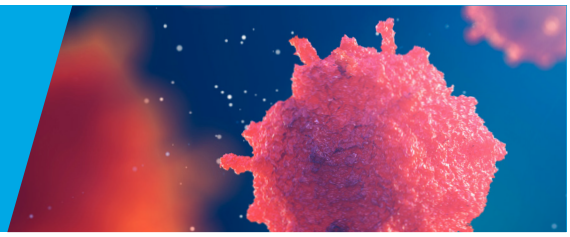
CURIOSITY AT HOME

DON'T BUG ME!



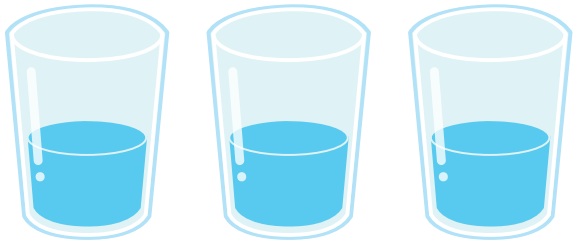
Step into the shoes of an epidemiologist, a scientist who studies the causes, distribution and control of diseases, and try to determine how to prevent the spread of disease. Scientists use models, simplified representations of reality that help to explore or understand a scientific phenomenon. In this experiment, you will model the spread of disease by creating your own fake flu outbreak using cups, vinegar, and water.

***Note:** This activity can be done individually, or can be adjusted for a classroom setting by giving each participant their own cup. If increasing the number of cups, be sure to maintain the 16 to 1 ratio of water to vinegar.*

MATERIALS

- pH test strips (three times as many as cups), either store-bought or made with our Purple Produce pH Indicator recipe
- 16 cups of any size
- ⅓ cup measuring cup
- Water
- ⅓ cup of white distilled vinegar
- Science notebook or paper
- Something to write with

water



vinegar

PROCEDURE

- Fill all but one cup with ⅓ cup of water. Fill the last cup with ⅓ cup of vinegar and no water.
- Each cup of liquid represents a different "person". The cup with vinegar will be the source of the "flu" outbreak. Shuffle the cups around so you no longer know which one is which.
- Pair each cup with another.
- Model the transfer of germs by mixing the liquid in each pair of cups. Pour all the liquid into one of the two cups, swirl them together, and then pour half back into the other cup.
- Once this step has been completed for each pair, find each cup a new random pairing, and repeat the process. Keep repeating until you get to round 4.
- Test to see which cups contain vinegar, or "flu germs" using strips of pH paper. Check the instructions on your pH indicator to see what color the indicator will turn in the presence of an acid. In this simulation, an acidic response means a cup contains vinegar and is "infected" with the flu virus.

@pacsci

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PACIFIC SCIENCE CENTER

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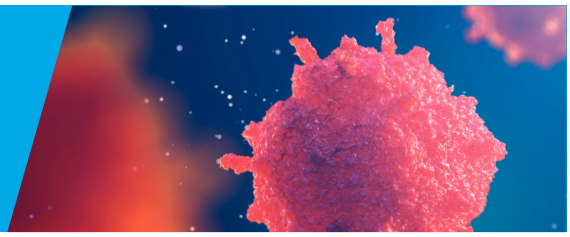

- Remember that at the start of the activity, only one cup was "infected" with the "flu". How many "people" are "infected" now?
- Draw the table below in your science notebook.

Round #	Number of Infected Individuals
1	
2	
3	
4	
5	

- Starting with 1 cup "infected" at round 0, write out how many individual cups were "infected" at the end of each round. Remember that each round, each infected cup would have come in contact with another new cup. So typically, but not always (thanks to randomness of which cups got paired up), by the end of round 4, around 16 cups will have been "infected"

EXPLORE MORE

- Set up the cups again, with one cup having vinegar and the rest having water.
- Do the experiment again, but this time, have cups get tested after every two rounds. If a cup has acid in it, you now know you that person is ill and can sit the rest of the game out while they recover.
- After a total of 4 rounds, test everyone again and see how many people have the "flu" this time. Is it more or less than previously?

WHAT'S GOING ON?

This simulation showed how quickly a disease can spread through a community. Thankfully, there are tools to help prevent the spread of disease that we can use. In the second round, we learned about the value of rapid testing. Like with COVID-19 or strep throat, some diseases can be tested for in a laboratory. That way, if someone gets sick, they can isolate and prevent further spread of the disease. This also lets doctors know what treatments to provide a patient with to help them get better.

Another powerful tool to prevent the spread of viral infections is vaccination. Vaccination trains your body to know what a specific virus looks like. This way, when exposed, your body can go into defense mode and start an immune system response faster and stronger. This helps prevent serious illness, and in many cases, can prevent you from getting sick or spreading the germs at all!

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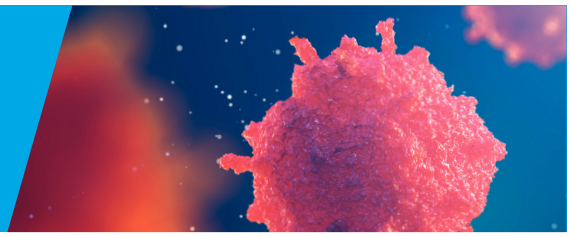

3–5 GRADE EXPLORATION

Explore the following questions and write your observations in your science notebook.

- In your science notebook, graph out the number of people in each round who were "sick" each round in the initial experiment, with round 0 representing the start before anybody has spread "germs". Does the graph make a straight line or a curve? What does this tell us about the spread of infectious diseases?
- Imagine you had enough people in your experiment to do a fifth, sixth, and even seventh round. We know that in the initial experiment, the number of people who were "sick" approximately doubled (multiplied by two) with each round. Extend your data table with predictions of how many people would be "sick" after rounds 5–7.
- How can you personally reduce the spread of the flu, cold, or other infectious disease? List at least three ideas in your science notebook.

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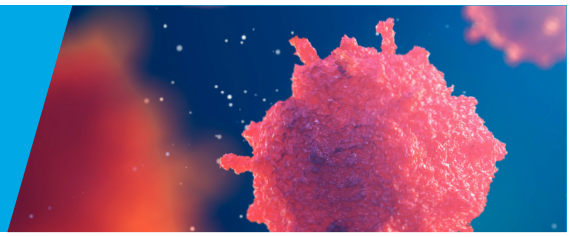

6–8 GRADE EXPLORATION

- Explore the following questions and write your observations in your science notebook.
- In your science notebook, graph out the number of people in each round who were "sick" each round in the initial experiment, with round 0 representing the start before anybody has spread "germs". Does the graph make a straight line or a curve? What does this tell us about the spread of infectious diseases?
- Try making a table and graph for the mathematical equation y=2x. This equation means that every round, the number of sick people doubled. Compare this graph and table to the graph and table for your actual model. How close are they to each other?
- Extend the table for y=2x through round 7, so that you can predict approximately how many people would fall ill each round if you had a larger number of cups.
- Things that grow predictably faster with each round can be said to be growing "exponentially". Can you think of any other examples of exponential growth?
- Want more information on how exponential equations work? Check out this video[1] from Khan Academy that will get you started.
- How can you personally reduce the spread of the flu, cold, or other infectious disease? List at least three ideas in your science notebook.Try hitting the container with the same amount of pressure, but moving it closer to the salt. What do you notice happens to the movement of the salt as you move closer? Can you use your observations to explain why sounds that are further away sound softer than sounds that are close by?

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[1] https://youtu.be/XZRQhkii0h0