An infectious disease is any disease caused by pathogens that can be spread from one person to another. Pathogens include viruses, bacteria and protozoa.

***What are some infectious diseases?

***What are some diseases that are not infectious?

This activity will simulate the spread of an infectious disease. A simulation is a simplified demonstration of a real biological process. Our simulation will show how an infectious disease can spread from one infected person to other people, who in turn infect others.

Instructions

1. Your teacher will give everyone a cup filled with a clear solution. This solution represents your body. Only one person in the class will have a cup that has been “infected”.

   Obviously, you should not drink from the cup. (In laboratory activities you should never drink or eat anything unless your teacher tells you that it is safe to do so.)

2. In this part of the activity, you will interact with two other students.

   To interact with another student, pour all of your solution into your partner’s cup. Then have your partner pour all of the mixed solution back into your empty cup. Finally, pour half of the mixed solution back into your partner’s empty cup.

   Wait for the signal from your teacher, and then move to another part of the classroom and interact with a second student. After you have finished your second interaction, return to your seat.

   Estimate how many people you think will be infected. ________

3. Your teacher will come around and put an “infection indicator” in your cup. If you have exchanged solutions with the original infected person or someone else after they became infected, you are now infected and your solution will turn pink. If you have not exchanged solutions with anyone who was infected, your solution will not turn color.

   Next, your teacher will ask everyone who is infected to raise their hand.

   How many people were infected? ________
4. You will do another set of interactions, again beginning with only one student with an infected cup. This time there will be three rounds of interactions. For each interaction, be sure to move to a different part of the room with different students.

Estimate how many people you think will be infected after each student has interacted with three other students. ________
After the teacher has come around with the indicator, write down how many people were actually infected. ________

5. Now you will graph how an infection spreads with increasing numbers of interactions.

First, plot a point to indicate that one person was infected before any interactions.

How many people would be infected after just one interaction? ________
Add this point to your graph.

Next, plot the number of people who were infected after two interactions (from 3 on page 1) and the number of people who were infected after three interactions (from 4 on pages 1-2).
Discussion Questions

6. Did the number of people infected increase by the same amount for interaction 1, interaction 2, and interaction 3?

   Which interaction resulted in the smallest increase in the number of infected people?

   Which interaction resulted in the largest increase in the number of infected people?

   In each interaction, each infected person can infect one new person. Therefore an interaction that begins with more infected people will generally result in more new infections.

7. How many people do you think would be infected if you had four interactions? _______

8. How many people do you think would be infected if you had ten interactions? _______
   After the tenth interaction, would the rate of increase in the number of infected people become faster or slower? Explain why.

9. What are some ways that infectious diseases are transmitted from one person to another?

10. What are some ways you can prevent the spread of an infectious disease?

11. Our simulation showed the way a disease could spread if the spread of disease depends on person-to-person contact. Examples of this kind of disease include pink eye, chickenpox and herpes (lip sores). Other diseases, such as colds and tuberculosis, can be spread by germs in the air. How might the spread of these diseases differ from the spread of diseases that depend on person-to-person contact?
12. The spread of the disease in our simulation was very rapid. Multiple people were infected within a few minutes. In real life, infections do not spread as rapidly as in this simulation. Why is the spread of infections slower in real life?

13. In addition to exposure to germs or pathogens, what other factors influence your risk of getting an infectious disease? What defenses does your body have that can prevent you from getting sick, even when you have been exposed to a pathogen?

14. Once you have caught a cold or flu, you do not stay sick forever. How does your body eventually get rid of the viruses that cause a cold or flu?

15. A person who becomes infected with the HIV virus is not able to get rid of the HIV virus. With highly effective modern medical treatment, a person may survive a long time with an HIV infection, but an untreated HIV-infected individual is very likely to develop AIDS and die. Why is a person with an HIV infection unable to get rid of this infection the way a person can get rid of an infection with a cold or flu virus?