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**Student Exploration:** **Disease Spread**

**Vocabulary:** disease, epidemic, infect, infectious disease, pathogen

**Prior Knowledge Questions** (Do these BEFORE using the Gizmo.)

1. Why do you think it is important to cover your mouth when you cough? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

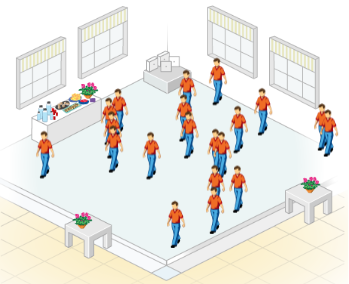
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1. Why should you always wash your hands before you eat? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Gizmo Warm-up**

When a person has a **disease**, his or her normal body functions are disrupted. Some diseases, such as diabetes and most cancers, are not spread from one person to another. But other diseases, such as the flu and strep throat, can be spread. These diseases are known as **infectious diseases**. Infectious diseases are caused by viruses, bacteria, and other agents known as **pathogens**.

In the *Disease Spread* Gizmo, you will be able to observe how various pathogens can spread through a group of people. Click **Play** (379SE4) and observe.

1. Describe what happened on the SIMULATION pane: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. Look at the color key on the bottom right of the Gizmo. What is happening when a person changes color? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| **Activity A:**  **Person-to-person transmission** | Get the Gizmo ready:   * Click **Reset** (379SE5). * On the CONTROLS tab under **Active Diseases**, turn off **Foodborne** and turn on **Person to person**. * Set the **Number of people** to 5. | 379SE2 |

**Question: What factors affect how quickly a pathogen spreads from person to person?**

1. Predict: Some pathogens are spread directly from one person to another. This can happen when people come into direct contact or share items, such as drinking glasses. What do you think might affect how quickly a pathogen is spread from person to person?

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1. Identify: Select the SIMULATION tab on the left and the TABLE tab on the right. (You will want the table tab open to answer question C.)
   * 1. What does the purple person represent? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
     2. Click **Play**, and observe the simulation for a while. What must happen for the disease to spread from one person to another? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
     3. How long did it take to **infect** five people? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Experiment: Click **Reset**. Change the **Number of people** to 15. Click **Play**, and record how long it takes to infect five people. Then repeat the experiment when there are 25 people and 35 people in the room.

|  |  |
| --- | --- |
| **Number of people in room** | **Time required to infect five people (hr)** |
| 15 |  |
| 25 |  |
| 35 |  |

1. Interpret: Study the data you collected. What trend do you see in the data, and how would you explain it? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**(Activity A continued on next page)**

**Activity A (continued from previous page)**

1. Experiment: Not all pathogens are equally infectious. Click **Reset**. Set the **Number of people** to 20. Under **Probability of transmission**, select **Low** for **Person to person**.

On the SIMULATION tab, click **Play**. Record the time it takes to infect five people. Then repeat the experiment with a medium and high probability of transmission. (Note: For the “Medium” setting, move the slider half-way between the **Low** and **High** positions.)

|  |  |
| --- | --- |
| **Probability of Transmission** | **Time required to infect five people (hr)** |
| Low |  |
| Medium |  |
| High |  |

1. Interpret: Study the data you collected in the table above. What trend do you see in the data, and how would you explain it? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. Analyze: On the CONTROLS tab, place the **Probability of transmission** slider under **Person to person** half-way between **Low** and **High**. Select the SIMULATION and GRAPH tabs. Click **Play**.
   * 1. At what time did the disease spread most slowly? Most quickly? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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* + 1. How could you explain this change in the rate of the disease’s spread? \_\_\_\_\_\_\_\_\_\_

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1. Apply: An **epidemic** is the rapid spread of an infectious disease. How do you think a government could try to prevent an epidemic of a dangerous person-to-person pathogen?

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