

The Spread of a Virus Through a Population

* Teacher's Version

Purpose of lab

- This is an inquiry based activity that simulates the movement of a virus through a population. Students will be engaged in acting out the spread of a virus through their classroom. The students will use critical thinking skills to determine the source(s) of the virus and the factors that influence the rate of transmission.

Safety Issue: This exercise will involve the use of a weak base (.1 M Sodium Hydroxide (NaOH))

Preparation

- Fill all of the test tubes, or cups, with one quarter full with tap water except one.*
- Cups should be pre-filled before class so that there are no contamination problems in each round, and also so students don't see you putting the "special fluid" into one of the cups!
- Fill one test tube one quarter full with a weak solution of sodium hydroxide.

For this lab, the teacher will need:

- A weak concentration of Sodium Hydroxide (NaOH) [.4g per 100ml of water] (total volume depends on the number of students)
- Eyedropper
- Plastic cups or test tubes
- Phenolphthalein solution. Phenolphthalein is an indicator of pH. Phenolphthalein is clear in a basic solution and pink in an acidic solution, such as Sodium Hydroxide (NaOH). To make phenolphthalein indicator solution, dissolve 0.1 g phenolphthalein in 50 mL of ethyl alcohol. Add 50 mL water.

After learning background information from your teacher, record the following information:

Question (e.g. why are we doing this?)	Are students in our classroom more likely to get infected the more contact there is between them?
Hypothesis (what do you think will happen?)	Example hypothesis: the more contact there is between students, the more infected people there will be in the classroom.
Materials and Methods	<p>Materials</p> <ul style="list-style-type: none"> - 1 plastic cup with special fluid - Phenolphthalein solution (teacher has) <p>Methods</p> <ol style="list-style-type: none"> 1) Obtain a cup with the special liquid (be careful not to spill) 2) Exchange about half of your special fluid for each 1 minute time interval: <ul style="list-style-type: none"> - 2 students - 4 students - 6 students - 8 students - 10 students 3) At the end of test, take a seat at your desk and obtain a few drops of the Phenolphthalein solution from your teacher. 4) Get a NEW cup of special fluid for each of the 5 tests. 5) In your data table, record the percentage of people in the class that became infected for each of the 5 tests.

Data Collection

How many people were involved in the activity (total number of students in class)? _____

Hint: to calculate percentage of students of infected, follow this formula:

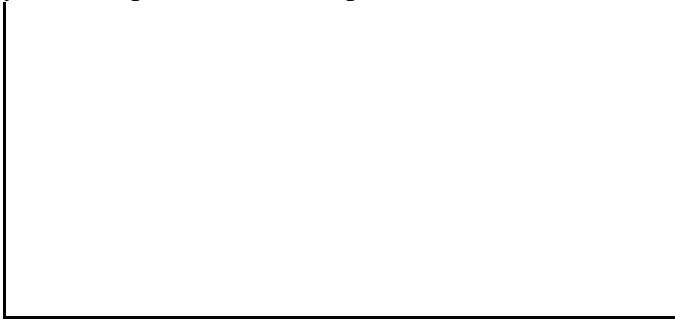
$$\text{Percentage of students infected} = \frac{\text{Number of students infected}}{\text{Total number of students in class}}$$

Number of students contacted	Percentage of students infected

Name _____ Period _____ Date _____

Data Analysis

Plot your data on the graph below. Remember to label the X and Y axis. Next, draw a line that connects your data points (see example on board).



The X-axis is number of people infected, the y-axis the number of people contacted in each round.

Results and Conclusions

Answer these questions to the best of your ability. Feel free to discuss questions with your classmates.

1. What did the phenolphthalein represent in this activity? Explain.
2. Before adding phenolphthalein, could you tell by looking at the liquid if it was infected? How is this similar to a real virus (for example, when you catch a cold?)
3. As the number of people you contacted increased, what happened to the percentage of infected students in the classroom?
4. Based on your results, was your hypothesis supported? Why or why not?
5. Does this experiment answer our question? Why or why not?
6. What else does the graph show us?
7. What other factors besides the number of people you contact do you think could influence how fast a disease spreads in a population?
8. Why should we care? How do these kinds of data apply to your life?
9. What are two other testable questions you can think of that are related to diseases?