

1. Work collaboratively to complete a vocabulary Mind Map using terms, definitions, and visuals.
2. Solve a mystery that examines the various types of ways energy exists (for example: light, heat, electric, motion, and sound energy).
3. Communicate understanding that sound and light energy can travel in waves.
4. Communicate understanding that energy can be transferred and converted from one form of energy to another (for example, an electrical circuit being used to make a light bulb glow).

Time Required: 40–75 minutes

Materials Required	Safety Considerations	Science & Engineering Practices
● Student Guide (<i>includes student agenda and Mind Map</i>) ● Evidence of Energy Transfer Comic Mystery ● Scissors ● Glue or tape	None	● Developing and Using Models ● Constructing Explanations or Arguments From Evidence

Episode Description:

JoJo and Felix, cousins and best friends, find themselves in the middle of a family feud: their twin parents are fighting and refuse to allow members of each family to communicate with one another! Upset by this family dilemma and separation, the boys are determined to find a way to communicate with one another to resolve their family's conflict.

Uncovering the Mosa Files, JoJo explores various forms of energy and attempts to utilize sound, light, heat, and electric energy to communicate with Felix.

After many failed attempts at communicating, JoJo and Felix construct a successful plan that uses multiple forms of energy to effectively unravel a secret twin message that breaks the family silence.



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*)

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/read the animated mystery twice: once in full, and a second time along with the discussion questions, pausing the video/reading 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*)

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.

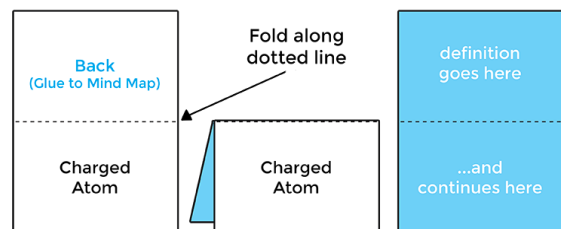
Then, view/read the animated mystery in full. Afterwards, have students work through the episode questions to the best of their ability in small groups. Play/read the mystery a second time, pausing the video/reading to discuss each question. Finally, have students complete the quiz digitally or on paper 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.

- Students may complete the Mind Map **digitally**. Follow directions below. (15 minutes)
 - Go to <https://mosamack.com/home/energy-transfers>
 - Select **Lesson 1: The Solve**.
 - Select **Vocabulary** and complete **Part 1**: matching terms with definitions.
 - Complete **Part 2**: matching terms and definitions with images on a diagram.
- To complete the Mind Map **on paper**, follow the directions below (45 minutes).
 - Print and pass out the Student Guide: Evidence of Energy Transfer Lesson 1: *The Solve*.
 - Introduce the warm up task: students will be making a Mind Map of the vocabulary for this Evidence of Energy Transfer unit.
 - 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
 - Students use the clues from the Mind Map images, definitions, and terms to place the cards in the correct location in the Mind Map.
 - Check that the students have matched their cards correctly before moving on.
 - Students use glue or double-sided tape to connect the back of the vocabulary card to the correct place on the Mind Map.
 - Students discuss the questions with their group or as a class when they have completed the Mind Map.



Discussion Questions and Answers:

- What was the problem JoJo and Felix were trying to solve? *Their parents are involved in a family feud and are no longer speaking to each other. They're trying to get an apology message sent from one family to the other.*
- What types of energy transfers did JoJo and Felix observe in *The Solve* Mystery? *They observed light, sound, heat, and electrical energy transfer.*
- Predict the types of evidence that can be gathered to prove that these types of energy transfer exist. *Answers will vary. Potential answers include: light, heat, sound, motion, and electric.*

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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 through this process. When you see a student or group who has placed a 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 students 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 version of the Mind Map at the front of the room so that students can reference both images.

II. Solve the Evidence of Energy Transfer Felix and JoJo Mystery (20 minutes)

Differentiation Tip: The comic book and motion comic video can be read/watched as a class, in small groups, individually, or completed for homework. For additional support, students can read or watch the comic/episode twice: once before completing the questions, and once with teacher guidance, pausing to discuss each answer.



1. Read/watch the Mosa Mack Mystery on Evidence of Energy Transfer.
2. Students answer the questions in their Student Guide as they read/watch. Encourage students to cite the specific page numbers/time codes in the Comic Mystery to promote writing with supporting evidence. Answers can be found in the key below.

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 key below.

 MOSA MACK SCIENCE STUDENT GUIDE	
III. Exit Ticket, Check for Understanding Complete the exit ticket before or after you can take the quiz online!	
Name: _____	Date: _____
1. Which of the following is an example of a <u>non-renewable</u> resource?	
a. Wind	
b. Solar (Sun)	
c. Trees	
d. Petroleum	
2. Resources are equally distributed throughout the world. True or false?	
a. False	
b. True	
3. How long does oil take to make?	
a. Hundreds of millions of years	
b. 40 years	
c. A few years	
d. 1 million years	
4. Burning fossil fuels releases which gas into the air, making the Earth warmer?	
a. Oxygen	
b. Water	
c. Nitrogen	
d. Carbon Dioxide	
5. Which of the following does not show a quick "cycle"?	
a. Wood	
b. Oil	
c. Water	
d. Carbon	

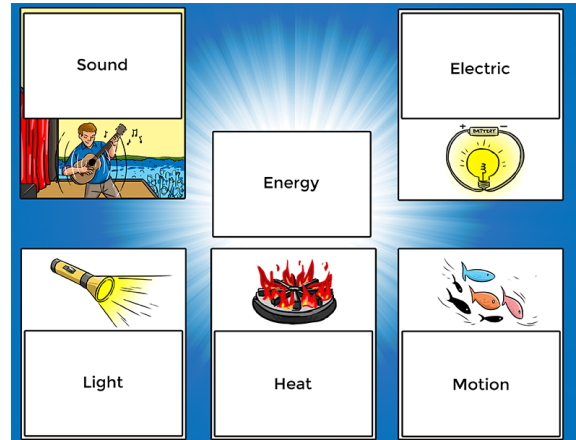
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Answer Key

Mind Map

Episode Questions Answers

1. What problem are Felix and JoJo facing? *Their parents are involved in a family feud and they are no longer speaking to each other. (Page 1; 0:11)*
2. How did Betty the Raccoon try to help the boys communicate? *Betty carried handwritten notes for Felix to his cousin JoJo's house but the parents said, "No handwritten notes either." (Page 1, 1:06)*
3. Explain how Felix and JoJo tried to use sound waves to communicate with one another. *JoJo used taps on a can to make sounds that represented letters so he and Felix could communicate using soundwaves. (Page 3, 2:38)*
4. How did JoJo attempt to use light energy to communicate with Felix? *JoJo was going to use flashes of light to represent codes for words but his dad found out and put a stop to it. (Page 4, 3:18)*
5. Why did the heat energy method of communication fail? *The fire did not heat up/ transfer heat to the copper wire. (Page 5, 5:21)*
6. How did JoJo create electric current to send a message to Felix? What materials did he need? *JoJo created an electric circuit. JoJo used a copper wire, a battery, a small light bulb, and a switch. (Page 6, 6:15)*
7. What did Felix and JoJo figure out? How did they help to end the family feud? Explain. *Felix and JoJo figured out that they could send messages using electric energy. They used electric energy to transmit a coded message using lights. They shared that important message with their parents, helping to end the feud. (Page 8, 6:30)*



Quiz:

1. Sound energy can be produced by which of the following objects below?
 - a. **Drum**
 - b. Flashlight
 - c. Copper wire
 - d. Battery
2. Which of the following energy types travels in waves?
 - a. Sound energy
 - b. Light energy
 - c. Electrical energy
 - d. **Both A and B**
3. Heat energy would be present in which example(s) below?
 - a. A stove heats up a pot of water
 - b. The sun melts an ice cream cone on a hot summer day
 - c. A flame heats a log in a fire
 - d. **All of the above**
4. There are many types of energy, including:
 - a. Heat
 - b. Sound
 - c. Light
 - d. **All of the above**
5. When a copper wire is connected to a battery and light bulb, the light bulb glows brightly. Which type of energy transfer occurs in this process?
 - a. Heat energy → Light energy
 - b. Sound energy → Electric energy
 - c. **Electric energy → Light energy**
 - d. Light energy → Electric energy
6. True or False: Energy can change from one form to another.
 - a. **True**
 - b. False