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# LESSON PLAN

## CONSERVATION OF MATTER GRADES 3-5

### SUMMARY

Students see what happens when things change, seem to disappear, or seem to appear out of thin air.



**5-PS1-2** Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.

Science & Engineering Practices	Connections to Classroom Activity
<p><b>Using Mathematics and Computational Thinking</b></p>	<ul style="list-style-type: none"> <li>• Students measure and record weight of water in different forms as evidence of conservation of matter.</li> <li>• Students use math and logic to calculate the amount of matter released as gas during an experiment.</li> </ul>
Disciplinary Core Ideas	Connections to Classroom Activity
<p><b>PS1.A: Structure and Properties of Matter</b> The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish.</p> <p><b>PS1.B: Chemical Reactions</b> No matter what reaction or change in properties</p>	<ul style="list-style-type: none"> <li>• Students observe evidence that weight stays the same when matter undergoes changes.</li> <li>• Students observe evidence that matter that seems to vanish or appear from nowhere actually comes from matter in other forms.</li> <li>• Students observe both open and closed systems to understand why weight might vary slightly after a change.</li> </ul>

occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.)

### Crosscutting Concepts

#### Scale, Proportion, and Quantity

### Connections to Classroom Activity

- Students use standard units when working with weights.
- Students measure physical quantities while following directions to complete an investigation.
- Students observe multiple scenarios in which the conservation of matter is consistent.

## DURATION

One to two 45-minute classroom periods divided over two possibly non-consecutive days to allow for water in bags to evaporate (Engage and part of Explore can be completed in less than one classroom period, then the bag needs to be left for evaporation, then the rest of the lesson can be completed in one classroom period)

## MATERIALS

- Growing snake type of firework (or video)
- Snack size zipper bags (one per student or pair)
- Ice cubes, broken into small pieces (one piece per student or pair)
- Sensitive scale
- Science notebooks
- Pencils

## PRE-ASSESSMENT QUESTIONS

Please see Discussion Questions. These can be discussed as a group or answered individually in student science notebooks.



## ENGAGE

Show students a growing snake type of firework (or show them a video of this). They have likely seen these before. Ask students, how does the long snake come out of the tiny tablet? Can matter be created from thin air? Explain to students that they will explore where matter comes from, where it can go, and how it can change its form in this lesson.



## EXPLORE

First, students will explore where matter comes from and where it goes using water. Provide each student or pair of students with a small zipper bag. Now give each student/pair a small piece of ice. Students should place the ice in the bag, zip the bag most of the way closed, and then carefully inflate the bag by blowing into it lightly. They should then

zip the bag closed tightly. Now each student/pair should weigh the bag, air and ice. Have each student create a chart and record the weight in their science notebooks. Explain that students will now set the bags aside and wait for the ice to melt. They will then weigh them again. Ask students to predict whether that weight will be the same, less than, or more than the weight for the ice.

When the ice has melted, repeat weighing and recording. Did students predict correctly? Now instruct students to tape their bags to a sunny window, ensuring that the bags are still closed tightly. Ask them to predict what they think is going to happen in their science notebooks.

When there is noticeably less water in the bags, or the water has evaporated completely, ask the students to look at their bags again. Where did the water go? Ask students to predict in their science notebooks whether the bag will weigh the same, more, or less than the other measurements they recorded. Students should weigh their bags and record the data.



## EXPLAIN

Facilitate a student-led discussion using the following questions:

- What happened to the ice? Why? (It melted into water because the air temperature was too warm for ice to remain.)
- What happened to the water? Why? (The water evaporated into water vapor, a gas, because more heat was added.)
- How did the weight of the ice compare to the weight of the liquid water? Why? (No water was removed, so the weight remained the same.)
- How did the weight of the water vapor compare to the liquid water? Why? (The weight of the water vapor was the same as the liquid water and ice.)
- Why was the weight of the gas, which is invisible, the same as that of the visible liquid and ice? (No water was removed from the system, so matter was conserved even though it changed forms.)
- Ask students what they think will happen if they open their bags and leave them sitting open for several days. If they weigh the bags again after that will they be the same, less, or more than before? (If the bag is left open the water vapor will escape and any liquid water will evaporate into the surrounding air. The bag will weigh less because only air will be left inside.) Ask them to make a prediction in their science notebooks. Then, open the bags and set them aside.



## WATCH GENERATION GENIUS CONSERVATION OF MATTER VIDEO AS A GROUP.

Then facilitate a conversation using the Discussion Questions.



## ELABORATE

Students can complete the DIY Activity to create a lava lamp just like Zoe's from the video. Because of the amount of materials involved, you may choose to create these in groups or one for the class. Use the suggestions from the *Further Explorations* section of the activity to calculate how much matter was lost as gas.





## EVALUATE

Individually, have students answer the following questions in their science notebooks. Where did the firework snake we saw at the beginning of this lesson come from? Discuss conservation of matter in your answer. (The firework snake from the Engage portion of the lesson is very similar to the “fire snake” from the video. When heat is added to the tablet, a chemical reaction causes gas to be released which becomes trapped inside creating a foam that appears to be much bigger than the original tablet. If the tablet and the finished snake were both weighed, the weight would be about the same—some gas may have escaped to the surrounding air. No matter is created although it appears to be. Matter is just changing forms.)

