MARION INSTITUTE
GROW EDUCATION

LESSON:
MICROBES AND ME!
DURATION: TWO (2)
40 MIN SESSIONS

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Duration: *Two (2) 40-minute sessions*

Section 1: Framework

Essential Questions

- How essential are the smallest living beings on our planet?
- What do humans and other living organisms need to grow and thrive?
- How do different organisms interact to support all forms of life on Earth?
- How does energy flow through and to living things?
- What impact do microbes have on human health?
- How can we support and protect the microbes that we rely on for our health?

Lesson Objectives

- Students will know key vocabulary associated with microbes and human health: microbes, organisms, microorganisms, nutrient, whole foods, pesticides, scientific laws, law of conservation, food web
- Students will understand that there is a world of living organisms that exists that is too small to be seen with the naked eye.
- Students will understand that bacteria, viruses, and fungi are examples of microorganisms that are essential to the health of other organisms, including humans.
- Students will understand that when one organism eats another, the act of eating represents a transfer of energy and nutrients; and students will be able to use this understanding to evaluate the flow of energy among organisms in a food web.
- Students will understand that the health of our microbes is related to our overall health.
- Students will understand that the foods we eat impact our microbes; and they will also understand that each food gives us specific nutrients, including vitamins and minerals.
- Students will apply their learning and research skills in order to name vitamins and minerals found in common garden produce.
- Students will be able to articulate at least two steps they can take to support the health of their gut microbiome (and their overall health).

Context

Like an astronaut in space, we are too large and too far away to appreciate the abundance of life that is everywhere around us and within us. Though we cannot see them, trillions of microbes are part of our biology. These tiny life forms play essential roles in our everyday health, helping to break down and extract energy and nutrients from the foods we eat. They rely on us to keep them safe so they can do their jobs and keep us healthy. In "Microbes and Me!" students will learn about the important role that microbes play in human health, practice tracing the flow of energy and nutrients from one organism to the next in the context of a food web, and create a flipbook that reinforces the nutritional value of the produce that comes from the local garden or market.

Standards

PRIMARY
Massachusetts Science Standard 3.LS4.3: Construct an argument with evidence that in a particular environment some organisms can survive well, some survive less well, and some cannot survive.

RELATED
Massachusetts Science Standard 3.LS4.4: Analyze and interpret given data about changes in a habitat and describe how the changes may affect the ability of organisms that live in that habitat to survive and reproduce.
Massachusetts Reading Standard RI.3.10: Independently and proficiently read and comprehend informational texts, including history/social studies, science, mathematical, and technical texts, exhibiting complexity appropriate for at least grade 3.

Section 2: Activities

PART A

Materials

- Slides: Microbes and Me! (Part I of II)
- Handout: Endless Energy
- Writing utensil
- Paper (lined or unlined)

1. Activator (4 minutes)

An activator is a great way to encourage students to begin thinking about the day's topic. Since today's topic has to do with the scale of living things, it may be helpful to activate students' prior knowledge as it relates to the size of living things on Earth.

Begin by ensuring that each student has a piece of paper and a writing utensil. Ask students to spend 30 seconds listing the largest living things on our planet. Ask students to then spend 30 seconds listing the smallest living things on our planet. After one minute has elapsed, spend 2-3 additional minutes recording students' feedback in a place within the classroom that all students will remain visible to all students throughout the lesson. You might even place students' contributions on a spectrum from smallest to largest. Feel encouraged to use this visual aid as a building block throughout the lesson.

2. Slides: "Microbes and Me!, Part I of II" (20 minutes)

Read through the provided slides, "Microbes and Me!, Part I of II", with students. Review any unfamiliar words or phrases as you go. Several questions are asked throughout the presentation to help students engage with the terms and cultivate understanding through personal connection. Take a moment to briefly discuss students' responses to these questions, as appropriate and beneficial.

3. "Endless Energy" Handout (16 minutes)

Provide students with a copy of the handout "Endless Energy". This handout is designed to help students better understand the way that energy and nutrients flow from small organisms to bigger ones in the food web. Students are asked to utilize the illustration provided to determine the transfer of energy that takes place among organisms in a soil food web and to apply their knowledge to describe how energy from organic waste ends up in the food we eat. Depending on time, this handout may be assigned as independent work or form the basis of further sharing and discussion.

PART B

Materials

- Slides: Microbes and Me! (Part II of II)
- Handout: The Nutrients in My Garden Flipbook
- Handout: The Nutrients in My Garden Informational Resource
- Video: How to Make a Flipbook with Just One Cut
- Writing utensil
- Scissors
- Optional: crayons, markers, colored pencils

1. Introduction (2 minutes)

Begin by reviewing learning from Part A of the lesson with students. Let students know that today they will be learning more about the microbes we rely on for our energy and nutrients. Students will also be learning about the various nutrients available to us in the garden or at the grocery store.

2. **Slides: “Microbes and Me!, Part II of II” (10 minutes)**

Read through the provided slides, “Microbes and Me!, Part II of II”, with students. Review any unfamiliar words or phrases as you go. Several questions are asked throughout the presentation to help students engage with the terms and cultivate understanding through personal connection. Take a moment to briefly discuss students’ responses to these questions, as appropriate and beneficial.

3. **Making “The Nutrients in My Garden Flipbook” (8 minutes)**

In the next part of the lesson, students will do some research to learn about the vitamins and minerals that we gain when we eat certain foods commonly found in the garden or at the local market.

In order to prepare to record their research, students must first make a Flipbook, which they can color, customize, and record their research findings in.

To help guide students through the folding and cutting involved, please review the How to Make a Flipbook With Just One Cut video.

4. **Completing the Flipbook (20 minutes)**

Once students have made their Flipbooks, it’s time to add content and color! “The Nutrients in My Garden Flipbook” invites students to learn about the vitamins and minerals in common garden produce. The first pages prompt students to learn about the vitamins and minerals in garlic, lettuce, and tomatoes. Three additional pages allow students to select produce they would like to learn more about (fruits, vegetables, herbs, etc.) and to draw their own graphics to accompany their informational text.

To simplify the research process, teachers may wish to project or provide students with the handout “The Nutrients in My Garden Informational Resource”. This handout lists six fruits and vegetables that are commonly found in gardens and at local markets. For teachers wishing to provide students with a bite-sized research opportunity, a search engine search of “vitamins and minerals in _” will return a list of these for each search query. Students can then record their research findings for any produce items they wish to include.

Section 3: Lesson Extensions

- Consider using the information included in finished Flipbooks to make garden placards for each fruit, vegetable, and herb growing there!
- Challenge students to design a snack using produce that incorporates several fruits, vegetables, and/or herbs and includes a range of vitamins and minerals.