

Problem 1

Spread of Disease

How disease spreads through a population



Jacklyn Bonneau and Louise Chapman

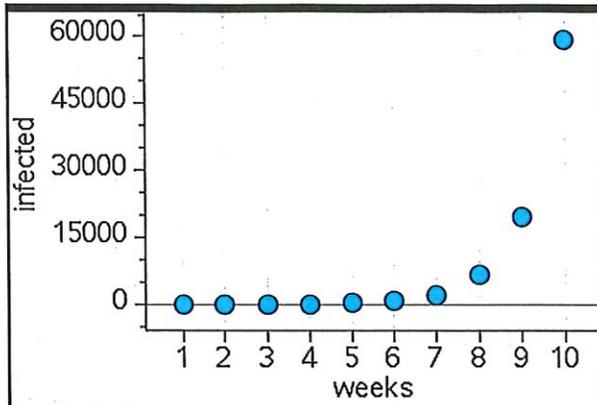
The Scenario

A virus outbreak has been discovered. Epidemiologists are trying to figure out what to do to help stop the outbreak. A virus can be spread by many modes of transmission. Depending upon the mode needed will affect how fast it spreads. This virus is airborne, being transported in saliva droplets of affected individuals.

Background of the Crisis

As with all infectious diseases, it's assumed that the virus started with one person becoming infected. It's estimated that each person then infects an average of two people per week. The number of people infected grows and grows and grows. Take a look at the graph on the next page.

Warning: The graph is pretty scary.



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

Student: Type response here.

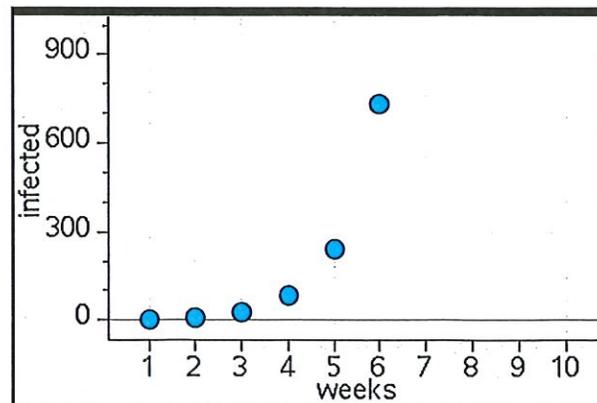
Q2a. What is the approximate infection rate between week 1 and week 6?

Student: Type response here.

Using the graph on page 1.4, the infection rate appears to be very close to zero. This is because of the scale used. Notice that the maximum number of zombies is 60,000.

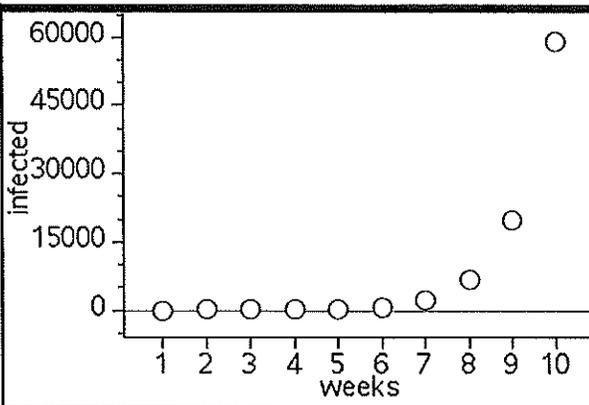
On the next page is a graph of the same data, but with a different scale. The maximum number of humans is only 1000.

Use the graph on page 1.8 to answer Q2b on page 1.13.



The next page contains the original graph of the data.

Use this graph to answer questions Q3 and Q4.



Q2b. What is the approximate infection rate between week 1 and week 6?

Student: Type response here.

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

Student: Type response here.

Q3. Take another look at the graph and predict what the number of infected will be after the 25th week.

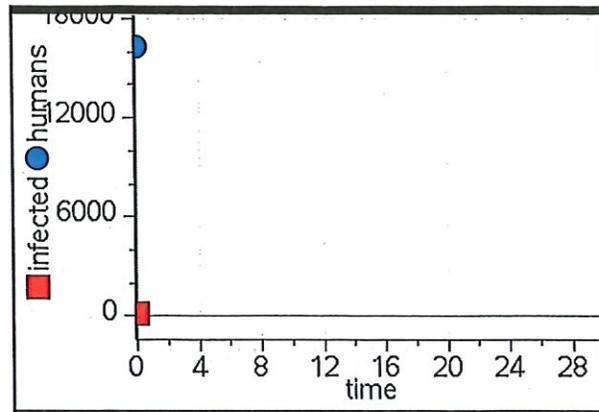
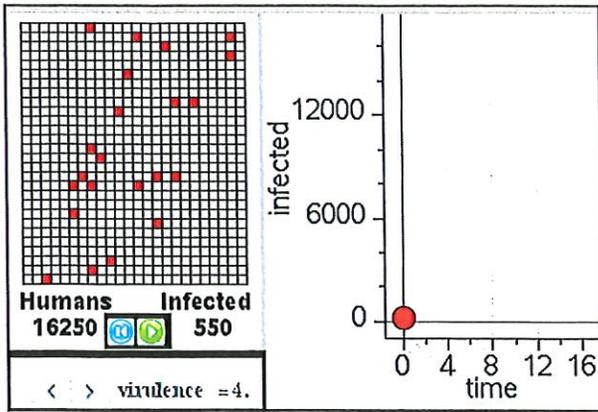
Student: Type response here.

Problem 2

Select the play button on the simulation on the next page and watch the graphs. Then go to the page that follows the simulation to see the graph showing the number of infected compared to the number of uninfected remaining!

"Virulence" is a measure of how effectively a disease-causing agent can spread through a population. Run the simulation several times, changing the virulence of the virus each time.

Eventually, the rate of infection of any disease begins to decrease due to fewer and fewer people remaining to be infected with the disease. If so, then you know that some of the potential infection victims never become infected because they have developed an immunity to it.



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 a virus?

Student: Type response here.

Q6. Estimate the point at which the number of infected and the number of uninfected humans are equal.

Student: Type response here.

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

- Direct
- Inverse
- There appears to be no relationship

Q8. What effect did changing the virulence have on the virus infection rate?

- 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 this specific virus isn't a real concern for us today, name another disease that you think has a pretty high degree of virulence.

Student: Type response here.

The CDC (*Center for Disease Control*) is frantically working to develop a vaccine that will combat the further spread of this virus. Historically, what other devastating diseases were brought under control through the development of a vaccine? What diseases have been prevented in YOU because of vaccines? How do vaccines work? Talk with another student about these questions.

Check the disease(s) that you have had?

<input type="checkbox"/>	Polio
<input type="checkbox"/>	Smallpox
<input type="checkbox"/>	Chickenpox
<input type="checkbox"/>	Measles
<input type="checkbox"/>	Influenza
<input type="checkbox"/>	Mumps

Problem 3

What disease are you investigating?

Student: Type response here.

Notes

	A time	B infected	C	D
1				
2				
3				
4				
5				

