

RESOURCE LIBRARY
LESSON

Bodies Versus Germs

Students consider what our bodies do to help protect us from germs and create a body map to show how the different parts of the immune system work together to fight off germs. They then consider how different activities, such as diet, exercise, sleep, and being in the sunshine, affect the immune system, and how those activities vary between summer and winter. Finally, students learn how soap and hand sanitizer work to kill germs on our hands.

GRADES

3, 4

SUBJECTS*Biology, Health***CONTENTS**

3 Activities

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ACTIVITY 1: BAD GERMS: KEEP OUT! | 1 HR

DIRECTIONS

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

1. Invite students to share ideas about how our bodies help to protect us from germs.

- Revisit the *Know and Need to Know* chart created in the first activity, [Sick Days](#). Review the questions in the “Need to Know” column to see if students can now answer them after the

last lesson, *Germ Flow*, and can move those questions to the “Know” column. Elicit any new questions students have developed and add them to the “Need to Know” column.

- Connect to students’ ideas from the activities in the *Germ Flow* lesson by asking:
 - *Last time, we talked about activities that help or prevent germs from spreading. What do you think our bodies do to help protect us from germs? (Depending on students’ prior knowledge and experiences, their responses may include: Sneezing and coughing helps to expel germs; Our bodies make extra snot/mucus to help flush germs out; Hair in our noses and our skin helps to trap and shield us from germs.)*
 - Document students’ responses in a visible place, to be referenced as they learn more about the immune system in the following steps.

2. Support students as they collaboratively read about how our immune systems help protect our bodies from germs.

- Organize students into reading pairs and provide each pair with the *Attack of the Germs!* article and the *Our Immune System: Body Map* handout.
- Introduce the *Attack of the Germs!* article and the purpose for reading it: to understand how the different parts of the immune system help protect our bodies from germs.
- Display the class body map (see Setup) in a visible location and introduce it as the class version of what students will create with a partner.
- Explain that as students read, they will add what they learn about the location, structure, and function of different parts of the immune system to their map of the human body.
- Read the first page of the article aloud to the class, to model how to annotate the body map with relevant information.
 - The first page focuses on bacteria and viruses; as you read, connect the key concepts to what students already know about these microbes from the *Germs All Around Us* activity, especially the idea that many bacteria are beneficial and necessary for our bodies to function properly.
 - Model how students should add relevant information to their body map on the *Our Immune System: Body Map* handout. In the second section, Unwanted Guests, pause to emphasize the following sentences: “About 500 types of bacteria live in your intestines (collectively, these are referred to as your “gut microbiome” – fun fact: about 700 trillion bacteria total live in our digestive systems including beneficial ones and germs). The gut environment is complex – many of the bacteria living in your guts are beneficial to

absorb nutrients, process food, remove waste, fight off germs – and can be even necessary for a healthy immune system; however, some can be harmful to our health.

- Invite students to explain how this information addresses the reading purpose.
- Demonstrate how to add this to the class body map:
 - Sketch a picture of the intestines, roughly where they are in the body. Label the sketch with a brief summary: “Bacteria: help digest food; can keep out and kill germs (bad bacteria).”
- After modeling the sections described above, prepare student pairs to finish the article with the reading purpose in mind and continue adding what they learn about the location, structure, and function of some key parts of the immune system to the body map on their handout. Encourage creativity in how students draw the body parts and germs!
- Information from the article includes:
 - Skin (considered our heaviest and largest organ): Covers and protects the body by acting as a waterproof barrier. Also has special cells to warn the body that germs are going to attack, makes chemicals to kill germs.
 - Mucus (water-insoluble gel): Mainly in the nose (and in stomach internal surfaces), acts as a wall to block viruses (and other germs) from getting further into the body.
 - Hairs in nose (act as a natural filter): Try to sweep virus (and other germs) out. Particles tend to stick to the wet surface of hairs preventing them to go in further.
 - White blood cells (account for one percent of all blood but have an essential role – think of them as always being in war towards protecting your immune system): Present in the bloodstream throughout the whole body. Different kinds of white blood cells: Some, such as neutrophils (these are your first line of defense!), surround germs (bad bacteria and fungi) as they enter and destroy them. Others, like B cells (aka lymphocytes), create antibodies which match specific germs to help stop infection. B cells remember which germs they have encountered before so they can fight them off again faster and more efficiently (which is how some vaccines work!). T cells: Some tell other white blood cells what to do; others fight to kill cells that have germs inside.
- As students near the end of the article, highlight the two prompts in Part two of the handout. Partners should add tips from the last section of the article about how to help stay healthy and support our immune systems. Additionally, encourage students to add their new ideas and questions in the space provided.
- Circulate to support understanding of the article and press their thinking about the immune system and human body by asking questions related to the structure and function

of the different immune system tools, such as "How do microbes play a role in the different defense systems we have in the body?"

- In preparation for students' game show development in the final step of this activity, ask partners to review their tips, questions, and ideas and annotate those that will be interesting and helpful to share with their community through the Germology Game Show.

3. Use student's ideas about how the immune system fights off germs to create a class body map.

- Lead a class discussion and have students share out the different immune system parts identified on their body maps.
 - As students share, document their ideas on the class body map. Elicit additional ideas beyond the information in the article and add these parts of the immune system to the body map, as well.
 - Additional responses could include:
 - Coughs and sneezes to expel germs
 - Extra mucus production in nose to flush out germs
 - Probiotics to help fight off bad germs in stomach
 - Increased body temperature (fever) which helps support T-cells and other parts of the immune system
 - Use the completed body map to introduce the idea that different immune tools work together as a system to protect our bodies and fight off germs.
 - For example: As a first line of defense, mucus and hairs in the nose work together with sneezing to help keep out or expel germs.
 - Another example: If we get a stomach bug, we may need to use the restroom more often as our body. (stomach/intestines) are working hard to expel the virus/bacteria causing our sickness
 - Note for students that they will return to this idea in the next activity, *Helping and Hurting Our Immune Systems*.

Guide question writing for the Germology Game Show to connect learning about the immune system to the unit's driving question.

- Gather and document students' ideas about how to support the immune system and students' additional questions, from the boxes on Page two of the *Our Immune System: Body Map* handout.
- Connect to the unit's driving question about why germs make us sick more often in the winter by documenting these ideas and questions on the relevant quadrants (likely Germs and People) of the class Question Quadrant chart.
- Organize students back into their reading pairs (or any other grouping of two or three students) to develop trivia questions and evidence-based answers for the Germology Game Show. Re-distribute individual students' *Trivia Question Builder* handouts from the *Germ Flow* lesson.
 - If they did not do so at the end of Step 2, prompt groups to review their tips, questions, and ideas from the body map activity and annotate those that will be interesting and helpful to share with their community.
- Guide students to select two ideas from this activity to focus on for writing trivia questions and evidence-based answers. Use the *Bad Germs: Keep Out!* Question Set section on the *Trivia Question Builder* handout to structure their process.
 - To help support groups, point to the teacher-modeled and collaboratively-developed trivia questions and evidence-based answers from the *Germs All around Us* activity.
 - For this activity, evidence can come from the *Attack of the Germs!* article and students' body maps.
 - Circulate to support and press students' thinking as they work on their questions and evidence-based answers.

Informal Assessment

Reviewing the *Know and Need to Know* chart provides a crucial opportunity to assess students' broad understanding related to the unit driving question and project. Use the *Our Immune System: Body Map* handout, trivia questions, and evidence-based answers they develop for the unit project to assess their developing understanding of how the immune system works to protect us from germs. The last section of the handout elicits student ideas and questions; assessing these to identify themes of understanding and misconceptions can be used to guide subsequent instruction.

Extending the Learning

To supplement the article and support developing readers, consider also showing the video from KidsHealth, [How the Immune System Works \(7:22\)](#), or leading a read-aloud of a book about the immune system, such as [My Messy Body](#) by Liza Fromer and Francine Gerstein.

OBJECTIVES

Subjects & Disciplines

Biology

- Health

Learning Objectives

Students will:

- Read an article to identify how the immune system works to help protect us from germs.
- Create a body map to show the location, structure, and function of different parts of the immune system, and understand that the parts work together as a system to protect our bodies and fight off germs.

Teaching Approach

- Project-based learning

Teaching Methods

- Cooperative learning
- Discussions
- Reading

Skills Summary

This activity targets the following skills:

National Standards, Principles, and Practices

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS & LITERACY

- Reading Standards for Informational Text K-5:

Key Ideas and Details, RI.3.2

- Reading Standards for Informational Text K-5:

Key Ideas and Details, RI.4.2

- Writing Standards K-5:

Text Types and Purposes, W.3.2

- Writing Standards K-5:

Text Types and Purposes, W.4.2

NEXT GENERATION SCIENCE STANDARDS

- Crosscutting Concept 2:

Cause and Effect

- Crosscutting Concept 4:

Systems and system models

- Science and Engineering Practice 2:

Developing and using models

- 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 activity introduces basic information on some of the key parts of the immune system (skin, mucus, hairs, white blood cells), so that students have some framing with which to respond to the unit driving question about why germs make us sick more often in the winter. The immune system more broadly is complex and made up of two separate subsystems: the

innate (or non-specific) immune system and adaptive (specific or acquired) immune system. The innate immune system (the one we are born with and considered our “first line of defense” that immediately tries to prevent the spread and movement of germs/particles) generally defends the body from infectious germs and harmful/foreign particles through skin (and skin oils), mucous membranes (which physically trap bacteria), enzymes in tears, stomach acid, and immune responses, such as sneezing or blood clotting. In contrast, the adaptive immune system creates antibodies that specifically target germs the body has previously encountered. Vaccines, which expose the body to a deactivated version or genetic material from an infectious germ, work by stimulating the production of specific antibodies (produced by the adaptive immune system) to help fight future infections. Examples of how the body responds when the adaptive immune system is activated includes swelling, redness, pus, pain and production of lymphocytes. Sometimes, the adaptive immune system can make errors and attack itself instead of attacking foreign germs – when this occurs, autoimmune diseases can arise (such as lupus).

In addition to the parts of the immune system introduced in this activity, other parts of the immune system include the tonsils, spleen, bone marrow, stomach acid, lymph nodes, bowel, internal mucous membranes, and the thymus.

A third type of immunity (that is transient and short-lived) exists and is called “passive” immunity. This defense is “borrowed” from a different source such as the mother’s breast milk that provide antibodies to the baby, protecting them from the diseases the mother has been exposed to.

Prior Knowledge

["Many common illnesses are caused by microbes/germs."]

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.
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.

ACTIVITY 2: HELPING AND HURTING OUR IMMUNE SYSTEMS | 1 HR 30 MINS

DIRECTIONS

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

1. Show a video to demonstrate how the different parts of the immune system work together to help protect our bodies and fight off germs.

- Use the class body map from the [Bad Germs: Keep Out!](#) activity to remind students of the key parts of the immune system and how they protect our bodies.
- Prepare students to watch a video that demonstrates what happens to the body when germs get into our bodies.
- Ask students to listen for answers to the following questions and to be ready to share after the video:
 - *How do the different parts of the immune system work together?*
 - *What similarities and differences do you see between the video and our body map?*
- Use “The Cells that are Part of the Immune System” table on [The Story Behind the Scenes](#) page of Arizona State University’s digital comic book, *Viral Attack*, to preview some of the key immune system vocabulary from the video, which differs from the terms used in the *Bad Germs: Keep Out!* activity. Emphasize that the specific terms and parts of the immune system are less important than the idea of the different parts working together.

- Show the [Viral Attack](#) video (3:41). Consider stopping and pausing at key moments to point out the new parts of the immune system or eliciting students' initial ideas about how the different parts work together.
- Lead a debrief discussion for students to share their ideas about how the different parts of the immune system work together and how it relates to the class body map.
 - Key ideas may include:
 - The first wave of defense (macrophages and neutrophils) calls for backup from the T-cells (some T-cells are actually called "killer cells") when they aren't able to kill all of the viruses.
 - The T-cells call for backup from the B-cells when they aren't able to kill all of the cells that have viruses in them.
 - The B-cells create a "memory" of the viruses so that any B-cell can recognize the virus in the future.
 - T-cells and B-cells were documented on the class body map, but connections were not made about how they work together.
- Share that these waves of immune response as shown in the video accurately show how our bodies actually work as a system to protect us from germs.

2. Lead a class discussion to prompt students to consider how our immune systems can be weakened by a variety of factors.

- Transition to the main idea for this activity: Our immune systems don't always function as well as they should, especially if there are factors that weaken different parts of people's immune system (such as infections, poor diet, lack of exercise, stress, exposure to harsh chemicals, smoking, drinking alcohol).
- Use the class Question Quadrant to remind students of the unit driving question: Why do germs make us sick more often during the winter?
 - Remind students about what they learned during the *Germs All around Us* activity about environmental factors that help viruses survive in the winter and the ideas in the *Spreading Germs* activity about how people interact inside more often during the winter.
- Explain that students will now investigate what may happen to our immune systems during winter to increase the chances of getting sick. Elicit student's initial ideas about this by

asking: *Why don't our immune systems always protect us?*

- Lead a discussion to document and follow students' ideas and thinking.
- Build on their responses to remind them of the tips to support the immune system that they read about in the *Attack of the Germs!* article during the *Bad Germs: Keep Out!* activity:
 - Eating healthy foods, exercising, getting enough sleep, keeping stress levels low
 - Add on to explain that vitamin D from sunlight is another evidence-based factor that helps our immune systems function.

3. Guide students as they read about and analyze data representations that show how our immune systems are impacted by activities differently during the winter versus the summer.

- Explain that students will now become experts on one of these activities and how they impact our immune systems. Organize students into groups of four and distribute the *Helping and Hurting Our Immune Systems* handout.
- Within their groups, have students determine which activity they will focus on. Direct them to circle the activity and make a prediction about how it might differ between summer and winter on the top section of their handout.
- Then re-organize students into expert groups based on the activity on which they are focusing; for example, all students who are focused on sleep. Distribute the relevant *Helping and Hurting Our Immune Systems Data Sheets* for the activity they are focusing on.
- Using the relevant page for their activity, prompt expert groups to collaborate in reading about their activity and analyzing a graph showing how people's engagement in the activity changes seasonally. Students should individually record their findings in the relevant section of their Results Table on the handout, since they will be responsible for reporting to their original group.
- Circulate as expert groups collaborate, using the data sheets as a reference and pressing their thinking in terms of cause-and-effect relationships and how their results help us understand why germs make us sick more often in the winter.
 - Students' ideas for the cause-and-effect pathways should come from the paragraph that they read. For example: For the activity "Eating lots of fruit and vegetables," one effect is "helping the body create better white blood cells by

providing essential nutrients and minerals,” which in turn has the effect of “white blood cells create antibodies and fight germs.” Another effect of eating lots of fruit and vegetables is that it “gives your body fiber feeding ‘good’ microbes in our stomachs,” which has the effect of “help[ing] support digestion and fight infection in your gut.”

- Support data literacy for interpreting the graphs by:
 - Reminding students of the steps they have taken in previous activities, such as first identifying what each axis tells us, then what the line means over time.
 - Modeling how to interpret one of the graphs.
- After expert groups complete the table for their activity, have them reorganize into their original groups and facilitate as students share with their group members. Prompt students to record results on their finding table.
- Lead a class discussion to review their results and lead to the idea that our immune systems do not function as effectively in the winter, due to decreased eating of fruits and vegetables, exercise, and exposure to sunlight (which means less natural vitamin D).
- Note that the data on sleep shows that people tend to get more sleep during the winter. Getting full hours of sleep is generally considered healthy to allow our body to recover and stay healthy. So we could think that sleeping more during the winter would automatically strengthen our immune system, although this is not often true. Help students make sense of the fact that even though one factor may be helpful to our immune systems during the winter, the other three activities likely outweigh it.
- Be sensitive to the fact that these activities not only vary seasonally, but also between and within communities, especially in regards to race and socioeconomic status (or religion), which may vary among students within your classroom. Emphasize that access to healthy foods and opportunities to exercise are not available to all people and communities in the same ways.

4. Guide question writing for the Germology Game Show to connect learning about the immune system to the unit driving question.

- Lead the class through thematically organizing the four activities as they relate to each quadrant of the class Question Quadrant chart: Germs, People, Environment, or Something Else.

- Prompt students to consider if the new evidence supports or counters their revised hypotheses about why germs make us sick more often in the winter.
- Students may respond: I originally thought that germs make us sick more in the winter because our bodies use more energy to stay warm and can't fight off germs. I know now that this is only part of the story; our bodies' immune systems are affected by factors like decreased vitamin D due to lack of sunlight that makes it harder for our bodies to fight off germs.
- Organize students into their original jigsaw groups from Step 3. Guide students to select one or two ideas from this activity to focus on for writing trivia questions and evidence-based answers. Use the section for this activity on the [Trivia Question Builder](#) handout to structure their process.
 - For this activity, evidence can come from the video about how the different parts of the immune system work together, cause-and-effect pathways about different activities' effects on our immune systems, and the findings and/or data representations about how those activities differ between the summer and winter seasons.
 - Circulate to support and press students' thinking as they work on their questions and evidence-based answers.

Informal Assessment

Use the discussion in Step 1 to assess students' understanding of how the different parts of the immune system work together to help protect our bodies and fight off germs. To build on this key idea, prompt students to write a summary statement on this topic after they have discussed it in Step 1.

The *Helping and Hurting Our Immune Systems* handout can be used to assess students' ability to identify cause-and-effect relationships between certain activities and their impacts on our immune systems as well as analyzing graphs.

Use students' questions and evidence-based answers to assess their developing understanding of how the immune system is negatively impacted by activities and other factors in the winter versus the summer, which can contribute to why germs make us sick more often in the winter.

Extending the Learning

To support students in developing their evidence-based trivia questions for the Germology Game Show, have students survey community members about what they know and don't know about germs and why they think people get sick more often in the winter.

OBJECTIVES

Subjects & Disciplines

Biology

- Health

Learning Objectives

Students will:

- Understand how the different parts of the immune system work together to help protect our bodies and fight off germs.
- Read and analyze data to demonstrate that our immune systems are impacted differently by activities during the winter versus the summer.
- Connect their learning about the immune system and factors that impact it to the unit driving question related to why germs make us sick more often in the winter.
- Collaborate to create trivia questions and evidence-based answers about factors that support or weaken our immune systems.

Teaching Approach

- Project-based learning

Teaching Methods

- Discussions
- Multimedia instruction
- Simulations and games

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.RI.3.3:**

Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.

- **CCSS.ELA-LITERACY.RI.4.3:**

Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

- **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.3.2

- **Writing Standards K-5:**

Text Types and Purposes, W.4.2

NEXT GENERATION SCIENCE STANDARDS

- **Crosscutting Concept 2:**

Cause and Effect

- **Crosscutting Concept 4:**

Systems and system models

- **Science and Engineering Practice 4:**

Analyzing and interpreting data

- **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 activity builds on what students previously learned about the immune system, with a focus on how specific everyday activities help support our immune systems, and how people's engagement in those activities varies seasonally. The four activities are eating a lot of fruits and vegetables, exercise, sleep, and being in the sunshine (which provides vitamin D). Students learn about the seasonal trends for these activities by analyzing data representations, which is an authentic scientific practice with which students should start developing expertise during elementary school.

Additionally, systems thinking is an important practice for students to make sense of complex phenomena. The cause-and-effect pathways in this activity are a foundational way for students to begin engaging in systems thinking by considering how particular activities impact the ability of the immune system to fight off germs.

Prior Knowledge

["Many common illnesses are caused by microbes/germs.", "Different parts of the immune system work together as a system to protect our bodies and fight off germs."]

Recommended Prior Activities

- [Bad Germs: Keep Out!](#)

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.

Term	Part of Speech	Definition
environment	noun	conditions that surround and influence an organism or community.
germ	noun	disease-producing microbe.
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 3: CLEAN YOUR HANDS | 1 HR 15 MINS

DIRECTIONS

This activity is part of The Truth About Germs unit.

1. Lead students in categorizing everyday activities that help keep us from getting sick.

- Show or have students access their copy of the Spreading Germs Card Sort handout from the Spreading Germs activity. Ask students: *Which activities helped to keep us from getting sick?*
 - Responses from the cards include: Staying home when you're sick; wearing a mask; coughing or sneezing into your elbow; video call with friends or family; keeping six feet of distance between students at school; cleaning door handles, desks, countertops; washing your hands.
 - Students may also share their own ideas from the card sort, especially related to activities that they identified as "it depends."
- Explain that this activity is focused on one of the easiest and most effective activities to prevent germs from spreading and attacking our bodies: cleaning and washing our hands properly (at least 20 seconds using soap).
- Remind students that they will use what they learn about this common activity to help explain the science behind *why* it's important to clean and wash our hands through their game show questions.

2. Provide resources for students to learn about how soap and hand sanitizer help to protect our bodies from germs.

- Distribute the *Clean Your Hands* handout to pairs or small groups of students. Review the directions, highlighting that students will become experts about one of the methods of cleaning our hands and will then explain that method to another student.
- Assign each student-group to focus on either soap or hand sanitizer and provide access to the relevant resources linked on the handout:
 - Soap
 - Video: [*The Science of Soap*](#) (3:44)
 - Article: [*Curious Kids: Why Do We Need Soap?*](#)
 - Sanitizer
 - Video: [*How Does Hand Sanitizer Kill Germs?*](#) (4:51)
 - Article: [*Does Hand Sanitizer Really Work?*](#)
- Provide time for small groups to read their assigned article, watch their assigned video, and complete the *Clean Your Hands* handout.
- Re-organize students to share what they learned about their method with a student who learned about the other method. Direct them to record key ideas on the designated hand-shaped text boxes on the handout.
- Circulate to support students' explanations, drawing on the key ideas below:
 - Soap gets rid of germs by physically removing them. Soap molecules bond with both the oils and fats on our hands (that contain germs) and water, so the water rinses the germs and oils away. This is why it's important to build up a soapy lather. A cool visual experiment to grasp this concept could be to mix water with oil in a clear container and seeing how you obtain two separate layers that do not mix.
 - The alcohol in hand sanitizer kills germs (and other microbes) by disrupting the proteins in their outer membranes.
- In preparation for writing their trivia questions and evidence-based answers for the Germology Game Show in the next step, ensure students respond to the final question on the handout: What facts or ideas from this activity do you want to share with your community through the Germology Game Show?

3. Guide question writing for the Germology Game Show to connect learning about clean hands to the unit driving question.

- Revisit the class *Know and Need to Know* chart for a final time. Review the questions in the “Need to Know” column to see if students can now answer them after the *Bodies Versus Germs* lesson and can move questions to the “Know” column. Elicit any new questions that students have developed and add them to the “Need to Know” column.
- Since students are preparing to dive into project work, address any remaining questions that are relevant to creating the Germology Game Show.
- Organize students into their original jigsaw groups from Step 2. Guide students to select one or two ideas from this activity to focus on for writing trivia questions and evidence-based answers. Use the section for this activity on the *Trivia Question Builder* handout to structure their process.
 - For this activity, evidence can come from the *Clean Your Hands* handout.
 - Circulate to support and press students’ thinking as they work on their questions and evidence-based answers. Emphasize how they should make cause-and-effect connections between the different ideas and factors they are communicating about, such as, “Soap causes us to have less germs on our hands by lifting up the oil that holds on to the germs, which helps keep us from spreading germs to others.”

4. Prepare for finalizing the unit project by having students engage with an example of their final product and write an introduction to the Germology Game Show.

- Have students review different examples of the type of final product that they will be creating, in preparation for the rest of the step and for finalizing their trivia questions and evidence-based answers for the Germology Game Show in the next activity.
 - Examples include Kahoot-style quizzes about a topic they already know about, such as the quiz, *Gross Out*; video clips of kid-friendly trivia shows; or MythBusters-style explanatory videos. such as *How Much Water Can a Wet Dog Shake Off?* (2:44).
 - Depending on the class’ access to technology, students can also get inspiration for writing their game show questions by playing the Health IQ game after downloading the *CDC’s Health IQ App* on a tablet or phone.

- Explain that all the trivia questions students have written throughout the unit will be finalized in the next activity, but first they need to consider how the Germology Game Show should be introduced to the audience of community members to spark their interest.
- Guide students as they individually write a paragraph that expresses their opinion about why it matters for community members to understand the scientific reasons that germs make us sick more often in the winter. Their paragraphs can be used to introduce the Germology Game Show, so encourage creative writing and use of language.
- Supporting sentence starters to provide to students include:
 - Welcome to the Germology Gameshow! I think you should know about the science of winter germs because...
 - One reason I think this is....
 - For example, [connect between opinion and reason]
 - Finally, [concluding statement that leads into the game show]

Informal Assessment

Use students' responses on the *Clean Your Hands* handout to assess their ability to understand key ideas from reading and media resources. Use students' questions and evidence-based answers to assess their understanding of how soap and hand sanitizer work, and how that connects to the unit driving question. Students' written paragraphs can be used to assess their ability to clearly express an opinion and support that opinion with reasoning.

OBJECTIVES

Subjects & Disciplines

Biology

- Health

Learning Objectives

Students will:

- Identify how everyday activities can help keep germs from spreading.
- Teach about and learn from a peer about how soap or hand sanitizer work to kill germs.

- Collaborate to create trivia questions and evidence-based answers for the unit project.
- Write an introductory paragraph about why it matters for community members to understand the science behind why germs make us sick more in the winter.

Teaching Approach

- Project-based learning

Teaching Methods

- Discussions
- Jigsaw
- 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.RI.3.3:**

Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.

- **CCSS.ELA-LITERACY.RI.4.3:**

Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

- **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.3.1

- **Writing Standards K-5:**

Text Types and Purposes, W.4.1

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

As highlighted in this activity, washing or cleaning our hands is one of the easiest and most effective activities to prevent germs from spreading and attacking our bodies. Washing with soap and water for at least 20 seconds (singing the Happy Birthday song twice can help keep track of time!) is the ideal method since it physically removes germs and substances from our skin, but when not available, an alcohol-based sanitizer that is at least 60 percent alcohol is a recommended substitute.

Especially in the wake of a challenging and traumatic event such as the COVID-19 pandemic, it is important to empower students in project-based learning (PBL) units by orienting towards actionable solutions. This activity, as well as the unit as a whole, helps to do so by providing the science behind cleaning our hands, which students can leverage in their evidence-based game show questions for the unit's final product.

Prior Knowledge

☐ Recommended Prior Activities

- [Bad Germs: Keep Out!](#)
- [Helping and Hurting Our Immune Systems](#)

Vocabulary

Term	Part of Speech	Definition
germ	<i>noun</i>	disease-producing microbe.
molecule	<i>noun</i>	smallest physical unit of a substance, consisting of two or more atoms linked together.
soap	<i>noun</i>	substance used for washing and cleaning.

