

CHANGES IN MATTER: MAKING ICE CREAM

Prep Time: 15 minutes

Teaching Time: 90 minutes

Science Concept:

Cooling causes changes in the properties of materials.

Objectives:

The student will:

- observe and document the process of ice cream formation;
- identify solids and liquids; and
- use vocabulary to write a description of how ice cream is made.

GLEs Addressed:

Science

- [3] SB1.1 The student demonstrates an understanding of the structure and properties of matter by classifying matter according to physical properties (i.e., color, size, shape, weight, texture, flexibility).
- [3] SA 1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring and communicating.

Language Arts

- [3] W1.2.2 The student writes for a variety of purposes and audiences by using expressive language when responding to literature or producing text (e.g., journals, pictures supported by text or poetry).

Vocabulary:

freezing point - the temperature at which a liquid becomes solid

ice - frozen water

liquid - flowing freely like water

matter - the substance of which a physical object is composed; especially the material substance that occupies space, has mass, and makes up the observable universe

recipe - a set of instructions for making something (as a food dish) from various things <a recipe for beef stew>

solid - neither gaseous nor liquid; having relative firmness, coherence of particles, or persistence of form

temperature - the degree of hotness or coldness of something (as air, water, or the body) as shown by a thermometer

Materials:

- Tubs (three, to hold block ice, cubed ice, and water)
- Cubed ice (one bag)
- Block ice (one bag)
- Water
- Sugar (one tablespoon per student)
- Half and Half (1/2 cup per student)
- Vanilla (1/2 teaspoon per student)
- Rock Salt (six tablespoons per student)
- Pint-size resealable plastic bags (two per student)
- Gallon-size resealable plastic bags (one per student)
- Ice cubes (four cups per student)
- Spoons (one per student)

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INSTRUCTIONS Grade 3



- Towels or pair of gloves (one per student)
- Blueberries, or other fruit to mix in (optional)
- Sprinkles (optional)
- Chocolate sauce (optional)
- Gibbons, G. (2006). *Ice cream: the full scoop*. Holiday House Publishing.
- STUDENT INFORMATION SHEET: "Recipe for Ice Cream in a Bag"
- STUDENT WORKSHEET: "Changes in Matter"

* Snow may be used in place of ice.

Activity Preparation:

1. Immediately before class, place block ice in one tub, cubed ice in a second tub, and fill a third tub half-way with water.
2. Create a three-column K-W-L (What you KNOW, What you WANT to Know, What you LEARNED) chart for use in class discussion.

Activity Procedure:

Please refer to the assessment task and scoring rubric located at the end of these instructions. Discuss the assessment descriptors with the class before teaching this lesson.

Gear Up

Process Skills: observing, describing, and asking questions

1. Show students the three tubs prepared during the Activity Preparation. Directs students to observe the contents in each container using all five senses. Ask students to describe their observations orally.
2. Record student responses in the first column of the K-W-L chart. Record any questions students have about freezing, cooling, or changes of state of materials in the second column of the K-W-L chart.

Explore

Process Skills: observation, measuring, and classifying

3. Explain the class will be making ice cream to learn more about cooling.
4. Discuss differences between a liquid (flows freely and easily changes its shape) and a solid (is not liquid or fluid and does not change shape easily).
5. Distribute the STUDENT INFORMATION SHEET: "Recipe for Ice Cream in a Bag." Go over the materials list with students and ask them to identify each ingredient as a liquid or solid. Younger students may have difficulty identifying sugar as a solid, believing it takes the shape of the container it is in. To overcome this misconception, ask students to view sugar under a microscope or magnifier. Point out sugar is composed of individual grains. Each grain is a solid. Students can compare this to other granular solids, such as salt or sand.
6. Assist students in following the directions on the STUDENT INFORMATION SHEET: "Recipe for Ice Cream in a Bag." Direct students to observe the changes occurring in each bag.

Teacher's Note: Having an adult helper can help to keep students on task and minimize disruptions. Preparing measuring ingredients before the activity can also help with this, but will reduce the measuring skills component of the lesson.

7. After ice cream is formed, instruct students to dispose of the outer bag and add toppings to ice cream as desired.

Teacher's Note: Alternatively, students can use round containers with sealable lids, such as coffee canisters instead of gallon-sized bags. Students can then roll the container back and forth.

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Generalize

Process Skills: *observing, describing, making generalizations, and communicating*

8. Refer to the K-W-L chart that was started in the Gear Up. Discuss student questions and list responses on the chart.
9. Ask the following questions and discuss:
 - a. What do you think caused the liquid ingredients to change to solid? (If relevant, point out that all matter has a melting point, which is the temperature at which it melts; salt changes the melting point of water, enabling water to stay frozen at a higher temperature.)
 - b. Why was the salt necessary in this process? (The salt lowered the melting point of the ice so that it stayed frozen longer, giving the cream mixture time to freeze.)
 - c. What do you think would happen if we did not use salt?
 - d. What effect do you think the salt had on the ice?

Apply

Process Skills: *communicating and observing*

10. Read *Ice Cream: The Full Scoop* to the class. Discuss with the class.

Answers to Student Worksheet:

1. The writing-entry answers will vary, but must include those words listed.
2. The T-chart should include:
 - Liquid: half and half, vanilla
 - Solid: sugar and any of the added ingredients listed (berries, cocoa, sprinkles)
 - Since other liquids or solids may be used in cooking. So those answers will vary.



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RUBRIC

Assessment Task

Students will use their worksheets to describe what happened to the ingredients as they worked. They should use the following words on your recording sheet: solid, liquid, temperature, and freezing point. Ask students to use provided T-chart to list the ingredients from the recipe as solid or liquid.

Rubric

Objective	GLE	Below Proficient	Proficient	Above Proficient
The student identifies solids and liquids.	[3] SB1.1	The student does not identify and describe solids or liquids in the ice cream recipe.	The student correctly identifies and describes one solid and one liquid from the ice cream recipe.	The student correctly identifies and describes two solids and two liquids from the ice cream recipe.
The student classifies ingredients used to make ice cream.	[3] SA 1.1	The student classifies two or fewer ingredients used to make ice cream.	The student classifies at least three ingredients used to make ice cream.	The student classifies four or more ingredients used to make ice cream.
The student will use vocabulary to write about how ice cream is made.	[3] W1.2.2	The student uses two or fewer vocabulary words from the worksheet when writing about making ice cream.	The student uses three vocabulary words from the worksheet when writing about making ice cream.	The student uses four vocabulary words from the worksheet when writing about making ice cream.

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Recipe for Making Ice Cream in a Bag

Materials:

- 1 tablespoon sugar
- ½ cup half and half
- ½ teaspoon vanilla
- 6 tablespoons rock salt
- 2 pint-size resealable plastic bags
- 1 gallon-size resealable plastic bag
- 4 cups of ice cubes
- Spoon
- Towel or pair of gloves

Directions:

- 1) Place ice cubes in the large bag, and add the rock salt. Seal the bag.
- 2) Put half and half, vanilla, and sugar into the small bag, and then seal it carefully, leaving as little air as possible. Place the bag into a second small bag and seal.
- 3) Place the small bags inside the large bag and seal the large bag carefully.
- 4) Wear gloves or roll a towel around the bag. Shake until the mixture becomes ice cream, about 8-10 minutes.
- 5) Take out small bag and wipe off the top. Open carefully and enjoy!

Optional items to flavor ice cream:

- Cocoa (2 teaspoons before shaking)
- Blueberries or other fruit to taste (add after shaking bag)
- Sprinkles to taste (add after shaking bag)

NAME: _____

CHANGES IN MATTER

1. Describe what happened to the ingredients as you worked. Please use the following words in your entry: solid, liquid, temperature, and freezing point.

2. Sort the ingredients from the recipe into the "liquid" or "solid" columns below. List additional liquids and solids you might use when cooking in the kitchen.

Ingredient Sort

Liquid	Solid