



Zombie Apocalypse Part I

Adapted from an activity © 2013 Texas Instruments

Background

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.



What Page Am I On?

When you see the ? (question mark) symbol above **GRAPH** key, you can press it to find out what page you're on.

Send files to your TI-84 Plus C Silver Edition

Using TI-Connect 4.0 or higher, or a classmate's calculator, send the program ZOMBIEA1 (ZOMBIEA1.8xp) and the AppVar ZA1TD (ZA1TD.8xv) to your TI-84 Plus C Silver Edition. Both files should go to your calculator's Archive.

- **Using TI-Connect:** Open TI DeviceExplorer and select your calculator. Drag ZOMBIEA1.8xp into the item labeled "Flash/Archive" and wait for the transfer to complete. Drag ZA1TD.8xv into "Flash/Archive" as well.
- **From another calculator:** Put the receiving calculator in Receive mode by pressing **2nd** **XTN** **▶** **ENTER**. On the sending calculator, go to the **Link** menu with **2nd** **XTN**, choose 2: All-..., then find "ZOMBIEA1 PRGM" and "ZA1TD AVAR" and press **ENTER** next to each one. Each one should be marked with a square, indicating that it will be sent. Press **▶** **ENTER** to send the files over.

You will also need Doors CSE 8.1 or higher, which can be found at <http://dcs.cemetech.net>. The process of sending Doors CSE to your calculator is the same as above, and is also detailed in the Doors CSE readme document.

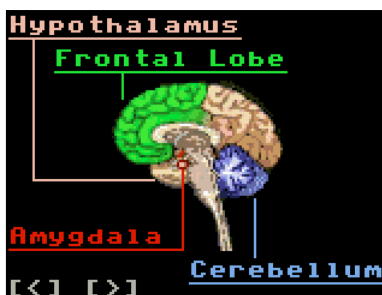
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Run the ZOMBIEA1 program; move to pages 2-6

1. Run Doors CSE 8 from the Apps menu of your calculator, select ZOMBIEA1, and run the program. You should see the Zombie Apocalypse I title screen. Throughout the Zombie Apocalypse I activity, you can press the arrow keys (◀▶) to move between pages, or ENTER to advance to the next page.
2. On a text page, press the ▼ and ▲ arrows to scroll down and up, and ZOOM or ENTER to scroll down.
3. Read the scenario of the zombie virus epidemic on page 2. Page 3 describes the method by which the virus infects humans and explains the resulting symptoms in the human brain.

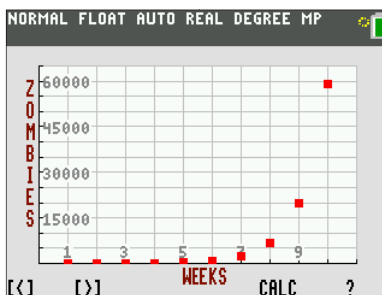


4. Review the parts of the brain on page 4. These are the structures that are affected by the zombie virus. Read about the symptoms of this fictional disease on page 5.
5. Go to pages 6 to 10 and step through the progression of the disease. The normal human becomes 'zombified' over time as the virus works on specific areas of the brain. Can you think of some real diseases that affect the brain?



Move to pages 11-12

6. Read about the background of the zombie crisis on page 11. Advance to page 12 and look at the graph. Look at both axes. Notice the pattern of the data. What predictions can you make based on this data?



Move to pages 13-21. Answer the following questions here, in the space provided.

- Q1. The greatest rate of infection occurred between week _____ and week _____.
- Q2. (a) What is the approximate infection rate between week 1 and week 6?



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(b) Now read page 15 and use the graph on page 16, which zooms in on the early part of the graph on page 12. What is the approximate infection rate between week 1 and week 6?

Q3. Take a look at the graph on page 19 and predict what the number of zombies will be after the 25th week.

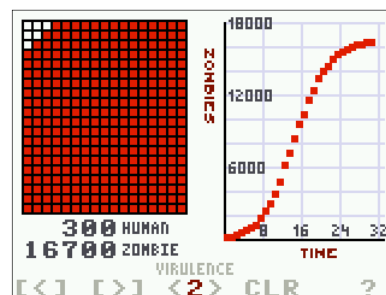
Q4. Explain what will happen with the rate of zombie production after 30 weeks.

Move to page 22.

7. 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?

Move to pages 23-25.

8. "Virulence" is a measure of how effectively a disease-causing agent can spread through a population. Using the simulation on page 24, explore how changing the virulence of the zombie virus changes how quickly a human population can become infected.
9. On page 25, 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.



Move to pages 26-34. Answer the following questions here, in the space provided.

- 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?



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- 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.

Image Credits: Texas Instruments. See readme.txt for full links.