

Click here for the official BPS Scope & Sequence for this unit.

Mystery Science- Human Machine

<https://mysteryscience.com/body/human-body-vision-the-brain>

Unit Overview: In this unit, students investigate structures and functions of the human body. Students explore how our bones and muscles are interconnected, how our eyes interact with light and impact our vision, and how our brain responds to stimuli in our environment.

Key Concepts Overview:

- Muscles pull on bones to create movement.
- Eyes are sensory organs that receive information about the world.
- Light enters the eye, which provides information about surroundings.
- The pupil gets larger to let more light in when it is dark.
- The brain receives information from the senses, processes the information, and controls the muscles to enable movement.

Materials:

- Printable mystery science materials
- Dot stickers or tape
- Credit card magnifiers
- Rulers
- Glue sticks
- Index cards
- String
- Paper clips
- Rubber bands
- Q-tips
- construction paper
- Paper fasteners
- Pipe cleaners

Standards:

Grade 4: Life Science 4-LS

LS1. From Molecules to Organisms: Structures and Processes

4-LS1-1. Construct an argument that animals and plants have internal and external structures that support their survival, growth, behavior, and reproduction.

Clarification Statements:

- Animal structures can include legs, wings, fins, feathers, trunks, claws, horns, antennae, eyes, ears, nose, heart, stomach, lung, brain, and skin.
- Plant structures can include leaves, roots, stems, bark, branches, flowers, fruit, and seeds.

Science & Engineering Practices:

☒ 1: Asking Questions and Defining Problems	☒ 2: Developing and Using Models	☒ 3: Planning and Carrying Out Investigations	☐ 4: Analyzing and Interpreting Data
☐ 5: Using Mathematics and Computational Thinking	☒ 6: Constructing Explanations and Designing Solutions	☐ 7: Engaging in Argument from Evidence	☒ 8: Obtaining, Evaluating, and Communicating Information

Anchor Phenomenon

Unit Launch: Owl Ambush- Anchor Phenomenon

The anchor phenomenon for this unit is an owl catching its prey. Students generate observations and questions about the phenomenon and create an initial model to explain how the owl's body systems work together to catch prey.

Objectives: Students will be able to...

- Share what they think, notice and wonder about how an owl's body parts work as a system to sense and respond to its environment through class discussion and writing.
- Create an initial conceptual model to explain how the owl's body parts work together to hunt. Students will revisit their model after each Mystery to add new information to it.

Standards:

Grade 4: Life Science 4-LS

LS1. From Molecules to Organisms: Structures and Processes

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Vocabulary: **predator, prey, system, environment**

Materials:

For each student:

- Owl System Model worksheet
- See-Think-Wonder worksheet

For instruction:

- Copy of Human Machine Teacher Guide teacher-only resource
- Internet & Projection of Mystery Science video for class to view

Preparation:

- Before starting this lesson, review the unit Teacher Guide for an overview of the Human Machine Anchor Layer. This anchor phenomenon for this unit is the process of owls catching prey. In the activity, they create an initial conceptual model to explain how the owl's body parts work together to hunt. Students will revisit their model after each Mystery to add new information to it. It is important to encourage students to recognize that even if they don't know the perfect answer yet, they are going to learn a lot throughout the unit and have an opportunity to change or add to their first model.
- Step 1: Set up your classroom Set up your classroom by creating a class "See-Think-Wonder" chart (the student version is linked below). We recommend using chart paper, or a space on your board that won't be erased since you will revisit it throughout the unit.
- Step 2: Print out worksheets Each student needs a: See-Think-Wonder chart Owl System Model worksheet

Procedure:

- Follow the procedure outlined in the Mystery Science lesson.

Notebooking/Documentation/Assessment:

- Owl System Model worksheet
- See-Think-Wonder worksheet

Lesson 1

Why do your biceps bulge?

Objectives: Students will be able to...

- Construct a model of a human finger and observe how pulling on a string (a model for tendons) causes it to bend at the joints.

Standards:

Grade 4: Life Science 4-LS

LS1. From Molecules to Organisms: Structures and Processes

4-LS1-1. Construct an argument that animals and plants have internal and external structures that support their survival, growth, behavior, and reproduction.

Clarification Statements:

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Science & Engineering Practices:

☐ 1: Asking Questions and Defining Problems	☒ 2: Developing and Using Models	☐ 3: Planning and Carrying Out Investigations	☐ 4: Analyzing and Interpreting Data
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Vocabulary: **bicep, bone, dissect, function, joint, model, muscles, observe, skeleton structure system, tendon**

Materials:

For each student:

- Robot Finger Template printout
- glue stick
- Ruler
- Scissors
- Dot stickers or tape
- Index card
- Paper clip
- 18 inch string
- [Move Your Muscles!, Fourth Grade Reading Passage](#)
- Extension Activity: [Mystery Science Document #41](#) - Robot Hand Template

For instruction:

- Internet & Projection of Mystery Science video for class to view

Preparation:

- Print worksheets, gather materials and preview video.
- Prepare String- Each student will need one piece of string that is 18 inches long.
- Extend this Activity and Create Robot Hands-mIn the Extensions, we have a fun engineering extension activity where students combine four robot fingers to create a robot hand. We recommend having each group of four students assemble a hand using the robot fingers they each made. Check our "Extensions" for further instructions.

Procedure:

- Follow the procedure outlined in the Mystery Science lesson.

Notebooking/Documentation/Assessment:

- Orally explain how the model works.
- [Move Your Muscles!, Fourth Grade Reading Passage](#) Answer questions after the reading passage.

Lesson 2

What do people who are blind see?

Objectives: Students will be able to...

- Explain in class discussion and in writing how their eyes work and list some of the causes of vision problems.
- develop a working model of a human eye, using a magnifying lens as a model of the cornea to explore how the structure of this lens is related to the function of our eyes.

Standards:

Grade 4: Life Science 4-LS

LS1. From Molecules to Organisms: Structures and Processes

4-LS1-1. Construct an argument that animals and plants have internal and external structures that support their survival, growth, behavior, and reproduction.

Clarification Statements:

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Science & Engineering Practices:

☐ 1: Asking Questions and Defining Problems	☒ 2: Developing and Using Models	☐ 3: Planning and Carrying Out Investigations	☐ 4: Analyzing and Interpreting Data
☐ 5: Using	☐ 6: Constructing	☐ 7: Engaging in	☒ 8: Obtaining,

Mathematics and Computational Thinking	Explanations and Designing Solutions	Argument from Evidence	Evaluating, and Communicating Information
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Vocabulary: **cornea, dissect, experiment, function, iris, lens, light, model, pupil, retina, structure, vision**

Materials:

For each student:

- Front of the Eye printout
- Colored pencils, crayons or markers
- Scissors
- Dot Stickers or tape
- Index Cards (3x5)s
- Credit Card Size Magnifiers (3x)
- [Mystery Science Document #204](#) -Lesson Assessment

For instruction:

- Internet & Projection of Mystery Science video for class to view

Preparation:

- Print worksheets, gather materials and preview video.
- Print and preview assessments.
- Try Making An Image With the Lens Before Class- As soon as you have a 3X magnifying lens, use it to make an image. For the best image, you need a dimly lit room and an interesting light source — like a window that lets light in, a lamp with a shade, or a television. Watch this short video for a demonstration.
- After you've made an image, check to see what will work in your classroom. Do you have a door to the outside that you can prop open? A bright window? An interesting light fixture?
- If you have a large class, you can set up a few stations with lamps around the room, or send students in batches to a window.
- Hold On To The Eye Models

- If you will be teaching the next lesson "How can some animals see in the dark?" , then you must save the eye models that students make in this lesson. Keep them in a safe place until you are ready to teach the next lesson.

Procedure:

- Follow the procedure outlined in the Mystery Science lesson.

Notebooking/Documentation/Assessment:

- Notebook question: What do people who are blind see?
- [Mystery Science Document #204](#) -Lesson Assessment
- [Mystery Science Document #1013](#) - Unit Assessment

Lesson 3

How can some animals see in the dark?

Objectives: Students will be able to...

- add a smaller pupil to the eye model that they created in the previous lesson.
- observe how the changing size of the pupil controls how much light enters the eye.
- explain the function of their iris and pupil.

Standards:

Grade 4: Life Science 4-LS

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Vocabulary: **dissect, experiment, function, iris, light, model, nocturnal, pupil, reflect, retina, structure, vision**

Materials:

For each student:

- Pupil Card printout
- Eye Model from Previous Lesson
- Colored pencils, crayons or markers
- Copy Reading- “Reading in the Dark:
<https://mysteryscience.com/docs/431>

For instruction:

- Internet & Projection of Mystery Science video for class to view

Preparation:

- Print worksheets, gather materials and preview video.
- Students need the complete eye model (magnifying lens and the index card “retina”) that they made in the previous lesson. If any students were absent for this activity, you can pair them with someone who has an eye model.
- In the first activity, students will experiment to see how their eyes change in response to changes in the light around them. Watch this video

<https://mysteryscience.wistia.com/medias/y3r9dye40o> to see the change they are looking for. (You can also watch for this change in your own eyes. Look at your eyes in a mirror in a dark room and watch what happens when you turn on the lights.)

Procedure:

- Follow the procedure outlined in the Mystery Science lesson.

Notebooking/Documentation/Assessment:

- Notebook question: How can some animals see in the dark?
- [Mystery Science Document #161](#)- Lesson Assessment

Lesson 4

How does your brain control your body?

Objectives: Students will be able to...

- test their reflexes with two very quick experiments and one more involved activity to gather ideas about how we process information in our brains and then respond to that information in different ways.
- explain the brain's role in receiving information from the senses, processing that information, and controlling the muscles to enable movement.

Standards:

Grade 4: Life Science 4-LS

LS1. From Molecules to Organisms: Structures and Processes

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Vocabulary: **brain, dissect, experiment, illusion, motor nerves, muscle, nerves, nervous system, sensory nerves, system**

Materials:

For each student:

- Think Fast! worksheet
- Blank Paper (8.5 x 11")
- Ruler
- [The Human Body: You've Got Some Nerve!, Third Grade Reading Passage](#)
- [Mystery Science Document #163](#)- Lesson Assessment
- [Mystery Science Document #1013](#) - Unit Assessment

For instruction:

- Internet & Projection of Mystery Science video for class to view

Preparation:

- Print worksheet and reading. Gather materials and preview video and reading.

Procedure:

- Follow the procedure outlined in the Mystery Science lesson.

Notebooking/Documentation/Assessment:

- Notebook question: How does your brain control your body?
- [Mystery Science Document #163](#)- Lesson Assessment
- [Mystery Science Document #1013](#) - Unit Assessment

Performance Task

How are animals and plants like machines?

Objectives: Students will be able to...

- research one of the following plant or animals: anglerfish, bat, great white shark, venus flytrap, rattlesnake.
- create a system model to explain how the animal or plant parts work together as a system to receive information, process it, and respond to its environment.

Standards:

Grade 4: Life Science 4-LS

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Vocabulary: **All vocabulary from previous lessons.**

Materials:

For each student:

- Rubric - [Mystery Science Document #1058](#)
- Graphic organizer- <https://mysteryscience.com/docs/1056>
- Research information on anglerfish, bat, great white shark, venus flytrap, rattlesnake - [Mystery Science Document #1059](#)

Preparation:

- Print and read rubric, graphic organizers and research information. Read teacher resource- <https://mysteryscience.com/docs/1057>.

Procedure:

- Follow the procedure outlined in the Mystery Science lesson.

Notebooking/Documentation/Assessment:

- Rubric - [Mystery Science Document #1058](#)
- Presentation- Students share findings with the class.

Extension Activity: Use the following materials to create a model of the animal you researched:

- Modeling clay
- Pipe cleaners
- Paper fasteners

- Construction paper
- Q-tips
- Rubber bands
- Paper clips
- Tape