

# Investigating Melting and Freezing — Facilitator guide

Teaching notes and answers

## Overview & Lesson Alignment

This facilitator guide supports the Grade 4 science lesson 'Investigating Melting and Freezing with Ice and Water'. Students explore how adding heat causes solid ice to melt into liquid water, and how removing heat causes liquid water to freeze into solid ice.

Ensure students work in cooperative pairs (e.g., Timekeeper and Recorder) and follow safety rules: no tasting materials, and immediate cleanup of spills using paper towels.

## Part 1: Observation Log Guidance

Melting times will vary depending on room temperature, water temperature, and the size of the ice cube. This variation is expected and serves as an excellent talking point.

At 0 min, students should sketch a full ice cube and note it is a solid. For subsequent observations, teachers should accept and discuss what students actually observe. The timing of melting depends on ice size, water temperature, and room temperature, and some ice may still remain even at 15 minutes.

Guide students to describe the physical changes: 'The ice cube is shrinking,' 'More liquid water is in the cup,' or 'The solid is turning into a liquid.'

## Part 2: Comparison Chart Answers

Melting (Ice to Water): Starting State = Solid; Ending State = Liquid; What Happens to Heat? = Heat is added.

Freezing (Water to Ice): Starting State = Liquid; Ending State = Solid; What Happens to Heat? = Heat is removed.

## Part 3: Puddle Predictions Answers

Question 1 (Prediction 1): The process is melting. Students should draw liquid water (a puddle) and describe that the ice melts because heat is added by the sun.

Question 2 (Prediction 2): The process is freezing. Students should draw solid ice and describe that the liquid water freezes because heat is removed by the cold winter air.

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## Exit Ticket Answer Key

Question 3: The correct option is Freezing (removing heat).

Question 4: The completed sentence frames are: 'Adding heat causes solid ice to melt into liquid water.' and 'Removing heat causes liquid water to freeze into solid ice.'

## Worksheet answer copy

Welcome to your science investigation! Today, we will observe melting and discuss freezing.

Word Bank:

solid • liquid • heat • melting • freezing

## Part 1: Ice Cube Melting Investigation

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### Directions

Place one ice cube in your cup of room-temperature water. Observe the ice cube every three minutes and record your observations in the log below. Remember: do not taste the ice or water, and use a paper towel to clean up any spills immediately.

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## Observation Log

| Time          | Quick Sketch (What it looks like) | My Observations (What do you see?) |
|---------------|-----------------------------------|------------------------------------|
| 0 min (Start) |                                   |                                    |
| 3 min         |                                   |                                    |
| 6 min         |                                   |                                    |
| 9 min         |                                   |                                    |
| 12 min        |                                   |                                    |
| 15 min (End)  |                                   |                                    |

## Part 2: Melting vs. Freezing Comparison

### Comparison Chart

| Process                 | Starting State | Ending State | What Happens to Heat?            |
|-------------------------|----------------|--------------|----------------------------------|
| Melting (Ice to Water)  | Solid          | Liquid       | Heat is _____<br>(added/removed) |
| Freezing (Water to Ice) | Liquid         | Solid        | Heat is _____<br>(added/removed) |

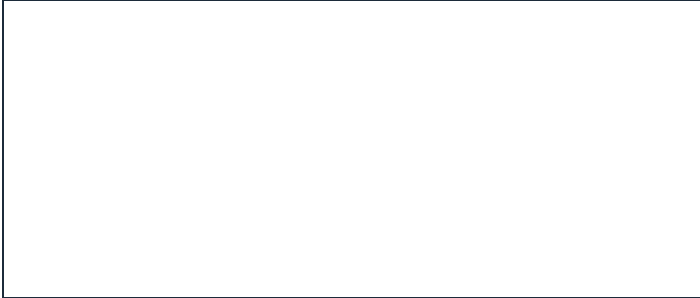
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## Part 3: Puddle Predictions

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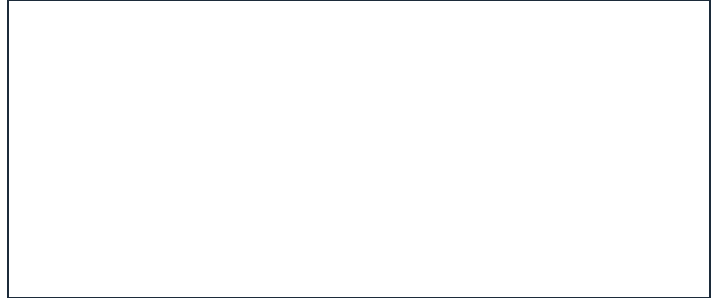
1. Prediction 1: Draw and describe what happens to a frozen ice puddle on a warm, sunny afternoon.



What process is this? \_\_\_\_\_

**Answer:** The ice puddle melts into liquid water because heat is added by the sun.

2. Prediction 2: Draw and describe what happens to a puddle of liquid water on a freezing cold winter night.



What process is this? \_\_\_\_\_

**Answer:** The liquid water freezes into solid ice because heat is removed by the cold air.

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## Melting & Freezing Exit Ticket

3. When liquid water is placed in a freezer, it turns into solid ice. What process is happening?

- ☐ A Melting (adding heat)
- ☐ B Freezing (removing heat)
- ☐ C Boiling (adding heat)
- ☐ D Evaporating (removing heat)

**Answer:** B. Freezing (removing heat)

4. Complete the sentence frames to explain how heat causes water to change states:

- Adding heat causes solid ice to \_\_\_\_\_ into liquid water.
- Removing heat causes liquid water to \_\_\_\_\_ into solid ice.

**Answer:** Adding heat causes solid ice to melt into liquid water. Removing heat causes liquid water to freeze into solid ice.