

RESOURCE LIBRARY
LESSON

Sharing the Truth about Winter Germs

Students finalize their hypotheses and evidence-based trivia questions, answers, and explanations about why germs make us sick more often in the winter. They then present their trivia questions to peers and external audience members through a class Germology Game Show, which is the final product for the unit.

GRADES

3, 4

SUBJECTS*Biology, Health***CONTENTS**

2 Activities

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ACTIVITY 1: TELLING THE TRUTH ABOUT
GERMS | 1 HR 40 MINS

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

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.

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

ACTIVITY 2: GERMOLOGY GAME SHOW | 1 HR

DIRECTIONS

This activity is part of [The Truth About Germs](#) unit.

1. Support the class as they complete final preparations for the Germology Game Show.

- Provide any necessary time for the class to finalize and/or rehearse their trivia questions, answers, and explanations.
- Students should have the class set of questions, answers, and explanations prepared in final format from the [Telling the Truth about Germs](#) activity. It may be useful to have these written on index cards that students can read from during the game show, and/or have the questions, answers, and explanations on a slide deck that can be projected during the game show.
- If students have not already chosen or been assigned to key roles for the game show, do that now.
 - Roles could include: hosts, scorekeepers, or explainers.
- Explain the game show format, which will vary depending on the school context, audience, and mode of presentation.

- Include any other finalizing steps as needed for your class's final product format and context.
- Prepare and practice technology, introductions, and roles:
 - Technology: Any technology involved in the game show (such as audio systems or projectors) should be tested out by student groups ahead of time.
 - Student introductions: Even if the game show venue is digital, remind students to introduce themselves before presenting their question set and to take questions from the audience after the game show has concluded.
 - Roles: Hosts and explainers should prepare scripts so they can practice what they will say. Scorekeepers should set up and practice keeping score.

2. Facilitate as students lead the audience through the Germology Game Show.

- Welcome additional audience members, whether in-person or virtually, and introduce the students who will be hosting the game show. Be sure to introduce (or have students explain) the inquiry process that students undertook to understand the unit driving question.
- Provide opportunities for audience members and peers to ask questions of presenting groups.
- Conclude the game show and celebrate the conclusion of the unit!

3. Use a reflection form to have students reflect on *The Truth about Germs* unit.

- Collectively revisit the class Question Quadrant chart; students can likely now answer many of the questions that they had at the beginning of the unit.
- Distribute [The Truth about Germs Unit Reflection](#) sheet. Review the prompts with students.
- Ask students to complete a self-evaluation/reflection of their work in this project.
- Consider leading a whole-class discussion in which students share one or two of their reflections with the class.

Informal Assessment

Use [The Truth about Germs Project Checklist and Rubric](#) to assess students on the key concepts and practices of the unit via their group's set of trivia questions, answers, and explanations. Additionally, students' reflection responses can be used to inform your final assessment of each student's individual understanding and contribution to the project.

Extending the Learning

To extend the impacts of the important ideas students learned in this unit and communicated via the Germology Game Show, consider having students take the game show out into the community for relevant contexts and audiences. These could include younger grade levels, childcare centers, community centers, or health and wellness fairs. Another option is to digitally record and upload the game show (or alternative format for the final product) onto an internet platform to share their message with a wider audience.

OBJECTIVES

Subjects & Disciplines

Biology

- Health

Learning Objectives

Students will:

- Present their trivia questions, answers, and evidence-based explanations about why germs make us sick more often during the winter.
- Reflect on their process of learning and collaboration during the unit.

Teaching Approach

- Project-based learning

Teaching Methods

- Discussions
- Reflection

- Self-directed learning

Skills Summary

This activity targets the following skills:

National Standards, Principles, and Practices

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS & LITERACY

- Speaking and Listening Standards K-5:

Presentation of Knowledge and Ideas, SL.3.4

- Speaking and Listening Standards K-5:

Presentation of Knowledge and Ideas, SL.4.4

NEXT GENERATION SCIENCE STANDARDS

- Science and Engineering Practice 8:

Obtaining, evaluating, and communicating information.

Preparation

BACKGROUND & VOCABULARY

Background Information

Scientists communicate their findings to scientific communities as well as the public in order to contribute knowledge to developing fields but also to educate the public and shape policies. To be successful in these goals, it is essential for scientists to break down complicated ideas and support their claims with evidence. Similarly, scientific game and quiz designers must communicate clearly if they are to achieve their goal of educating participants and audience members on issues of importance, such as public health.

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

- [Telling the Truth about Germs](#)

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.
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.

