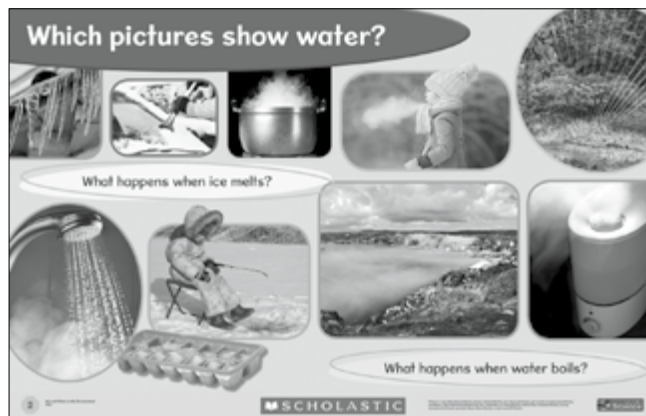


States of Water



Focus: Students will identify the different states of water and compare the characteristics of water and ice.

Specific Curriculum Outcomes

Students will be expected to:

- 1.0 pose questions that lead to exploration and investigation [GCO 2]
- 2.0 communicate using scientific terminology [GCO 2]
- 4.0 explore characteristics of the three states of water [GCO 1/3]

Performance Indicators

Students who achieve these outcomes will be able to:

- describe the characteristics of water in one of its states
- use appropriate scientific terminology to communicate their observations

NOTES:

Attitude Outcome Statements

Encourage students to:

- willingly observe, question, and explore [GCO 4]

Cross-Curricular Connections

Social Studies

Students will be expected to:

- describe how people's interactions with their environment have changed over time [2.4.2]

English Language Arts

Students will be expected to:

- interpret, select, and combine information using a variety of strategies, resources, and technologies [GCO 5]
- use writing and other forms of representation to explore, clarify, and reflect on their thoughts, feelings, experiences, and learnings; and to use their imaginations [GCO 8]

Getting Organized

Components	Materials	Before You Begin	Vocabulary
• Science Card 2 • IWB Activity 2 • BLM <i>Same or Different?</i> • IWB Activity 3 Literacy Place: • <i>An Early Worm Got Out of Bed</i> ("Fog," page 7, Shared Reading–Active Learning Kit)	• students' Science Journals • washing tubs, plastic sheeting, newspapers, or towels • ice cubes • Freezies (optional) • warm, room temperature, and cool water in shatterproof glasses, tubs, or bottles of various volumes • sponges • various kinds of paper • empty containers of various sizes • thermometers • digital camera (optional)	• Freeze water in containers of various shapes or provide Freezies. • Invite an Elder or an Indigenous Knowledge Keeper to share how the different states of water figure in traditional activities. • Gather Internet and print resources related to the importance of ice to polar bears.	• explore • investigate • evidence • solid • liquid • gas • water vapour

Science Background

- There are three main states of matter: solid, liquid, and gas. Solids, liquids, and gases have distinctive physical properties. When a substance changes from one state to another (e.g., ice melts), the particles making up the substance remain the same, but their arrangement relative to one another and their amount of motion changes.
 - Solids are made of particles that are packed tightly together and have little movement. They keep their shape. Heating some solids can turn them into liquids.

- Liquids are made of loosely packed particles and have medium movement. Liquids can flow and take the shape of any container. Heating a liquid can turn it into a gas. Cooling a liquid can turn it into a solid.
- Gases are very loosely packed particles and have high movement. They spread out and change their shape to fill up whatever container they are in. Cooling a gas can turn it into a liquid.
- Water vapour is always present in our atmosphere and is invisible. The steam that comes from a kettle is actually small droplets of condensed water that form when the water vapour contacts cooler air. Similarly, clouds are not water vapour; they are formed of water droplets that condense from water vapour in the air high in the atmosphere.

Possible Misconceptions

- Students are likely to see ice, water, and steam as distinct substances and believe one substance “turns into” another. Address this by asking students to explain their thinking (e.g., when ice melts, ask where the ice went and where the water came from).
- Young students rely primarily on their senses to get information about the world. Gases can therefore be difficult for grade 2 students to conceptualize, since they generally cannot be seen. Prompting students to smell cologne or other aromatic substances, can help them move toward an acceptance of the existence of gases. Note that water vapour is always invisible: steam (and fog and clouds) is made up of tiny droplets of liquid water suspended in air, which condensed from the water vapour when it contacted cooler air (such as outside a kettle).

ACTIVATE



Gas, Liquid, Solid

Share Science Card 2 with the class. Invite students to describe what they see. Then, tell students that every picture has the same thing in it, and challenge them to tell you what it is. Allow students to make suggestions.

After listening to suggestions, point to the water in each picture and ask students to name it. Students likely will call each state of water by a different name (e.g., ice, water, steam). Link back to previous knowledge of seasons and weather, and of hot and cold, by asking questions such as:

- **What is the weather like in this picture? How do you know?**
- **What time of year was this picture was taken? What clues do you see that tell you?**
- **What is the temperature like? What evidence is there of that?**

Invite students to answer the question on the card: *What happens when ice melts?* and *What happens when water boils?* Introduce the terms “solid,” “liquid,” and “gas” and add them to the KWLN chart. Prompt students to share what they know about each term and what they wonder about each of the terms. Challenge students to give other examples of each state of water.

IWB Activity:

- Invite students to use Activity 2: *Solid or liquid?* (see the Teacher's Website) to sort images of water as liquid or solid.



Students may have difficulty thinking of examples of gas; if so, present familiar examples and ask if it is a gas or not. Examples may include your breath (air), car or ATV exhaust, helium for balloons, or propane for a bbq. Point very close to steam and clouds on Science Card 2 to “show” water in the gas state and say that this is evidence of water being a gas. You might introduce the term “water vapour.” Add “solid,” “liquid,” “gas,” and “water vapour” to the Word Wall and then have students draw an example of a solid and a liquid in their Science Journals.

CONNECT

Water World

Create mini science centres with tangible examples of liquid and solid water that students can explore. Examples may include ice cubes (various shapes and sizes) or Freezies (different sizes); and warm, room temperature, and cool water in shatterproof glasses, tubs, or bottles of various volumes. Use washing tubs, plastic sheeting, newspaper, or towels to keep the area dry. Also provide material that will allow students to explore the properties of liquid and frozen water using their five senses, such as sponges, various kinds of paper (e.g., loose leaf, toilet paper, wax paper, paper towel), empty containers of various sizes, and thermometers. Make a record of students explorations by making a video or taking digital photos. As students explore, prompt deeper questioning and thinking by wondering aloud:

- I wonder if ice makes things wet?
- I wonder what happens when I put ice in water?
- I wonder what happens when I put this paper in the water?
- I wonder what material would best clean up a water spill?
- What do you wonder about?



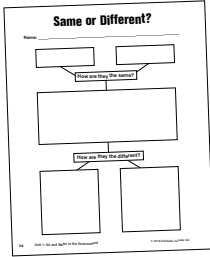
Invite students to record any new questions they have on index cards or sticky notes and add them to the I Wonder Wall.

Introduce/review the terms “explore,” “investigate,” and “evidence” during discussions and add these terms to the Word Wall. Provide prompts such as:



- How could you explore that idea?
- How might a scientist investigate to see if that idea is true?
- What evidence can you find to support your thinking?

CONSOLIDATE



Same or Different?

Divide the class into small groups, and provide copies of BLM *Same or Different?* Instruct students to think back to their explorations of ice and water. Ask:

- **How are ice and water the same? How are they different?**

For each answer given, have students decide as a group where and how to record that answer on their graphic organizer. When work is complete, have each group display their finished graphic organizer in the classroom. As a class, discuss any differences between the graphic organizers, whether in categorization of a response or in how groups decided to represent it.

Three "Types" of Water

Provide students with materials with which to create a scene depicting water in each of its three states. If students struggle, consider providing a scenario. For example, say:

- **Imagine you and your family go for a walk in the winter beside a river or the ocean. You bring along a thermos of hot chocolate to drink along the way. Can you think where you might find water in its liquid, solid, and gas state on this day?**

Alternatively, provide students with pictures to use as reference and/or for clues, such as pictures of a kitchen scene, a waterfall in winter, or a picnic scene.

Living with the Three States

Invite an Elder or Indigenous Knowledge Keeper to talk about the effects and importance of the different states of water on traditional activities such as hunting or fishing. For example, the visitor could talk about how snow changes with the temperature and affects activities such as pulling sleds (e.g., on warmer days, snow melts, which makes it more difficult to pull sleds; on colder days, snow is dry and crystalized and so blows in wind more easily, which makes travel more difficult).

IWB Activity:

- Challenge students to name each form of water shown in the illustration using Activity 3: *Where's the water?* (see the Teacher's Website).



Literacy Place Connection:

"Fog" on page 7 of *An Early Worm Got Out of Bed* describes the feeling of fog. Revisit or read the text with students and ask:

- **Is fog a solid, a liquid, or a gas?** (Fog is made up of tiny droplets of liquid water suspended in the air.)



EXPLORE MORE

Polar Bears and Ice

Working in small groups, challenge students to find an answer to the question:

- **Is ice important for polar bears?**

Provide Internet and print resources. Groups can share their findings with the class as a poster or an oral presentation.

Labelling States of Water

Revisit Science Card 2 and invite students to use sticky notes to label the images on the card according to the states of water shown. (Students will readily identify liquids and solids. Help them to identify gases [water vapour] any time there is air shown. Remind students that water vapour is invisible: steam, fog, and clouds are made up of tiny droplets of liquid water suspended in air, which condensed from the water vapour when it contacted cooler air.)



Same or Different?

Name: _____

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graph TD; A[ ] --- B[How are they the same?]; C[ ] --- B; B --- D[ ]; D --- E[How are they the different?]; E --- F[ ]; E --- G[ ]
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How are they the same?

How are they the different?