

Melt Away

Levels



Grades K-4

Overview:

Students use their senses to explore objects before and after heating.

Objectives:

The student will:

- write a prediction about how objects are affected by heat;
- make and record observations using her or his senses (touch, sight, sound, and smell); and
- explain how heat affects objects in various ways.

GLEs Addressed:

Science

[3-4] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, making generalizations, inferring, and communicating.

[3-4] SB3.1 The student demonstrates an understanding of the interactions between matter and energy and the effects of these interactions on systems by recognizing that temperature changes cause changes in phases of substances (e.g., ice changing to liquid, water changing to water vapor, and vice versa).

Whole Picture:

Heat can move from one object to another through conduction, convection, or radiation. Heat always travels from the warmer object to the cooler one until equilibrium is reached; cold does not travel. For example, in a cup of ice water, the warmer water transfers heat to the ice, causing it to melt until the entire glass is the same temperature; the ice does not transfer cold to the water making it cooler. The reason the water initially cools off is because heat transfers out of the water into the ice.

Heat transfer drives our climate. Solar radiation heats Earth's atmosphere, resulting in wind. Solar radiation also heats Earth's oceans and land. Heat transfer directly affects the Arctic climate. The land and oceans absorb solar radiation. Over time, this heat is released back into the atmosphere, as well as into the sea ice and snow cover.

Snow cover serves as insulation for the permafrost, trapping heat within Earth. As the snow melts, more heat can penetrate the ground, resulting in the increased thawing of permafrost.

Heat also affects small everyday items. This concept is demonstrated through the following activity.

Materials:

- Chocolate chips
- Marshmallows
- Crayons
- Paper
- Popcorn kernels
- Feathers
- 12 small dishes, such as aluminum tart tins
- Hot plate
- Water
- Saucepan
- Safety goggles (one per student)

- Tongs
- Timer
- STUDENT WORKSHEET (Level I): “Heat It Up”
- STUDENT WORKSHEET (Level II): “Melt Away”
- STUDENT WORKSHEET (Level II): “Heat Changes Things”

Teacher’s Note: Any common objects can be used for this activity. Students will gain the most from a variety of objects with varying textures. Please save crayons and small dishes for use in other ACMP activities, such as the lesson: “Touch and Discover.”

Activity Preparation:

Remove the paper from the crayons. Fill each dish with chocolate chips, marshmallows, crayons, paper, popcorn kernels, or feathers so there are two sets of dishes (one type of item per dish). Fill the saucepan with water and place over the hot plate; do not turn on the hot plate until needed.

Teacher’s Note: Observe all necessary safety procedures during this investigation. Be sure students stay away from the hot plate and sides of the saucepan. Always wear safety goggles. Always use tongs to place items in and remove items from the water. Adult volunteers should be available to work with K-2 students.

Activity Procedure:

1. Ask students how heat affects objects. List all student responses on the board.
2. Ask students if heat affects all objects in the same way. Direct students to think about ice cream melting, an egg cooking, cookies baking, snow melting, etc.
3. Explain that students will use their senses (except taste) to explore how heat affects various objects.
4. Place one dish on the table where students can explore. As a class, discuss the object. How does it feel? How does it look? How does it sound? How does it smell? List student responses on the board.
5. Turn on the hot plate. Distribute safety goggles and demonstrate how to wear them. When the water is at a steady boil, gather students at a safe distance around the hot plate, observing all safety precautions.
6. Ask one student to be the timer, stating the time after five minutes. Use a pair of tongs to place a dish of the substance discussed earlier (Activity Procedure 4), so that it floats on top of the boiling water. Ask the student to start the timer.
7. After five minutes, remove the dish using the tongs. Set it down on a safe, flat surface and ask students to explore as they did before, using their senses (except taste). List student responses on the board.
8. Distribute the STUDENT WORKSHEET: “Heat It Up” to Level I students and the STUDENT WORKSHEET: “Melt Away” to Level II students. Repeat Activity Procedure 4-7 with the remaining objects. Instruct students to make a prediction (level II only) and record their observations before and after each investigation.
9. As a class, discuss how the objects differed.
10. Distribute STUDENT WORKSHEET: “Heat Changes Things” to Level II students, and ask them to complete the worksheet individually.

Answers:

STUDENT WORKSHEET (Level I): “Heat It Up”

Answers will vary but should be reasonable for the item listed.

STUDENT WORKSHEET (Level II): “Melt Away”

Answers will vary but should be reasonable for the item listed.

STUDENT WORKSHEET (Level II): “Heat Changes Things”

1. Some objects melted, some hardened, and some did not change at all.
2. Objects react differently to heat.

Name: _____

Heat It Up

Student Worksheet (page 1 of 3)

Level



Directions: **First**, in the “before” box, draw or write about what the item looks like before being heated.

Second, in the “after” box, draw or write what happened to the item when it was heated.

1. Item: _____

before

A large empty rectangular box for drawing the item before heating.

after

A large empty rectangular box for drawing the item after heating.

2. Item: _____

before

A large empty rectangular box for drawing the item before heating.

after

A large empty rectangular box for drawing the item after heating.

Name: _____

Heat It Up

Student Worksheet (page 2 of 3)

Level



3. Item: _____

before

after

4. Item: _____

before

after

Name: _____

Heat It Up

Student Worksheet (page 3 of 3)

Level



5. Item: _____

before

after

6. Item: _____

before

after



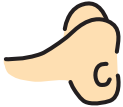

Name: _____





Level



Melt Away Student Worksheet

Directions: Using your observation skills, complete the chart below by writing what you predict will happen to the item before you add heat. Then, draw or write what happens to the item after heat is added.

Item	Prediction			
	 Touch	 Sight	 Smell	 Sound
chocolate chips				
marshmallows				
crayons				
paper				
popcorn kernels				
feathers				

Result				
 Touch	 Sight	 Smell	 Sound	

Name: _____

Heat Changes Things

Student Worksheet

Level



Directions: Answer the following questions.

1. How did the heat affect the objects?

2. Why did the heat change some objects and not others?

RUBRIC

Objective	GLE	Below Proficient	Proficient	Above Proficient
The student writes a prediction on her or his worksheet about how each object is affected by heat.	[3-4] SA1.1	The student does not make a reasonable prediction for each object about how it will be affected by heat.	The student writes a reasonable prediction for each object about how it will be affected by heat.	The student writes a prediction for each object about how it will be affected by heat and explains the reason for her or his prediction.
The student makes observations using her or his senses (touch, sight, sound, and smell) and records observations onto a worksheet.	[3-4] SA1.1	The student does not record, or incorrectly records, observations based on her or his senses for each object observed.	The student records observations based on her or his senses for each object observed.	The student records observations based on each sense for each object observed and compares and contrasts those observations.
The student explains on his or her worksheet how heat affects objects in various ways and provides an example.	[3-4] SB3.1	The student does not explain, or inaccurately explains, how heat affects the various objects.	The student explains heat affects some objects and not others. The student explains some objects showed no change, others melted, and some hardened.	The student explains heat affects some objects and not others. The student explains some objects showed no change, others melted, and some hardened. Further, the student infers that more or less heat will change the reactions.