

## Cells Lesson 1: “The Solve”

### Educator’s Resource Guide: Animated Mystery

*The Solve* contains two mini lessons: The [live video lesson](#) and the [animation lesson](#). For the most comprehensive learning experience, conduct both. If you’re short on time, choose one. Which lesson?

- For a more structured lesson, choose the animation (the lesson below).
- For a more inquiry-based lesson, choose the live video lesson and assign the animation for homework.

#### Objective:

In *The Solve*, students will:

1. Solve a mystery that demonstrates an understanding that the human body is made up of many different types of cells that work together in order to make their bodies function.
2. Create a mind map to explore relationships among complex Cells vocabulary.
3. Demonstrate an understanding that body cells have a slightly different structure, which affects their function.
4. Communicate the role of three main cell parts across different cellular contexts: the mitochondria, the nucleus, and the cell membrane.

**Time Required:** 40-75 minutes

Materials Required	Safety Considerations	Science & Engineering Practices
<ul style="list-style-type: none"> <li>• Student Guide (<i>includes student agenda and vocabulary handout</i>)</li> <li>• Cells Episode</li> <li>• Computer with speakers</li> <li>• Scissors</li> <li>• Glue or Tape</li> </ul>	None	<ul style="list-style-type: none"> <li>• Developing and Using Models</li> <li>• Constructing Explanations or Arguments From Evidence</li> </ul>

#### Episode Description:

When Eric collapses during a hike, Mosa is called to the scene to investigate. After taking an animated journey into the body, learners will discover that there are many parts of a cell at play. As Mosa Mack and team visit a muscle cell, small intestine cell and nerve cell, learners compare three main cell parts: cell membrane, mitochondria, and nucleus. By the end, students discover that a complex set of cells and cell parts are responsible for getting Eric back on his feet.



## **Inquiry Scale: Leveling Information**

*The Solve* can be completed in various settings, including presentation-style, small groups, or individually. In the case of a flipped or blended classroom, it can be completed entirely at home.

### **Level 1: Most teacher-driven** (*recommended for grades 4–5*)

View the animated mystery twice: once in full, and a second time along with the discussion questions, pausing the video as needed to answer the episode questions as a group. Project and complete the Mind Map as a class-wide activity. This can be done digitally or on paper. Have students informally quiz each other on the vocabulary until you feel they're familiar with the terms. Use the discussion questions at the bottom of the Mind Map to have a group discussion. Finally, have students complete the quiz digitally or on paper as an exit ticket.

### **Level 2** (*recommended for grades 5–6*)

View the animated mystery in full. Afterwards, have students work through the episode questions to the best of their ability in small groups. Play the mystery a second time, pausing the video to discuss each question. Direct students to complete the Mind Map in small groups, either digitally or on paper. Come back as a class to review correct answers, as needed. Have students informally quiz each other on the vocabulary until you feel they're familiar with the terms. Use the discussion questions at the bottom of the Mind Map to have a group discussion. Finally, have students complete the quiz digitally or on paper as an exit ticket.

### **Level 3** (*recommended for grades 6–7*)

Provide students with their student URL and have students view the animated mystery in small groups. Have students play the animated mystery once in full and then answer episode questions in their table groups to the best of their ability. Then, as a class, project the mystery, pausing, as needed, to discuss episode questions in a think-pair-share format. Have students complete the Mind Map in table groups, either digitally or on paper. Have students quiz each other on the vocabulary until you feel they're familiar with the terms. In table groups, have students go through the discussion questions on their own, and review answers as a class. Finally, have students complete the quiz digitally or on paper as an exit ticket.

### **Level 4** (*recommended for grades 7–8*)

Provide students with their student URL and have students view the animated mystery and complete episode questions in pairs. Have students review their answers with a neighboring table group. Have students complete the Mind Map in pairs, either digitally or on paper. Have students quiz each other on the vocabulary until they feel they're familiar with the terms. Have these same pairs go through the discussion questions. Finally, have students complete the quiz digitally or on paper as an exit ticket.

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## Agenda

### I. Solve the Cells Video Mystery (20 minutes)

**Differentiation Tip:** The Video Mystery can be viewed as a class, in small groups, individually, or completed for homework. For additional support, students can view the episode twice: once before completing the questions and once with teacher guidance, pausing the video to discuss each answer.

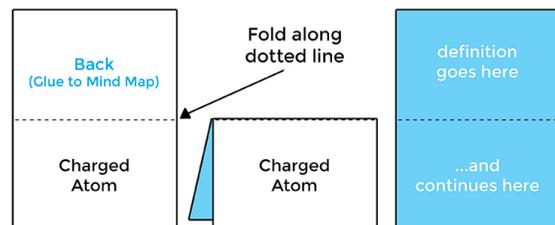
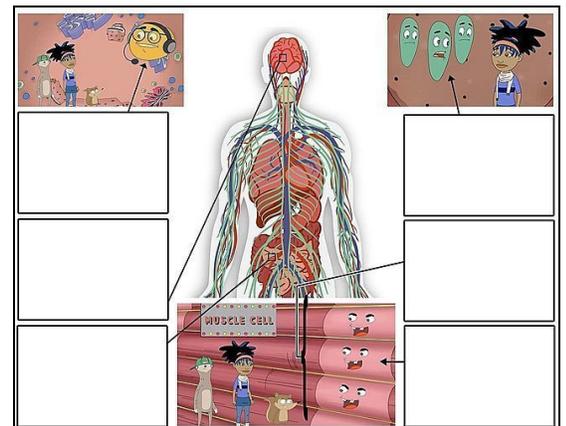
1. Play the animated Mosa Mack Mystery on Cells.
2. Students answer questions either digitally on the Mosa Mack platform or on paper in the Student Guide as they watch. Encourage students to cite the specific time codes in the episode to promote writing with supporting evidence. Answers can be found in the key below.
3. View the answer video to confirm student understanding.



### II. Vocabulary Mind Map Activity (15–45 minutes)

**Differentiation Tip:** The Mind Map can be done as a class, in small groups, individually, or completed for homework. It can be done digitally or on paper.

1. Students may complete the Mind Map **digitally**. Follow the directions below. (15 minutes)
  - a. Go to <https://mosamack.com/home/cells>
  - b. Select **Lesson 1: The Solve**.
  - c. Select **Vocabulary** and complete **Part 1**: matching terms with definitions.
  - d. Complete **Part 2**: matching terms and definitions with images on a diagram.
2. To complete the Mind Map **on paper**, follow the directions below (45 minutes).
  - a. Print and pass out the Student Guide: Cells Lesson 1: *The Solve*.
  - b. Introduce the warm up task: students will be making a Mind Map of the vocabulary for this Cells unit.
  - c. Model the directions carefully, emphasizing the following. Students should:



- **cut** out the vocabulary cards on the solid lines only
- **fold** the cards at the dotted lines
- write the definition of the term on the inside of the card using definitions provided

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- d. Students use the clues from the Mind Map images, definitions, and terms to place the cards in the correct location in the Mind Map.
- e. Check that the students have matched their cards correctly before moving on.
- f. Students use glue or double-sided tape to connect the back of the vocabulary card to the correct place on the Mind Map.
- g. Students discuss the questions with their group or as a class when they have completed the Mind Map.

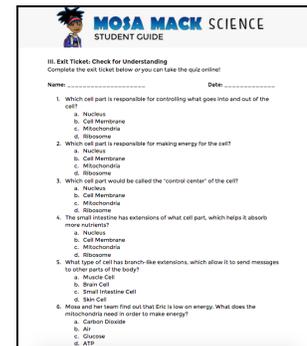
## Teacher Tips:

- Since this is the first time many of the students will have seen these vocabulary terms, have students work together to use the images, definitions, and collaborative thinking to figure out where the terms go.
- Check in on student groups throughout this process. When you see students or groups who have placed their card in the correct place, ask a facilitating question such as, “Why do you think that term goes there?” or, “What evidence leads you to believe that term goes there?” When students explain their thinking, this is a great opportunity to provide positive reinforcement. Then, encourage them to share their reasoning to the class or to other groups who may have trouble identifying the location of that specific term.
- If you do not have access to a color printer, provide students with black and white copies and project the colored Mind Map at the front of the room so that students can reference both images.

## III. Exit Ticket: Check for Understanding (10–15 minutes)

Differentiation Tip: This can be done in groups, pairs, individually, or more formally as a quiz online.

1. Students complete the exit ticket to check for understanding. This can be done online by selecting the **Quiz** button in Lesson 1 or on paper in the Student Guide. Answers are in the Answer Key section below.



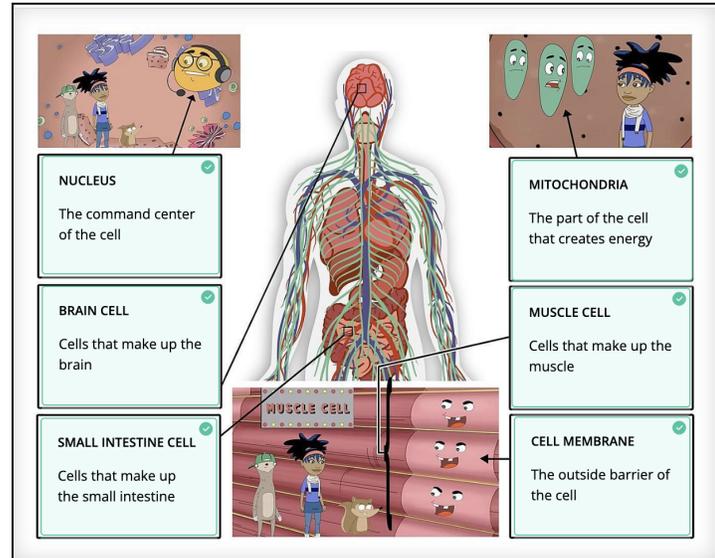
The image shows a page from the 'MOSA MACK SCIENCE STUDENT GUIDE'. At the top, there is a logo with a cartoon character and the text 'MOSA MACK SCIENCE STUDENT GUIDE'. Below the logo, the section is titled 'III. Exit Ticket: Check for Understanding' and includes the instruction 'Complete the exit ticket below or you can take the quiz online!'. There are lines for 'Name: \_\_\_\_\_' and 'Date: \_\_\_\_\_'. The main content consists of six multiple-choice questions about cell biology, each with four options (a, b, c, d). The questions are: 1. Which cell part is responsible for controlling what goes into and out of the cell? (a. Nucleus, b. Cell Membrane, c. Mitochondria, d. Ribosome); 2. Which cell part is responsible for making energy for the cell? (a. Nucleus, b. Cell Membrane, c. Mitochondria, d. Ribosome); 3. Which cell part would be called the 'control center' of the cell? (a. Cell Membrane, b. Mitochondria, c. Ribosome, d. Nucleus); 4. The small intestine has extensions of what cell part, which helps it absorb more nutrients? (a. Nucleus, b. Cell Membrane, c. Mitochondria, d. Ribosome); 5. What type of cell has branch-like extensions, which allow it to send messages to other parts of the body? (a. Muscle Cell, b. Brain Cell, c. Small Intestine Cell, d. Skin Cell); 6. Mitochondria are the powerhouses of the cell. What does the mitochondria need in order to make energy? (a. ADP, b. ATP, c. Glucose, d. ATP).

## Answer Key

### Episode Questions

1. What is the job of the cell membrane? (1:42)  
*To control what substances enter and exit a cell.*
2. Which part of the cell is in charge of the whole cell? (2:10)  
*Nucleus*
3. What does the mitochondria need in order to make energy? (2:51)  
*Glucose*
4. What does Mosa and her team take a taxi to the small intestine? (3:13)  
*They hop on a red blood cell.*
5. Why do the small intestine cells look slightly different than the muscle cells? (4:58)  
*They have extensions of their cell membrane in order to absorb more nutrients.*
6. What cells are responsible for telling Eric to eat more food? (6:22)  
*Brain cells, or nerve cells.*
7. Why does the brain cells look different than the other cells? (6:52)  
*It has branch-like or wire-like extensions to allow it to send messages.*
8. What did Mosa figure out? Why did Eric collapse? (Answer Video)  
*Eric hadn't eaten enough food, so there were no nutrients coming through the small intestine cells. This meant that all the cells in the body, such as the muscle cells, did not have the glucose needed to make the energy used in hiking.*

### Mind Map Answer



## Quiz:

1. Which cell part is responsible for controlling what goes into and out of the cell?
  - a. Nucleus
  - b. Cell Membrane**
  - c. Mitochondria
  - d. Ribosome
2. Which cell part is responsible for making energy for the cell?
  - a. Nucleus
  - b. Cell Membrane
  - c. Mitochondria**
  - d. Ribosome
3. Which cell part would be called the “control center” of the cell?
  - a. Nucleus**
  - b. Cell Membrane
  - c. Mitochondria
  - d. Ribosome
4. The small intestine has extensions of what cell part, which helps it absorb more nutrients?
  - a. Nucleus
  - b. Cell Membrane**
  - c. Mitochondria
  - d. Ribosome
5. What type of cell has branch-like extensions, which allow it to send messages to other parts of the body?
  - a. Muscle Cell
  - b. Brain Cell**
  - c. Small Intestine Cell
  - d. Skin Cell
6. Mosa and her team find out that Eric is low on energy. What does the mitochondria need in order to make energy?
  - a. Carbon Dioxide
  - b. Air
  - c. Glucose**
  - d. ATP