

# BREATH OF FRESH AIR

## Background Information for Activity Leaders

### Overview

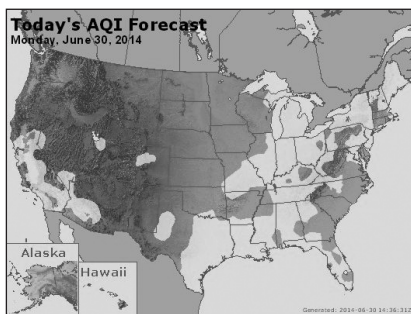
Children will explore what kinds of large particles can be found in air.

### Key Concepts

- Clean air has no particulate matter or chemical pollutants, and it's the best thing for people to breathe. However, millions of people live in cities and other areas where the air is polluted.
- Particulate matter pollution is made-up of microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems.
- Major sources of outdoor pollution include the exhaust from burning fuels in automobiles, homes, and industries. Some scientists believe that even the burning of wood and charcoal in fireplaces and barbecues can release significant quantities of particulate matter into the air.
- There are many sources of indoor air pollution. Mold, tobacco smoke, cooking, and vapors released from building materials and paints, can all cause pollution inside buildings.
- Local air quality can affect our daily lives. Like the weather, it can change from day to day. You can check the daily **Air Quality Index (AQI)** for where you live by looking at the weather forecast section of your local newspaper, or by using the U.S. government's Air Quality Index at:

<http://airnow.gov>

- The AQI index reports air quality daily. It reports how clean or polluted air is in U.S. cities, and what associated health effects might be a concern for them.



### Air Quality Outlook

This map represents a two-day air quality forecast for the United States.

Air Quality Index (AQI) Values	Levels of Health Concern	Colors
<i>When the AQI is in this range:</i>	<i>...air quality conditions are:</i>	<i>...as symbolized by this color:</i>
0 to 50	Good	Green
51 to 100	Moderate	Yellow
101 to 150	Unhealthy for Sensitive Groups	Orange
151 to 200	Unhealthy	Red
201 to 300	Very Unhealthy	Purple
301 to 500	Hazardous	Maroon

### Air Quality Index (AQI)

This table explains using color coded "Levels of Health Concern" what the air quality is throughout the map.

# BREATH OF FRESH AIR

## Background Information for Activity Leaders

- The AQI focuses on health effects that may be experienced within a few hours or days after breathing polluted air. It does not measure longterm effects.
- The Environmental Protection Agency calculates the AQI for five major air pollutants regulated by the Clean Air Act: ground-level ozone, particle pollution (also known as particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide.
- National air quality standards have been established to protect the public's daily health. Ground-level ozone and airborne particles are the two pollutants that pose the greatest threat to human health.

## What to Expect

- The vacuum and coffee filter method of collecting large particles in the air introduces children to the idea that there are particles in the air that they may not see unless they are filtered out.
- During the investigation it is best not to use a battery-operated vacuum. Attempt to make arrangements so the vacuum cord can reach far enough to collect some outdoor area samples as well as some indoor area samples.

## Common Misconceptions

- *Children may think: "Air that looks clear is clean."*  
Suspended in air are many different types of particles that we can't see. Other particles, like smoke and dust, are visible.

# BREATH OF FRESH AIR

.....

## Data Collection Sheet

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**WONDER** What kinds of particles can be found in air?

**RECORD** Draw what you notice on the filter after you collect your samples.

with magnifier	with microscope
INDOOR SAMPLE	

with magnifier	with microscope
OUTDOOR SAMPLE	

Location:

\_\_\_\_\_

Observations:

\_\_\_\_\_

\_\_\_\_\_

Location:

\_\_\_\_\_

Observations:

\_\_\_\_\_

\_\_\_\_\_

**CONCLUDE** What did you discover about the solid particles found in air?

\_\_\_\_\_

\_\_\_\_\_

## Set Up the Expedition

### Materials:

#### For the activity leader:

- *A Breath of Fresh Air* Learning Cards
- (1) Air Quality Table and Air Quality Outlook Map
- (2) vacuums, to be used by all groups

#### For each group:

- (2-4) coffee filters
- (1) microscope
- (3) clothespins
- (1) 100cm length of string

#### For each child:

- (1) *A Breath of Fresh Air* Data Collection Sheet
- (1) magnifier

#### Prepare the demonstration

1. Cut out the Air Quality information from your local newspaper.
2. Post the Air Quality Table and Air Quality Outlook Map where all the children can see it.
3. If possible, arrange for the use of computers with internet access.

#### Prepare the exploration:

1. Arrange for the use of two vacuums that have hose attachments.
2. Identify strategic places to plug in the vacuums. Samples will be collected indoors and outdoors.
3. Hang the string like a clothesline along a wall. Place clothespins far enough apart to be able to hang each group's air pollution samples.

# BREATH OF FRESH AIR

## Activity Leader's Guide

**Group Size:** 4-6 children

**Time:** 45 minutes

## Engage

- 1** Gather the children together.

### Say:

*Most of us take the air we breathe for granted. To live healthy lives we need to have clean air. Sometimes air becomes polluted with particles and chemicals that can make us sick.*

### Say:

*Take a deep breath. Can you tell if the air that you're breathing has any pollution? Look at the air around you. What do you see? Have you ever noticed anything in the air that makes it look different? Smoke? Dust?* Allow children to share their ideas.

- 2** Say:

*Every day the U.S. government uses scientific tools to determine the Air Quality Index, or AQI. This guide is printed every day in the weather section of newspapers and on the internet. It tells you how clean or polluted the air in your city is, and whether it's healthy to be outside.* Show children the air quality guide. Explain what each color represents.

### Ask:

*Can you think of ways we could measure the air quality around our center?* Allow the children to contribute their ideas.

# BREATH OF FRESH AIR

## Activity Leader's Guide

### Explore/Expand

- 3** If working with more than 4-6 children, divide the children into groups. Distribute the Data Collection Sheet and the Learning Cards.

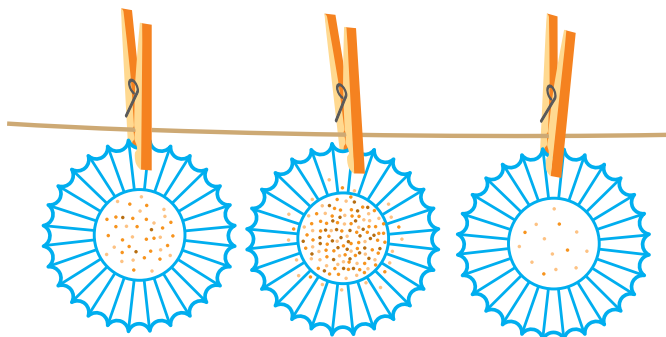
**Say:**

*Today we are going to use a very simple method to measure the amount of air pollution inside and outside our building.*

- 4** Allow children enough time to complete the WONDER, EXPLORE, RECORD, and EXPAND sections of their Learning Card.

- 5** Label each filter with the location where it was collected. Display the various coffee filter samples collected by using clothespins to hang them on the clothesline.

Ask children to observe the samples from each group.



### Conclude

- 6** Gather the children together and ask the following questions:

*What kind of particles did you see on your filter?*

Children may be able to observe a variety of large particles: hair, dust, fibers, leaf litter, and even tire dust.

*What differences did you notice between the samples collected indoors and the samples collected outdoors?* Children may notice a difference in the amount of particles on the filter or they may notice that the types of particles are different.

*What did you notice about the air samples collected by other groups?* Allow children to contribute their observations.

- 7** **Note:**

If you have access to the internet, allow time for the children to explore the website below to learn more about the Air Quality Index and how it affects them. Alternately, provide children with the website address so they can explore at home:

[www.epa.gov/students](http://www.epa.gov/students)

or

<http://www.epa.gov/learn-issues/learn-about-air>

- 8** **Say:**  
*Congratulations! You have earned your Ask Me About Air stamp. You are ready to tell people about air*

# BREATH OF FRESH AIR

## Expedition Learning Card

? How can air pollution be measured?

air quality  
air pollution  
filter

Explore what solid particles can be found in the air you breath.

**1 WONDER** What kind of particles can be found in air?

 Record your prediction on your Data Collection Sheet.

**2 EXPLORE** Discover what kinds of solid particles can be found in the air.

1. Place a filter over a vacuum tube. Attach it tightly to the hose using a rubber band.
2. Allow the vacuum to run for 5 minutes.
3. Turn off the vacuum and remove the filter.
4. Label the filter with the location, for example: "inside by the air conditioning duct" or "outside by the door to the building."
5. Using a magnifier, carefully observe the surface of the filter that faced the outside of the vacuum.
6. Use the magnifier, and then the 10X objective lens on the microscope to observe the surface of the filter that faced the outside of the vacuum.




# BREATH OF FRESH AIR

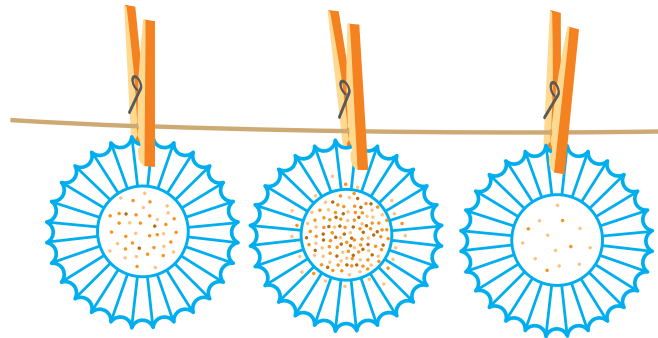
## Expedition Learning Card

**3 RECORD** Notice everything you can about what you see on the filter.

 Draw or write your observations on your Data Collection Sheet.

**4 EXPAND** Compare the air samples from other locations collected by other groups. What differences do you notice?

 Draw or write on your Data Collection Sheet what you observe.



**5 CONCLUDE** What did you discover about solid particles found in air?

## Discovery

### Why did we do that?

- Air quality is measured and monitored every day by the government to protect our health.
- Air pollution can be harmful.
- Filters can be used to trap solid particles found in the air.

### Congratulations!

You have earned your "Ask Me About Air Pressure" stamp! Now you are ready to tell people about air quality!

