

Air in the Environment



Focus: Students will explore evidence that air exists all around them and use scientific terminology when communicating their understanding.

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]
- 3.0 explore how air surrounds us, takes up space, and is felt as wind when it moves [GCO 1/3]

Performance Indicators

Students who achieve these outcomes will be able to:

- select materials to demonstrate how air surrounds us, takes up space, and can be felt as it moves
- use scientific terminology to communicate their observations

NOTES:

Attitude Outcome Statements

Encourage students to:

- recognize the role and contribution of science in their understanding of the world [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:

- speak and listen to explore, extend, clarify, and reflect on their thoughts, ideas, feelings, and experiences [GCO 1]
- respond personally to a range of texts [GCO 6]

Getting Organized

Components	Materials	Before You Begin	Vocabulary
• Science Card 1 • Anchor Video: <i>Air and Water in the Environment</i> • IWB Activity 1	• electric fan (optional) • streamers or light scarf (optional) • balloons • books • hand-held pump • paper towels • transparent, shatterproof cups • low-sided container of water (e.g., a baking dish) • empty water bottles • scrap paper • plastic or paper bags • straws • whoopy cushion (optional) • students' Science Journals	• Display a KWLN chart. • Create a Wordle or another word cloud puzzle. • Invite an Elder or an Indigenous Knowledge Keeper to participate in the Nature Walk.	• air • water • weather • wind • temperature • question • explore • observe • evidence

Safety

- Review school safety rules before students go outside for an investigation.
- Use trays or other containers when working with water and wipe up any spills immediately.

Science Background

- “Air” is the mixture of gases found in the lowest part of Earth’s atmosphere. Air is 78% nitrogen and 21% oxygen, with traces of water vapour, carbon dioxide, and other gases.
- Air takes up space. A balloon expands when inflated with air because air takes up space.
- Air has mass. Weight is a measurement of mass; if a balloon were weighed before and after it was inflated with air, the inflated balloon (balloon + air) would weigh more.
- Air moves. We feel air movement or see its consequences when it makes other objects or substances move. Wind is the movement of large masses of air.
- Air can exert pressure. As air is pumped into a container, it fills the container and then compresses (squeezes), generating pressure. Air pressure can be used to do work; for example, in automobile tires, air pressure supports the vehicle.
- The volume (amount of space it takes up) and density (mass per unit volume) of air changes with temperature. Heating adds energy, which causes the gas particles in air to move faster and further apart; in a flexible container (e.g. a balloon) or in the atmosphere, this causes the volume to increase and the density to decrease. Therefore, a cubic litre of cold dense air will weigh more than a cubic litre of warm, less dense air. A hot air balloon rises because the air within it is less dense than the air surrounding it.

Possible Misconceptions

- Students often believe that scientists only invent things or solve practical problems, and imagine them as working alone in laboratories. Address this misconception by integrating “science” and “scientist” into enjoyable activities that involve observation and exploration. For example, during the nature work, mention how a scientist would look for interesting things and try to find out more about them, just like they are doing.
- Grade 2 students rely on their five senses to tell them about their world far more than logical ideas. Perhaps because air is invisible, students may not think of air as being a substance at all, or imagine that it comes and goes (such as with wind or by breathing), not existing otherwise. Students may think of wind as a different substance than air.
- Students at this age often think that evidence is something they already know, have personally experienced, or that someone told them, and are unlikely to consider observations of an experiment to be evidence. Ask students to explain their reasoning to get insight into their viewpoints and gently challenge these ideas.

ACTIVATE



Air and Water Around Us

Create a chart, such as a KWLN chart, for recording the class exploration of air and water. This is also an opportunity to start the I Wonder Wall. Share Science Card 1 and ask students to tell you what they notice about the pictures. Prompt thinking by asking:

- **What do these pictures show?**

Record students' ideas and questions on the KWLN chart. Then, wonder aloud why the flag, the dandelion seeds, and ribbons on the fan are moving and then, if there is anything the same about the iceberg, the running water, and the steam from the kettle. Pause during your wondering so that students can respond, and encourage them to share any questions they have. Then ask:

- **Where can you find air and water?**
- **How do you know if there is air and/or water in the picture?**
- **How can we group these pictures into air and water?**

Record students' responses using a T-chart or take the opportunity to demonstrate using a graphic organizer such as a Venn diagram.

Anchor Video

Play the Anchor Video: *Air and Water in the Environment* which is located on the Teacher's Website. Set a focus for viewing by asking students to think about why air and water are important. You may choose to pause the video to allow students to answer questions or to discuss any questions which students may have.

I Wonder Nature Walk

Take the class on a walk outside, somewhere that has natural water (e.g., a body of water, a puddle) and objects that will readily show wind movement (e.g., a flag, vegetation). You might invite an Elder or an Indigenous Knowledge Keeper to participate in the walk, and ask her or him to share stories or other cultural aspects of how air is important to Indigenous peoples, such as the importance in predicting weather when living on the land. Photograph or have students sketch things that pique their interest and which relate to air and water in the environment.

As you are walking, model posing "I wonder" questions about air and water. For example, ask:

- **I wonder why the leaves are moving?**
- **I wonder why it's warmer out of the shade?**
- **I wonder why the grass is wet?**

Ask students what they wonder about as the walk continues. Students may not naturally generate I wonder questions related to air and water around them, but do not restrict the topic of their questions.



Back in the classroom, sketch a large map of the walk route in a central place and, working as a class, have students add the photographs and/or sketches from the walk. Students might make drawings from memory and add these images. Continue to model “I wonder” questions about air and water as students work on adding images. Prompt students to ask their own questions. Encourage creative ways of expression, such as supporting a student to draw a picture of a phenomenon they are curious about. Use of a question generator such as Wonderopolis or question matrix may lead students to deeper questioning. Add these questions to the I Wonder Wall in the classroom.

Air and Water Words

Create and make copies of a Wordle, using terminology that came up in the Nature Walk or any or all of the following unit terminology: air, water, ice, water vapour, steam, moisture, weather, wind, rain, snow, hail, fog, cloud, dew, frost, humidity, question, explore, investigate, observe, predict, measure, record, sequence, group, conclude, communicate, solid, liquid, gas, evaporation, condensation, melting, freezing, temperature, thermometer, rain gauge, windsock, anemometer, weather vane, waterproof, rust, stream, river, lake, pond, ocean, wells, pipes, tap, pollution, conservation. Have students circle any words they don’t know, and tell that they will learn about these words in this unit. Have students keep the Wordle somewhere they can access easily and refer to throughout the unit. Alternatively, make thematic Wordles based on key concepts, such as air, states of matter, moisture, drying, weathering, and the environment.

Introducing Air

Open a window or turn on an electric fan to show students the effects of air movement on a light object, such as a streamer or light scarf. Ask students to explain what happens to the object. Respond to students’ suggestions by asking:

- **How do you know? What is the evidence?**



Explain that evidence is something we observe (e.g., see, hear, or feel) that backs up an idea. Add “evidence” to the Word Wall, and continue to use it during discussions with the students. Then, ask:

- **Is there anything else you wonder about what we observed?**
- **Is there anything you wonder about evidence?**



Add students’ questions to the I Wonder Wall.

CONNECT

Carnival of the Air

You will perform three demonstrations, some of which involve direct student participation. Before class, or at the start of class with student help, set up a stage area to perform the demonstrations as acts in a show. Students can

create a banner or sign for each act. You might wear a costume, such as the top hat and tails of a ringmaster for the Carnival of the Air; you could also present the demonstrations as a magic show. Make a video of each demonstration.

Demonstration 1:

Gather balloons, a few books, and (if available) a hand-held pump. Speak like a carnival barker and say:

- **Watch as I raise these books without touching them!**

Show a balloon to the students, and then place it under the books. Using the pump or your breath, inflate the balloon until the stack of books begins to rise. You might ask for a volunteer to inflate the balloon. When the performance is over, ask:

- **Why do you think the books rose?**
- **What was in the balloon? What is the evidence?**
- **Where did the air come from? How do you know?**

Demonstration 2:

Gather paper towels, a transparent shatterproof cup, and a low-sided container of water, such as a baking dish. In your carnival voice, say:

- **I am now going to put a paper towel in water, and it won't get wet!**

Place a crumpled paper towel inside the bottom of the cup, and invert the cup in the container of water. The air in the cup will displace the water, so water will not enter the cup and moisten the towel. Ask for volunteers to perform the same act. Challenge students to explain the trick and provide evidence for their explanations. If any of the towels get wet, ask students to suggest reasons to explain this, again asking them to provide evidence.

Demonstration 3:

Gather several empty water bottles and scrap paper. Hold the empty water bottles horizontally and place a small, crumpled piece of paper inside the neck of each bottle. In your carnival voice, say:

- **Blow the paper into the bottle and win a prize!**

Invite students to try to blow the paper into the bottle. It will not go in because the paper will push up against the air already filling the bottle. Guide students in coming up with an explanation and providing evidence for their ideas.

CONSOLIDATE

IWB Activity:

- Have students circle the images where air is found using Activity 1: *Is there air there?* (see the Teacher's Website).



Get In On the Act

Tell students they are going to create their own act for the Carnival of the Air; their act must show that air is a substance that takes up space. Allow students to explore and choose a variety of items (such as those at the Curiosity Centre) that can be filled with air, for example, bags, balloons, transparent shatterproof cups, or a whoopy cushion, as well as various materials that can be used to add air to or keep air in these items, such as straws, paper, and containers of water. Have students work in small groups to create and then perform their act. After performances are complete, have each group describe how their act showed how air takes up space, or ask other class members to describe what the act showed about air.

Question List

Invite students to generate a personal list of questions that they would like to explore and investigate throughout the unit. Students can record the list of questions in their Science Journals.

EXPLORE MORE



Weathered Objects

Ask students to bring to class a small, inexpensive object that can be left outside over the course of the year. Tell students that you will keep the objects outside and bring them back to class periodically so that students can observe how the objects have been affected by the weather. Invite students to predict what, if anything, they think will change about the object. Ask students to record their predictions in their Science Journals.