Teacher Tools

Lesson 1
Keep It Clean…Or Pass It Around

Video Entry Topic: Preventing the Spread of Germs/Disease

OVERVIEW

Preventing the spread of germs/disease: People pick up germs from surfaces that are not well cleaned. Health care facilities (hospitals, doctors' offices) and other public places are difficult to keep free from disease-carrying germs. What can you do to make sure that surfaces that people come in contact with are as germ-free as possible?
Explain the danger and the science behind it.
Explain and/or demonstrate possible option(s) for protection and explain the science, technology, engineering and/or mathematics involved.

Length of Lesson: 2-3 class periods

Subject Area(s): Science, Health, Technology, Visual Arts, Language Arts

OBJECTIVES

Students will:

- Research germs, such as bacteria, and disease;
- Determine the positive and negative impact of germs on human life;
- Determine the impact of germs to society, the economy, and lives; and
- Research and present ways to protect yourself and others from harmful germs.

MATERIALS

- Access to the Internet
- Four petri dishes with sterile nutrient agar per group
- Three different antibacterial cleaners (hand soaps, dish soaps, or a combination)
- Three medicine droppers per group
- Post-it® Notes
- Scotch® Tape
- For final project, materials will vary. May include art materials, access to multimedia presentation software, Internet and e-mail, video equipment, etc.

PROCEDURE

1. Divide students into groups of four. Hand each student one of the "Did You Know?" examples (see below). Have students share and discuss their information with each other.
2. Ask students what they know about bacteria and germs in general. Ask for examples of when they thought bacteria might be helpful and when they thought other germs were harmful and how we might be able to control harmful germs.
3. Have each group of students test to see if antibacterial cleaners are effective in killing germs. (See activity below.)
4. Have each group of students develop a presentation that will incorporate researched information about germs and bacteria along with a scenario that will help others better understand why it is important to keep surfaces clean from germs. For example explain why some schools closed to control an outbreak of H1N1.
5. Research the topic and possible solutions using such Internet sites as:
   - HowStuffWorks.com – *Harmful Bacteria* video (see http://tiny.cc/pt7Hr)
   - HowStuffWorks.com – *Dr. Drew on Germs* video (see http://tiny.cc/Eh0F6)
   - HowStuffWorks.com – *Nuke Your Sponge* video (see http://tiny.cc/FZ7yp)
   - HowStuffWorks.com – use search terms such as "preventing the spread of germs" and "how to prevent viral infections"
   - Centers for Disease Control and Prevention – Stopping the Spread of Germs at Home, Work and School (see http://tiny.cc/ellWI)
   - Centers for Disease Control and Prevention – Questions and Answers about Methicillin-Resistant *Staphylococcus aureus* (MRSA) in Schools (http://tiny.cc/EfaxA)
   - 3M – Health Care Market Solutions (see http://tiny.cc/by3KW)
   - 3M – StayFresh Technology (http://tiny.cc/zLTEO)
   - 3M – Quat Disinfectant Cleaner Concentrate (see http://tiny.cc/tgouN)
   - Discovery Education – ReadyZone H1N1 (see http://tiny.cc/ZeG36)

EXTENSIONS

- Have students create a cryptogram about germs by going to Discovery Education's Puzzlemaker. (See http://tiny.cc/GtkTE)
- Have students create a game based on how to stay healthy and control germs. In the game make sure to include facts about different kinds of germs, impact on society, and various methods of controlling the spread of germs.

SUPER EXTENSION!

Have your students create individual videos that showcase what they know about preventing the spread of germs and diseases and enter them in the 2010 Discovery Education 3M Young Scientist Challenge for a chance to win a $50,000 U.S. savings bond. To learn more about the 2010 Challenge, visit www.youngscientistchallenge.com.

EVALUATION

You can evaluate your students on their presentations using the following three-point rubric:

- **Three points:** Presentation well researched; information clearly and logically organized; presentation interesting and lively
- **Two points:** Presentation adequately researched; information sufficiently organized; presentation could be improved
- **One point:** Presentation insufficiently researched; information inadequately organized; presentation poorly prepared

You can ask your students to contribute to the assessment rubric by determining a minimum number of facts to be presented in a report and setting up criteria for an interesting and lively presentation.

STANDARDS CORRELATION

The National Academy of Sciences provides guidelines for teaching science in grades K–12 to promote scientific literacy. To view the standards, visit this Web site: books.nap.edu/html/nses/html/overview.html#content.

This lesson plan addresses the following national standards:
Grades 5-8
Science in Personal and Social Perspectives: Personal health
Science in Personal and Social Perspectives: Risks and benefits

Source: “Did You Know?” and “Antibacterial Action” courtesy of http://school.discoveryeducation.com/curriculumcenter/bacteria

Did You Know?

No matter where you go on this planet, you'll find bacteria. In the billions of years bacteria have lived on Earth, these tiny survivors have evolved and adapted to every environment. You'll find bacteria in icy regions, deserts, and rain forests, even places without air. Some live in the extreme environments of active volcanoes and hydrothermal vents on the ocean floor. Bacteria also live in the human body. In fact, the average healthy person is home to a stunning 100 trillion bacteria.

While some bacteria can move on their own, others must be carried from one place to another. Some bacteria rely on ocean tides, rushing rivers, and other moving bodies of water. The bacterium that causes tuberculosis and others travel on currents of air when an infected person coughs, sneezes, or laughs. Bacteria even hitch rides on animals and use magnetism to point themselves in the right direction.

The first antibiotic grew out of a lab mistake. In 1928 British chemist Alexander Fleming found bacteria growing in petri dishes that he had forgotten about. Because the dishes were covered with mold and probably contaminated by other microbes, he decided to throw them away, until he saw something peculiar. No bacteria grew wherever mold existed. Fleming soon concluded that the penicillin mold in the dishes had killed the bacteria. Today we use penicillin as a medicine because it kills many kinds of pathogenic bacteria.

Microbe Math. Bacteria make more of themselves using a fast and simple process called binary fission. First the cell makes a copy of its DNA molecule. Then it stretches into an elongated shape, narrows in the middle, and finally splits in half. Some bacteria repeat this process several times an hour.

Between the 1200s and 1700s, the bubonic plague regularly struck the cities of Europe and killed an estimated 20 percent of the population. Because no one knew what caused the plague or more importantly, how to prevent or cure it, people relied on potions and magic charms.

To replenish the soil, farmers introduce bacteria by growing peanuts. Legumes, a group of plants that includes peanuts, peas, and beans, have nodules, or bumps, in their roots. Caused by the Rhizobium bacteria, the nodules absorb nitrogen from the soil. They convert it to nitrate and create an essential nutrient that plants can use. This process works so well that farmers often plant legumes in fields every few years to renew nitrogen-depleted soil where other crops have been grown.

Antibacterial Action

Hands-On Activity

Background Information

In recent years, a number of antibacterial soaps and detergents have been introduced. How effective are they at killing germs? Do all of them work the same, or does their effectiveness differ among brands? In this activity, you'll test different antibacterial cleaners.

What You Need

- four petri dishes with sterile nutrient agar
- three different antibacterial cleaners (hand soaps, dish soaps, or a combination)
- three medicine droppers
- Post-it® Notes
- Scotch® Tape

What to Do

1. Wash your hands with regular soap. Then run your fingers across your desk or another surface.

2. In each of the four petri dishes, wipe your finger through the sterile agar in a zigzag motion.

3. Use the Scotch® Tape to seal one petri dish. Mark this "control dish A" with a Post-it® Note.

4. Use a medicine dropper to transfer a drop of the first soap to another petri dish. Write the type of soap in this dish on the worksheet. Seal the petri dish with Scotch® Tape, and use a Post-it® Note to label it "B".

5. Repeat step 4 for the second and third soaps, using a different medicine dropper and petri dish each time. (Label these petri dishes "C" and "D.")

6. Place all four petri dishes in a warm environment. For the next three days, check the dishes, and write your observations in the worksheet chart. At the end of the experiment, answer the worksheet questions.

Worksheet
Antibacterial Action

Name _____

Dish	Soap	Comparisons and Other Observations		
		Day 1	Day 2	Day 3
A (Control)				
B				
C				
D				

1. What difference, if any, do you see between the four petri dishes?

2. How effective were the antibacterial soaps at killing bacteria? Which one was the best? Which one was the worst?

3. Using what you know about the differences between good and bad bacteria, which type of bacteria do you think are most effectively killed? Why?