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ACTIVITY : 45 MINS

## Getting Rid of Gross Germs

Students read a book and discuss how germs infect us and model how soap kills germs. Students learn about the second part of the engineering cycle—research the problem. They research solutions for stopping the spread of germs, discuss barriers to these solutions, and consider how to overcome these problems.

### GRADES

1, 2

### SUBJECTS

*Biology, Health, Engineering*

### CONTENTS

1 PDF

## OVERVIEW

Students read a book and discuss how germs infect us and model how soap kills germs. Students learn about the second part of the engineering cycle—research the problem. They research solutions for stopping the spread of germs, discuss barriers to these solutions, and consider how to overcome these problems.

For the complete activity with media resources, visit:

<http://www.nationalgeographic.org/activity/getting-rid-gross-germs/>

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# DIRECTIONS

This activity is part of the *Germ Problem-Solvers: Using Engineering to Develop Solutions* unit.

**1. Lead a discussion about how we keep germs from spreading and read a text called *Germs vs. Soap* to help students understand how handwashing slows the spread of germs.**

- Remind students of the specific problem(s) they are trying to solve in the unit, leveraging their ideas from the *Spreading Germs Snapshots* handout from the *Invisible Villains* activity. Relate their work to the driving question of the lesson (How do germs spread, and how can we keep them from spreading?) and the final product for the unit project (to design a tool or product that helps keep germs from spreading so that they can keep themselves and others healthy).
- Ask students to brainstorm ways to keep germs from spreading. Keep track of their ideas in a place the class can see. (Students may respond: washing hands, using hand sanitizer, covering coughs and sneezes, giving other people personal space, washing hands if we share items, staying home when we are sick, wearing masks, and not touching our faces.)
- Read a children’s book that explains how soap gets rid of germs to the class, such as *Germs vs. Soap* by Didi Dragon. Or show the video, *Germs vs. Soap - Read Aloud* (8:10), of the book being read aloud. Discuss how germs get into our bodies and how soap helps get rid of germs. Write the questions below on the whiteboard or chart paper, to guide students as they listen:
  - How do germs get into our bodies? (Germs enter through the eyes, noses, and mouths – especially when we have open cuts through which they can get directly into the bloodstream)
  - What do germs want from people? (Germs want “energy cupcakes” or a safe place to make more of themselves or an easy way to spread around so they can reproduce more easily.)
  - Where can germs “hide” on our hands? (Germs hide between fingers and under fingernails.)
  - What does soap do to germs? (Handwashing works by binding to the oils on our hands, and then mixing with the water to suspend and wash the germs away.)

## 2. Model how soap works through a hands-on simulation so students can understand how soap works and begin to make connections to the project.

- Ask students why they think soap gets rid of germs. Some students may say that soap kills germs, but soap just binds to the oils on our hands, and then mixes with the water to wash the germs away.
- Model how soap works to get germs off our hands. You can do this as a demonstration yourself or with a student volunteer, or it can be a hands-on activity for students.
- For each pair or small group, provide a bowl or tub with oil, big enough for hands to fit into. They should also have a sink available for washing their hands.
- Add 2-3 tablespoons of cocoa powder, cinnamon, chalk dust, or pepper to each container of oil. Ask: *What do you think the material in the oil represents?* (Germs.) Have students place their hands in the oil and mix the two together. Ask: *What do you think the oil represents?* (The oil represents the natural oils from our hands.) Make sure they rub lots of the cocoa powder, cinnamon, chalk dust, or pepper into their hands.
- Have students attempt to wash their hands in the water without soap. Ask: *What do you notice about your hands?* (The oil and spices or chalk are still on our hands.)
- Ask students to use soap to wash their hands for at least 20 seconds. Then have them rinse with the water. Ask: *Are there any “germs” left?* (They should have been able to wash all or most of the “germs” off their hands.)
- You might say: *What would happen with the spread of germs if you had germs on your hands—like the spices or chalk dust—and didn’t wash with soap?*
- Ensure that students understand how soap works. How germs get into our bodies, where they can “hide,” and what they want from people may be somewhat clear from the text, but ensure that students understand the importance of using soap and how soap gets rid of germs.
- Ask: *How does this activity help you think about solving a problem or finding a solution to a real-world problem about the spread of germs?* (Students may make connections to problems with hand washing in their context. They may report a lack of soap in restrooms, a lack of time to wash thoroughly, or a lack of knowledge in themselves, their classroom, or community about how to wash thoroughly. This may bring up other questions about when or how often to wash their hands.)

## 3. Introduce the second part of the engineering cycle, research, so that students can begin researching solutions to the spread of germs.

- Show students the [Engineering Design Process Cycle Graphic](#) again. Point them to the research step. Let students know that the research component can include talking to

people who can share solutions that exist or what solutions could be adapted to fit their needs. Explain for the purposes of this unit, solutions include promoting behaviors that can stop or slow the spread of germs, as well as designed objects, such as masks, face shields, gloves, or other devices.

- Introduce the [Getting Rid of Gross Germs Research Notes](#) handout to collect their research and review the directions with students. Have students choose a solution they want to learn more about. Organize the groups based on students' preferences.
- Distribute the [Getting Rid of Gross Germs Resources](#) handout. Have students complete their research in like-groups reading about the same topics.
- Come back together as a class and discuss barriers to these solutions in your context and how these problems could be overcome. You might ask:
  - *What could keep people from using that solution?*
  - *How could we make it work?*
  - *If \_\_\_\_ is hard to do, how could we fix that problem?*
- Ensure that students document other groups' findings and barriers so they can reference these in the next activity as they brainstorm solutions.
- Let students know that in the next activity, *Sick Solutions*, they will be working on developing solutions.

## Informal Assessment

**Class Discussion:** Use class discussions to assess students' ability to explain why washing with soap is necessary to get rid of germs and dirt, as well as their ability to participate in collaborative conversations.

**Class Discussion:** Use a class discussion to assess students' ability to discuss barriers to solutions in your context and how these problems could be overcome.

**Research Notes:** Use the *Getting Rid of Gross Germs Research Notes* handout to evaluate students' ability to gather information from provided sources to answer a question.

## Extending the Learning

Take a "brain break" at some point in the activity and have students learn the song [Wash Your Hands](#) (0:47) from the World Health Organization and Disney Junior's Doc McStuffins.

You may decide to have the school nurse or a medical professional talk to the class about ways to keep germs from spreading.

Some teachers prefer using [Glo Germ gel](#) and UV light for a visualization of germs' persistence on our hands and to show the importance of proper handwashing. You can learn more about Glo Germ procedures by viewing the resource, [Handwashing Training](#).

## OBJECTIVES

# Subjects & Disciplines

### **Biology**

- Health
- Engineering

# Teaching Approach

- Project-based learning

# Teaching Methods

- Demonstrations
- Reading
- Research

# Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
  - Learning and Innovation Skills
    - [Communication and Collaboration](#)
    - [Critical Thinking and Problem Solving](#)
- 21st Century Themes
  - [Health Literacy](#)

- Critical Thinking Skills
  - Applying
  - Understanding
- Science and Engineering Practices
  - Constructing explanations (for science) and designing solutions (for engineering)
  - Developing and using models
  - Obtaining, evaluating, and communicating information

# National Standards, Principles, and Practices

## COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS & LITERACY

- **CCSS.ELA-LITERACY.SL.9-10.1:**

Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

- **Speaking and Listening Standards K-5:**

Comprehension and Collaboration, SL.1.1

- **Speaking and Listening Standards K-5:**

Presentation of Knowledge and Ideas, SL.1.6

- **Speaking and Listening Standards K-5:**

Comprehension and Collaboration, SL.2.1

- **Speaking and Listening Standards K-5:**

Presentation of Knowledge and Ideas, SL.2.6

### Preparation

### What You'll Need

### MATERIALS YOU PROVIDE

- Cinnamon, black pepper, chalk dust, cocoa powder, or other material to represent germs
- Container filled with water
- Soap
- Vegetable oil

### REQUIRED TECHNOLOGY

- Internet Access: Optional
- Tech Setup: 1 computer per classroom

## PHYSICAL SPACE

- Classroom

## GROUPING

- Heterogeneous grouping
- Large-group instruction
- Small-group work

## ACCESSIBILITY NOTES

Pair students with each other for the research step. Ensure that at least one student per pair is able to read the text independently.

## BACKGROUND & VOCABULARY

### Background Information

The engineering design process is a series of steps that engineers go through to solve a problem. The second step—research the problem—includes talking to experts and practitioners to assist with researching what products or solutions already exist. In this activity, students research several solutions for how to stop the spread of germs. One specific solution students investigate is washing their hands. Hand washing works by binding to the oils on our hands, and then mixing with the water to wash the germs away. Think of oil and water: if you add both of them to a clear container, they won't mix and will form separate layers. The process in which soap works leverages this chemistry to wash away germs from our hands. It separates the germs from our skin. This is why it's important to form a soapy lather when washing our hands.

### Prior Knowledge

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### Recommended Prior Activities

- [Feeling Yucky](#)
- [Getting to Know Germs](#)
- [Invisible Villains](#)

# Vocabulary

Term	Part of Speech	Definition
barrier	<i>noun</i>	obstacle or object that prevents movement.
disinfect	<i>verb</i>	to clean and remove harmful microorganisms.
engineering		
design process	<i>noun</i>	series of steps that guides engineers as they solve problems.
model	<i>noun</i>	image or impression of an object used to represent the object or system.
research	<i>noun</i>	scientific observations and investigation into a subject, usually following the scientific method: observation, hypothesis, prediction, experimentation, analysis, and conclusion.
solution	<i>noun</i>	an answer to a problem.

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## For Further Exploration

### Articles & Profiles

- [Teach Engineering: Engineering Design Process](#)

