MOSA MACK SCIENCE

Diabetes Lesson 1: *The Solve*

Educator's Resource Guide

Objective

In *The Solve*, students will:

1. Create a Mind Map to explore relationships among diabetes vocabulary.
2. Solve a mystery that demonstrates their understanding of the function and interaction of glucose and insulin.

Time Required: 45–80 minutes

Materials Required	Safety Considerations	Science & Engineering Practices
• Student Guide ○ includes Student Agenda and Mind Map • Diabetes Mosa Mack Episode • Computer with speakers (for projecting video) or headphones (for student viewing on laptops) • Scissors • Glue or tape	None	• Developing and Using Models • Constructing Explanations or Arguments From Evidence

Mosa Mack Mystery Episode Description

Despite how much Jaylene eats, she is constantly hungry. She can't figure out why this is, so she calls Mosa to help solve the mystery. When Mosa travels to the cellular level, the cells report that they haven't seen any of the glucose they need to make energy in ages! After Mosa and her team realize that a hormone called insulin is necessary for cells to get the glucose they need, they head to the pancreas to investigate. Here, they figure out exactly why Jaylene has been so hungry.

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)*

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.

Then, 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. Finally, have students complete the quiz digitally or on paper as an exit ticket.

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

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.

Then, 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. Finally, have students complete the quiz digitally or on paper as an exit ticket.

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

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.

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. Finally, have students complete the quiz digitally or on paper as an exit ticket.

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

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.

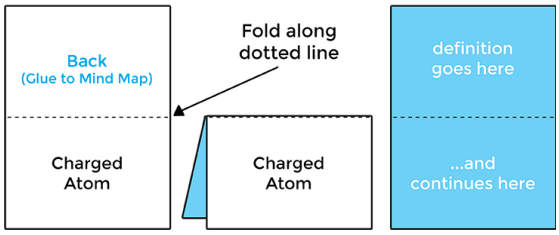
Provide students with their student URL and have students view the animated mystery and complete episode questions in pairs. Have students review their answers with a neighboring table group. Finally, have students complete the quiz digitally or on paper as an exit ticket.

Agenda

I. Warm Up: Vocabulary Mind Map (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 directions below (15 minutes).
    a. Go to https://mosamack.com/home/diabetes
    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: Diabetes Lesson 1: *The Solve*.
    b. Introduce the warm up task: students will be making a Mind Map of the vocabulary for this Diabetes 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.



    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.

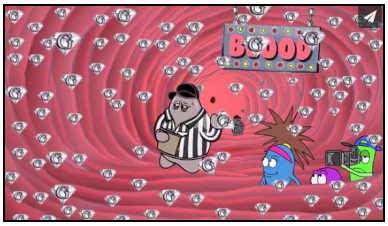
Teacher Tips:

- 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.

II. Solve the Diabetes 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 Diabetes.
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.

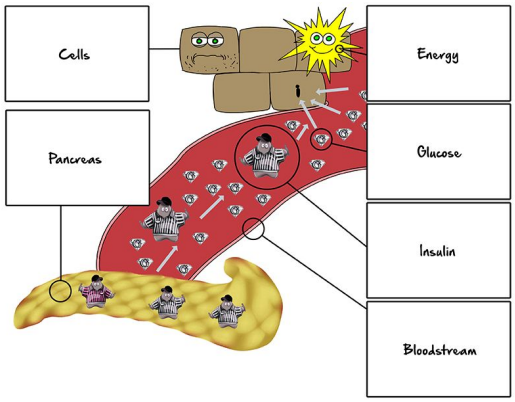


III. Exit Ticket: Check for Understanding (10–15 minutes)
Differentiation Tip: This can be done in groups, pairs, individually, or more formally as a quiz online.

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.

Answer Key

Mind Map



Episode Questions

1. Why is it odd that Jaylene is hungry? (1:00, 2:52) *She did not exercise today and has already eaten a lot of food.*
2. Why are the esophagus cells grumbling and complaining? (1:32) *They are complaining because they are hungry.*
3. Why don't the cells care about all the foods Jaylene lists off? What do cells really need to make energy? (3:12) *Cells do not eat food like burgers or pasta; they "eat" glucose. Cells need glucose to make energy.*
4. Where is glucose absorbed? (3:50) *In the small intestine.*
5. What regulates the amount of glucose the cells in the body get? (4:17) *Insulin "unlocks" the glucose "door" to let glucose into cells.*

6. Where does insulin come from? *The pancreas.*
7. What are the insulin doing in the bloodstream? Describe the scene. (5:15) *The insulin look tired and are not effectively unlocking the glucose doors.*
8. What did Mosa figure out? Why has Jaylene been so hungry? (Answer Video) *The insulin in the bloodstream are not functioning properly, so the glucose in the bloodstream is not properly absorbing into cells. Thus, the cells cannot make the energy Jaylene needs!*

Quiz:

1. What do cells need to make energy?
    a. Food
    b. Carbon dioxide
    c. Burgers
    d. Glucose
2. How does glucose from food travel from the small intestine to cells that need it?
    a. Nerve cells
    b. White blood cells
    c. The bloodstream
    d. Absorption
3. What do cells need in order to absorb glucose?
    a. Insulin
    b. DNA
    c. Glycogen
    d. Oxygen
4. Where is insulin produced?
    a. Small intestine
    b. Esophagus
    c. Blood cells
    d. Pancreas
5. In the video, what unlocks the cell's door to let glucose in?
    a. Red blood cells
    b. Insulin
    c. Small intestine cells
    d. Glucose
6. What is wrong with Jaylene? Why is she so hungry?
    a. Her body is not creating insulin, so no glucose can absorb into cells
    b. There is no insulin in the bloodstream, so no glucose can absorb into cells
    c. The insulin "key" does not work for the cell "lock," so no glucose can absorb into cells
    d. She isn't eating enough