

RESOURCE LIBRARY  
ACTIVITY : 1 HR

## Introduction to Microbes and Human Body Systems

Students build a stronger understanding of how the human body is organized and interacts with microbes through a series of articles and videos and by creating a human body microbial map. Then they create a public service announcement on a specific microbe.

### GRADES

5 - 8

### SUBJECTS

*Biology, Health*

### CONTENTS

2 PDFs

## OVERVIEW

Students build a stronger understanding of how the human body is organized and interacts with microbes through a series of articles and videos and by creating a human body microbial map. Then they create a public service announcement on a specific microbe.

For the complete activity with media resources, visit:

<http://www.nationalgeographic.org/activity/introduction-microbes-and-human-body-systems/>

## In collaboration with



## DIRECTIONS

This activity is a part of the Misunderstood Microbes unit.

## 1. Students make Human Body Microbial Maps to show their initial ideas about how the body is organized.

- Explain that the purpose of making a microbial map is for students to show their initial ideas about how the human body is a system of interacting subsystems.
- In partners, prompt students to use the body outline on the Human Body Microbial Map handout (or on chart/butcher paper, to facilitate drawing with greater detail and sharing out) to create their maps.
- Encourage students to use just one colored pencil to draw the systems of the body. In Step 3, students will use additional colors to add microbes that might be found in or on those body systems and their impacts on the body.
- As students collaborate on their models, circulate to understand their ideas and thinking.
  - Emphasize that there are no wrong ideas at this point; each group's map should show each partner's initial ideas about the organization and systems of the human body.

## 2. Elicit students' ideas about microbes in order to activate their prior knowledge and understand their thinking.

- Ask students to share what they think a microbe is and why microbes are important for human body systems, other organisms, and ecosystems. Record students' responses in a visible place to keep track of their thinking and to refer back to throughout the rest of the activity.
- Ask students:
  - *What is a microbe?* (Organisms that cannot be seen with the naked eye.)
  - *Why are microbes important for other organisms and ecosystems?* (Many organisms (including us!) rely on microbes to digest food, process waste, and protect from disease. In ecosystems, microbes are also crucial in decomposing waste and other organisms to cycle nutrients back into the food web. Additionally, some microbes produce their own energy through photosynthesis or chemosynthesis, and therefore are foundational to food chains, especially in extreme environments.)

### 3. Students build on their existing knowledge about microbes by watching a short video and reading the accompanying online information.

- Learn about microbes from the [Misunderstood Microbes](#) video:
  - Before starting the video, post these two questions to guide student viewing:
    - *What do you notice about the microbes? What similarities and differences do you see between the types of microbes shown?* (The microbes featured in the video are eyelash mites, head lice, belly button bacteria, bacteria that cause stinky feet, and skin bacteria.) Students may notice that they vary in their shapes and relative sizes.
    - *Do you notice any patterns in the parts of the human body that are highlighted as habitats for microbes?* The video will show eyelashes, head/hair, belly button, feet, and skin. (Patterns that students may notice include: on the outside of the body, in crevices or areas that offer some amount of protection to the microbes.)
  - After watching the video, lead the class in a discussion, encouraging students to share their observations in response to the questions listed above.
- Learn about microbes by reading information provided online: Engage in multiple rounds of collaborative reading of the “Background Info” and “Fast Facts” sections on the [Misunderstood Microbes](#) video page.
  - The purpose of this reading is to give students a brief introduction to the many kinds of microbial organisms, and their importance to the human body and other ecosystems.

**Round 1:** Read the information aloud to students. Model active reading by unpacking dense sentences, making use of the embedded definitions, and pausing to ask questions and make connections. Prompt students’ sense-making by asking:

- *What new ideas about microbes were surprising?*
  - *What terms/words/ideas in this article were challenging?*
  - *What do you want to know more about?*
- Direct students to return to their Human Body Microbial Maps to add in microbes using a new color of pencil. Ask:
    - *What microbes did you learn about from the video and the text?* Direct students to add the microbes to the body map on the area they affect and label.

- *What other microbes do you know about?* Direct students to add the microbes to the body map on the area they affect and label.

**Round 2:** Re-read the “Background Info” section on the [Misunderstood Microbes](#) video page with students, this time emphasizing the body systems that are discussed.

- Direct students to add additional body systems to their Human Body Microbial Maps. Ask:
  - *What body systems were referenced in the video and the text? Place them on the body map and label.*
  - *What other systems do you know about and think might have microbes?*

**Round 3:** Finally, students can start to categorize the microbes on their maps. Have them use the margins of their body map to:

- List positive microbes and their impact.
- List negative microbes and their impact.
- Encourage students to be creative in considering the type of microbes and their impact on different parts of the body.

#### **4. Introduce students to the Misunderstood Microbes unit and project.**

- If following the Misunderstood Microbes unit, describe the unit’s learning arc and culminating project:
  - Tell students that they will return periodically to their Human Body Microbial Maps over the course of the unit they are starting today.
  - Outline some of the key learning activities that students will undertake during the unit, which include:
    - Using online interactives to understand how scientists organize and classify all living organisms.
    - Reading and interactives about the organization of the human body system.
    - Learning that living things are made of cells through hands-on investigation.
    - Readings and interactives to understand how microbes are helpful, harmful, and neutral to humans.
- Introduce students to the unit’s Driving Question and project:

**Driving Question:** Which microbes should we protect or eradicate to keep our bodies healthy?

**Project:** Students will collaborate in small groups to create a public service announcement (PSA) with an online animation app (teacher's choice) to introduce a particular microbe to their community. Their PSA will include an evidence-based argument regarding the value of eradication of the microbe, based on its various impacts on the systems of the human body. The microbes are:

- *E. coli* (bacteria)
  - Botulism (bacteria)
  - Measles (virus)
  - *Giardia* (protozoan)
  - Valley Fever (fungus)
  - Ringworm (fungus)
- Create a *Know & Need to Know* chart based on students' understanding and questions about the Misunderstood Microbes unit.
  - Use the Think-Pair-Share process described below to elicit and record students' ideas and questions related to the unit, which can be revisited over time:
    - Ask students to think on their own and then discuss with a partner:
      - *What do we already know about microbes and the human body?*
      - *What do we need to know about microbes and the human body in order to create an evidence-based argument about the value of eradicating a particular microbe?*
  - Prompt students to share their ideas and questions in a whole-class discussion, recording their thoughts on the class *Know & Need to Know* chart.
  - Keep the chart in a visible place in the classroom or easily accessible online to be able to refer to students' expertise and questions with which they started off the unit. Students will more formally revisit the chart throughout the unit as they learn new content and develop new questions.

Tip

Step 2: Before the whole-class discussion, scaffold students' sharing of their ideas by having them engage in a Think-Pair-Share. Read more about this collaborative learning strategy in [this article](#) from Adolescent Literacy.

## Modification

Step 3: To support students' comprehension of the reading, students can also complete the reading individually, in partners, or small groups.

## Tip

Step 4: To learn more about facilitating a Know & Need to Know chart in project-based learning, [this PBL Works blog](#) provides explanation and examples.

## Informal Assessment

Use students' responses from the various discussions and reading prompts, as well as the ideas they reveal in their [Human Body Microbial Maps](#), to understand their initial thinking about microbes and human body systems. You can then leverage and build on students' ideas in subsequent activities in the Misunderstood Microbes unit.

## OBJECTIVES

## Subjects & Disciplines

### Biology

- Health

## Learning Objectives

Students will:

- Collaborate on creating a visual model to share their initial ideas about how the human body is organized into systems and the presence and impacts of microbes on the different systems of the body.

## Teaching Approach

- Project-based learning

# Teaching Methods

- Brainstorming
- Discussions
- Reading

# Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
  - Information, Media, and Technology Skills
    - Information, Communications, and Technology Literacy
  - Learning and Innovation Skills
    - Creativity and Innovation
    - Critical Thinking and Problem Solving
- 21st Century Themes
  - Financial, Economic, Business, and Entrepreneurial Literacy
- Geographic Skills
  - Asking Geographic Questions
- Science and Engineering Practices
  - Asking questions (for science) and defining problems (for engineering)
  - Constructing explanations (for science) and designing solutions (for engineering)

# National Standards, Principles, and Practices

## COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS & LITERACY

### • CCSS.ELA-LITERACY.RST.6-8.2:

Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

# NEXT GENERATION SCIENCE STANDARDS

## • MS. From Molecules to Organisms: Structures and Processes:

MS-LS1-3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

### Preparation

### What You'll Need

### MATERIALS YOU PROVIDE

- Butcher paper
- Chart paper
- Colored pencils

### REQUIRED TECHNOLOGY

- Internet Access: Required
- Tech Setup: 1 computer per classroom, Monitor/screen, Printer, Projector, Speakers

### PHYSICAL SPACE

- Classroom

### GROUPING

- Large-group instruction
- Large-group learning
- Small-group learning

## BACKGROUND & VOCABULARY

# Background Information

Microbes are organisms that are too small to be seen by the human eye and include bacteria, archaea, protists, viruses, and fungi. Although some microbes cause disease, they are also crucial to the functioning of human bodies through processes such as digestion and aiding



the immune system, and ecosystems through processes such as nutrient and energy cycling.

# Prior Knowledge

## Recommended Prior Activities

- None

## Vocabulary

Term	Part of Speech	Definition
ecosystem	<i>noun</i>	community and interactions of living and nonliving things in an area.
eradicate	<i>verb</i>	to destroy or remove.
microbe	<i>noun</i>	tiny organism, usually a bacterium.
organism	<i>noun</i>	living or once-living thing.
system	<i>noun</i>	collection of items or organisms that are linked and related, functioning as a whole.

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### For Further Exploration

#### Video

- [Curiosity Stream: Life on Us Trailer](#)

