



# How Clean is the Scene?



Prep **10** minutes



Activity **45** minutes



Grades **3-5**

## OBJECTIVE:

To conduct an experiment to determine the effects of different methods of cleaning in the presence of germs.

## MATERIALS:

- *How Clean is the Scene?* Handout
- Raw potatoes
- Cleaning cloths or paper towels
- Painter's tape
- Clean knife and fork
- Soap (not antibacterial)
- Cotton swabs
- Petri dishes or plastic baggies
- Disinfecting wipes

## EDUCATION STANDARDS:

**Health:** 1.5.3 Describe ways in which safe and healthy school and community environments can promote personal health.

3.5.1 Identify characteristics of valid health information, products, and services.

**Science:** A.1.b Plan and conduct a simple investigation.

## INSTRUCTIONS

1. Have students read the *How Clean is the Scene?* handout and identify the research question Harry, Ella, and Johnny want to answer. Brainstorm some ways they could use scientific experimentation to test the effectiveness of different cleaning methods. Remind students that germs aren't visible and ask for ideas of ways they can tell if significant numbers of germs are left behind after cleaning.
2. Explain to students that, though germs are too small to be visible without a microscope, under certain conditions, microbes such as fungi and bacteria can grow so numerous that they can actually be seen as a group.
3. Preview the experiment with students. Ask them to identify the independent variable they will be testing (method of cleaning), the variables they will need to control (surface tested, cloth or paper towel used to clean the surface, amount of force used to clean the surface, etc.), and the experiment's control (the potato that isn't swabbed).
4. Ask students to make a hypothesis about the research question. Which cleaning method will result in fewer germs?
5. Clean the potatoes and slice them so there are five slices for each student or group of students. Place each slice into a sterile Petri dish or unopened plastic baggie using a fork. Do not touch the potatoes with your hands.
6. Select a hard surface, such as a countertop or desktop, where germs are likely to be found and divide the surface into four sections, using masking tape. Label the sections no cleaner, water only, soap and water, and disinfectant. If students are working in groups, you can prepare a different surface for each group.
7. As students watch, clean each section using cleaning cloths or paper towels and the cleaner indicated for that section. Do not clean the section marked "no cleaner."
8. Have students rub a cotton swab over one section and then over a potato slice, being careful not to touch the potato. They should then seal the baggie or Petri dish and label it with the method of cleaning for that section. They should repeat this for each section, and seal an additional potato slice without swabbing it.
9. Set the sealed, labeled baggies or Petri dishes aside in a cool, dark area where they will not be disturbed.
10. Have students observe and record the changes to each potato slice after 3, 7, 10, and 14 days. Students should begin to see growth of bacteria or fungi on some of the slices after 3 days. If the growth is slow, the experiment can be extended.
11. Have students summarize the results of the experiments in the *Case Report* section of the handout.

**Caution:** Do not unseal the baggies or Petri dishes after bacteria or mold begins to grow, and have students wear gloves when handling the specimens as a precaution. At the end of the experiment, throw the specimens away without unsealing them.



## Interactive Whiteboard Extension

1. Have students plan and conduct another experiment to test the cleanliness of a given area.
2. Use the following prompts on a whiteboard to guide students through the planning process:
  - What question do you want to answer?
  - What do you think the answer will be?
  - How could you test your idea?
  - What variable will you change in your experiment?
  - What variables will you need to make sure stay the same in your experiment?
  - What will you use as a control for your experiment?
  - How will you communicate your results?



## How Clean is the Scene?

Harry, Ella, and Johnny were standing in the store with Johnny's mom, staring at the cleaning aisle. Johnny's mom had volunteered to buy cleaning supplies for the classroom, but the choices were overwhelming!

"Wow," Johnny said. "I had no idea there were so many different kinds of cleaners!"

"Yeah," said Ella with a glazed look on her face. "Antibacterials, disinfectants, EPA-certified cleaners..."

"How are we supposed to know which is the best?" Harry asked.

"As long as it gets the dirt off, does it really even matter?" asked Ella. "Why can't we just clean with soap and water?"

Johnny's mom smiled at them. "Well, you are getting quite a reputation for your excellent science investigation skills," she said. "Maybe there is a way you can figure out if the type of cleaner matters."

"Of course!" Johnny said, "I know just the experiment to test how clean an area really is after a cleaning!"



Help Harry, Ella, and Johnny determine how clean the scene is. Use the data table below to record your observations from each "clean scene" over time.

Type of Cleaner	Day 3 Observations	Day 7 Observations	Day 10 Observations	Day 14 Observations
Control				
No cleaner				
Water only				
Soap and Water				
Disinfectant				



**Case Report:** Now that you have investigated how clean the scene is using three different cleaning techniques, it is time to write your case report.

- How did the results from the slices that were swabbed compare to the one that wasn't? \_\_\_\_\_
- How did the results from the areas with different cleaners compare to the area that wasn't cleaned at all? \_\_\_\_\_
- Which cleaning method showed the most germ growth over time? Why might that be the case? \_\_\_\_\_
- Did this match your hypothesis? If not, what could have caused the results you got? \_\_\_\_\_