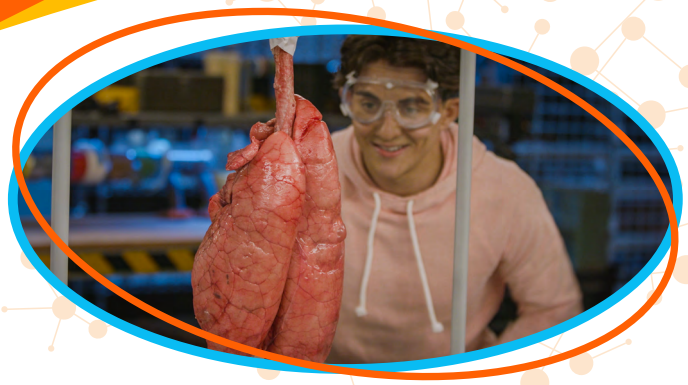
GENERATIONGENIUS
ALWAYS QUESTION. ALWAYS WONDER.



LESSON PLAN

MULTICELLULAR ORGANISMS

GRADES 6-8

SUMMARY

Students will conduct an investigation to figure out how different body systems interact with each other.

NEXT GENERATION SCIENCE STANDARDS CORRELATION

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

MS-LS-1-8. Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

Science & Engineering Practices	Connections to Classroom Activity
Developing and Using Models	• Students create an argument supported by evidence from data they collect in an investigation to support an explanation.
Engaging in Argument From Evidence	• Students use their body systems model to create an explanation of how systems work together.
Obtaining, Evaluating, and Communicating Information	• Students watch the video and engage in an investigation to gather evidence.

Disciplinary Core Ideas	Connections to Classroom Activity
LS1.A: Structure and Function In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions.	• Students engage in an investigation to collect data to serve as the basis for evidence to explain how body systems work together to perform a task. • Students watch a video to learn multicellular organisms are organized in a similar way: cells, tissue, organs, and systems.

LS1.D: Information Processing Each sense receptor responds to different inputs (electromagnetism, mechanical, chemical), transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain, resulting in immediate behaviors to memories.	• Students watch a video to learn about some of the body's sense receptors. • Students engage in sensemaking discussions and explain what they figured out about the senses throughout the questions activities.
Cross Cutting Concepts	**Connections to Classroom Activity**
System and System Models	• Students create a body systems model based on their investigation and use this model to explain the system and their interactions.
Cause and Effect	• Students explain the cause-and-effect relationship between sense receptors and how they can be altered (e.g., taste sweet instead of sour or move from an electrical current).

DURATION

90 min. (or two 45 min. class periods)

This lesson builds on science ideas developed in the Generation Genius 3–5: Brain Processing of Senses video and lesson.

MATERIALS

- Meterstick
- Timer
- Tennis ball or similar item (will be squeezing this item in their hand)
- Materials to make a data table (digital or paper)

ENGAGE

Ask students to engage in any kind of movement (e.g., bouncing a ball, playing catch, or running in place) in the classroom or outdoors. When students are back in their seats, ask them to think about how they were able to do the activity, and tell them to document any questions they have about how their body was able to do the task.

Ask each student to share one question with the class. Record student questions where they are visible to the class. Discuss the questions that have to do with how different parts of the body work together. Students will likely say the different parts of our body (or different body systems) work together, but they may not be able to explain how they work together.

Say to students, "Many of us are wondering how body systems work together. Does it make sense to answer this question first?"

EXPLORE

Tell students that today they will investigate how their eyes and hands work together.

Assign students to work in pairs. Each student will need to create a data table to record “distance meterstick traveled” in centimeters (cm). Students should create space to record three trials and an average.

Student A stands and holds the meterstick at the top, making sure the 1 cm mark is at the bottom. Student B positions his or her open hand at the bottom of the meterstick, making sure his or her thumb is just below the end of the meterstick.

Without warning, student A lets go of the meterstick, and student B grabs it as quickly as possible when he or she sees it begin to drop through his or her open hand. Students may grab the meterstick however they choose (with whole hand, or with thumb and index finger). However, they must use the same grabbing method for each trial.

Students should record where they are touching the meterstick at the highest point. For example, if student B’s finger is at 13 cm on the meterstick (even though rest of hand is lower) when they grab it, then record 13 cm as the highest point. Repeat the investigation two more times. After three trials, tell students A and B to switch places.

Finally, have students average their three trials.

EXPLAIN

Individually or in pairs, ask students to create a model that explains how our bodies are able to catch the meter stick without warning. Remind students to label the components (parts) of their models and use symbols and words to show the relationships between the components. For example, students might include eyes and a brain on their model and show information moving from the eye to the brain with an arrow in the direction of the brain.

WATCH THE GENERATION GENIUS MULTICELLULAR ORGANISMS VIDEO AS A GROUP

After the video, ask students to revise their models based on information shared in the video. Then ask students to compare their models with those of a partner or small group, noting similarities and differences. Allow students to revise their models.

ELABORATE

From the video, students learned that the human body and other living things are made up of many different systems. They also know that all organisms are organized in the same way: groups of specialized cells that work together form tissue, different tissues work together to form organs, and organs work together to create systems.
Students were also introduced to some examples of systems working together. For example, the circulatory system and the excretory system work together to rid the body of things it doesn’t need.

To prompt a class discussion, ask students, “If one system was not working like it should, would it affect other systems? Why do you think those systems work together?” Ask students to turn and talk to share their ideas.

Next, tell students that they are going to do another short investigation to gather data to answer the question, “If one system is not functioning properly, will it affect other systems?” Ask students to make a claim and record it.

Tell students to make a second data table. Have them repeat the previous investigation, but this time, the student catching the meterstick must squeeze a tennis ball for 1 minute *before each trial*. Students should switch roles after completing three trials.

When the investigation is complete, ask students to revisit their claim to determine if there is relevant evidence from their data to support or refute their claim.

Finally, ask students to create an oral and/or written argument using evidence from their data and body systems models to support a claim that answers the question, “If one system is not functioning properly, will it affect other systems?”

EVALUATE

There are multiple ways to assess your students’ understanding of this topic. The exit ticket is an opportunity for students to use the science ideas they built in the lesson in a new context. Alternatively, you can use the Kahoot! quiz (which provides downloadable scores at the end of the game) and/or the paper quiz. All these resources are located right below the video in the assessment section.

EXTENSION

This lesson can be differentiated for more advanced students by having them develop a more sophisticated argument using patterns they identify within and between data set 1 (reaction time) and data set 2 (fatigued muscle reaction time). This could include using a full-class data set and creating a histogram (see guidance for creating a histogram in Google sheets) to help identify patterns.