

RESOURCE LIBRARY

ACTIVITY : 1 HR 40 MINS

Telling the Truth about Germs

Students revisit their hypotheses for a final time to answer the unit driving question about why germs make us sick more often in the winter. They then apply their learning from the whole unit as they select and finalize a class set of trivia questions, answers, and evidence-based explanations for the Germology Game Show.

GRADES

3, 4

SUBJECTS*Biology, Health***CONTENTS**

3 PDFs

OVERVIEW

Students revisit their hypotheses for a final time to answer the unit driving question about why germs make us sick more often in the winter. They then apply their learning from the whole unit as they select and finalize a class set of trivia questions, answers, and evidence-based explanations for the Germology Game Show.

For the complete activity with media resources, visit:

<http://www.nationalgeographic.org/activity/telling-truth-about-germs/>

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DIRECTIONS

This activity is part of *The Truth About Germs* unit.

1. Guide students to finalize their hypotheses about why germs make us sick more often in the winter.

- Remind students of the unit driving question: Why do germs make us sick more often during the winter?
- Review the additional ideas and evidence students have learned and added to the class Question Quadrant chart throughout the unit:
 - Evidence to emphasize includes:
 - *Germs All around Us* activity: Viruses (which cause the common cold, influenza, and coronavirus) have been found to be more stable and stay in the air longer in cold and dry conditions.
 - *Spreading Germs* activity: More indoor gatherings in the winter increases the likelihood of spreading germs (think of less air circulation and closer face-to-face contacts).
 - *Helping and Hurting Our Immune Systems* activity: In the winter, there are environmental factors such as dry air drying up the mucus in our noses and stressors on our bodies (such as lack of vitamin D from diminished exposure to sunlight and less exercise) that decrease our immune systems' ability to fight off germs.
- Redistribute students' individual *Question Quadrant* handouts, featuring their revised hypotheses in response to the unit driving question.
- Prompt students to consider whether the evidence from the unit supports or counters their current hypothesis about why germs make us sick more often in the winter.
- Have students revise their hypothesis for the last time.
- In preparation for finalizing game show questions in the next step, prompt students to review their own questions from throughout the unit, to help think about what questions other people in the community may have about germs in the winter.

2. Support students as they choose and finalize their best evidence-based trivia questions and answers for the unit's Germology Game Show.

- Distribute students' individual *Trivia Question Builder* handouts that they have been working on throughout the unit and *The Truth about Year Round Germs Project Checklist and Rubric*. Review the rubric with students, emphasizing the following key points:
 - Questions, answers, and evidence-based explanations should draw from activities in the unit to explain the cause-and-effect relationships between different factors (Germs, People, Environment, or Something Else) related to why germs make us sick more often during the winter, as well as different ways that we can keep from getting sick, especially in the winter.
 - Consider the audience of community members that will be attending or interacting with the game show, in terms of how to phrase questions and answers, as well as the concepts that they need to know or would find interesting.
 - Review and discuss the criteria on the project rubric to help guide students' work to be high in quality. Each student will be assessed on their selected set of questions, while the class will collaborate in the next step to determine which questions will be ultimately included in the final Germology Game Show.
 - For additional inspiration in finalizing their questions, review the questions that students documented throughout the unit on their individual *Question Quadrant* handout, since community members may have similar types of questions.
- Direct students to review the trivia questions, answers and evidence-based explanations they have written throughout the unit on the *Trivia Question Builder* handout. They should select what they think is the best question from each set by starring or otherwise noting it. Explain that those questions will be the ones that they are graded on and to be considered by the class for being included in the Germology Game Show.
 - For questions that students have written (collaboratively as a class during the *Bad Germs: Keep Out!* activity, and independently during the *Helping and Hurting Our Immune Systems* and the *Clean Your Hands* activities), provide time for students to finalize the questions to align with the rubric criteria.

3. Lead the class in determining which questions and evidence-based answers will be used in the Germology Game Show.

- Depending on the format of the final product (some options include: live game show or quiz bowl, self-quiz cards, Kahoot-style interactive quiz, or MythBusters-style explanatory video; see Setup), it may be necessary to pare down the number of trivia questions to a

class set of 12-15 that span the content of the unit. If students are creating self-quiz cards or each group will lead a small subset of audience members in a trivia game show, then this step may not be necessary.

- Have students write their chosen questions on chart paper or other visible document to share with others.
- Lead students in a gallery walk to vote for their top choices via sticky notes or tally marks.
 - As students circulate, remind them to use the criteria on the rubric to select their top choices, such as using clear language, interesting questions, and supported by well-presented, reliable evidence.
- Use the results to choose the final class set of questions for the Germology Game Show, being sure that each project group has at least one question, and that the question set addresses all important ideas from across the unit.

4. Provide tools and resources for students to create their trivia questions and answers in the chosen format for the Germology Game Show.

- Once the final set of questions and evidence-based answers is determined, provide appropriate tools and resources to build out the questions in the appropriate format for the Germology Game Show.
- Circulate to support students' use of the technology or tools as they build out their part of the final product.
 - Especially for a quiz bowl or video option, determine and assign students to the different roles that will be needed, such as: hosts, scorekeepers, or explainers.
- To prepare for introducing the Germology Game Show, lead students through your chosen process (see Setup section) of determining which students' paragraphs (written during the *Clean Your Hands* activity) will be used during the actual game show introduction.

Informal Assessment

Students' final hypotheses in response to the unit driving question on the *Question Quadrant* handout, as well as the class sensemaking discussion in Step 1, provide an opportunity to assess students' understanding of the key content in the unit. Use *The Truth about Year*

Round Germs Project Checklist and Rubric to assess students' trivia questions, answers, and evidence-based explanations for the unit final product.

Extending the Learning

To improve the quality of students' final products and engage them in an authentic practice of scientists and engineers, consider building in a peer review step to give and receive feedback on another student's set of trivia questions, answers, and evidence-based explanations.

OBJECTIVES

Subjects & Disciplines

Biology

- Health

Learning Objectives

Students will:

- Draw conclusions and make final hypotheses related to why germs make us sick more often in the winter.
- Choose and finalize their trivia questions, answers, and evidence-based explanations for the Germology Gameshow, the unit's final product.
- Use tools and technology to create their trivia question set in the chosen format for the Germology Game Show.

Teaching Approach

- Project-based learning

Teaching Methods

- Discussions
- Reflection
- Writing

Skills Summary

This activity targets the following skills:

National Standards, Principles, and Practices

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS & LITERACY

- **CCSS.ELA-LITERACY.SL.3.1:**

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly.

- **CCSS.ELA-LITERACY.SL.4.1:**

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.

- **Writing Standards K-5:**

Text Types and Purposes, W.4.2

- **Writing Standards K-5:**

Text Types and Purposes, W.3.2

NEXT GENERATION SCIENCE STANDARDS

- **Crosscutting Concept 2:**

Cause and Effect

- **Science and Engineering Practice 6:**

Constructing explanations and designing solutions

- **Science and Engineering Practice 8:**

Obtaining, evaluating, and communicating information.

Preparation

What You'll Need

MATERIALS YOU PROVIDE

- Art supplies
- audio/video recording devices

REQUIRED TECHNOLOGY

- Internet Access: Optional
- Tech Setup: 1 computer per pair, Audio recording device, Digital camera (and related equipment), Mobile data device (smartphone or tablet), Video camera (and related equipment)

PHYSICAL SPACE

- Classroom

SETUP

To support students in creating their final product for the unit project, confirm the format(s) and prepare tools that students will need to build out their trivia questions.

For the live game show, start inviting community members to attend (if in-person) or tune in (if virtual).

Review the paragraphs that students wrote during the *Clean Your Hands* activity to introduce the Germology Game Show and explain why it is important for the audience to learn about winter germs. Determine the process that you will use to select paragraphs to use for the game show.

GROUPING

- Large-group learning
- Small-group work

BACKGROUND & VOCABULARY

Background Information

This unit focuses on the scientific understanding of why people get sick more often in the winter. Based on their learning through the unit, students are able to fully explain the phenomenon in this activity. Key contributing factors include: In the winter, there are environmental factors (i.e., dry air drying up the mucus in our noses) and stressors on our bodies (i.e., lack of vitamin D, less exercise, and constriction of airways) that decrease our immune systems' ability to fight off germs. Additionally, there are more indoor gatherings between people from different households in the winter, which increases the likelihood of spreading germs as there is increased face-to-face contact and less air circulation. Another factor is that viruses (which cause the common cold, influenza, and coronavirus) have been found to be more stable and stay in the air longer in cold and dry conditions (where there is less moisture - studies have shown that the flu epidemics "almost always followed a drop in air humidity"). It is hypothesized that moisture disrupts the virus' surface, interrupting their mechanism of attack to our cells and making it more difficult for viruses to infect us.

The goal of this project-based learning (PBL) unit is for students to share their understanding of this everyday, compelling, and relevant phenomenon with their community, through creating a Germology Game Show or similar type of product, which students also work on in this activity. One of the distinguishing features of project-based learning is that students engage in authentic, disciplinary work. In this unit, a game show means that the audience for students' work is not confined to their own classroom. Just as scientists must clearly communicate with public audiences, students must also share their work with community members, who in turn can provide meaningful feedback about students' ideas, suggestions, and concerns. A public product is a powerful motivator for students. In order to create a product that they can present to outsiders, students understand that they must hold themselves and their work to high standards.

Prior Knowledge

["Many common illnesses are caused by microbes/germs.", "Our susceptibility to getting sick from germs can depend on environmental and individual factors, which can be related to seasonal variations in temperature and humidity."]

Recommended Prior Activities

- None

Vocabulary

Term	Part of Speech	Definition
antibody	<i>noun</i>	molecule that help fight disease and infection.
bacteria	<i>plural noun</i>	(singular: bacterium) single-celled organisms found in every ecosystem on Earth.
environment	<i>noun</i>	conditions that surround and influence an organism or community.
germ	<i>noun</i>	disease-producing microbe.
hypothesis	<i>noun</i>	statement or suggestion that explains certain questions about certain facts. A hypothesis is tested to determine if it is accurate.
immune system	<i>noun</i>	network of chemicals and organs that protects the body from disease.
mucus	<i>adjective, noun</i>	slimy, fluid secretion of some animals.
virus	<i>noun</i>	pathogenic agent that lives and multiplies in a living cell.

For Further Exploration

Articles & Profiles

- [Harvard University: The Reason for the Season: why flu strikes in winter](#)

Video

- [SciShow: Why Do We Get Colds When It's Cold?](#)
- [The New York Times: Study Shows Why the Flu Likes Winter](#)

