Zombie Apocalypse
## Student Activity – TI-84 Plus CE

Name _____

Class _____

In this activity you will explore the spread of a fictional virus that turns normal humans into angry, hungry zombies. Although zombies aren't real, they are a fun way to learn about how a disease can spread and how populations can suffer the effects of REAL viruses, like influenza. You will also learn a little about the human brain and certain areas of the brain that, if affected, would cause a person to become a zombie again, if such a thing were real. Explore the activity and remember, although zombies aren't real, viruses and diseases certainly are. Knowing how populations become infected is important to understand if we want to control the spread of diseases.
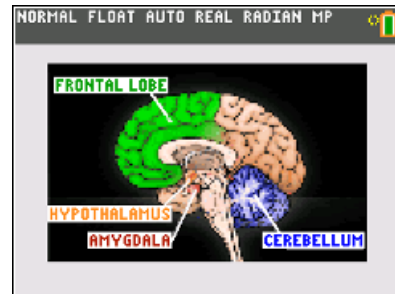
Open the TI-84 Plus CE program ZOMBIEP1 found by pressing the program key. Check with your teacher if the program file cannot be found.

Use the right and left arrow keys to move from page to page.

1. Read the scenario of the zombie virus epidemic. The scenario describes the method by which the virus infects humans and explains the resulting symptoms in the human brain.
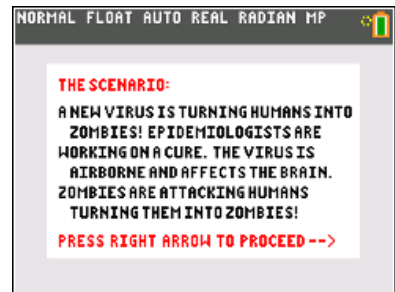
2. Continue to read the story until you get a page with an image of a brain. Review the parts of the brain. These are the structures that are affected by the zombie virus. Read about the symptoms of this fictional disease on the following page. Continue to the page with a face and brain image. The normal human becomes 'zombified' over time as the virus works on specific areas of the brain. Can you think of some real diseases that affect the brain?
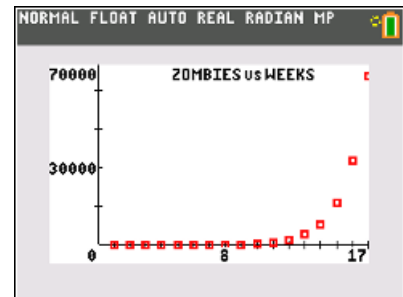
3. Proceed to the page to watch a human turn into a zombie. Notice the effects of the contagion on the different parts of the brain.

4. Read about the background of the zombie crisis. Advance to the page shown and look at the graph. Look at both axes and observe the pattern of the data. What predictions can you make based on this data?

Answer the following questions based on the Zombies vs Weeks graphs

Q1. The greatest rate of infection occurred between week _____ and week _____.

Q2a. What is the approximate infection rate between week 1 and week 8?

Q2b. Now move to the graph on the following page (it has blue plots). What is the approximate infection rate between week 7 and 8?

Q3. If the trend were to continue, predict the number of zombies that will exist after the 25th week.

Q4. Explain what you believe will be happening with the rate of zombie production after 30 weeks.

Infection rate and Virulence

5. The rate of infection of any disease will eventually decrease because of many different factors. For this activity, the main factors are lack of food (healthy humans) and lack of additional targets to infect (again, healthy humans). For other epidemics or diseases those factors may include the development of a vaccine or the elimination of a vector (the source that carries and distributes the pathogen) such as mosquitos, rats, or other organisms. Historically, factors such as sanitation have helped to control the rate of disease spread. What other factors can you think of?

6. "Virulence" is a measure of how effectively a disease-causing agent can spread through a population. Using the simulation, explore how changing the virulence of the zombie virus affects how quickly a human population can become infected. In a small group, have each person try a different virulence setting and compare results.
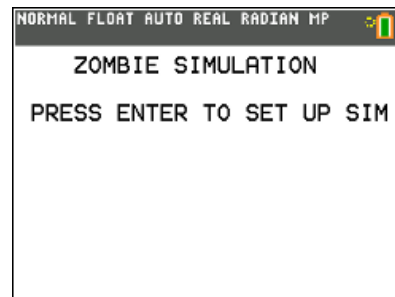
7. On the graph, notice that both zombie and human populations are plotted on the graph. Even when you change the virulence in the simulation you should see a relationship between the numbers of humans and zombies.
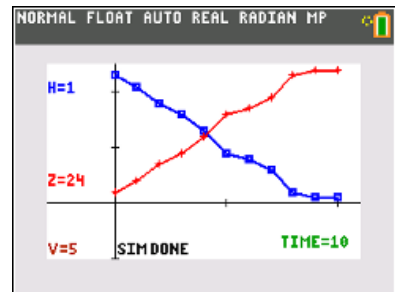
Answer the following questions

Q5. In the graph, "time" is the independent variable, but there is no actual UNIT of time indicated. What do you think would be an appropriate unit of time for the spread of the Zombie Virus?

Q6. Estimate the point at which the number of zombies and the number of humans are equal? What variable would affect this point?

Q7. Based on the graph of humans and zombies from the previous page, which do you think is the relationship between the two populations?

A. Inverse
B. Direct
C. There appears to be no relationship.

Q8. What effect did changing the virulence have on the rate of Zombie Virus infection?
A. As virulence increased, the rate decreased.
B. As virulence increased, the rate increased.
C. As virulence increased, the rate did not change.

Q9. Although the Zombie Virus isn't a real concern for us YET, name another disease that you think has a pretty high degree of virulence.

Q10. What if a new "strain" of the Zombie Virus appeared that was almost the same as the original virus, except that it did not affect the cerebellum? Predict what the result would be.

Q11. What if the virus changed again, and neither cerebellum nor the frontal lobe were affected? Predict the results.