CATCHING AIR

BENCHMARKS AND TASKS

SC.D.2.1.1 The student understands that people influence the quality of life of those around them.
SC.G.2.1.2 The student knows that the activities of humans affect plants and animals in many ways.

- The student investigates the air in the environment.
- The student classifies and justifies changes humans make in the environment as positive or negative.

KEY QUESTION

What do we find in the air around our school?

BACKGROUND INFORMATION

The students will collect matter from the air around the school. A special sticky frame, an air collector, will collect evidence of many different types of matter (e.g., insects, pollen, lint, dust, hair, parts of plants).
Particulate matter (second graders would refer to as dirt) is made up of tiny particles of solid matter and/or droplets of liquid. It is produced by a variety of natural (pollen, dust) and man-made (smoke, lint) sources. Particulate matter is a necessary part of the water cycle. It is what the moisture (evaporated water) clings to when condensation takes place, thus forming a cloud. Particulate matter can also consist of matter that is considered a pollutant. Most of these pollutants are invisible unless large amounts concentrate in areas, like large cities, and result in smog. Some of these particles are harmful to our lungs, make things dirty, and coat plants so that it is difficult for them to grow.
It is important for the teacher to point out that not all particulate matter is considered harmful. Some, such as plant parts, dust, and insects are simply part of the natural world.

MATERIALS

Teacher

graph or chart paper
safety goggles
1 prepared *Air Collector*
candle
matches
The World That Jack Built by Ruth Brown
The Lorax by Dr. Seuss

Per pair of students

Air Collector frames
contact paper to cover frame opening
scissors
hole punch
string
wooden dowel, ruler, or pencil

Per student

science journal
hand lens
pencil

TEACHING TIPS

The teacher may choose to make the air collectors or have students construct them with teacher direction.

1. To build an *Air Collector* frame:
    - Duplicate the blackline master using heavy cardstock. Each rectangle will be a frame.
    - Cut out the center.
    - Cut out a piece of clear contact paper a little smaller than the outer edge of the frame.
    - Remove the protective covering from the sticky side of the contact paper.
    - Lay the contact paper down, sticky side up on the table and place the cardboard frame onto the sticky paper.
    - To protect the sticky side until it will be used, replace the protective covering.
    - Using packing tape or staples, attach a wooden dowel, ruler, or pencil to the bottom center of the frame if the collector is to be staked in the ground. If the air collector is to be suspended, punch a hole in the middle of the top of the frame and place a string in the hole so it can be tied and suspended from a tree, pole, etc.
2. Find places around your campus that will work well for the collectors.
3. Put some collectors out ahead of time in order to be familiar with what might be found.
4. Keep all materials gathered, charts, and journals for assessment.

ENGAGE

Read *The Lorax* and/or *The World That Jack Built* to the class and discuss how humans effect the environment in positive and negative ways. Lead the class in a discussion about air pollution. Discuss causes of air pollution produced by gas burning engines (e.g., cars, jets, some lawn mowers, machinery with gas burning engines) and by smoke producing sources (e.g., furnaces, fireplaces, factories, coal burning power plants).

Create a chart of things the students think may be bad for them to breathe. Discuss how for many people, some of the things listed may not cause any problems. However, some people may be allergic to dust or pollen or some of the other items on their list. Share with the students that allergic reactions may include sneezing, watery eyes, or shortness of breath. Discuss what sources around the school may be producing things which may produce problems for some people.

EXPLORE

1. Show students what smoke from a burning candle looks like when "caught" using the *Air Collector*. Light a candle using a long wick and ask the students to observe smoke rising from the flame. Ask them where they think the smoke goes once it reaches the air. (It seems to disappear, but it really is still there, mixed in with the other air.)
2. Discuss what they think smoke would look like, using a hand lens or microscope, if they could capture it
3. Blow out the candle and hold an *Air Collector* above the candle until the candle stops smoking.

4. Pass the *Air Collector* around for the students to observe. Encourage the use of hand lenses.
5. Discuss what they have observed.
6. Ask students to name other things that give off smoke (e.g., campfires, fireplaces, factories).
7. Ask a student to gather up some dust from the floor or under the doormat and blow it gently into the air while the teacher holds the *Air Collector* nearby, positioned to catch some of the particles (teacher should wear safety goggles).
8. Again, pass the *Air Collector* around to observe.
9. Discuss the observations and ask the students how dirt can get into the air we breathe (e.g., cars driving by, wind blowing, children playing on the playground).

Collecting Air Activity

1. Tell the students that they are going to become scientists and gather information about what's in the air around the school. Show them an *Air Collector*.
2. Explain that the sticky side will gather evidence of some of the things found in the air around the school.
3. Create teams of two students and give each team an *Air Collector* and ask them to decide where they will place their *Air Collectors*.
4. Take students outside and have them place their catchers in appropriate, safe areas (not around driveways, dumpsters, etc.). Do not place in areas that will interfere with other classes learning (not in the windows of other classes, on walkways, etc.).
5. Direct the students to place the collectors and record the location of their *Air Collector* frame.
6. With the class, make a graph using labels that indicate the area of all of the *Air Collectors*.
7. Leave the *Air Collectors* out for two or three days. Check the frames and discuss their observations each day.
8. Have the students bring in their *Air Collectors*, use a hand lens to observe, and record what they see in their science journals.
9. Ask students to try to determine what the matter is and where it came from. Include this information through pictures or words in the journals.
10. Have teams compare their frames and information with other groups.

EXPLAIN

Make a bar graph with the *Air Collectors* labeling the x-axis *heavy, medium, light*. Sort the *Air Collectors* into heavy, medium, and light according to the amount of matter collected. Place them above the three labels on the x-axis.

Ask the following questions:

- Where did the class collect the most evidence of matter?
- Where did the class collect the least amount of evidence?
- What do you think the matter particles are?
- Do all of the particles look the same? Explain.
- Where do you think the particles came from?
- What type of matter did we collect the most of around our school?
- Would you consider this air pollution? Explain.

- Is there something that could be done to reduce any of the air pollution?
- Does air pollution cause any problems for anyone?
- Is there evidence of matter in our air that is bad? Explain.
- Why is it important to have clean air?

EXTEND/APPLY

1. Make additional *Air Collectors* and send one home with each student. Students are to set the Air Collector up at a location at home and observe for three days. They will need to keep observations in their science journals during this time. After three days the *Air Collectors* are brought back to class and the data they collected is compared with what was found at school.
2. Make additional *Air Collectors* and set them up with the class in the school parking lots. Ask an adult to start a car (with the students back) and place the *Air Collector* near the car exhaust. Gather the other *Air Collectors* after two days and compare the materials found with the materials collected directly from the car exhaust. Use hand lenses or microscopes to look at these collectors and discuss what comes from cars.

EXTENSIONS

1. Discuss the fact that the matter particles in the air also contribute to what we smell. Send each student home with a plastic bag (such as those used to cover the morning paper, or those found in the produce department of the grocery store) and a twist tie. Challenge the students to capture an odor from dinner. They will need to "scoop" air from near where cooking is taking place and twist the bag shut. Bring the bags back to class and ask students to guess what a classmate had for dinner.
2. Create a T-chart and categorize common odors (or locations of odors on campus) as pleasant or unpleasant. Use Air Collectors to capture matter from these areas. Discuss what is found.

ASSESSMENT

Teacher assessment through observation should include the following criteria:

- Tasks have been completed by the student.
- Level of detail and specificity in descriptions found in the student journal entries show growth and understanding.
- Students demonstrate understanding through successful completion of the activities and in class discussions.
- Student answers to questions should show evidence of conceptual knowledge.
- Students use appropriate vocabulary.
- Data collection and organization of data was effective.
- Use of science tools enhanced their learning.
- Science safety rules were observed.

Air Collector **frame**