

Germs! Germs! Everywhere!

MOST*

Introduction

Microorganisms, sometimes called **microbes**, are tiny living creatures that cannot be seen without a microscope. There are **microscopic animals**, plants, and **fungi**, as well as **bacteria**, **protists**, and **viruses**. These organisms are incredibly diverse and well-adapted to survive in almost any environment on earth – even on and within other living things! The vast majority of these tiny living things exist without affecting the larger macroscopic living world. Sometimes these organisms do interact with larger life forms, however. These interactions can be beneficial, harmful, or have no effect on the larger **host** organism.

Examples of beneficial organisms include the multitude of bacteria that inhabit the digestive systems of larger animals (“gut flora”), working to assist in the breakdown of foods, and mycorrhizal fungus adapted to live on the roots of many **vascular** plants, enhancing the plants’ nutrient absorption.

There are a small number of microorganisms that are adapted to survive in or on another organism and which harm that organism. This type of microorganism is commonly called a **germ** or pathogen. Germs are usually one-celled (larger infectious organisms are usually called **parasites**) and include types of viruses, bacteria, fungi, and protozoa. These organisms are small enough to cause damage on a cellular level. When many cells in an organism are damaged, the result is **disease**.

Diseases caused by germs include the common cold (virus), malaria (protist), athlete’s foot (fungus), strep throat

(bacteria), tuberculosis (bacteria), chicken pox (virus), HIV/AIDS (virus), ringworm (fungus), amebic dysentery (protist), and swine flu/H1N1 (virus).

Transmission is the term for the spreading of germs from one individual to another. Different germs are transmitted in different ways, or **vectors**, including on surfaces, in liquids, and even in the air. Usually, however, germs are not adapted to survive the harshness of the outside environment for very long. Some simple germs have no means of even feeding themselves or of keeping themselves hydrated in the outside environment and will expire in seconds. There are quite a few, however, that have mechanisms adapted to extend their viability in the outside environment, thus increasing their chance to infect other organisms.

Among the most effective ways to prevent transmission of germs is to avoid touching your eyes, nose, and mouth or eating before washing your hands thoroughly. Soapy, warm water and a good dose of friction will break up skin oils and dirt, releasing potential germs stuck to our skin. While antibiotic soap may be better at killing some forms of bacteria and certainly should be used for medical reasons, for normal, everyday washing it is best to use regular soap and to be mindful – spend an entire minute and attempt to clean all areas of your hands.

VOCABULARY

Bacteria

Disease

Fungi

Germ

Host

Microbes

Microorganisms

Parasites

Protists

Protozoa

Transmission

Vascular

Vectors

Viruses

Inside This Packet

About Germs	1
Activity: Balloon Germs	2
Activity: Wash Away Germs	4
Information for the Teacher	5
New York State Standards	5

Activity: Balloon Germs

MATERIALS NEEDED

Paper punches
from a hole punch

Balloons

Handkerchief or tissues

Room for sitting in circle

Tape

Protractor

String

Students should be able to:

Understand how micro-organisms infect the body.

Make a plan to slow down or impede the rate of infection

Questions to ask:

1. What are germs?
2. What words do you think of when you hear the word “germ”?
3. Why do you sneeze?
4. How can we limit our exposure to germs and stay healthy?

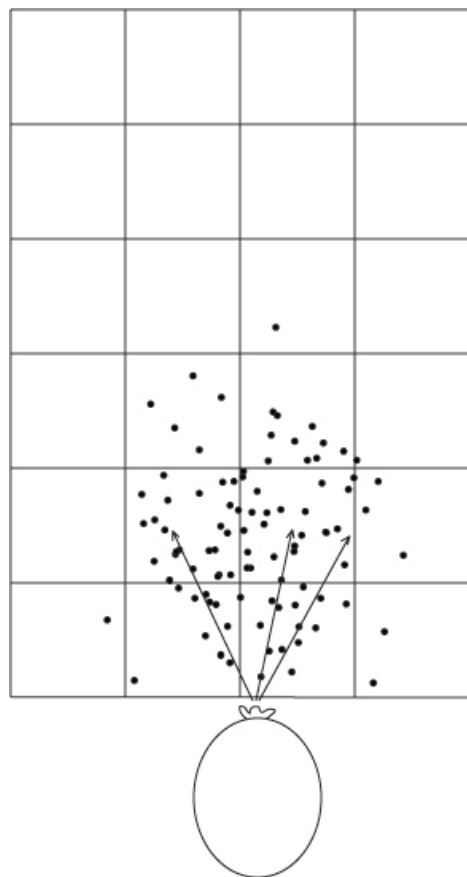
What to do:

1. Sit in a circle or double circle in the designated area.
2. Fill an uninflated balloon with paper circles (this can be done prior to the activity)
3. When ready, inflate one balloon and hold the end closed. The paper is inside the balloon.
4. You will help by saying “ah-choo” on the count of three and the balloon will be released.
5. On the count of three release the balloon and try to direct the dots onto other students. What do the dots represent?
6. Inflate the second balloon and repeat the process, but this time have a handkerchief ready and release the balloon’s air into the handkerchief. What happens? Why is it a good idea to cover your nose and mouth with a tissue when you sneeze?
7. Repeat one more time and this time cover the balloon with just a hand. Why is hand washing so important?



Graph the Sneeze!

1. Create a square grid on the floor that is 5 sections by 5 sections. (Use a regular tile floor, square off paper to be 8 inches by 8 inches and tape these to the floor.)
2. Fill the balloon up $\frac{1}{2}$ full with paper dots.
3. Release the balloon at the center edge of the grid.
4. Assign a number to each square on the grid, trial A1, A2, A3 etc.
5. Assign students to count the dots for each square.
6. Using a protractor and string choose three paths that are the most dense with dots moving away from the release area. Estimate the best lines from the release area and determine the angle from the start point for these areas.
7. Construct a bar graph of dots on squares.
8. Notice any patterns that emerge from the graphing activity.



Activity: Wash Away Germs

MATERIALS NEEDED

- Soap
- Paper towels
- Non-toxic water-soluble paint
- Paint brushes

Students should be able to:

Explain how hand washing slows down the rate of infection

Explain the areas of the hand that are the hardest to get germ free and why

What to do:

1. Near a sink, paint your hands with the easy to wash off paint. Make sure you paint all parts of your hand.
2. Once your hands are completely painted, begin to wash off the paint.
3. As you wash the paint off, take notice of which areas are the hardest to clean

Answer these questions:

1. Which part of the hands were hardest to clean?

2. Explain how this activity relates to germs?

3. What can be done to improve health within your classroom?

4. Relate the size of germs to the size of paper dots?

5. What would be different about how germs might be dispersed?



Information for the Teacher

To help younger persons wash thoroughly, encourage them to sing a short song at a normal pace.

While alcohol-based hand sanitizers do work they must also be rubbed for an entire minute to be as effective as washing, and it should be noted that while the organisms may be killed – they and dirt or grime are not rinsed off of hands.

Extension Ideas:

Based on this lesson, what changes could be made in the classroom environment to improve health? Have the students select an idea to implement in the classroom. Collect data such as the number of absences due to illness once the change is made.

Discuss the Elbow Sneeze Catch, where one sneezes into their elbow instead of one's hands. Explain why this is a better option.

Have the students make posters sharing what they learned about staying healthy and display around the school environment to increase awareness. Share the balloon germs with another classroom to increase awareness. Ask the students to become the educators.

Possible Modifications:

Use a clean mist or spray bottle with water instead of the balloon and hole punches and spray a mist for the students to feel in their circle. Repeat this with a paper towel in front of the spray bottle to capture the spray. Discuss the proper way to sneeze.

Instead of counting the dots on the graph do an approximation of the most dense line through the data by using a string and tape. Measure the angle of the spray using a protractor.

New York State Standards

Elementary Life Science

Inquiry and Process Skills

Creating models, generalizing, inferring, making decisions, observing

Standard 1: Scientific Inquiry: Key Idea 1: s1.1, s1.3

Key Idea 2: s2.1, s2.1a, s2.2

Key Idea 3: s3.2, s3.2a, s3.4

Standard 2: Key Idea 1

Standard 4: Key Idea 5: 5.3b

Key Idea 7: 7.1c

Standard 6: Key Idea 2

Process Skills: iii, ix, xii, xiv, xvi