

RESOURCE LIBRARY

ACTIVITY : 1 HR 15 MINS

Sick Days

Students launch into the unit by making personal connections to the common cold and analyzing data related to seasonal patterns of people getting sick. They are introduced to the driving question and final product for the unit and share their initial hypotheses about why germs make people sick more often during the winter.

GRADES

3, 4

SUBJECTS*Biology, Health***CONTENTS**

1 PDF

OVERVIEW

Students launch into the unit by making personal connections to the common cold and analyzing data related to seasonal patterns of people getting sick. They are introduced to the driving question and final product for the unit and share their initial hypotheses about why germs make people sick more often during the winter.

For the complete activity with media resources, visit:

<http://www.nationalgeographic.org/activity/sick-days/>

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DIRECTIONS

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

1. Engage students in the unit's driving question by having them share experiences related to the common cold.

- Ask students to think back to when they last had a cold, flu, or stomach bug. Use a Think-Pair-Share strategy to have students share responses to some or all of these follow-up questions:
 - *What were your symptoms?*
 - *Did you have to miss school or other events?*
 - *How did you feel, either in your body or your emotions?*
 - *What time of year were you sick?*
- On the board or as a digital resource, tally students' responses to the final question, with the four seasons as column headers.
- Have students determine which season had the highest number (or proportion) of incidents of illness. This can be done individually, in partners, or as a class. Options, depending on the math standards that you are working with, include:
 - Adding up the tally marks for each category
 - Dividing up the tally marks for each category by the total number to calculate the fraction or decimal represented by each category
 - Creating a bar or line graph
- Lead the class in making sense of their data, to determine which seasons had the highest number of incidences of the common cold. Typical responses should indicate more students were sick in fall and winter.

2. Lead students through analyzing an authentic data representation to understand that people get sick more often in the winter.

- Project the [Flu Trends](#) website and select the "Current Flu Season" option to display a line graph of the percentage of people in the United States experiencing flu-like symptoms.
 - You may need to use the slider at the bottom of the graph to show a full year that includes the summer months.

- Support data literacy as you walk the class through the line graph, making sense of what it shows. For example, identify:
 - The units on the x-axis—Time/Years
 - The units on the y-axis—Percentage of people in the United States experiencing flu-like symptoms
 - What the lines represent—The changes in the percentage of people in the United States experiencing flu-like symptoms over time
 - The data sources—
 - Blue line: *The Centers for Disease Control: [Weekly U.S. Influenza Surveillance Report](#)*
 - Red line: *[Flu Near You](#)*, a website in which people can self-report if they have flu-like symptoms
- Have students practice interpreting trends by selecting two to three of the previous flu season year options.
 - For most years, the fall and winter months will show a higher percentage of people in the United States experiencing flu-like symptoms in comparison to the spring and summer months.
- Compare the results from the findings on the class' data table or graph to their findings from the *Flu Trends* graph.
 - Ask students if this is the same or different finding than what they found for their class.
 - If the trends are different, invite students' ideas about why this could be the case. Build on their ideas to emphasize the concept that it could be related to the small number of data points represented by each student in the class versus the *Flu Trends* graph, which draws from two different data sources of nationwide data: the U.S. Centers for Disease Control and self-reported data from the *Flu Near You* website.

3. Elicit students' initial hypotheses related to the unit's driving question of why germs make us sick more often in the winter.

- Introduce the unit's driving question: Why do germs make us sick more often during the winter?
 - Explain that students will investigate this question during the unit, applying what they learn about germs, our immune systems, and environmental factors.

- Distribute the Question Quadrant handout and use the Think-Pair-Share strategy to have students record and share their ideas in response to the unit's driving question.
- The Question Quadrant helps scaffold and organize students' thinking about the unit's driving question by separating their ideas into possible factors: Germs, People, Environment, or Something Else.
 - For the Something Else category, direct students to identify additional factors that they think may also play a role. At this point, do not dispel any misconceptions that students may have.
- Next, direct students to draw on the ideas they recorded for each factor to write an initial hypothesis that responds to the unit's driving question. Hypotheses could relate to just one factor or more factors.
- Emphasize that students are not meant to identify the "right" answer at this point, but to share their initial thinking, just like scientists do.
- Prompt students to also add one or two questions that they have about each factor.
- Create a shared class Question Quadrant chart to record class trends of students' initial hypotheses and questions, either on chart paper or digitally, that can be revisited over the course of the unit.
 - Be sure not to reveal the explanation to students at this point but ask probing questions as you elicit their initial hypotheses and questions.

4. Introduce the unit's final product: The Germology Game Show.

- Explain that students will create a Germology Game Show to communicate what they learn about germs and to challenge community members to think about why we get sick more often in the winter.
 - Determine in advance the format that students will present their trivia questions, whether a game show or otherwise (see Tips for suggestions). Share those details with students to foster excitement and engagement.
- Explain that the class will work collaboratively to create the game show as small groups develop questions and answers about each of the factors on the Question Quadrant.
- All the learning activities in the unit will support students in creating their game show questions and evidence-based answers that they will use to teach their community about

germs and how to stay healthy during the winter.

- Create a class *Know and Need to Know* chart (See Tips for more details) to provide students a road map of guiding questions that will lead them to a successful unit project. Document students' ideas and questions in a public document, either on chart paper or digitally, so that the chart can be revisited throughout the unit.
- Have students discuss the following questions with a partner and then share their thoughts with the class:
 - What do we already know about why germs make us sick more often in the winter?
 - What do we need to know about why germs make us sick more often in the winter, in order to create a Germology Game Show to share what we learn with our community?

Tip

Step 1: Be sensitive to the fact that students' experiences of "being sick" may be more serious than the common cold, especially given the 2020-2021 COVID-19 pandemic. Direct the discussion to the common cold or focus more broadly on when students have observed that more people at school or in their communities have been sick with the common cold. Students can also have the option to individually write and submit their responses rather than share with a partner or the class.

Step 3: To orient yourself to the full explanation as to why germs make us sick more often in the winter, read the Background Information section and/or visit the resources in the Resources (For Further Exploration) section. Be sure not to reveal the explanation to students at this point, but it may help to generate probing questions as you prompt their initial hypotheses in Step 3.

Step 4: In preparation for introducing the unit's final product of a Germology Game Show, consider key factors in advance: 1) Is there a specific and/or authentic audience that you can invite for the game show? Some options include: peers or younger students at school, family members, and community members; and 2) What format for the game show best fits your class

and school setting? Some options include: a live game show or quiz bowl, like the [National Geographic GeoBee](#); self-quiz cards; an interactive quiz, such as [Gross Out](#); or a MythBusters-style explanatory video, such as [How Much Water Can a Wet Dog Shake Off?](#) (2:44).

Step 4: To learn more about facilitating a *Know and Need to Know* chart in project-based learning, read the article [Using the Need to Know List to Support Gold Standard PBL Teaching](#) from PBL Works for explanations and examples.

Informal Assessment

On the *Question Quadrant* handout, assess students' initial hypotheses about why germs make us sick more often during the winter to understand their prior experiences, knowledge, and questions. Students' ideas and questions on the *Know and Need to Know* chart can also be used to assess their existing understanding. Use what you find out about students' thinking to guide subsequent instruction.

If the Common Core Math Standards are a focal point of instruction, use students' data representations in Step 1 and/or abilities to analyze the *Flu Trends* graphs in Step 2 as evidence for meeting these standards.

OBJECTIVES

Subjects & Disciplines

Biology

- Health

Learning Objectives

Students will:

- Collect and analyze data and graphs to determine that winter generally has the highest incidence rate of common illnesses.
- Share initial hypotheses about the unit's driving question: why germs make us sick more often during the winter.
- Understand the project and driving question for The Truth about Year Round Germs unit.

Teaching Approach

- Project-based learning

Teaching Methods

- Cooperative learning
- Discussions
- Writing

Skills Summary

This activity targets the following skills:

- Geographic Skills
 - Asking Geographic Questions

National Standards, Principles, and Practices

COMMON CORE STATE STANDARDS FOR MATHEMATICS

- CCSS.MATH.CONTENT.3.MD. B.3:

Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories.

- CCSS.MATH.CONTENT.3.NF. A.1:

Understand a fraction $\frac{1}{b}$ as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction $\frac{a}{b}$ as the quantity formed by a parts of size $\frac{1}{b}$.

- CCSS.MATH.CONTENT.4.NF.C.6:

Use decimal notation for fractions with denominators 10 or 100.

- CCSS.MATH.CONTENT.4.NF.C.7:

Compare two decimals to hundredths by reasoning about their size.

NEXT GENERATION SCIENCE STANDARDS

- Science and Engineering Practice 1:

Asking questions and defining problems

- **Science and Engineering Practice 4:**

Analyzing and interpreting data

- **Science and Engineering Practice 6:**

Constructing explanations and designing solutions

THE COLLEGE, CAREER & CIVIC LIFE (C3) FRAMEWORK FOR SOCIAL STUDIES STATE STANDARDS

- **Causation and Argumentation: D2.His.14.9-12:**

Analyze multiple and complex causes and effects of events in the past.

- **Human Population: Spatial Patterns and Movements: D2.Geo.7.6-8:**

Explain how changes in transportation and communication technology influence the spatial connections among human settlements and affect the diffusion of ideas and cultural practices.

Preparation

What You'll Need

REQUIRED TECHNOLOGY

- Internet Access: Required
- Tech Setup: 1 computer per classroom, Projector

PHYSICAL SPACE

- Classroom

SETUP

Before class, it may be helpful to create a chart with the four seasons as column headers to note what times of year students had the common cold, and a class Question Quadrant to note students' initial hypotheses about why germs make us sick more often in the winter. The initial hypotheses will be revisited over the course of the unit, so be sure to use chart paper, digital resources, or another shared document.

GROUPING

- Large-group instruction

- Small-group learning

BACKGROUND & VOCABULARY

Background Information

This unit focuses students' learning about germs, the environment, and the human immune system through the everyday phenomenon of why we get sick more often in the winter. By the end of the unit, students will be able to fully explain the phenomenon by discussing the following contributing factors. In the winter, there are environmental factors (i.e., decreased humidity so droplet particles remain in the air for longer, dry air drying up the mucus in our noses) and stressors on our bodies (such as lack of natural vitamin D from the decreased levels of sunlight during the winter, 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, decreasing the levels of ventilation and forcing face-to-face contact for longer periods of time without a barrier of protection (i.e. mask) which increases the likelihood of spreading germs. Another factor is that viruses (which cause the common cold, influenza, and coronavirus) have been found to be more stable (cold temperatures make the virus coating tougher and more resilient) and stay in the air longer in cold and dry conditions. This is because the low amounts of moisture present in the air quickly evaporate, allowing the virus to stay in the air for longer times when the weather is cold and dry. It is important to note that we typically only get sick if exposed to the disease-causing germs and not from cold temperatures alone (unlike popular myths).

In Project-Based Learning (PBL) and the related approach of leveraging an anchoring phenomenon to engage and support students' science learning, teachers should understand the explanation for the phenomenon in order to anticipate and guide students' content learning. However, it is crucial to not reveal key aspects of the explanation or correct students' original hypotheses or misconceptions. Instead, throughout the unit, students will continually return to the unit driving question why germs make us sick more often during winter, revising their initial hypotheses as they learn more and deepen their understanding. Importantly, the goal of this 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 are introduced to in this activity.

Prior Knowledge

Recommended Prior Activities

- None

Vocabulary

Term	Part of Speech	Definition
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.
symptom	<i>noun</i>	sign or indication of something.

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](#)

