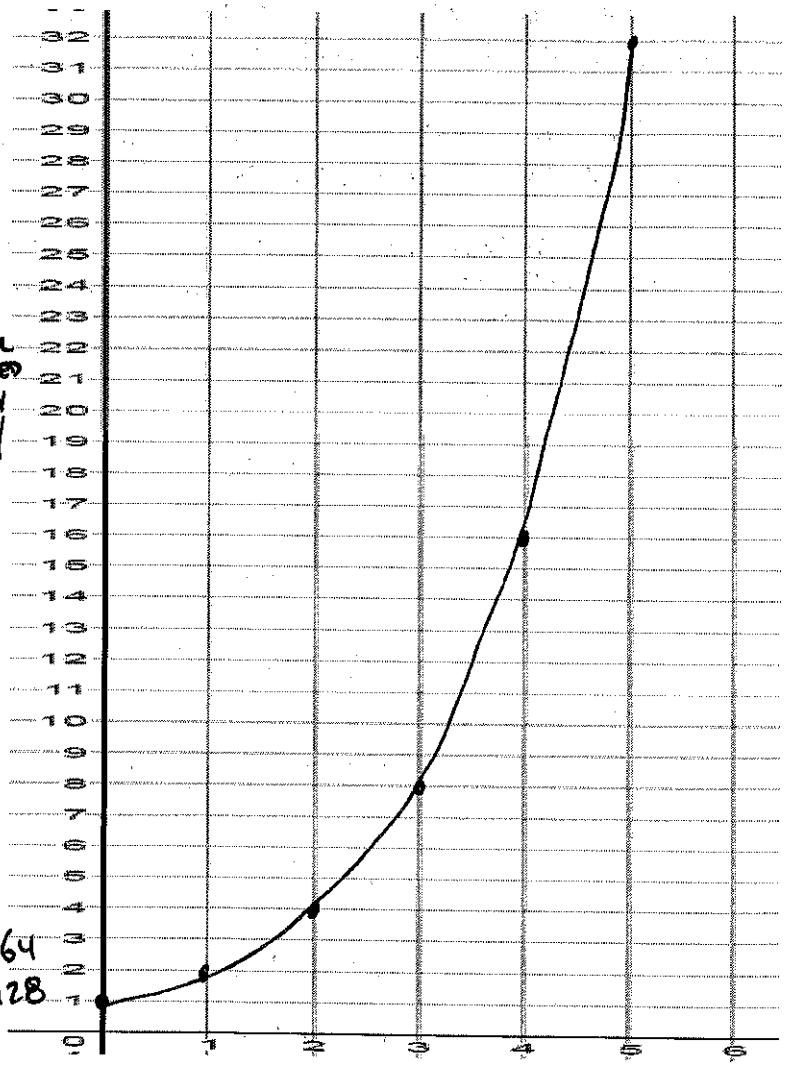
Day (x)	# Infected (y)
0	1
1	2
2	4
3	8
4	16
5	32

FORMULA

$y = 1(2)^x$

WE STARTED WITH 1 PERSON

THE TOTAL DOUBLED EVERY DAY



How many days until we were all infected?

5 DAYS

How fast did this outbreak spread?

IT DOUBLED EVERY DAY

Can you predict how many people would be infected in 7 days? How did you arrive at the answer?

128 PEOPLE

5	32
6	32×2=64
7	64×2=128

How many days would it take for the whole school to be infected? (there are about 1750 students in the school) How did you come up with that answer?

8	128×2= 256
9	256×2 = 512
10	512×2= 1024
11	1024×2 2048
12	

SOMETIME ON THE 11TH DAY & THE ENTIRE SCHOOL WILL BE INFECTED