

Fourth Grade Lesson Plan Hand Washing Experiment/Data Collection

Health SOL 4.4b: The student will demonstrate an understanding of health concepts and behaviors that prevent illness of self and others, with a focus on the spread of germs (viruses, bacteria, fungi).

Interdisciplinary SOLs:

Math 4.20 The student will collect, organize, and display data in line and bar graphs with scale increments of one or greater than one and use the display to interpret the results, draw conclusions, and make predictions.

Science 4.1 f, h Students will plan and conduct investigations in which f) data are displayed using bar and basic line graphs, and h) predictions are made based on data from picture graphs, bar graphs, and basic line graphs.

Rationale:

Fourth grade students are capable of applying health skills to disease prevention, and identifying cause/effect relationships of personal and community health decisions. They are also able to analyze facts and data for validity, which may help to dispel myths related to health information (for example, you only have to wash your hands for a few seconds to get them clean). They will take these skills into their adult years and use scientific reasoning in their daily lives to make good choices about personal health.

Goal: For students to develop skills in scientific reasoning and data interpretation that will support them in making health-conscious choices.

Objectives: *The student will be able to...*

- Correctly record data based on experiments with a control variable
- Correctly chart a line or bar graph (teacher's preference depending on prior knowledge from earlier math lessons) with the data
- Evaluate data to interpret results, form conclusions, and make predictions

**On a line graph, the x-axis represents time in seconds and the y-axis represents cleanliness

**On a bar graph, the x-axis represents cleanliness, and the y-axis represents time

Materials:

Washable paint (finger paint or tempera paint) in a bright color such as blue or red

Blindfold

Soap, Water, Paper Towels

4 hand outlines

8 blank sheets per group for hand prints

2 blank graph sheets per group (1 graph per day)

Chart paper

Time: 3 Days, 1 hour per lesson

Before the Lesson:

- This lesson requires quite a bit of preparation for it to be successful.
- Review math lessons involving graphs to reinforce prior knowledge
- Choose the type of graph you want the students to practice making with their hand washing data. Make a blank graph including the x or y axis, but leave the other axis blank for them to fill in. Make a copy of the blank graph for each group.
- Heterogeneously group students ahead of the lesson to provide support for lower-level students. There should be 3-4 students in each group to fulfill the responsibilities of data recorder(s), hand washer, and guide.
- Tape 4 sheets of blank white paper to the chalk board. Trace the outline in visible black marker of your hand on each.
- Have paint and materials for the project ready to eliminate down time and keep student interest.

Day One

Advance Organizer/Set (10 minutes):

1. Organize students into their groups at the beginning of the lesson. The movement and change of pace will get their attention.
2. Direct their attention to the chalk board. On the hand drawings, use pencil or crayons to shade in the class' idea of "Dirtiest", "Dirtier", "Dirty", and "A Little Dirty/Clean", based on their input in how you should determine the "dirty factor", i.e. Shade until they tell you to stop.
3. Explain that in this experiment, the paint will represent germs on their hands, and they will be collecting data on how clean their hands are after washing them for different lengths of time as well as with just water, or soap and water.
4. Ask them to make simple predictions about what will happen, and record them on chart paper:
 - a) Will the hands be cleaner the longer they wash them?
 - b) Will they be clean enough if only water is used?
 - c) Will the hands get cleaner, faster, if they use soap?

Procedure (40 minutes):

1. Ask the groups to choose which members will fulfill each of the duties in the experiment: hand washer, guide, and data recorder(s). Give them the attached sheet that explains the duties of each job, and the instructions for the experiment.
2. Ask the project manager to put a teaspoon of washable paint on one palm. They should then spread it all over their hands, including the backs and around the finger nails. Let the paint dry.
3. Go to a sink. Blindfold the hand washer. The guide should keep time by counting the seconds. Let the washer wash with ONLY WATER for ONLY ONE SECOND. The guide should assist the hand washer and blot/dab the washer's hands dry. DO NOT RUB OFF THE PAINT.

4. Be careful to not let the hand washer know how clean they are. Ask them to press one of their hands onto a blank paper.
5. Repeat the process of hand washing and pressing the hands on paper another three times: for four more seconds, 10 more seconds, and a further 10 seconds.
6. Take the blindfold off and let the washer completely wash his/her hands clean.

****IMPORTANT**** While students are waiting for their hand washer and guide to be called up, they should be working together on answering the critical thinking questions posed on the attached sheet.

Closure (10 minutes):

Discussion: After the guide and hand washer have returned, tell the class to take a few minutes to share what happened with each of their timed washings. Were they surprised? Why or why not?

Have the groups label the hand prints from Dirtiest to Clean/Least Dirty, based on the guidelines agreed upon at the beginning of the lesson. It is also important to label them with "Day One: Just Water" to help them keep track of which hand prints were recorded that day.

Day Two

Advance Organizer/Set (5 minutes):

1. Ask students to reform their groups from the previous day.
2. Tell them that they will be performing the same data collection today, their roles will be changed: the hand washer and guide will be data collectors, and the data collectors will become the hand washer and guide. Also, they will be using soap in their hand washing.

Procedure (40 minutes):

1. Put the blindfold back on and repeat the whole experiment with the new hand washer and guide.
2. While the hand washer and guide are at the sink, the data collectors should be working on entering the data from the previous day into the graph.
3. Once their group mates have returned from hand washing, they should all work together to enter the new data on the second graph.

Closure (15 minutes):

1. Ask students to compare their hand prints from using just water to the hand prints from soap and water. Did their hands get cleaner from using soap?
2. How did the length of time that they washed their hands affect the cleanliness?

3. What conclusions can they draw about using soap to wash hands? About how long they should wash their hands?
4. Ask the class to make a recommendation for hand washing (Example: "You should wash your hands with soap and water for at least 20 seconds to get them clean")
5. What do the graphs "say" about their experiment? Why is it a good idea to use graphs to show results?

Extension:

Use your pictures of the hands as a border for a display of their graphs in the hallway. Invite other classes to come see the results of their hand washing experiment. Make a poster with their recommendation for good hand washing practices.

Assessment:

1. Check the graphs for accuracy based on the following criteria:
 - a) Axes are labeled correctly
 - b) There is an accurate representation of the data that their group collected and the graph makes sense (i.e. the 20-second hand washing with soap and water should not be the dirtiest hand prints)
 - c) The students interpreted their data results correctly
 - d) They came to a logical conclusion based on the results of their data collection.
 - e) They draw correlations between an absence of germs (paint) and proper hand washing techniques

Differentiation

This lesson is designed with all types of learners in mind. There are tasks that require movement, mathematical/logical thinking, writing, critical thinking, and group cooperation. Also the heterogeneous grouping allows for lower level math and science students to be supported, as well as students with low-level oral and writing skills, since the roles are switched and each group member is presented with a challenge and a chance to show their strengths.