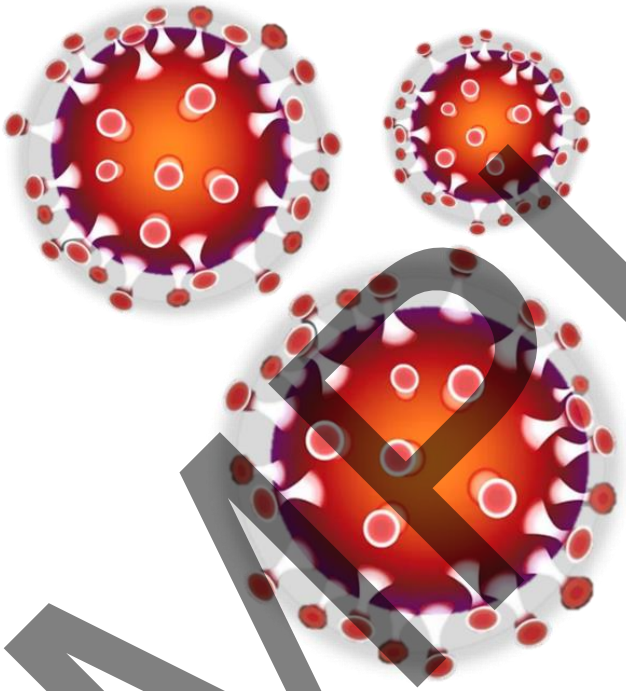

Elementary
Coronavirus Education Kit
Understanding Transmission and Response
TEACHERS GUIDE

Note: This manual contains information related to an ongoing disease outbreak. The facts related to this situation may change rapidly and this manual may not reflect the most up to date information. If you have questions or concerns, consult your doctor or local health officials for more information.

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MATERIALS

The materials in this kit can be used with an individual or a group of up to 5 students. **Copies of the Student Worksheet and Lab Manual are required for use in groups**. For larger groups, additional “add-on” materials are available at www.homesciencetools.com (Product ID: KT-PANCLA).

Item	Quantity Required (per group)
Glo Germ Powder (4 oz)	The included 4 oz bottle is enough for numerous students and/or repetitions of the lab.
UV Light (with Batteries)	1
Small Scoop	1
Balloons	4
Bottle & Spray Nozzle	1
Tissues	2 (not included)
Liquid Soap	(not included)
Ruler or Tape Measure	1 (optional; not included)
Sink (for washing hands)	(not included)

Using This Lab Kit

Along with the detailed instructions in this Guide, this kit contains hands-on materials, a Student Lab Manual, and a Student Worksheet. Prior to starting the lab, review this Guide to understand expected outcomes, preparation, additional materials required, and recommended areas for action.

Lab Overview

The Elementary Coronavirus Education Kit is a valuable hands-on activity that helps students better understand disease outbreaks, discover ways through which diseases can spread, and brainstorm ways to prevent pandemics and the spread of germs. In **Part 1**, students will discover practical hygiene techniques that help prevent disease spread through four "virus transmission" experiments. In **Part 2**, they'll apply what they've learned from the hands-on activities and background reading, and will decide how to respond to this fictitious pandemic scenario. Students will work to identify the source of a new virus passing through a community, and will then come up with ways to limit further spread.

Preparation	Time Required	Target Grade Range**
Review Background (10 - 15 min.) **Prepare Materials** (5 – 10 min.)	**Part 1**: 40 – 60 min. **Part 2**: 40 – 60 min.	**2nd – 6th Grade**

****NOTE:** For younger students, you may choose to skip some of the background and/or activities.

Throughout the lab, look for the following icons to make the most of your teaching and/or learning experience:

Use these **THINK ABOUT IT** sections to maximize the outcomes of this lab. These sections include questions to ask and steps to take to encourage discussion, debate, and more.

SAFETY is the highest priority. Look for this symbol for important safety tips and reminders.

Learning Outcomes

In this lab, students will learn to:

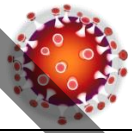
- **Qualitatively assess modes of disease transmission and methods for reducing the spread of viruses**
- **Investigate the source of a spreading disease and consider the impact on individuals and communities**
- **Describe a problem and develop a solution that meets criteria and constraints**

Note: Alignment to NGSS Standards provided on Page 18.

Background

"Germs" & Antibiotics

"Germs" is a common term used to refer to **bacteria, viruses, fungi** and **protozoa**, all of which can make you sick. Here, we focus on bacteria and viruses. Bacteria are small living microorganisms that can reproduce on their own (called **self-replication**). Viruses are often not even thought to be alive because they need other cells (like human cells) to make more viruses. See the chart below for more differences between bacteria and virus:

Bacteria	Viruses
	
Reproduce on their own (self-replicate)	Need other cells to make more viruses
Have cell walls	No cell walls (only a "protein coat")
Single cells ("unicellular")	Do not have cells
Treated by antibiotics	NOT treated by antibiotics

When faced with an illness, it is important to know the difference between bacteria and viruses to better understand the risks, treatment, and Impact. For example, when people are sick, they might ask about taking antibiotics. Antibiotics are life-saving medicines, but they only work against bacteria – **not** viruses. Antibiotics work by slowing or stopping the processes that **bacteria** use to live and grow. Often, antibiotics stop the **proteins** (**enzymes**) in bacteria that carry out important jobs, causing them to die.

Take a look at a few examples of when antibiotics work and when they don't:

Antibiotics Work!	Antibiotics <u>DO NOT</u> Work!
Ear infection caused by the bacteria *Haemophilus influenzae* [5]	The common cold caused by the Rhinovirus
Pneumonia caused by the bacteria *Streptococcus pneumoniae* [6]	The seasonal flu caused by the Influenza A virus
Strep throat caused by the bacteria group A *Streptococcus* [7]	Chicken pox caused by the virus Varicella Zoster [8]

To be clear, antibiotics are <u>not</u> able to prevent and/or treat COVID-19 [4] but they might be needed to treat bacterial infections that result from a virus. For example, some viral infections lead to bacterial **pneumonia**, which can be treated by antibiotics.

In this activity, you'll discover many ways through which viruses can be rapidly spread and explore the importance of good hygiene including:

- Proper handwashing technique
- Sanitizing contaminated surfaces
- Coughing or sneezing into a tissue or sleeve, not your hand

Activity 1: Testing Proper Hand Hygiene

Materials

Item	Quantity Required (per group)
Glo Germ Powder	½ Scoop
UV Light (with Batteries)	1
Small Scoop	1
Liquid Soap	(not included)
Running Water	(not included)
Sink & Soap (to clean up)	(not included)

WARNING!
Never look directly at UV lights, including the UV flashlight included in this kit. UV radiation exposure can damage the cornea - the outer protection of the eye. For extended usage, wear UV-filtering sunglasses or goggles (not included).

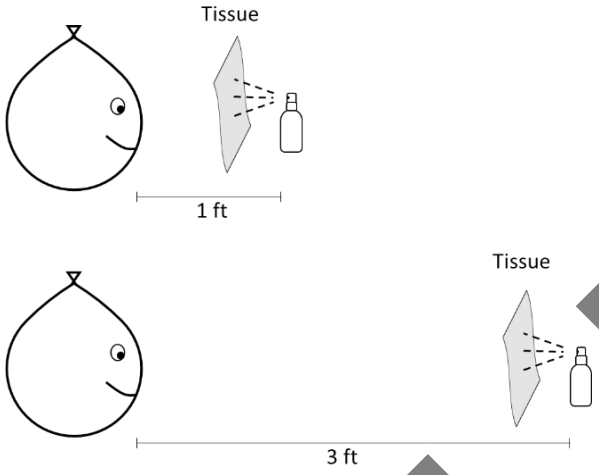
Procedure

Let's pretend that your hands have been contaminated:

1. Apply ½ scoop of Glo Germ Powder to your hands and smear it across your palm, between your fingers, and on top of your hands.
2. Turn off the lights, and use your UV light to examine all of the simulated virus "germs" on your hands!

Test handwashing techniques: Perform the following techniques individually, or break up the techniques between group members.

1. Cold Water Rinse, No Soap
   - Without using soap, rinse your hands in cold water for 30 seconds (but do not rub your hands together).
2. Hot Water Rinse, No Soap
   - Without using soap, rinse your hands in hot (not scalding) water for 30 seconds (but do not rub your hands together).
3. Cold Water Rinse, With Soap
   - Rinse your hands in cold water for 30 seconds (but do not rub your hands together).



3. Point the nozzle directly at the balloon., hold the tissue in front of the nozzle and press down quickly and completely 2 times.
4. Repeat for the “3 ft” balloon, again using a new tissue and 2 sprays.
5. Turn down/off the lights and use the UV light to assess the amount of contaminated saliva that reached each balloon face and the tissues. **Write your observations on Page 3 of the Student Worksheet (in the “With Tissue” section).**
6. Based on your observations, think about how sneezing in a tissue impacts the likelihood of transmission versus sneezing into the air or your hand.

THINK ABOUT IT

You will see that a simple tissue or sleeve is a great way to prevent mass contamination of the air and nearby surfaces during a sneeze – the UV light will show that most of the Glo Germ solution is on the tissue surface, not on the balloon. When a tissue is not used, even a sneeze from 3 feet away can contaminate another person through small droplets. The balloon, when sprayed at 3 feet, should have some small droplets present under the UV light, while the balloon at 1 foot will be completely contaminated.

1. What does this mean about how you can help prevent virus transmission?
2. How can you do a better job when coughing/sneezing in public?

Concept 2: Protecting Communities

During the 2020 COVID-19 outbreak many communities put rules in place to protect people and prevent spread of the virus. This included telling people to stay at home and away from public gatherings. Early in an outbreak, it is important to prevent transmission using rules like this as well as the hygiene steps in Activity 1 – 4. It is also important to investigate and respond to confirmed cases of the disease.

In this activity, you’ll use your understanding of transmission to identify the source of a new virus and develop a solution for preventing further spread.

Activity 5: Finding the Source of an Outbreak

In this scenario, you will play the role of a local Health Department Investigator. A patient, named Kathy, recently checked into the hospital with a confirmed case of a new viral disease. You need to attempt to find the source of the virus and determine who else may be infected.

Using the information on Page 16 (also printed on Page 11 of the Student Lab Manual) and the community map (Page 17 of this manual and Page 5 of the Student Worksheet), investigate and track the locations and people Kathy interacted with to answer the questions on Page 4 of the Student Worksheet.

GUIDANCE: Write each person's name on the map for each location they were in. Trace the infection from Kathy back through each location to find out where it might have come from. Think about where each person was and their current health status to help find the source. Then think about each person she could have contacted and whether or not they might be infected.

Answer questions on Page 4 of the Student Worksheet.

THINK ABOUT IT

Answer the following questions based on your investigation of the scenario:

1. Which people could have given the virus to Kathy?
2. Who is the likely initial source of the virus and how do you know?
3. Who else was potentially exposed?

In this exercise, you'll find that the source of the virus is not absolutely clear (though individuals, like Kyler, who recently traveled and aren't feeling well are top candidates). In the end, you'll also note that nearly everyone in the community may have been exposed. You'll need to use this information to create a strong plan for monitoring and reacting to additional cases of the disease.

Alignment to NGSS Metrics

This lab can be used alongside instruction based on the Next Generation Science Standards*.

Key Performance Expectations

MS-ETS1-2: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

3-5-ETS1-1: Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time or cost.

Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions Asking Questions and Defining Problems Engagement in Argument from Evidence	ETS1.A Defining and Delimiting Engineering Problems ETS1.B Developing Possible Solutions	Influence of Science, Engineering, and Technology on Society in the Natural World Systems and System Models

* “Next Generation Science Standards (NGSS)” is a registered trademark of Achieve. Neither Achieve nor the lead states and partners that developed the Next Generation Science Standards were involved in the production of this product, and do not endorse it.