JUST COOL IT!
(MODIFIED FOR ADEED)

INSTRUCTIONS

Science Concept:

Solid and liquid matter can be identified by their characteristics.

GLEs Addressed:

Science

[3-4] SB1.1 The student demonstrates an understanding of the structure and properties of matter by identifying and comparing the characteristics of gases, liquids and solids.

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

Math

[1] S&P-4 The student demonstrates an ability to analyze data (comparing, explaining, interpreting, evaluating; or drawing or justifying conclusions) by describing infomration from simple charts/ graphis (M6.1.2).

Objectives:

The student will:

- describe the charactistics of solids and liquids;
- classify solids and liquids; and
- chart a T-chart comparing the characteristics of matter.

Vocabulary:

melt - to change from a soid to a liquid by being heated to the malting point

freeze - to change from a liquid to a solid by cooling to the freezing point

solid - of definite shape or volume; not liquid or gaseous

liquid - one of the three basic forms of matter; liquids do not have a set shape and take on the shape of the container they are in

matter - the substance or substances of which any physical object consists or is composed; something that occupies space

characteristics - distinguised features or qualities

deposit - an item that is delivered or left

state of matter - one of the conditions in which matter exists; the three states of matter are solid, liquid and gas

Materials:

- Ice (one quart-size block)
- Hot plate
- Pot (large enough to contain the quart-size block of ice)
- Ice cube tray
- Science journals (one per student)
- Container (must be round-to roll) with lid (about the size of a 3 pound coffee can, 1 per group plus one extra for teacher demonstration)
- Resealable plastic bag (quart size, one per group plus one extra for teacher demonstration)
- Resealable plastic bag (gallon size, one per group plus one extra for teacher demonstration)
- Milk or half-and-half (one cup per group plus one extra for teacher demonstration; must be very cold)
- Sugar (one cup per group plus one extra cup for teacher demonstration)

- Vanilla (one teaspoon per group plus one extra for teacher demonstration)
- Measuring cup (1 cup size)
- Measuring spoon (1 teaspoon size)
- Ice cubes (one-to-two pounds per group plus extra for teacher demonstration)
- Cups or bowls (one per student)
- Cups (four to eight ounce capacity, one per group plus one for teacher demonstration [for rock salt])
- Spoons (one per student)
- Rock salt (one five pound bag per 20 children)
- Duct tape (one roll)
- RECIPE: "Ice Cream"
- STUDENT WORKSHEET: "Solid and Liquid T-chart"
- STUDENT WORKSHEET: "Erupting Volcano"
- STUDENT WORKSHEET: "Just Cool It! Cloze Sentences"
- STUDENT WORKSHEET: "Just Cool It! Solids and Liquids: Take Home"

Activity Preparation:

1. Write vocabulary words with definitions on chart paper.
2. At least two nights before the lesson, freeze a one-quart block of ice.
3. Set up the hot plate and pot for melting the ice block. Make sure the pot is the correct size for the ice block and the hot plate.
4. The night before the exploration, make one recipe (included in this lesson) of the ice cream mixture per 2-3 children, plus one additional bag for demonstration purposes. Pour the liquid into clean quart-size plastic freezer bags. Secure the zipper with duct tape, then cool well.
5. Put a half-cup of rock salt in a cup or other container.
6. Fill gallon-size zippered bags with ice.

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: predicting, observing and describing

1. Ask students what they know about the characteristics of liquids and solids. Record student responses with their initials on the board.
2. Place the block of ice in the pot to melt on the hot plate, turn to "high." Ask students to observe what takes place.
3. Ask, "Is the ice a liquid or a solid?"
4. Let the ice block melt completely.
5. Ask, "What changes do you observe happening to the ice?"
6. Pour the water from the pot into an ice cube tray.
7. Ask, "What do you think will happen when I pour the liquid from the pot into the ice cube trays and freeze them?"
8. Freeze the trays and tell the students they will use the ice later.

Explore

Process Skills: predicting, observing and describing

9. Introduce and/or review vocabulary words on chart paper.
10. Tell students they are going to change a liquid to a solid by making ice cream. Remind the students to observe the characteristics of the liquid they will be investigating.
11. Assign students to groups of two or three. Give each group a prepared bag of liquid mixture. Have students place the bag in the center of a large container and fill the container with ice and salt. Make sure the bag is completely surrounded with ice.
12. Seal the lid to the container with duct tape.
13. Seat the students on the floor and have them roll the container between them for about half an hour.
14. At the sink, remove the plastic bag from the container. Ask students to make observations about what they see.
15. Compare and contrast the ice cream from the different groups.
    a. Look at your neighbor's ice cream. What do you notice?
    b. How are the mixtures the same?
    c. How are the mixtures different?
16. Allow students to share and enjoy their ice cream with each other.
17. Have students draw a picture of their observations about making ice cream in their science journals. Ask them to list the physical characteristics of the ice cream before, and then after the activity.

Generalize

Process Skills: predicting and making generalizations

18. What were the characteristics of the liquid mixture used to make the ice cream?
19. Did the shape of your liquid mixture change? How?
20. What are some characteristics of your solid mixture?
21. What are the characteristics of the ice used to make the ice cream?
22. How did the characteristics of the water change when it went from being ice to being liquid?
23. What would you add to ice cream to make a milkshake?
24. What happens to lakes and rivers when it gets really cold outside?
25. Where have you seen something like this happen before?

Apply

Process Skills: describing and communicating

26. At home, complete the STUDENT WORKSHEET: "Just Cool It! Solids and Liquids: Take Home." Bring the completed worksheet to school the next day.
27. Distribute the STUDENT WORKSHEET: "Erupting Volcano." As a class, complete the worksheet by describing the characteristics of the liquid part of the volcano and the solid part of the volcano.
28. Ask students to complete the STUDENT WORKSHEET: "Cloze Sentences."

Assessment Task:

Take a walk around your school and observe as many areas in the school as possible, including your classroom. In your science journal, record at least two examples of a solid and two examples of a liquid. Classify at least two solids and at least two liquids by completing the STUDENT WORKSHEET: "Solid and Liquid T-chart." Describe characteristics of at least two of the solids and two of the liquids you found on your walk.

Rubric:

Objectives	GLEs	Below Proficient	Proficient	Above Proficient
The student will describe the characteristics of solids and liquids.	[4] SB1.1	The student describes the characteristics of one or fewer solids and liquids.	The student describes the characteristics of at least two solids and at least two liquids.	The student describes the characteristics of three or more solids and three or more liquids.
The student will classify solids and liquids	[3-4] SA1.1	The student classifies fewer than three solids and three liquids.	The student classifies three solids and three liquids.	The student classifies more than three solids and more than three liquids.
The student will complete a T-chart comparing the characteristics of matter.	[1] S&P-4	The student completes a T-chart comparing matter. Each section contains fewer than one characteristic.	The student completes a T-chart comparing matter. Each section will contain two solids and two liquids. Students will describe two characteristics of at least two solids and at least two liquids.	The student completes a T-chart comparing matter. At least one section will contain three or more solids or three or more liquids. Students will describe three or more characteristics of solids and/or liquids.

Image Credit:

Erupting volcano image is clip art licensed from the Clip Art Gallery on DiscoverySchool.com.

ICE CREAM

RECIPE

Materials:

- 1 cup sugar
- 1 cup milk or half-and-half
- 1 teaspoon of vanilla
- 4 to 8 ounces of rock salt
- quart-size resealable plastic bag
- gallon-size resealable plastic bag
- coffee can or another large container with lid (that can be rolled)
- ice cubes (1-2 pounds, depending on size of container)
- spoon
- duct tape
- towel or pair of gloves

Directions:

1. Mix sugar, milk or half-and-half and vanilla together until the sugar is dissolved.
2. Pour ingredients into a one-quart resealable plastic freezer bag. Secure the zipper with duct tape and chill well.
3. Place cooled bag of mixture into a container that rolls and has a lid (about the size of a 3-pound coffee can).
4. Fill the can to the brim with rock salt and ice. Be sure that ice cream mixture is completely surrounded by the ice/rock salt.
5. Tape the lid of the container closed with duct tape.
6. Roll the container back and forth on the floor for about 30 minutes.
7. Open the container at the sink. Dispose of the salt/ice mixture and serve the ice cream in cups or bowls. Enjoy!

NAME: _____ STUDENT WORKSHEET

SOLIDS AND LIQUIDS T-CHART

Directions: Classify at least 2 solids and 2 liquids found on your walk around school.

Solids	Liquids
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Directions: Describe the characteristics of at least two of the solids and two of the liquids.

Solids:

1. _____

2. _____

3. _____

Liquids:

1. _____

2. _____

3. _____

NAME: _____ STUDENT WORKSHEET

ERUPTING VOLCANO

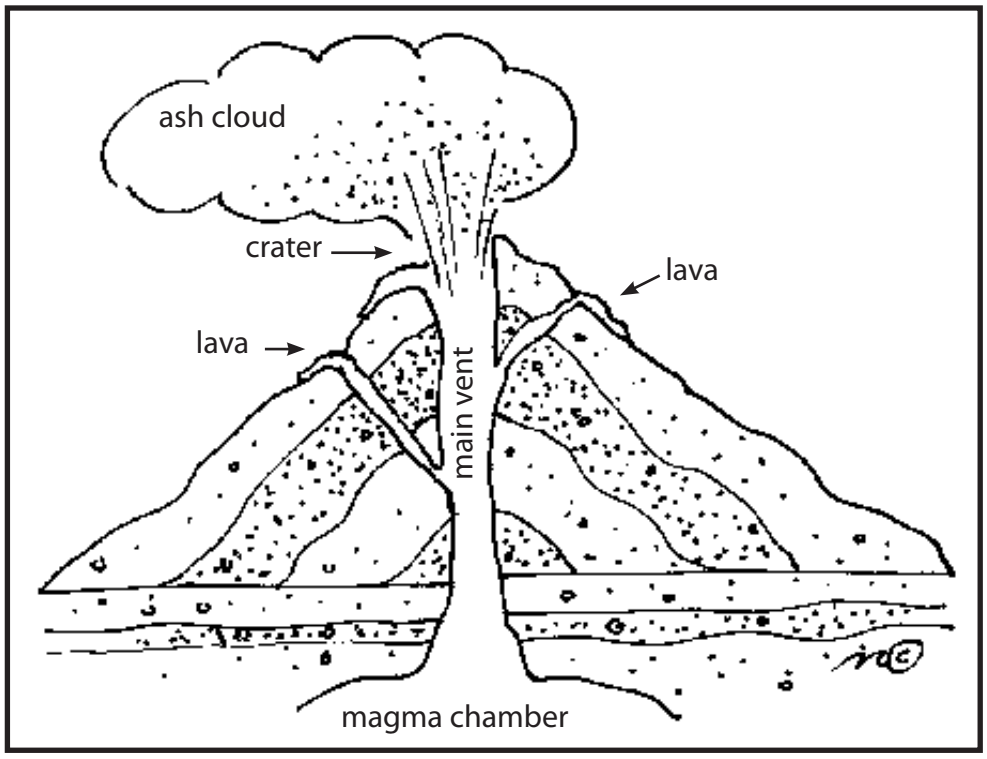

Image courtesy Discoveryschool.com

1. Describe the liquid part of the volcano:

_____

_____

_____

2. Describe the solid part of the volcano.

_____

_____

_____

NAME: _____ STUDENT WORKSHEET

CLOZE SENTENCES

Directions: Choose the correct word(s) from the box to complete each sentence.

1. When I put the mutter on my hot pancakes, it began to _____ .

2. The marble in my pocket is a _____ because it is firm and keeps its shape.

3. Feathers, two feet, and wings are some _____ of birds.

4. There are three _____ .

5. When my popsicle melts, it becomes a _____ .

6. In order to snow, water in the air must _____ .

7. _____ is anything that we can see, touch or breathe.

Vocabulary

melt: to change from a solid to a liquid by being heated to the melting point

freeze: to change from a liquid to a solid by cooling to the freezing point

solid: of definite shape or volume; not liquid or gaseous

liquid: one of the three basic forms of matter; liquids do not have a set shape and take on the shape of the container they are in

matter: the substance or substances of which any physical object consists or is composed; something that occupies space

characteristics: distinguishing features or qualities

state of matter: one of the conditions in which matter exists; the three states of matter are solid, liquid and gas

NAME: _____ STUDENT WORKSHEET

SOLIDS AND LIQUIDS TAKE HOME

Directions: Make a list of at least five solids and five liquids from your home. Be sure to bring this worksheet back to class tomorrow.

Solids	Liquids