1-D

Modelling the Spread of Disease

Skills and Strategies

- Processing and Analyzing
- Evaluating
- Applying and Innovating

Safety

- Never eat or drink anything in the laboratory.
- If you spill the contents of your cup, notify your teacher immediately.

What You Need

- paper cup provided by your teacher
- plastic dropper
- "infection indicator" solution (teacher only)

Pathogens can spread from one person to another in several ways, including through the air (when someone sneezes or coughs), through objects, or through insects, such as mosquitoes or ticks. When an outbreak of a disease occurs, public health authorities begin tracking the spread of the disease, trying to find out where it started and who was the first person to get sick. Tracking the origin and spread of an outbreak can help health authorities decide the best way to respond to the outbreak and minimize the number of people infected.

Question

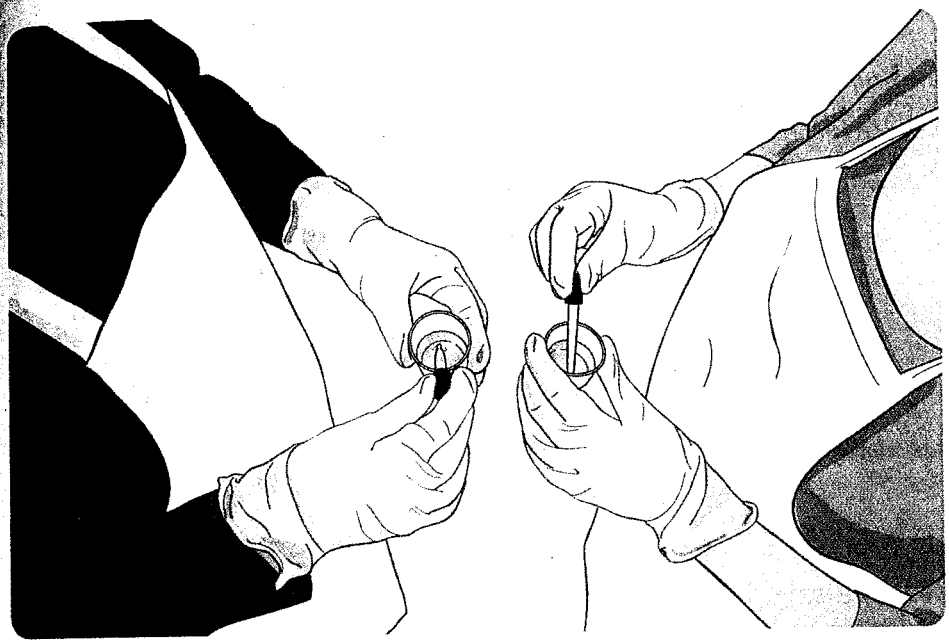
How can you model the spread of disease?

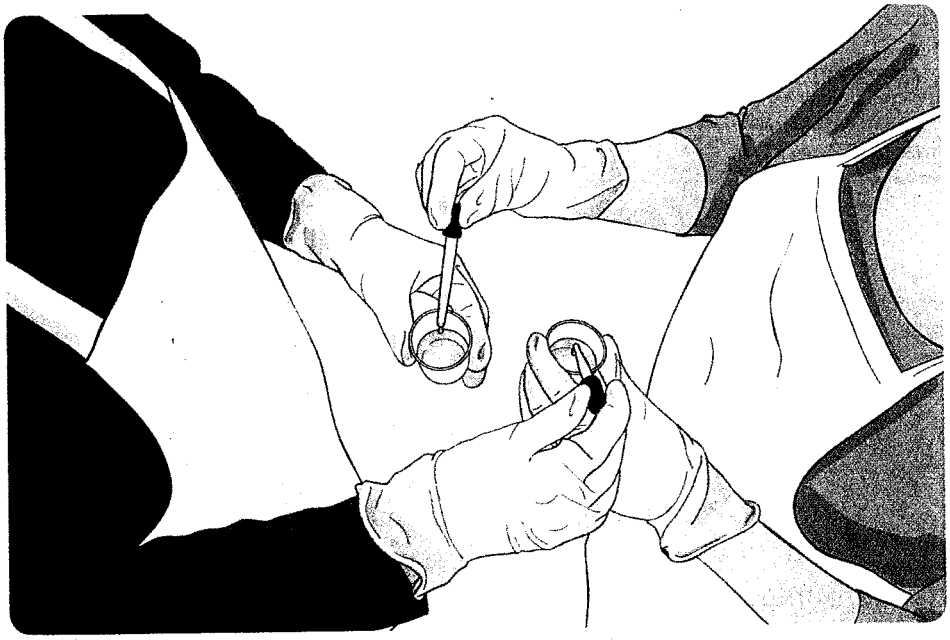
PART A: PROCEDURE

1. Take a paper cup from the cups provided by your teacher. Each cup contains about 10 mL of liquid. One cup contains a fake "pathogen."
2. When your teacher tells you, walk around the classroom until you are told to stop.
3. Use your dropper to pull some liquid from your cup. Then squeeze three drops into the cup of the person standing nearest to you. Remove the drops from your cup before either of you exchange any drops. After the exchange, place any of your own remaining dropper liquid back into your cup.
4. The dropper of liquid represents a potential passing of the pathogen to another person. Record the name of the person you exchanged drops with in a table like the one below.

My Contact Chart

Your Name	Contact 1	Contact 2	Contact 3





5. Repeat Steps 3 and 4 two more times.
6. Your teacher will put a drop of "infection indicator" in everyone's cup.
7. If you are "infected," the liquid in your cup will turn pink.
8. Record whether you are infected or not.
9. Dispose of your cup and liquid according to your teacher's instructions.

PART B: PROCEDURE

10. Figure out who "patient zero" is. "Patient zero" is a term used by public health agencies to indicate the first person that was infected and passed the pathogen to others.

11. Make a class chart like the one shown below. Fill in the name of each student in the class in the top row. In the columns on the left side, fill in the number of contacts that were made. (A contact was made each time you put drops from your cup into someone else's cup.) In each column below a student's name, fill in the people with whom they made contact.

Patient Zero Tracking Chart

Names of Students in Class

	Emma	Mason	Logan	Harper	Benjamin	Jun	Etc.
Contact 1	Jun	Chloe	Nabhitha				
Contact 2	I-Wen	Taress	Benjamin				
Contact 3	Joshua	Zoe	Haani				

12. Highlight the names of people in the table who became infected.

13. Track the names of the infected people. Look for people who were infected and all of the people they made contact with and were also infected. These people are possible patient zeroes. In the example above, Mason and Logan can be eliminated as patient zero. Although they each infected their first contact, neither of them infected his second contact.

14. If possible, make a diagram that shows the route of the pathogen being passed from one person to another.

Process and Analyze

1. At first, only one person in the class was infected. By the end of the investigation, how many people in the class were infected?
2. Explain how this investigation models the spread of a disease.
3. Were you able to determine who patient zero was? Why or why not?

Evaluate, Apply, and Communicate

4. How do you think tracking the spread of a disease during an outbreak and determining patient zero help public health authorities stop the spread of disease?
5. Suppose that someone could pass on a pathogen without appearing to be infected. How might that affect the public health authorities' ability to track the spread of the pathogen?
6. Suppose a scientist working in a lab is accidentally and unknowingly exposed to a pathogen. The scientist then leaves work, exposing people to the pathogen and leading to an outbreak. What steps could be taken to avoid a situation like this happening again?