MOSA MACK SCIENCE

Weather Lesson 1: *The Solve*
Educator's Resource Guide

Objective

In *The Solve*, students will:

1. Solve a mystery that demonstrates the understanding that different weather events are caused by a variety of common weather factors.
2. Create a Mind Map to explore relationships among complex weather vocabulary.

Time Required: 40–75 minutes

Materials Required	Safety Considerations	Science & Engineering Practices
• Student Guide (*includes student agenda and Mind Map)* • Weather Comic • Computer with speakers • Scissors • Glue or tape	None	• Developing and Using Models • Constructing Explanations or Arguments From Evidence

Episode Description

Mia and Henry's wedding planning business is on the brink of destruction! Their clients are counting on very specific weather in the Tropics and Arctic; but things aren't going as planned: there's a storm in the Tropics and no snow in the Arctic. Mia and Henry are baffled and desperate to save their reputation, so they call Mosa for help. Learners help Mosa solve the weather mystery and save both weddings.

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.

Agenda

I. Solve the Weather Mosa Mack Mystery (20 minutes)

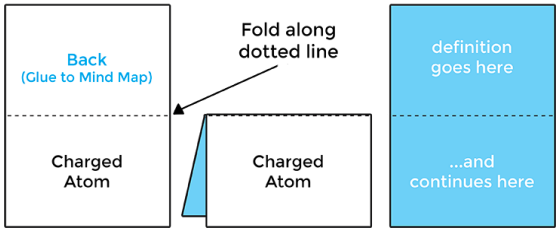
Differentiation Tip: The comic and motion comic video can be read/watched as a class, in small groups, individually, or completed for homework. For additional support, students can read or watch the comic/episode twice: once before completing the questions, and once with teacher guidance, pausing to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

1. Read/watch the Mosa Mack Mystery on Weather.
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.

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.

1. Students may complete the Mind Map **digitally**. Follow directions below. (15 minutes)
    a. Go to https://mosamack.com/home/weather
    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: Weather Lesson 1: *The Solve*.
    b. Introduce the warm up task: students will be making a Mind Map of the vocabulary for this Weather 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.

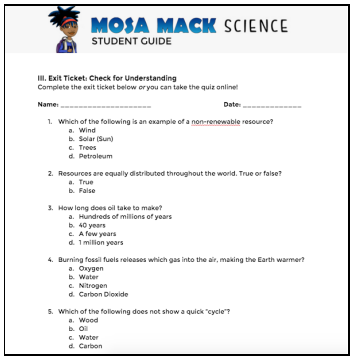
Teacher Tips:

- 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 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.

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

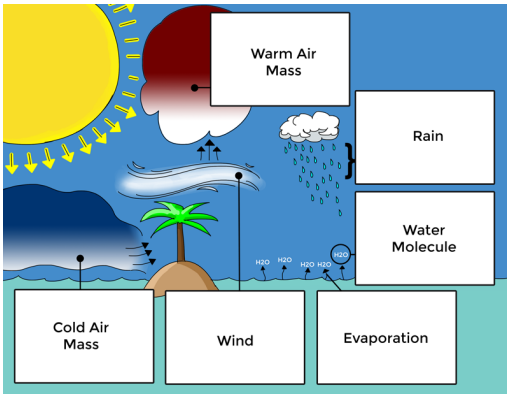
III. Exit Ticket: Check for Understanding
Complete the exit ticket below *or* you can take the quiz online!

Name: _____ Date: _____

1. Which of the following is an example of a non-renewable resource?
   a. Wind
   b. Solar (Sun)
   c. Trees
   d. Petroleum
2. Resources are equally distributed throughout the world. True or false?
   a. True
   b. False
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

Answer Key

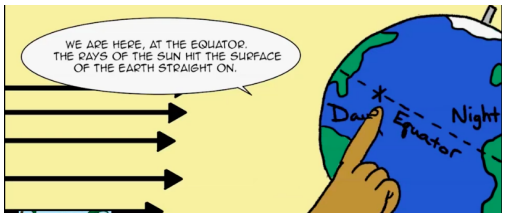
Mind Map



Episode Questions

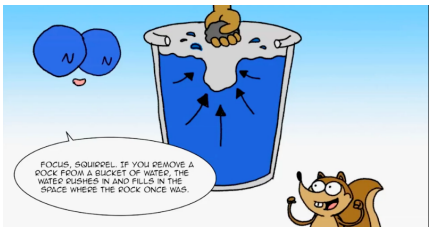
1. Why are the wedding planners so upset and confused about the tropical wedding and Winter Wonderland wedding that they planned? What weather were they expecting and what weather is actually occurring?
For the wedding in the Tropics, the bride is expecting beautiful sunny weather, but it begins to rain. Snowy magic was planned for the Winter Wonderland wedding, but it's just windy. (p. 4)

2. Why is it warmer at the equator? Draw a diagram to help you explain your answer. *The sun hits the Earth at a more direct angle.* (p.5)



3. Why are all the molecules rising off the surface of the Earth?
The heat from the sun heats up the molecules causing them to rise and transfer to the air mass above the Earth's surface. (p. 8–9)

4. Draw and explain the rock-in-a-bucket-of water analogy. What type of weather does this cause? (p.12)
If you pull a rock out of a bucket of water, the water rushes in to replace the space. This can be compared to a warm air mass rising and cold air rushing in to replace the space. This causes wind.



5. In a high-temp, low-pressure air mass, what happens to the gaseous water in the warm air when the air mass rises? What problematic weather results? (p.14)
When warm air rises, it cools and condenses. This causes rain.

6. Why is there so much wind at Henry's wedding in the Arctic? (pg. 19)
A cool air mass is coming in to replace a rising warm air mass.

7. What did Mosa figure out? Where did Mosa take everyone for the Arctic wedding and why? (p.20)
Mosa is going to take everyone to Watertown because it has more water nearby, and therefore more precipitation/more snow.

Quiz:

1. Where on Earth do the sun's rays hit at the most direct angle?
    a. The North Pole
    b. The South Pole
    c. North America
    d. The Equator

2. The sun beats down on the Tropics and causes what molecules to evaporate into the air mass above it?
    a. Nitrogen
    b. Oxygen
    c. Water
    d. Carbon dioxide

3. Which of the following is **true** about the movement of air?
    a. Warm air rises
    b. Cold air rises

4. As warm air rises, it cools and condenses. This causes which of the following?
    a. Sun
    b. Wind
    c. Rain
    d. Thunder

5. Wind is caused by which of the following?
    a. Clouds condensing
    b. Water evaporating
    c. Sun shining down on Earth
    d. A cold air mass moving in to replace a rising warm air mass

6. What has to be present in the air in order for it to snow?
    a. Nitrogen
    b. Oxygen
    c. Water
    d. Carbon dioxide