

Scientific Method 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:

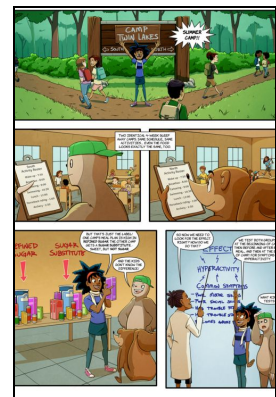
1. solve a mystery that disproves the myth that candy makes children hyperactive. In disproving this myth, learners will understand that humans make sense of the world around us by making observations, asking questions, and then conducting valid experiments..
2. create a mind map to explore relationships among complex scientific method vocabulary

Time Required: 40-75 minutes

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

Episode Description:

Parents across the nation want to ban Halloween, claiming too much sugar makes their kids hyper, but the kids are fighting back! As the candy ban goes before Congress, Mosa is called to the scene to get to the bottom of this question once and for all: Does sugar make kids hyperactive? In collaboration with a fellow scientist, Mosa embarks on a mission to answer this critical question using a sound scientific method--so all sides will have to believe her!



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 Scientific Method Mosa Mack 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 Scientific Method.
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.

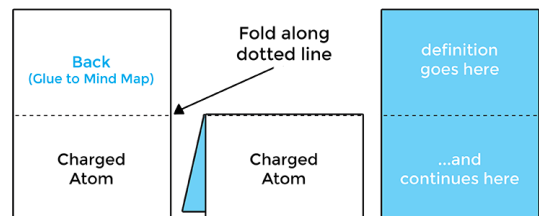
1. Students may complete the Mind Map **digitally**. Follow directions below. (15 minutes)
 - a. Go to <https://mosamack.com/home/scientific-method>
 - b. Select **Lesson 1: The Solve**.
 - c. Select **Vocabulary** and complete **Part 1**: matching terms with definitions.
 - d. Complete **Part 2**: matching 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: Scientific Method Lesson 1: *The Solve*.
 - b. Introduce the warm up task: students will be making a Mind Map of the vocabulary for this Scientific Method 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.

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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 it 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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- 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.



Answer Key

Episode Questions

1. What is the scientific question Mosa is trying to answer and what is at stake? (Page 3)

The question is, "does sugar make kids hyper?" The stakes are high: her results will determine whether there will be a Halloween candy ban.

2. An important part of the scientific process is research. What counts as research according to Mosa's collaborator? (Page 6)

Similar experiments that have been done in the past count as research as well as gathering observations; for example, video evidence.

3. In the next part of the scientific process, Mosa makes a hypothesis, or an educated guess, that hyperactivity is an effect of sugar. What is the independent and dependent variable in Mosa's experiment? (Page 7)

Independent variable = sugar, dependent variable = hyperactivity.

4. What are some other examples of dependent and independent variables, either from the comic or from your own experience? (Page 8)

Answers can include: IV = banging head on the wall, DV = pain. IV = doing nothing, DV = happiness. IV= thinking about brownies, DV=hunger.

5. Mosa figures out that there are a lot of other variables that could affect hyperactivity. Name at least three and explain what we can do to make sure it doesn't impact the study. (Page 9-10)

Mosa realized that there could be other variables that affect hyperactivity. For example, if a kid:

- *has a soda with caffeine before the study*
- *had just been playing with a friend*
- *is excited to see Star Wars*

then he or she may seem hyper. We can control those variables by making sure all kids do the same thing before and after the study.

6. Mosa comes up with a great plan: give one kid sugar and no sugar to the another, while controlling all other variables. What does the doctor point out is still a problem and what solution does she offer? (Page 11)

There may be a kid with an allergy to sugar or one that is naturally excitable, so it is better to have 50 in each test group, so we still have the overall group to look at if there are one or two weird cases.

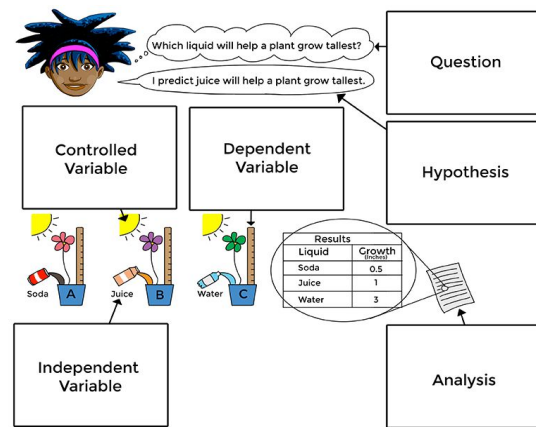
7. What did Mosa and her team do to conduct her experiment? Describe the two different camps. (Page 12-13)

Mosa set up two identical 4-week sleep away camps with the same schedule, same activities, even the same food EXCEPT one camp had refined sugar in their food, and the other camp gets a sugar substitute. They were then surveyed and observed for various factors of hyperactivity.

8. What did Mosa figure out? Does sugar make kids hyper? (Answer Comic)

Mosa rejects her hypothesis. Her experiment showed that sugar does not cause hyperactivity in kids. Halloween is saved!

Mind Map



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Quiz:

1. A _____ is an educated guess or prediction for an experiment.
 - a. Question
 - b. Hypothesis**
 - c. Inference
 - d. Observation
2. Which of the following is the “cause” variable in an experiment?
 - a. Independent Variable**
 - b. Dependent Variable
 - c. Controlled Variable
 - d. Question
3. Banging your head on the wall causes pain. What is the dependent variable in this situation?
 - a. Banging your head
 - b. The wall
 - c. Pain**
 - d. Size of your head
4. The two camps have the same schedule, the same activities, even the same-looking food. What are all these variables called?
 - a. Independent Variables
 - b. Dependent Variables
 - c. Controlled Variables**
 - d. Data
5. Which of the following experimental setups would be best for Mosa Mack?
 - a. 2 kids, one gets sugar and one does not
 - b. 2 groups of 5 kids, one gets sugar and one does not
 - c. 1 group of 50 kids, all get sugar
 - d. 2 groups of 50 kids, one gets sugar and one does not**
6. In the comic, Mosa needed to control all of the following EXCEPT:
 - a. Anticipation before seeing the new Star Wars Movie
 - b. Drinking a caffeinated soda
 - c. Eating sugar-filled candy**
 - d. Running around with other kids and getting excited