



MYSTERY EGGS

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Lesson Summary for Grade 4

This Science Day lesson plan used the “Mystery Eggs” activity as an introduction to the water cycle and a weather unit. This fourth-grade cross-curricular lesson includes science, language arts, mathematics, art, and social studies.

Science Activity: Mystery Eggs

Students investigate the properties of plastic eggs filled with solids, liquids, and gases and use these observations to hypothesize whether a chicken egg is hard-boiled or raw.

Source: Sarquis, J.; Hogue, L.; Sarquis, M.; Woodward, L. *Investigating Solids, Liquids, and Gases with TOYS*; McGraw-Hill: New York, 1997; pp 59–70. (ISBN 0-07-048235-7)

Key Science Topics:

- solid, liquid, and gas phases
- fluids

Key Process Skills:

- communicating
- comparing/contrasting
- investigating

Language Arts Activity 1

Students read a number of short books about solids, liquids, and gases, and then write summaries of the books.

Skills and Key Concepts:

- summarizing the text
- oral retelling
- using correct punctuation and capitalization of words
- knowledge of solids, liquids, gases
- identification of solids, liquids, and gases

Ohio Proficiency Learning Outcomes for Reading:

11. Summarize the text.
14. Identify and interpret vocabulary (words, phrases, or expressions) critical to the meaning of the text.

Ohio Proficiency Learning Outcomes for Writing:

- d. Use a variety of words.

- g. Form a response that shows an awareness of spelling patterns for commonly used words.
- h. Write legibly in print or cursive.
- i. Correctly use capital letters (beginning of sentences and for proper nouns) and end punctuation.

Scioto County Course of Study District Pupil Performance Objectives: 2, 3

Materials Needed:

- Berger, M. *Solids, Liquids, and Gases: From Superconductors to the Ozone Layer*. G.P. Putnam's Sons: New York, 1989.
- Lefkowitz, R.F. *Matter All Around You: A Book About Solids, Liquids, and Gases*. Parents' Magazine Press: New York, 1972.
- Robinson, F. *Solid, Liquid, or Gas?* Children's Press: Chicago, 1995.

Read aloud, or have students read, the books to reinforce the definition and identification of solids, liquids, and gases. After reading, have students give oral summaries and retellings of the book. Then have them write a short summary or retelling of the books independently, in pairs, or in groups.

Language Arts Activity 2

Students identify the different states of matter and write comparisons.

Skills and Key Concepts:

- comparing and contrasting
- using correct punctuation and capitalization of words
- knowledge of solids, liquids, gases
- identification of solids, liquids, and gases

Ohio Proficiency Learning Outcomes for Reading:

- 14. Identify and interpret vocabulary (words, phrases, or expressions) critical to the meaning of the text.
- 16. Analyze the text, examining, for example, comparison and contrast, cause and effect, or fact and opinion.

Ohio Proficiency Learning Outcomes for Writing:

- d. Use a variety of words.
- g. Form a response that shows an awareness of spelling patterns for commonly used words.
- h. Write legibly in print or cursive.
- i. Correctly use capital letters (beginning of sentences and for proper nouns) and end punctuation.

Scioto County Course of Study District Pupil Performance Objectives: 2, 3

Materials Needed:

- ice
- liquid water
- 2 candles, one lit and one not lit

- Jell-O® gelatin dessert
- hot plate
- sauce pan or teapot to heat water

Allow students to identify solids, liquids, and gases by showing them substances in various states of matter. For example: water in the three states (ice cubes, liquid water, and steam); liquid wax (melted candle) and solid wax (an unlit candle); and liquid Jell-O (when first mixed) and solid (after gelling). After identifying the items in different states, have students write comparisons and contrasts of the different states of matter.

Mathematics Activity

Students compare the mass of solids and liquids.

Skills and Key Concepts:

- measuring
- recording
- predicting
- knowledge of mass
- knowledge of metric and U.S. standard measurements

Ohio Proficiency Learning Outcomes for Mathematics:

19. Illustrate the approximate size of units of length, capacity, and weight; choose an appropriate unit to measure lengths, capacities, and weights in U.S. standard and metric units; and relate the number of units that measure an object to the size of the unit as well as to the size of the object.

Scioto County Course of Study District Pupil Performance Objectives: B07, F01

Materials Needed:

- scales
- ice cubes
- crushed ice
- containers

Have students measure and record the mass of ice cubes and crushed ice in U.S. standard and metric measurements. Allow the ice cubes and crushed ice to melt. While the ice is melting, have students predict the mass of the water after the ice has melted. Students then measure the mass after the ice has melted.

Art Activity

Students compare and contrast the three states of matter using different liquids, and different types of eggs.

Skills and Key Concepts:

- knowledge of solids, liquids, gases

Materials Needed:

- newspapers to cover tables
- container to cook onion skins, red cabbage, and tea

- different liquids, such as vinegar, onion skins (boiled), red cabbage juice, rubbing alcohol, boiled tea, etc.
- eggs (hard-boiled in eggshell, raw in eggshell, and blown)

Cover table(s) with newspapers. Have students predict which type of eggs and which liquids will result in the darkest color of dyed egg. Have students dye the eggs with the different liquids and the different types of eggs. After eggs have dried, have students discuss their results and compare their predictions as a class.

Social Studies Activity

Students use the three states of matter (solids, liquids, and gases) to identify locations of major landforms and/or major bodies of water on Earth.

Skills and Key Concepts:

- using map skills to identify various points on the Earth
- locating major bodies of water (lakes, rivers)

Ohio Proficiency Learning Outcomes for Citizenship:

- 7a. Identify various major reference points on the Earth.
- 7b. Locate major landforms and bodies of water.
- 7c. Use a number/letter grid system to locate places on a map, a map key to understand map symbols, a linear scale to measure distances on a map, and a direction indicator.

Scioto County Course of Study District Pupil Performance Objectives: A06, C01.01, C01.04

Materials Needed:

- floor-sized or playground-sized U.S. map
- flexible aquarium tubing
- containers of water
- salt
- volcano materials: container such as margarine bowl, baking soda, vinegar, food coloring
- containers of ice cubes

Show students how the different states of matter exist in different parts of the U.S.:

- Liquid state of matter: Using a floor-sized or playground-sized U.S. map, use the tubing (filled with water) to outline the Ohio River and/or other rivers. Use a container filled with water to be placed on the Great Lakes. For the Great Salt Lake, fill a small container with a brine solution. Show how some objects that sink in regular water float in the brine solution.
- Solid state of matter: Place ice cubes (in a container) around Alaska/North Pole. Show how ice floats in liquid water.
- Gaseous state of matter: In Montana indicate geysers, and in Hawaii set up and demonstrate a volcano. In place of erupting gases, which can be toxic and very hot, for your model use vinegar and baking soda to generate carbon dioxide gas.

Have students discuss the latitude, longitude, and directions (north, south, east, and west

from Ohio) to locate these places, and talk about how the state that matter is found in depends on the temperature. For example, some rivers freeze over in cold winter areas, and ice melts as weather gets warm enough.