

# What's Up There Besides Air?



**Grades: 3-5**

**Subject: Science, Language Arts and Social Studies**

**Time: 1 to 2 Class Periods**

## Student Objectives

- Write their own definition of air pollution.
- List some ways that we can tell that air pollution is present.
- List the various characteristics of air pollutants.

## Materials

- Notebook and pencil for each student
- A milk carton for each student, team or group of students
- Double-sided carpet tape
- Waterproof marker
- Directional compass
- Magnifying glass
- Colored pencils, markers or crayons
- Overhead projector (optional)
- Posters (optional)

## Background Information

Clean air is healthy for us to breathe. However, air can become polluted - that is, contaminated with particles and gases that are not supposed to be there - making the air dirty and unhealthy. In general, air pollution is any visible or invisible particle or gas found in the air that is not part of the normal composition of air.

Some air pollution is from natural causes, but much of it comes from man-made sources such as cars, factories, fires, and products that we use. It is important to note that both indoor air and outdoor air can be polluted. This lesson is focused on outdoor air. Air pollutants can be in one of two forms: particulate or gaseous. Particle pollution is in the form of small solids or droplets. Dust, smoke, sand, ash, smog, and pollen are examples of particle pollution. Particle pollution is often easy for us to notice because they can make the air look dirty or smell unusual. Sometimes we can see particle pollution when it settles out of the air and accumulates on surfaces - our cars can be covered with yellow pollen, outdoor surfaces can be covered with dust and statues can become dirty from deposited soot.

Gaseous air pollutants are those that are in the form of a gas: carbon monoxide, radon, ozone, and sulfur dioxide are a few examples. Some gaseous pollutants are invisible and odorless, making them more difficult to detect than particle pollution. Two such pollutants are carbon monoxide and radon.

## Background Info (Cont.)

Others are more obvious to us because we can smell them or immediately feel their effects. Gaseous pollutants can combine with water vapor and other elements to create other pollutants. For example, ozone is created by an interaction of volatile organic compounds (VOCs), nitrogen oxides, natural atmospheric gases, and sunlight.

How can we know when air pollutants are present? As mentioned previously, sometimes we can see them or smell them. Other times we might experience noticeable effects of the pollutants, such as difficulty breathing when there's a lot of ozone in the air or watery eyes when there is excessive pollen in the air. We have to rely on technology, government agencies, the news media and social media to inform us of the air quality conditions or forecast.

## Setting the Stage

### What is Air Pollution?

- This activity relates to the three student objectives. Students will discover ways in which they can tell that the air is polluted, learn that there are both particulate and gaseous air pollutants, and define (in their own words) the term air pollution.

- The class will take a "walking" field trip outside in the area around the school. Each student should have a notebook and pencil or pen. (*NOTE: This does not work as well immediately after a rain, because the air and surfaces have been cleansed of most air pollution.*)
- Before going outside, ask the students:
  - *Is the air always clean? (No)*
  - *When the air is dirty, we say that we have what kind of air? (Polluted)*
  - *What do we call the substances that make the air dirty? (Pollutants or air pollutants)*
- Now take the students outside. Have the students "smell" the air. Ask them if it smells clean, the way it does right after it rains.
- Ask them to write down how the air smells.
- Have the students to look at the air. Is it clear or hazy?
- Ask them to write down how the air looks.
- Have students look at objects in the vicinity to see if they see any evidence of air pollutants.
- Ask them to write down all the examples they can find of particulate air pollutants. They should describe the object and what the pollution looks like (color, texture, thickness).

## Setting the Stage (Cont.)

- When they have finished the field trip, return to the classroom and ask the students to share their findings. Ask them the following questions:
  - *Do you think that polluted air always contains the same pollutants? (No)*
    - *What observations tell you this? (Deposited pollutants look different, sometimes I sneeze when I go outside and sometimes I don't, etc.)*
  - *Do you think air pollutants are particles or gases? (They can be either.) Why do you think so? (Some we can see; some we can smell)*
  - *You mentioned several things that you smelled or saw that let you know the air contained pollutants. Which indicate the presence of particulate air pollutants and which indicate the presence of gaseous air pollutants? (Deposited particles indicate particulate pollutants; smelly air indicates gaseous or particulate pollutants.)*
- *Let's write a definition of the term "air pollution." How would you define it?*

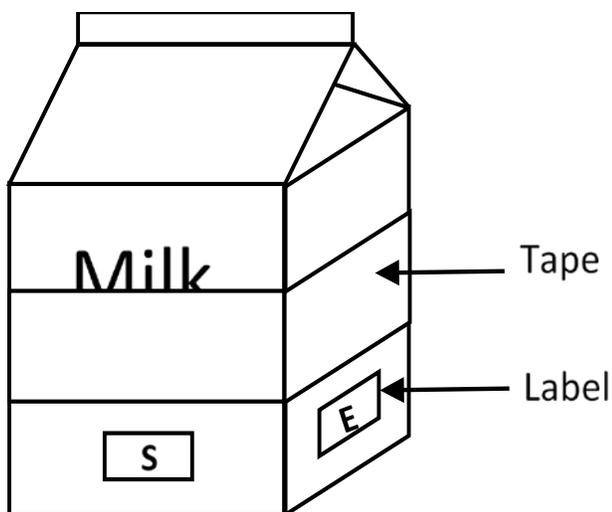
## Activity

### Catching Particle Pollutants

This activity relates to the three Student Objectives. Students will collect particle pollutants. Have the students follow these steps to create particle pollution "collectors".

1. Wrap a piece of double-sided tape around the middle of the milk carton.
2. On the four "sides" of the carton, write the directions north (N), south (S), east (E), and west (W). Make sure that students have the carton labeled in the correct orientations.
3. Label the catchers 1, 2, 3, etc.
4. Place the cartons in various spots around the school, using the compass to make sure that N is facing north, etc. (**NOTE: Write on the bottom of carton the location where it is placed.**) Make a list showing where catchers 1, 2, 3, etc., were placed.
5. Have students write their predictions about which side will "collect" more pollutants and explain their rationale.
6. After a few days, collect the cartons and examine them. On a chart write the location where the carton was placed, how much particulate matter was stuck to the tape, what it looked like (use a magnifying glass), and the direction from which the majority of the pollutants came, etc.

# What's Up There Besides Air?



## Follow Up

- Make a simple map that shows all the locations where the cartons were placed.
- Using colored pencils, markers, or crayons, to indicate the relative amount of particulate matter "collected" at each of the locations.
- Have students discuss possible reasons that more particles were caught in some locations than in others.
- Have the students make a bar graph illustrating what they found.

## Extension

- Turn off the lights in your classroom.

- Place an overhead projector at the front of the classroom and turn on the light to the projector. Ask the students if they think that the air in the classroom is clean. Have the students come forward and observe what they see around the projector. Have each student draw and describe in writing what they saw. Discuss their findings. Ask the students what senses were used and what senses were not used and why.
- Have students write a persuasive paragraph telling why we should stop pollution and care for the environment.
- Have the students make a collage using pictures cut from magazines. On one half of the paper, glue pictures of people or things polluting the air. On the other half, show pictures of people cleaning up and taking care of the earth.
- Have students write a cinquain (5-line stanza) on the topic of air pollution.
- Have students work in groups to create a "Don't Pollute" poster. They can make up their own catchy slogan. Display the posters around the school.
- Have the students create an opinion survey and ask older students or adults what they think are the biggest contributors to air pollution. Have the students record only what that individual thinks are the largest contributor. Have the students bring the results back to class and record their findings.