WEST MICHIGAN CLEAN AIR ACTION!

Educational Activities
Kindergarten – 5th Grade

Improving the air quality in West Michigan is important.

The West Michigan Clean Air Coalition was formed in 1995 and is working toward this goal. The West Michigan Clean Air Coalition is a partnership of businesses, academic institutions, government agencies, industry, and non-profit organizations in Kent, Ottawa, Muskegon, and Kalamazoo counties working together to achieve cleaner air in the region. The coalition works to educate the public about our air quality and its health effects, and to promote voluntary emission reduction activities that can improve our air quality.

The West Michigan Clean Air Coalition in efforts to expand the public education campaign would like to thank the Clean Air Coalition of Southeast Michigan for the permission to use their packet and adapt it to the needs of West Michigan. Information from the Michigan Department of Environmental Quality and the United States Environmental Protection Agency has been incorporated in this document as well.

Visit the West Michigan Clean Air Coalition's webpage (www.wmcac.org) and Facebook page for additional information that supports these activities.

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Introduction to Air Quality in West Michigan

Are your students curious about air quality in West Michigan? Have they noticed that sometimes the meteorologists on local weather stations talk about Clean Air Action Days? Do they know the difference between "good" ozone and "bad" ozone? Have they heard of fine particulate matter pollution? Do they know what to do on a Clean Air Action Day?

To help answer these and many more questions, the West Michigan Clean Air Coalition has lessons and a website for you to find lots of information about air quality in West Michigan (http://www.wmcac.org/). This along with the Michigan Department of Environmental Quality's website and the U.S. Environmental Protection Agency's AirNow site (https://www.airnow.gov/) can provide forecasts and real-time information about air quality in our area.

Pollutants of Most Concern in West Michigan

Michigan air quality has greatly improved over the past few decades. These days, primarily two criteria pollutants - ground level ozone and fine particles – are reported at concentrations that are sometimes higher than what is considered healthy.

Ground level Ozone

First, here is a word on "good" and "bad" ozone.

The chemical structure of ozone is O_3 as compared to oxygen which is O_2. The additional oxygen atom makes ozone very reactive which is good in the upper atmosphere (the ozone layer) but harmful in the lower atmosphere (a component of smog). Ozone is produced through complex photochemical reactions involving natural atmospheric gases, volatile organic compounds (VOCs), nitrogen oxides and sunlight. Hot days can accelerate these reactions. Elevated levels of ground level ozone make breathing more difficult – especially for people with respiratory problems. It can also damage vegetation and materials.

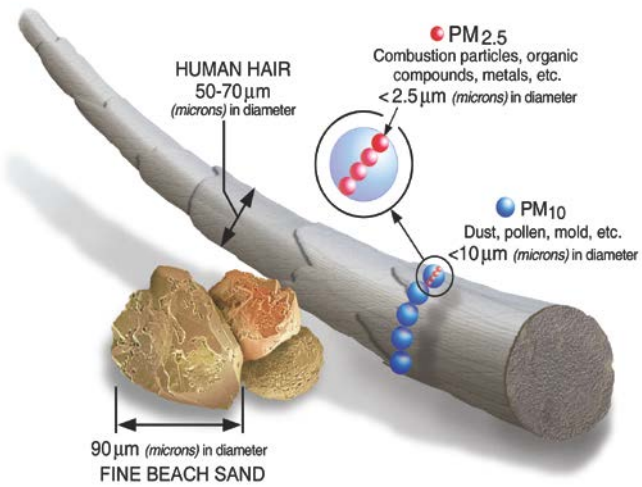
The Clean Air Action Program informs people when elevated ground level ozone values are anticipated and it offers tips for reducing ozone formation. Since vehicle exhaust and gasoline vapor contribute to the chemical mix, many of the "clean air" tips involve reducing emissions from cars and equipment such as gasoline powered lawn mowers.

Ground level ozone concentrations tend to be highest in the afternoon and early evening in the lower half of the Lower Peninsula. In northern Michigan, levels tend

to peak in the evening and nighttime hours after winds carry pollution northward from the population centers to the south.

Particulate Matter

And now a word about particulate matter. Although Clean Air Action Days are generally called just for ozone, there are other air quality concerns that could trigger a Clean Air Action Day.



"Particulate matter," also known as particle pollution or PM, is a complex mixture of extremely small particles and liquid droplets. It is made up of a number of components, including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles.

The size of particles is directly linked to their potential for causing health problems. The EPA is concerned about particles that are 10 micrometers in diameter (PM10) or smaller (PM2.5) because those are the particles that generally pass through the throat and nose and enter the lungs. Once inhaled, these particles can affect the heart and lungs and cause serious health effects.

Environmental Effects – Particulate Matter

Visibility reduction
Fine particles are the major cause of reduced visibility (haze) in parts of the United States, including many of our treasured national parks and wilderness areas.

Environmental damage
Particles can be carried over long distances by wind and then settle on ground or water. The effects of this settling include: making lakes and streams acidic, changing the nutrient balance in coastal waters and large river basins, depleting the nutrients in soil, damaging sensitive forests and farm crops, and affecting the diversity of ecosystems.

Aesthetic damage
Particulate matter can stain and damage stone and other materials, including culturally important objects such as statues and monuments.

Fine particles (PM2.5) concentrations can peak anytime during the night. Although PM2.5 episodes can occur at any time, it is more likely to occur during the summer and winter months. Fine particles are so small that ambient air concentrations are the same whether you are outdoors or indoors, so staying inside has little effect on exposure levels. [Note that the same is not true for larger, coarse particle pollution.]

What is the Air Quality Index?

The Air Quality Index (AQI) is a tool for reporting daily air quality. It tells you how clean or polluted the air is, and what associated health concerns you should be aware of. The AQI focuses on health effects that can happen within a few hours or days after breathing polluted air. The AQI is reported for five major air pollutants regulated by the Clean Air Act: ground level ozone, particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide.

What are Clean Air Action Days?

The Michigan Department of Environmental Quality(MDEQ) works to ensure that Michigan's air remains clean by regulating sources of air pollutants to minimize adverse impact on human health and the environment. Its goals are to meet and maintain air quality standards, limit emissions of hazardous and toxic pollutants, and inform the public about current air conditions. Clean Air Action Days provide a way to reduce pollution and to protect health on days when air quality is expected to reach Unhealthy for Sensitive Groups or above on the Air Quality Index (AQI).

The MDEQ monitors the air and keeps us informed about air quality conditions. MDEQ meteorologists forecast (i.e. predict) daily air quality. Clean Air Action Days are declared when unhealthy pollution levels are expected to occur.

Counties currently under an Action Day are shaded red on the AQI map on the MIair website (http://www.deqmiair.org). In addition, declaration information for today and tomorrow are viewable on the Action Day page. You can also receive automated electronic notification messages about air quality and Action Days via EnviroFlash.

What should be done on Clean Air Action Days?

There are many voluntary actions that can be done on Clean Air Action Days. The purpose of these actions is to work towards reducing emissions. Emission reductions help prevent the formation of ground level ozone and particulate matter. Examples of what to do include: riding a bike to work or school instead of riding in a car, avoiding car and bus idling, and many more actions as shown on the tip cars on the next page. Tip Cards Available at http://www.wmcac.org/resources/free_materials.html. Monitor the actual AQI online and sign up for Enviroflash (http://www.enviroflash.info/) to get notifications about air quality. Become familiar with the link between the Air Quality Index and health. (http://www.wmcac.org/forecast/airqualityindex.html)

AIR QUALITY INDEX FACT SHEET

What is the Air Quality Index?

The Air Quality Index, or AQI, is an easy way to understand how clean the outside air is. It is a simple tool that provides a color coded "picture" of current air pollution levels and health effects. People can use the AQI to adjust daily activities in order to protect their health when there is more air pollution than there should be.

What air pollution is reported by the AQI?

AQI pollutants include fine particles, ground-level ozone, carbon monoxide, sulfur dioxide and nitrogen dioxide. Fine particles or ground-level ozone are the pollutants most likely to control the daily AQI. Hourly air monitor data is collected and analyzed by an automated computer program that determines how clean the air is. The AQI tells people whether the air they breathe is currently **"good"**, **"moderate"**, **"unhealthy for sensitive groups"**, "**unhealthy**", "**very unhealthy**" or "**hazardous**". Values are reported in near real-time via the **MIair** webpage.

How clean is our air? Has the AQI ever reached "hazardous" levels in Michigan?

Michigan's air quality usually falls in the "**good**" or "**moderate**" air quality range. Sometimes, the AQI will reach the orange "**unhealthy for sensitive groups**" level. Michigan hardly ever experiences air quality concentrations in the "**unhealthy**" range. The AQI here has never reached hazardous levels.

How does the AQI work?

Air monitors analyze air samples. Each sample is given a numerical value. If more than one kind of air pollutant is monitored at a location, the pollutant with the highest value (worst air measured) becomes the AQI. An AQI number above 100 means a pollutant has reached unhealthy levels.

Why report the AQI?

The AQI is a federally mandated program. Since 1976, the Clean Air Act has required state and local air agencies to communicate air quality information in a consistent manner. The index was revised in 1999 to provide better information about health risks linked with air pollution. Today's air quality is reported the same way across the country. As air quality health standards change to better protect sensitive population groups, the AQI scale breakpoints are adjusted to reflect the new, more protective standard.

How is the current index different from the old one?

In 1999, the EPA added the AQI category called "**unhealthy for sensitive groups**" to better protect children, people with lung disease or asthma, and others who are more sensitive to air pollution than the general public. An AQI forecast has also been added so air agencies can notify the public ahead of time if poor air quality is predicted. These improvements help people to better protect their health – they can avoid prolonged, strenuous activity or reduce physical exertion when there is too much pollution in the air. People can also reduce air pollution levels by driving less and using products that conserve energy.

How can I find out what today's AQI is?

The current AQI is available on the DEQ "Air" webpage. Go to **www.michigan.gov/air** and select the **MIair** icon. The color-coded map shows monitor locations across the state. Index values are updated hourly during the day. You can view a detailed summary of AQI numerical values and the controlling pollutant for each monitor location. If you don't have convenient access to the Internet, you can contact the DEQ Environmental Assistance Center during office hours at 1-800-662-9278. National AQI maps and information are available via EPA's AIRNow webpage at **www.airnow.gov**. AQI forecasts are often reported with weather information in the news.

EnviroFlash is a free service that automatically sends out e-mail or cell phone text messages of tomorrow's AQI forecast. Participants receive air quality messages at the health level they select. (Most people choose the "**orange**" level.) Messages also include information when air quality "*Action!* Day" advisories are issued. For more information and to enroll, go to the **MIair** webpage and select the "Air Quality Notification" tab.

THE AIR QUALITY INDEX COLORS AND HEALTH STATEMENTS

AQI Color, Category & Value	PARTICULATE MATTER	OZONE	CARBON MONOXIDE	SULFUR DIOXIDE	NITROGEN DIOXIDE
	(µg/m3) 24-hour	(ppm) 8-hour / 1-hr	(ppm) 8-hour	(ppm) 24-hour	(ppm) 1-hour
GREEN: Good 1- 50	**None**	**None**	**None**	**None**	**None**
YELLOW: Moderate 51- 100	**People who are unusually sensitive to air pollution should consider reducing prolonged or heavy exertion.**	**People who are unusually sensitive to air pollution should consider limiting prolonged outdoor exertion.**	**None**	**None**	**None**
ORANGE: Unhealthy For Sensitive Groups 101- 150	**People with heart or lung disease, older adults, and children should reduce prolonged or heavy exertion.**	**Active children and adults, and people with lung disease, such as asthma, should reduce prolonged or heavy outdoor exertion.**	**People with cardiovascular disease, such as angina, should limit heavy exertion and avoid sources of CO, such as heavy traffic.**	**People with asthma should consider limiting outdoor exertion.**	**None**
RED: Unhealthy 151- 200	People with heart or lung disease, older adults, and children should avoid prolonged or heavy exertion. Everyone else should reduce prolonged or heavy exertion.	Active children and adults, and people with respiratory disease, such as asthma, should avoid prolonged or heavy outdoor exertion; everyone else, especially children, should reduce prolonged outdoor exertion.	People with cardiovascular disease, such as angina, should limit moderate exertion and avoid sources of CO, such as heavy traffic.	Children, asthmatics, and people with heart or lung disease should limit outdoor exertion.	None
PURPLE: Very Unhealthy 201- 300	People with heart or lung disease, older adults, and children should avoid all physical activity outdoors. Everyone else should avoid prolonged or heavy exertion.	Active children and adults, and people with respiratory disease, such as asthma, should avoid all outdoor exertion; everyone else, especially children should limit outdoor exertion.	People with cardiovascular disease, such as angina, should avoid exertion and sources of CO, such as heavy traffic.	Children, asthmatics, and people with heart or lung disease should avoid outdoor exertion; everyone else should limit outdoor exertion.	Children and people with respiratory disease, such as asthma, should limit heavy outdoor exertion.
MAROON: Hazardous 301- 500	Everyone should avoid all outdoor exertion; people with heart or lung disease, older adults, and children should remain indoors.	Everyone should avoid all outdoor exertion.	People with cardiovascular disease, such as angina, should avoid exertion and sources of CO, such as heavy traffic; everyone else should limit heavy exertion.	Children, asthmatics, and people with heart or lung disease should remain indoors; everyone else should avoid outdoor exertion.	Children and people with respiratory disease, such as asthma, should limit moderate or heavy outdoor exertion.

FOR MORE INFORMATION ON THE AQI, GO TO www.michigan.gov/air AND SELECT THE "MIair" ICON
OR CONTACT THE AIR QUALITY DIVISION

DEQ Air Quality Division
Michigan Department of Environmental Quality
DEQ TOLL FREE NUMBER: 1-800-662-9278

Rick Snyder, Governor
Dan Wyant, Director
March 2011

Take Clean Air Actions

while saving time, money, and gas!

In the Car...

Share a Ride: Carpool or ride the bus.

Telecommute: Work from home.

Trip Chain: Combine errands and avoid cold starts.

Turn it Off: Shut off the engine if stopping for a minute or more to reduce emissions from idling.

Maintenance: Keep vehicle tuned up and tires properly inflated to reduce emissions and improve gas mileage.

At the Pump...

Refuel after 6:00 p.m.: Ozone levels are at their highest in the mid to late afternoon.

Don't Top Off The Tank: This prevents the release of gas fumes into the air.

At Home...

Postpone Mowing: Mow the lawn late in the afternoon (after 6:00 p.m.) or use an electric or push mower.

Use Woodstoves / Fireplaces Sparingly: Burn only untreated wood in a well-maintained stove or fireplace.

Refrain from Burning Trash or Yard Waste: Recycle or compost instead.

Conserve Energy: Unplug unused appliances to reduce pollution from power plants.

For more information and forecasts go to wmcac.org or michigan.gov/deqair or call 1-800-656-0663.

WEST MICHIGAN CLEAN AIR ACTION!

Resources

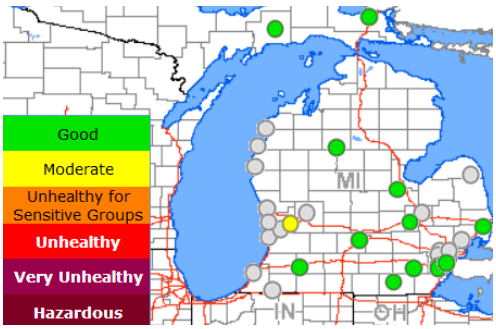
Here are some of the resources available on ground level ozone and particle pollution:

West Michigan Clean Air Coalition http://www.wmcac.org/
A group of concerned businesses, educational institutions, non-profit organizations, and government agencies are spreading the word about the West Michigan ozone problem. This site has specific information on when West Michigan Clean Air Action Days occur, a list of tips for Clean Air Action Days, and free materials.

U.S. EPA's AIRNow http://www.epa.gov/airnow/
This information on the Air Quality Index, ozone maps and animation, air quality forecasts, a kid's page, and facts about health issues. This site offers students the opportunity to compare air quality with meteorological events on a national scale.

Air Quality Index (AQI) Toolkit for Teachers
https://airnow.gov/index.cfm?action=resources.aqi_toolkit
Like weathercasters, teachers are a key resource for science and health information relevant to air quality thus EPA created the *AQI Toolkit for Teachers*. These lesson plans meet national science education standards and can be easily incorporated into school curricula.

Michigan Department of Environmental Quality
http://www.deqmiair.org
This website provides hour-by-hour ozone and particulate matter readings at selected sites and information about air quality in Michigan.



Michigan Environmental Education Curriculum Support (MEECS) http://www.michigan.gov/deq-meecs
The goal of MEECS is to provide students in grades 3 through 9 with an opportunity to learn more about their environment through lessons in Science and Social Studies. The MEECS curriculum consists of seven different curriculum units; Air Quality, Climate Change, Ecosystems & Biodiversity, Energy Resources, Land Use, Land and Environment, and Water Quality.

MEECS Online https://wgvu.pbslearningmedia.org/collection/meecs-air-quality/
Ten air quality lessons from MEECS are modeled on the MEECS Online website. Lesson 8 shows how to use the MDEQ and EPA websites for the air quality index.

EnviroFlash is a free service that automatically sends out e-mail or cell phone text messages of tomorrow's AQI forecast. Participants receive air quality messages at the health level they select. (Most people choose the "orange" level.) Messages also include information when air quality "*Action!* Day" advisories are issued. For more information and to enroll, go to the **MIair** webpage and select the "Air Quality Notification" tab.

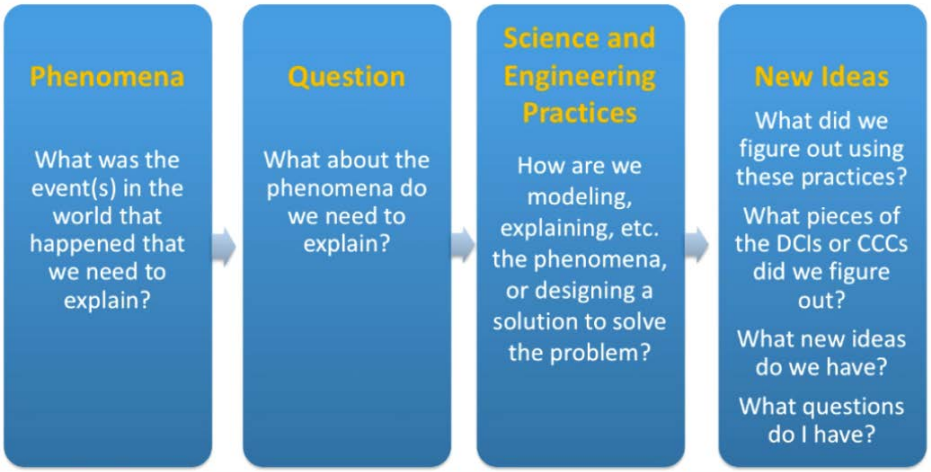
Michigan Science Standards

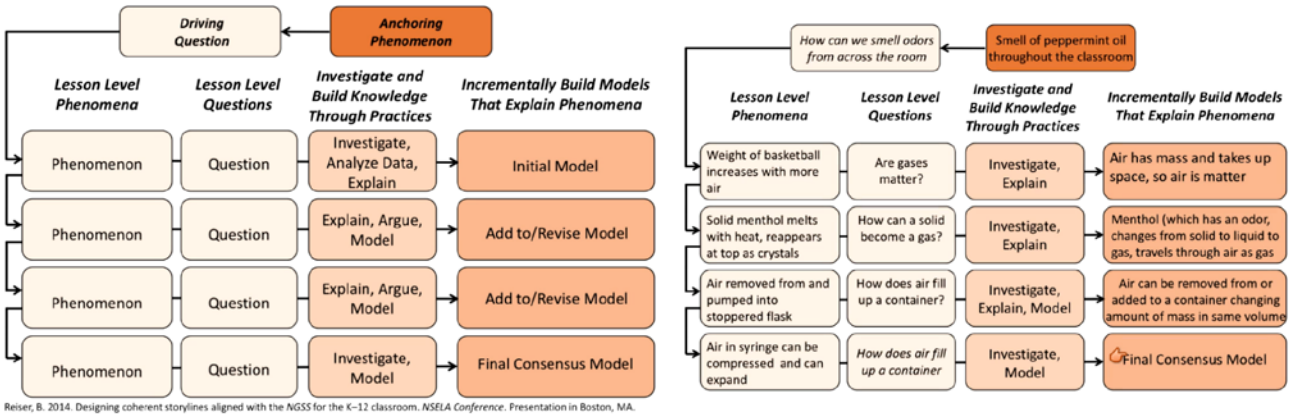
Exploring air quality in West Michigan represents a phenomenon that is on target for addressing the Michigan Science Standards. Because the student performance expectations were developed to align to a general context for all learners, the Michigan Department of Education (MDE) has worked with a variety of stakeholders to identify Michigan-specific versions of the standards for student performance expectations that address issues directly relevant to our state such as its unique location in the Great Lakes Basin, Michigan-specific flora and fauna, and our state's rich history and expertise in scientific research and engineering. These versions of the performance expectations allow for local, regional, and state-specific contexts for learning and assessment.

In addition to the specific performance expectations that frame more general concepts and phenomena in a manner that is directly relevant to our state, there are also a number of performance expectations which allow for local, regional, or state-specific problems to be investigated by students, or for students to demonstrate understandings through more localized contexts. The Michigan specific performance expectations should be used by educators to frame local assessment efforts.

These air quality activities are designed to help students make sense of a phenomenon and explore solutions to problems by engaging in activities that integrate the three dimensions of the Michigan Science Standards (Disciplinary Core Ideas, Cross-cutting Concepts, and Science and Engineering Practices). Local and regional problems are investigated by students, who will then be able to demonstrate understandings through these more localized contexts.

The following graphics illustrate how exploration of a phenomenon leads to questions, investigations, and models, which contribute to understanding. Introducing other phenomena at the lesson level builds towards a final consensus model of the phenomenon.





Source: National Science Teachers Association (NSTA) Web Seminar from March 15, 2017

Exploring Air Quality in West Michigan (Grades K-5)

Phenomenon: Sometimes meteorologists forecast that the air quality in West Michigan could be unhealthy and a Clean Air Action Day is called. What does this mean?

Essential Questions (from the MEECS Air Quality Unit)	**Michigan Science Standards Performance Expectations**	**Disciplinary Core Ideas Crosscutting Concepts and Practices**
Why should we be concerned about air quality? What are the sources of air pollution? How can we monitor air quality? How can we tell what the quality of air is today? What can we do about air pollution?	K-ESS3-3 Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment. K-ESS2-1 Use and share observations of local weather conditions to describe patterns over time. K-2-ETS1-1 Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. 2-PS1-1 Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. 3-ESS2-1 Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. 3-ESS3-1 Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard. 5-PS1-3 Make observations and measurements to identify materials based on their properties. 5-ESS2-1 MI Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact in Michigan and the Great Lakes basin. 5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. 3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	**Disciplinary Core Ideas (DCI) Topics** • Structure and Properties of Matter • Weather and Climate • Interdependent Relationships in Ecosystems • Earth's Systems • Engineering Design **Cross-cutting Concepts (CCC)** 1. Patterns 2. Cause and Effect 3. Scale, Proportion, and Quantity 4. Systems and System Models 5. Energy and Matter in Systems 6. Structure and Function 7. Stability and Change of Systems **Science and Engineering Practices (SEPS)** 1. Asking questions and defining problems 2. Developing and using models 3. Planning and carrying out investigations 4. Analyzing and interpreting data 5. Using mathematics and computational thinking 6. Constructing explanations and designing solutions 7. Engaging in argument from evidence 8. Obtaining, evaluating, and communicating information

What is Air?
Discussion Starter

Introduction:

In this activity, students will be asked a series of questions to see what they know about air. This can be a whole class or group activity. Ask students to back up their answers with evidence and record them on a chart or whiteboard. Some possible answers are provided.

Questions for students:

1. What do you know about air?
   - We breathe air
   - Air is a gas
   - Air makes up the atmosphere

2. What are some things you have observed about air?
   - Air moves (wind)
   - Air can change temperature
   - Air can smell
   - Air can be seen (water vapor, smoke)
   - You can feel air when it moves (wind)
   - You can see air moves things (storms)
   - Moving air makes weather
   - Hot air rises (hot air balloon)

3. What are the properties of air?
   - Air is transparent
   - Air has weight
   - Air takes up space
   - Air is a mixture of gases
   - Air is made up of molecules and atoms
   - While air is mostly gas, it also holds lots of tiny particles.
   - Air also holds water.
   - Air seems light, but there is a lot of it pushing down on Earth's surface. This is called air pressure.

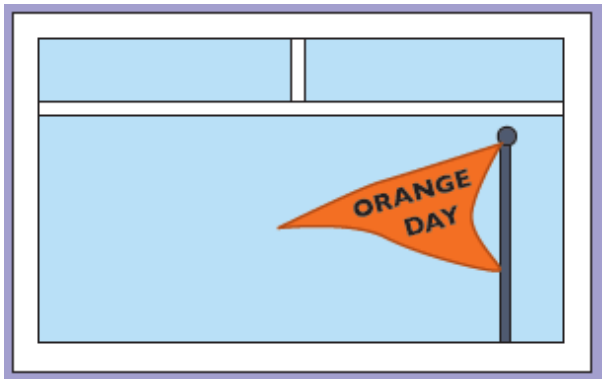
4. How do living things use air?
   - To breathe (oxygen)
   - Plants use air to make food (CO_2)
   - Birds fly in the air
   - Seeds are distributed by the wind

5. How does air become polluted?
   - Industry
   - Individual actions (driving, mowing)
   - Air coming from other areas
   - Transportation (planes, trucks, trains)

6. Is all air clean?
   - Some air is polluted
   - Sometimes we can smell pollution
   - Sometimes we can see air pollution

Summarize the student answers. Teachers can than choose from the accompanying series of activities to help students check their assumptions about air. Re-visit the student answers after doing the activities and engage the students in a discussion about what they have learned.

Why is Coco Orange?



Why is Coco Orange?

Overview

Air quality in West Michigan does not always meet the standards for a healthy environment. This activity informs students about to find out what the air quality for a given day is and what they should consider is the air quality isn't good.

Time

One Class Period

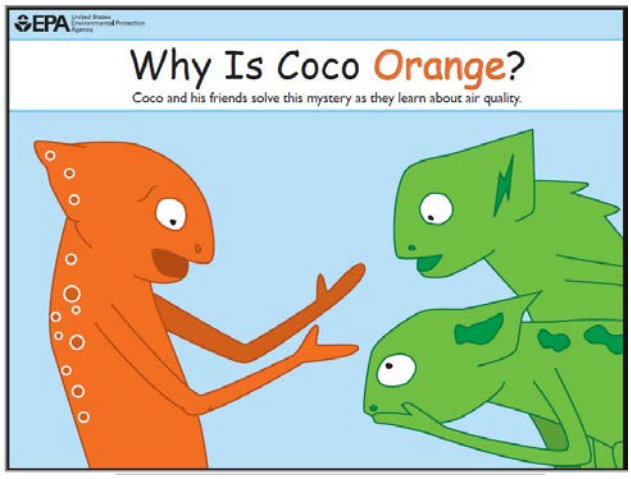
Materials

- *Why is Coco Orange?* (see https://www.epa.gov/asthma/asthma-picture-book-why-coco-orange) and accompanying Air Quality posters (see U.S. EPA AQI posters at https://cfpub.epa.gov/airnow/index.cfm?action=aqikids.teachers)
- Handouts: *My Air Quality Index, Why is Coco Orange? Quiz*
- Discussion Questions: *Why is Coco Orange?*
- Visuals: *Air Quality and Outdoor Activity Guidance for Schools*

Objectives

After participating in or observing this activity students will be able to

1. Relate the colors of the Air Quality Index to health concerns.
2. Make informed choices on Clean Air Action Days



Procedure

1. Ask the class whether anyone would like to share a story about how poor air quality may have affected them or someone they know. Alternatively, have them close their eyes and imagine having dense smoke from a fire blowing in their faces. How does that make them feel? Ask them if they know what asthma is. How would someone with asthma feel if the air quality was poor?

2. Do a pair-share with the students having them discuss what they know about air quality in West Michigan and if they have heard anything on the television or radio about air quality. Some may recall seeing or hearing the Clean Air Coalition's Public Service Announcements, and hearing the local meteorologists talk about Clean Air Action Days.

3. Pose the question: how can we let people know what the air quality is likely to be and what does that mean to their health? Entertain suggestions. Explain that a color code is used to communicate air quality. Using the *My Air Quality Index* handout, have students select colors to represent the air quality (good to poor). They may need a clue such as for a stop light, green is go, yellow is caution, and red is stop.

4. Compare their ideas with the chart below. Mention that Clean Air Action Days are called when air quality becomes unhealthy.

GOOD	MODERATE	UNHEALTHY FOR SENSITIVE GROUPS	UNHEALTHY	VERY UNHEALTHY

5. Read the *Why is Coco Orange?* book about how Coco and his friends at Lizard Lick Elementary solve this mystery as they learn about air quality and how to stay healthy when the air quality is bad. The discussion question handout can serve as a guideline for the story.

6. After reading the story, go to AirNow at https://www.airnow.gov/. Look at Michigan and have students decide what the forecast is telling them about air quality. Relate this to *Air Quality and Outdoor Activity Guidance for Schools*.

7. Administer the *Why is Coco Orange* quiz.

Linking the activity with Clean Air Action

1. Information about the air quality index is also found at the West Michigan Air Quality Coalition's website (www.wmcac.com).

2. Sign up for EnviroFlash to receive the air quality forecast.

3. Participate in the U.S. EPA's Air Quality Flag Program. See https://www.airnow.gov/index.cfm?action=flag_program.index

My Air Quality Index

Color	What does the color mean?
Green	
Yellow	
Orange	
Red	
Purple	
Maroon	

Why is Coco Orange?

Discussion Questions

What is a chameleon? (page 2)

Why do they change colors? (page 4)

Why did Coco go and see the school nurse? (page 5)

What is asthma? (pages 5 and 6)

What was the orange flag communicating? (page 12)

What Internet site did Mrs. Bugeye look at to see why the flag was orange? (page 13)

How is ozone formed? (page 15)

How can ozone be reduced? (pages 16 and 17)

How does the air quality chart compare to the chart that you made? (page 19)

What is the air quality color Mrs. Bugeye found for the next day? (page 21)

What did that color for the next day mean for outdoor activity? (page 22)

Why is Coco Orange?

Quiz

1. No one should play outside when the air quality color is:
a) Orange *b) Purple* *c) Angry*

2. If the air quality color is orange or red, do you have to stay inside all day?
a) No, but take more breaks *b) Yes* *c) No*

3. If the air quality word for the day is "very clean," what is the air quality color?
a) Green *b) Orange* *c) Purple*

4. The air quality color red means the air outside is:
a) Beautiful *b) Very good* *c) Unhealthy*

5. Asthma makes it hard to:
a) Breathe *b) Sit down* *c) Read*

6. What time of day would there probably be less ozone?
a) Afternoon *b) Morning* *c) Night*

7. What time of day would there probably be the most ozone?
a) Afternoon *b) Midnight* *c) Early Morning*

8. If you're playing outside when the air quality color is orange or red and you find it hard to breathe you should:

a) Ride your bike

b) Keep playing outside

c) Stop and tell an adult

9. Can you see dirty air?
a) Yes *b) No* *c) Sometimes, but not always.*

10. Why is it more of a problem for children to breathe dirty air?

a) You need more sleep

b) Your bodies and lungs are still growing

c) You eat more cookies

Why is Coco Orange?

Quiz - Answers

1. No one should play outside when the air quality color is:
a) Orange ***b) Purple*** *c) Angry*

2. If the air quality color is orange or red, do you have to stay inside all day?
a) No, but take more breaks *b) Yes* *c) No*

3. If the air quality word for the day is "very clean," what is the air quality color?
a) Green *b) Orange* *c) Purple*

4. The air quality color red means the air outside is:
a) Beautiful *b) Very good* ***c) Unhealthy***

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7. What time of day would there probably be the most ozone?
a) Afternoon *b) Midnight* *c) Early Morning*

8. If you're playing outside when the air quality color is orange or red and you find it hard to breathe you should:

a) Ride your bike

b) Keep playing outside

c) Stop and tell an adult

9. Can you see dirty air?
a) Yes *b) No* ***c) Sometimes, but not always.***

10. Why is it more of a problem for children to breathe dirty air?

a) You need more sleep

b) Your bodies and lungs are still growing

c) You eat more cookies

Air Quality and Outdoor Activity Guidance for Schools

Regular physical activity — at least 60 minutes each day — promotes health and fitness. The table below shows when and how to modify outdoor physical activity based on the Air Quality Index. This guidance can help protect the health of all children, including teenagers, who are more sensitive than adults to air pollution. Check the air quality daily at www.airnow.gov.

Air Quality Index	Outdoor Activity Guidance
green GOOD	Great day to be active outside!
yellow MODERATE	Good day to be active outside! Students who are unusually sensitive to air pollution could have symptoms.*
orange UNHEALTHY FOR SENSITIVE GROUPS	It's OK to be active outside, especially for **short activities** such as recess and physical education (PE). For **longer activities** such as athletic practice, take more breaks and do less intense activities. Watch for symptoms and take action as needed.* Students with asthma should follow their asthma action plans and keep their quick-relief medicine handy.
red UNHEALTHY	For **all outdoor activities**, take more breaks and do less intense activities. Consider moving **longer or more intense activities** indoors or rescheduling them to another day or time. Watch for symptoms and take action as needed.* Students with asthma should follow their asthma action plans and keep their quick-relief medicine handy.
purple VERY UNHEALTHY	Move **all activities** indoors or reschedule them to another day.

* Watch for Symptoms

Air pollution can make asthma symptoms worse and trigger attacks. Symptoms of asthma include coughing, wheezing, difficulty breathing, and chest tightness. Even students who do not have asthma could experience these symptoms.

If symptoms occur:
The student might need to take a break, do a less intense activity, stop all activity, go indoors, or use quick-relief medicine as prescribed. If symptoms don't improve, get medical help.

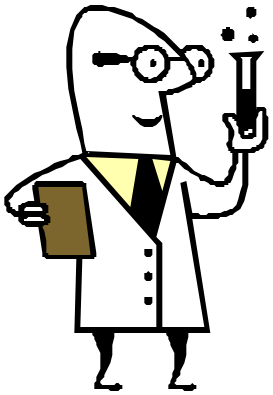
Go for 60!

CDC recommends that children get 60 or more minutes of physical activity each day. www.cdc.gov/healthyyouth/physicalactivity/guidelines.htm

Plan Ahead for Ozone

There is less ozone in the morning. On days when ozone is expected to be at unhealthy levels, plan outdoor activities in the morning.

What is Air?
Air is a Gas!



Air is gas!

Overview

A gas is one of the three states of matter. The two other states of matter are solids and liquids. This activity focuses on properties of gases.

Time

One Class Period

Materials

- 3 lightweight plastic bottles with lids
- a block or solid object that will fit into the container
- water

Procedure

1. Set the three containers on a desk, one containing the solid object, another containing some water and the third containing "nothing".

2. Have students describe what they see in relation to these three states of matter. Possible answers include:
   - Solid has its own shape inside the jar.
   - Liquid takes the shape of the container but has one free surface.
   - Gas fills the entire container.

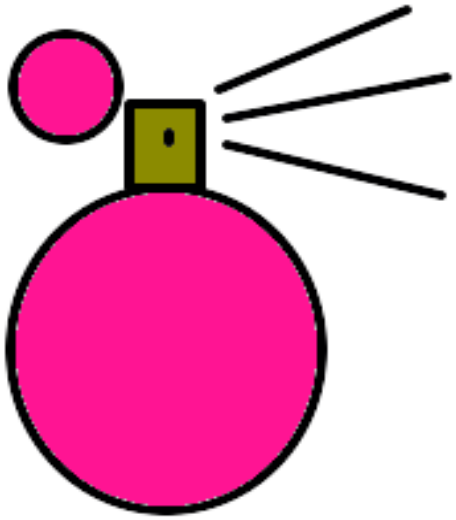
3. There may be some other properties they can name. Ask students what they notice about these states of matter when they are compressed. Older students may be able to talk about the distance between molecules in the three states of matter as well.

4. Take them as far as they can go! Squeeze the bottle with gas. Can we tell that something is in the bottle? How can we push the gas out of the jar?

Linking the activity with Clean Air Action

1. We need to breathe air to live. If our air is not clean, it affects our health.
2. Just because we can not see pollution does not mean it is not in the air we breathe.
3. Taking actions on Clean Air Action Days helps keep our air clean.
4. What are some simple actions students can take that can help clean the air? See TIP Sheet.
5. How might we know if our air is not clean? Have students draw pictures of, or list things they think make our air dirty.

What is Air?
It moves and it smells!



What is air?
It moves!

Overview

This demonstration and exercise will help students to understand the development of the movement of air, assist them in learning how to gather and analyze data, and encourage skills in both math and science.

Time

One Class Period

Materials

- Small container of household ammonia or vanilla extract
- Handout: *Air Can Move* classroom map
- Four colored pencils or crayons

Procedure

1. Set a small closed container of household ammonia on vanilla extract on your desk during a discussion on air.

2. When all of the students are seated and you are talking about things we observe about air, open the lid on the ammonia or vanilla extract container.

3. See how long it takes for the first student to notice the smell.

4. Students should observe that the odor moves from the source to the farthest place from the source. Does anything affect how the smell is carried through the room (such as a breeze from an open window)?

5. Students can plot the time and distance, tracking how air (and the odor) moves through the room (see student handout – classroom map).

Linking activity with Clean Air Action

1. After pollutants are released, they are moved to other communities by the wind. For instance, pollutants are transported across Lake Michigan.
2. Our own actions affect other people who might not even live near us. Can students name some neighboring communities?
3. Can students name some activities they (or their parents) do that might affect the air (and other people)?
4. What are some simple actions students can take that can help clean the air?

Air Can Move
Classroom Map

Back of classroom

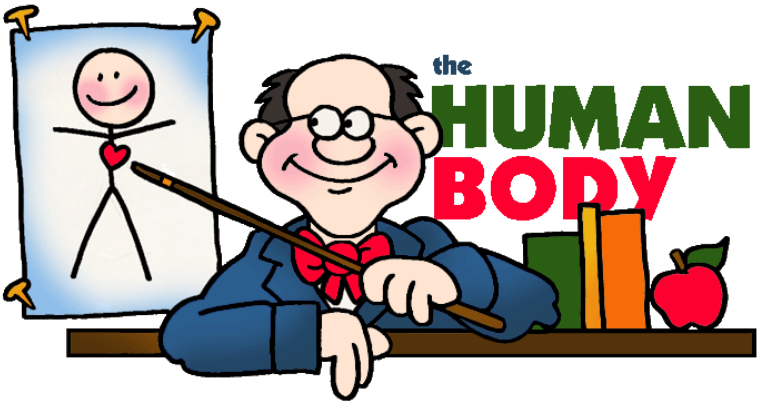
Front of classroom

This exercise will show you how air moves in your classroom. Your teacher will open a container of something that has a strong odor. Raise your hand when you begin to smell the odor. Put a "1" on the square above in the location where a student who can detect the smell is sitting. Wait 30 seconds and put a "2" on the squares where new students are raising their hands. After 1 minute, put a "3: on the squares where other students detect the smell. Repeat the exercise and note changes in the intensity of the smell by having each student raise 1, 2, 3, or 4 fingers using the code below.

Intensity

1. No Odor detected at all
2. Begin to smell odor
3. Odor is strong
4. Odor is <u>very</u> strong

What is Air?
How do living things use it?



What is air?
How do living things use it?

Overview

Understanding how air is used by the body is very helpful in teaching students to appreciate the necessity of clean air.

Time

One Class Period

Materials

- Student-made pictures of bones, liver, heart, lungs, small intestine, large intestine, brain, kidneys, muscles, stomach or mouth

- Thirty to forty (30 to 40) ping-pong balls (or other objects) in two colors, one color representing clean air, one color representing pollution.

Objectives

After participating in or observing this activity students will be able to:

- Explain how the human body uses air.

- Identify at least three of the body's major organs.

- Explain how pollution interferes with air delivery throughout the body.

- Visuals: *Human Body, Pathology of Asthma*

Procedure

1. After students are finished creating their pictures of the basic respiratory tract, compare their work the *Human Body* drawing.

   Have the class count the number of times they breathe per minute. Does each student breathe at the same rate? What would change their breathing rates? Can they figure out how many times they breathe in one day?

2. Share the following information with the students:

   Oxygen is inhaled through the nose and mouth. It enters the lungs and is transported to other organs through the blood. Once used, leftover air, or waste air, moves back to the lungs so that it can be exhaled through the mouth.

3. Start the simulation:

   Choose students to act as the body parts. They will tape a picture to their shirts. Provide a handful of balls to other students who will serve as inhalation and exhalation.

   To begin, "clean air" is handed to the mouth who then passes it on to the lungs. The lungs in turn, pass the air to the heart who keeps the ball before passing the rest to another organ who does the same. Eventually, all organs have air and the waste air is returned to be exhaled through the mouth.

   In the next part of the activity, pollution mixes with air. Students, taking air, must close their eyes when choosing the balls. In the end, we will see that polluted air has interfered with the delivery of clean air to the organs that need it.

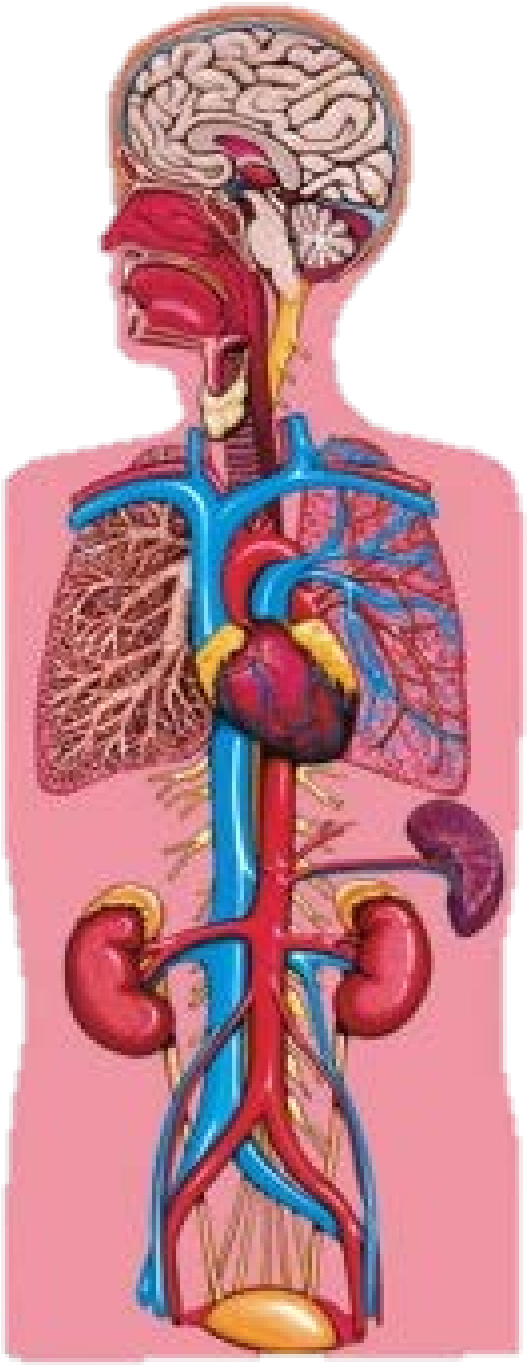
   Show the *Pathology of Asthma* diagram and engage students in a discussion of

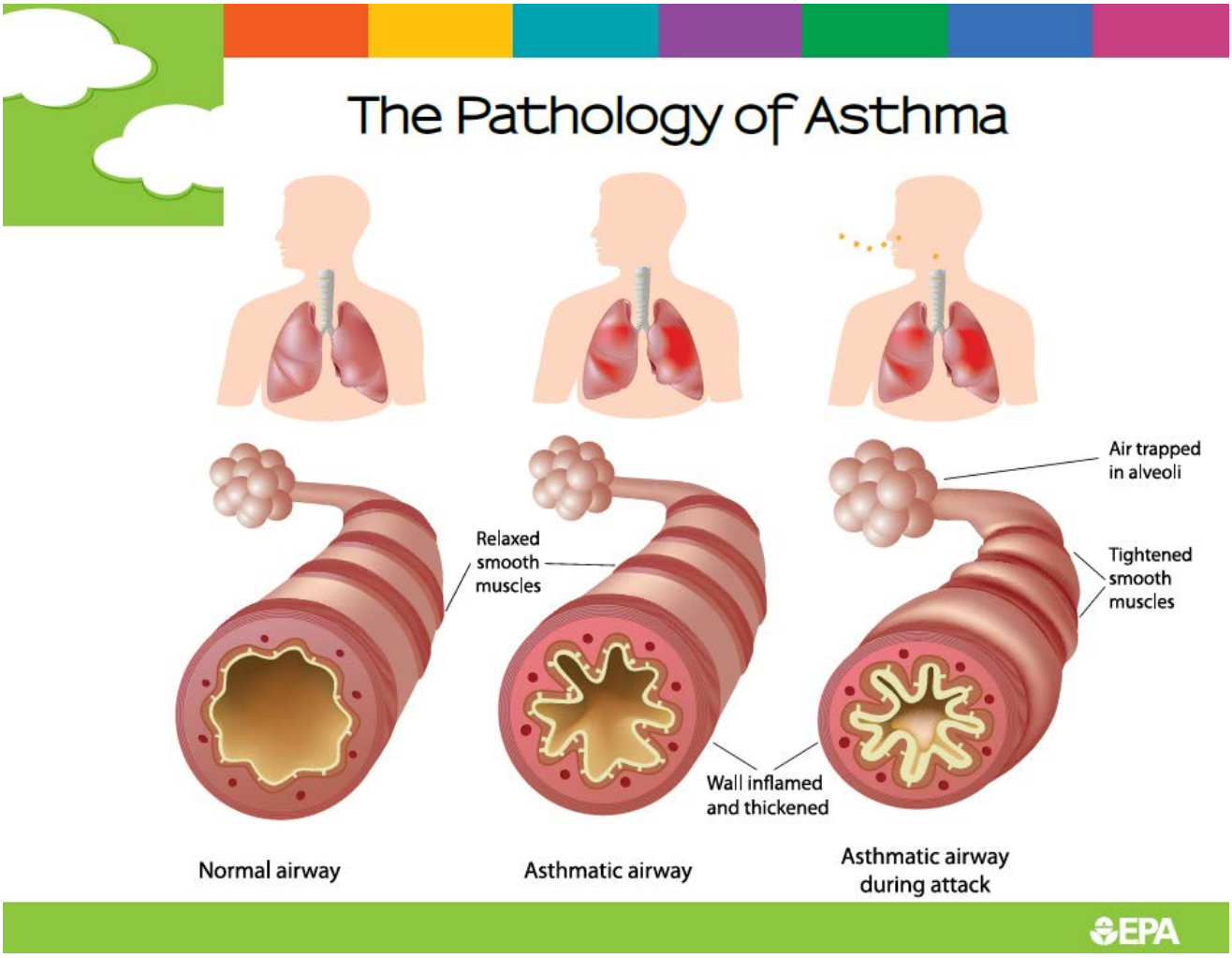
Linking the activity with Clean Air Action

1. What happens when the air has things in it that are not good for us?

2. How does the quality of air affect our health and our lives?

Human Body




The Pathology of Asthma
Air trapped in alveoli
Relaxed smooth muscles
Tightened smooth muscles
Wall inflamed and thickened
Normal airway
Asthmatic airway
Asthmatic airway during attack
EPA

What is Air?
Is it clean?
Discussion Starter

What is air?
Is all air clean?

Preparation

Discuss the fact that some of the gases we find in air can be harmful. One of these gases is Ozone (O_3). In the atmosphere, we have three forms of oxygen:

O = elemental oxygen

O_2 = molecular oxygen

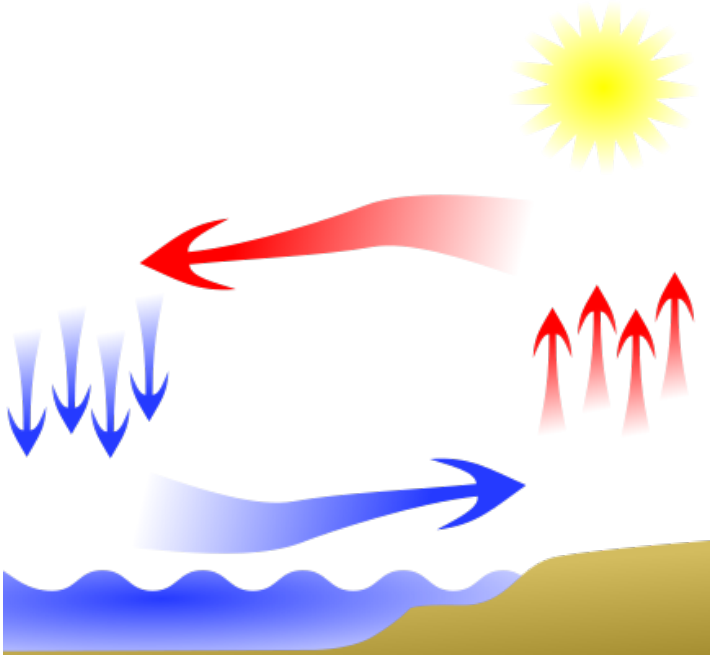
O_3 = Ozone

Naturally forming ozone up high in the stratosphere is good. It protects us, and the earth, from the sun's harmful ultraviolet rays. Ozone at the ground level is bad for us. Ground level ozone affects people's breathing, especially children, elderly, people with a respiratory ailment like asthma and those who exercise strenuously outdoors. At the ground level, ozone is formed when pollution (from cars, factories, and other sources) is "baked" by the sun. This bad ozone is likely to form on days when the temperature is above the mid-80s and there is little wind or cloud cover. When the ozone at ground level is really bad, you can see it and it is sometimes called smog. Thinking about how we contribute to air pollution (and taking actions to prevent it) will help ensure we keep our clean air.

Linking activity with Clean Air Action

1. Besides people, what needs clean air (oxygen) to live?
2. Can students cite examples of activities that pollute our air (make it "dirty")?
3. Why is ozone a problem for us from March through October?
4. Can students identify weather conditions that might cause ground level ozone?
5. What are some simple actions students can take that can help clean the air?

Moving Air!
Simulation



Moving Air! Simulation

Overview

The movement of air masses can be confusing and difficult for students to conceptualize. This activity aids in the understanding of how air and its contents move.

Time

One Class Period

Materials for the Race

- Marble
- Ball of yarn
- Clothes pin
- Rubber ball
- Crayon
- Leaf
- Small pebble
- Pencil
- Facial tissue
- Blown up balloon
- Feather

- Visual: *Great Lakes Airshed*

Other Materials

- Graph Paper
- Masking Tape
- Yardstick

Objectives

After participating in this hands-on activity, the students will be experienced in:

1. Observing data
2. Gathering data
3. Recording data
4. Interpreting data
5. Applying data to generalized statements
6. Explaining how air currents might move pollution from one area onto another, adding to problems on Clean Air Action Days.

Background Information

Wind is moving air. The wind has energy and can push objects in the direction it is blowing. For example, the wind can move things we can see like a tree, the grass, your hair and sand. The wind can also move very small objects that cannot be seen like particle pollution and ozone, which is a colorless, odorless gas.

People hear in weather reports about how fast the wind is blowing. If the wind is moving 10 miles per hour, that means it can push pollution ten miles in a single hour – faster than most people run! The air can push things, like leaves and balloons, and air pollution, from one place to another. Sometimes wind is good; people love to fly kites, or go sailing. Sometimes, wind can bring poor quality of air our way from somewhere else.

Procedure

1. Read the background information to the class and tell them to imagine that they had to move an object without touching it. What would they do? Write answers on the board.

2. Have they ever blown a piece of hair out of their eyes? Have they ever had their hair dried with a blow dryer? What happens? Wind can move things.

3. Show the students some of the objects (listed in the materials section) one at a time and have them name them. Do the students think they can move all of these objects with wind?

4. Present rules for the activity to the class (low voices, only one person out of their seat at a time, no running or throwing and keep hands to yourself are some suggestions).

5. Make sure that the table tops are clean and dry for the "race". Place a piece of masking tape about two feet long on one end of the students' tables for the starting line. Three feet away, place another piece of tape about two feet long for the finish line. Gather all of the objects for the "race" and place them in boxes; one for each group.

6. Form groups of five students. Once they are in groups, have the students count off, if necessary. Pass out role labels according to numbers. All of the ones are "Technicians" twos are "Wind," threes are "Timekeepers," fours are "Recorders" and fives are "Encouragers."

7. Announce to the class that they now are going to find out if they can use wind to move all of these objects and explain the instructions. If there are no questions, have the "Technicians" come up to the front and pick up the materials they need.

8. Have the "Technician" place one object on the desk and say: "On your mark, get

set, go!" The "Wind" will then blow through a straw on the object until it crosses the finish line. "Recorders" will count the number of air gusts it takes to move the object the entire distance and the "Encouragers" will record the number on a bar graph by coloring in the corresponding number of blocks. "Timekeepers" will monitor the length of time given for the race, (30 seconds to one minute) depending on the length of the desk.

9. The race continues until all of the objects have crossed the finish line or until time is up.

Note: Have the students read the names of the objects printed at the bottom of the graph to be sure they know where to record the data for each object, or have the students draw pictures to identify each object.

Safety Note: Students with breathing problems should not be assigned the role of "Wind".

Questions and anticipated responses

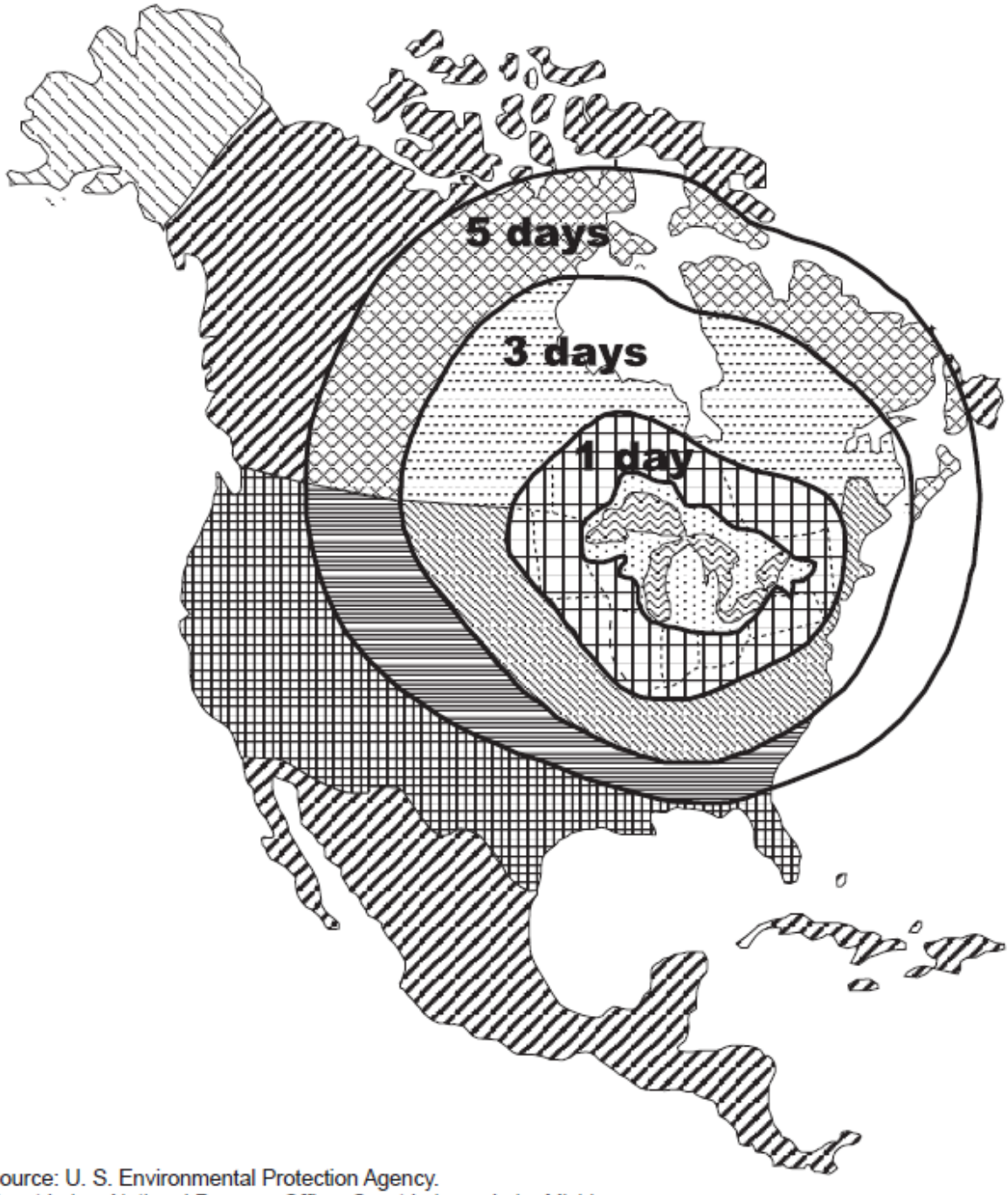
- What might have made the objects move? (Your breath, air, wind, number of gusts...)
- What is wind? (Wind is moving air. The wind has energy and can push object in the direction in which it is blowing.)
- Which objects took the most gusts of air to move? (Clothes pin, pebble, crayon, pencil…)
- Why? (Bigger, heavier, not round…)
- Which objects took the least amount of gusts of air to move? (Hats, windmills, leaves, flags, dust, clouds, paper, balls…)
- Do you think it makes a difference what direction the wind comes from in order for something to move in a certain direction? Hint: Think about your investigation. (Yes, you have to blow it in the direction you want it to go – the finish line. Yes, if you blow from an angle it might not move or it might go in a different direction.)

Linking the activity with Clean Air Action

1. Show the Great Lakes Airshed graphic. Define the term "airshed" as a geographic area sharing the same air. Explain that there are many sources in several states in our airshed that contribute to our air quality and that regional cooperation is necessary for controlling air pollution.

2. Track the wind direction on Clean Air Action Days and relate this to the geographic location of sources of pollution.

Great Lakes Airshed



Source: U. S. Environmental Protection Agency.
Great Lakes National Program Office, Great Lakes – Lake Michigan.
Retrieved June 22, 2005, from http://www.epa.gov/glnpo/lakemich/intro.html.

Moving air!
Extension Activities

Wind-powered puffs: Discuss ways in which the wind is helpful to us and how we might use the wind to help us accomplish tasks. For example, we use hair dryers, clothes dryers, fans and we even blow on hot food to cool it before we eat it.

Encourage the students to think of other ways to use wind. Invite children to use their wind power to accomplish a task. Divide the class into four or five equal teams. Have one person from each team kneel behind a starting line. Place a cotton ball in front of each person. On the start signal, have each student blow the cotton ball with just one puff. Measure how far the cotton ball went. Repeat until each student has had a turn. Graph the results. Discuss the results. Discuss some of the problems with wind power, such as harnessing its energy and controlling its effects and the way it can bring unwanted things (like pollution and odors) in the area.

Wind-powered rocket: Show the students a picture of a wind turbine and explain how wind can help generate power that can be used to create energy. Demonstrate how to build a wind-powered rocket with the following instructions:

1. Stretch a string tightly from one side of the room to the other.
2. Thread the string through a plastic drinking straw.
3. Blow up a balloon and hold the end with a finger to prevent air from escaping.
4. Using tape, attach the balloon to the underside of the straw.
5. Let the air out of the balloon and watch the "rocket" fly across the room on the string.

Give each student a plastic drinking straw and a balloon. Have students work in pairs to stretch a string between two points and launch their rockets. After they have had a chance to experiment, discuss the scientific principle of the wind-powered propulsion.

Wind picture: Give each student a 9"x12" sheet of black construction paper and a straw. Drop a few drops of diluted white paint in the center of each child's paper and encourage students to aim the straw at the paint and blow into it to create an interesting, wind-blown design. It is important that the straw does not touch the paint. For variety, try using bright colors of paint on white construction paper.

Make stuffed clouds.

Have students put two pieces of butcher or construction paper, one on top of the other, and cut a large cloud shape through both layers. Then have students paint, color, or decorate (with glitter, tissue, etc.) both of the outer layers. Staple the edges, leaving an opening to stuff with newspaper; then staple the remaining opening. Hang the clouds around the room.

Moving Air!
Cross curricular extension activities

Math:
There are a few math activities in this learning cycle. During the exploration, students will record and graph the number of gusts of air it takes to move each of the objects. Elaborating with "Wind-Powered Puffs," they are measuring distance and recording their findings on a graph.

Language Arts:
Read a poem about wind and have students write their own rhymes and poems about wind. (Recommended: *Who Has Seen the Wind* by Christina Rossetti.)

Read the book *The Wind Thief*, by Judi Barrett. Make hats out of newspaper and masking tape by placing two sheets of paper on your head and having someone else take the tape and wrap it around your head where the newspapers are. Fold the sides up or down to create a unique design, students can then decorate their hats. If it is a windy day, take the students, while wearing their hats, outside and let them see what happens.

Social Studies:
Ask the students: In history, what significant events has wind been involved in? Does the wind ever change direction? How can you tell? For study, have the students construct a wind vane and investigate the direction of the wind for three days. To make a wind vane, you need an eraser, a pencil, a straw, oak tag and a straight pin. Cut the point and tail arrow out of oak tag and tape them to the straw. Put the pin through the straw into the eraser end of the pencil. Stick the pointed end of the pencil into a flat eraser, and glue to a square piece of oak tag. Label the sides of the oak tag base North, East, South, and West and set the wind vanes outside with the north sides facing north. Record the direction of the wind for three days.

Environment:
Make an imaginary map of an imaginary city where people live on the south side of town; factories manufacture things on the north side of town and there are many cars, trucks and buses; the east side of town is surrounded by lakes, and the west by forests. Encourage students to imagine they live in a town on a day when the wind came from the east. What would they feel? Water? Warm air or cold air? Why? What would they smell? Fish? Ask students to imagine the wind changes direction and is now blowing from the west. What would they see? Leaves blowing? Dirt blowing? What might they smell? Animals? Trees? Flowers? Ask students to imagine the wind came from the north side of town. What would that be like? Would there be pollution? Would it smell bad? Look funny? Ask student to consider their own pollution and how it blows other places, too. Ask students to think about the sources of pollution and what they can do to reduce the amount of pollution they put into the air that moves, blown by wind.

No More Ozone!
The Rain Game
Simulation

No More Ozone! *The Rain Game* Lab

Overview

The effect of weather on air quality is difficult for students to conceptualize. This activity encourages an understanding of how weather can both help form and dissipate air pollution.

Time

One Class Period

Materials

- Assorted colored construction paper
- Rope or hula hoop

Objectives

After participating in this hands-on activity that simulates the processes of ozone formation and precipitation, the students will be able to:

1. Explain how weather influences ground-level ozone formation and depletion

2. Explain the precipitation

3. Explain why precipitation happens

Background Information

Clean Air Action Days are sometimes called to encourage people to reduce the amount of pollutants in the air. Hot, sunny days help turn pollutants into ozone – a lung irritant when excessive amounts are inhaled. West Michigan never has Clean Air Action Days when it rains, because rain helps to get rid of ground level ozone.

Procedure

1. Outside, or in a room with plenty of space, have the students line up and count off one through six. Tell all the students in group one that they are pollution from factories, blowing in the wind. Tell group two they are people driving cars. Students in group three are the pollutants escaping from cars (they will have to stay close, at first, before moving with the wind) and students in group four are people mowing lawns. Students in group five are pollutants from lawn mowers and group six represents light and heat from the sun.

2. Tell the students to imagine that the world's people are still asleep and as the sun rises (Group six should "rise and shine") the people start to wake up too. Next, some people drive to a work (polluting); the factory starts to work (maybe polluting). Other people start to mow their lawns and the pollutants start to mingle together. Later in the morning, the sun is higher in the sky shining everywhere and lots of people are driving around and pollution from driving is mingling with other pollution. At lunch time, the sun is at the highest point in the sky it can be and people take breaks for lunch. The factories stop working, the people mowing lawns go inside to eat and the people driving get out of their cars and go to lunch, too. All the students who stopped the simulation should sit together, in a group, and watch what happens next, while pollution that is still moving in the air begins its transformation.

3. Imagining that they are transforming the others, students from group six (sunshine) should gently tap the pollutants on their arms while the others sit and watch. When the "pollutants" feel the sun tap them on the arm, they are to join hands. In the end, the students have formed a giant mass of ozone.

4. Explain to the students that pollution and sunlight, together, create ozone. They are now ozone, staying at ground level, in the air we breathe. The ozone plume should move slowly toward the group of "polluters," and sit down with them.

5. When all students are sitting explain the difference between naturally occurring ozone in the stratosphere (protects us from ultraviolet radiation) and ozone in the troposphere (a lung irritant). Explain that there are a lot of things being done to decrease the pollution that causes ground level ozone. One thing students can do is participate in the Clean Air Action program. This program encourages people to reduce pollution on days when weather conditions make ozone formation more likely.

6. Ask students to talk about what their families do, or can do, to reduce the emissions that cause ground level ozone.

7. Explain that weather, while it helps to make ozone, can also help get rid of it. One weather condition that is really helpful is rain. Give each student a piece of construction paper and have them tape each piece in a random pattern on the ground.

8. Instruct each student to stand on top of their piece of construction paper with their arms outreached. Tell them they are going to pretend they are a small drop being blown about by wind. When you say "go", have the students move from their piece of paper to another of the same color, keeping their arms spread out to their sides.

9. Each time one student touches another, they should grab hands as if they were becoming a larger cloud drop and continue moving on to a piece of paper which has the same color as the one from which they came. If students from two

different colors should happen to collide en route, they should combine and move to the closest piece of colored paper. This will be the group's new color. Larger drops move about intermixed with smaller drops and keep combining in a similar manner. When a drop has five students in it they have formed a rain drop and they should go to the puddle area and sit down. The puddle area is defined by a roped off area or hula hoop, located out of bounds. If drops combine to make a single drop of six or more, students then should divide it in half, choose new colors, and remain moving throughout the cloud. Continue this game until the cloud in rained out and the puddle is full.

10. Tell the students that the rain destroyed the bad ozone and that the air is clean, as it was washed by the rain.

Linking the activity with Clean Air Action

1. Ask them to discuss what they learned about how weather helps ozone form and how it also helps destroy ozone.

2. Remind them that there is a lot they can do on Clean Air Action Days to reduce ozone-forming pollution. Some ideas are:
    - Conserve energy
    - Carpool, ride your bike, walk, take the bus
    - Don't make trips in cars you don't need to make\
    - Ask your adults to help (by keeping cars tuned, filling up early or late in the day, inflating tires, etc.)
    - Follow the news or online to hear about Clean Air Action Days are happening.

Making an Alphabet Book Activity

Making an Alphabet Book Activity

Overview

Making a Clean Air Action alphabet book is a fun learning experience for students. It can be used in many subjects and helps students learn about a topic through research, drawing, writing and completing a finished product.

Time

Depending on the depth of information in the alphabet book, this can take anywhere from two to five class periods.

Materials

- Access to dictionaries, encyclopedias, and the library
- Clean Air Action Tip cards
- Clean Air Action meteorological forecasting notes
- Clean Air Action glossary
- Magazines
- Scissors Glue or tape
- Pencils, crayons, and other drawing media

Objectives

As a result of this activity, the students will:

1. Become familiar with the Clean Air Action program and with air quality vocabulary words

2. Improve their thinking skills, research skills, art skills, language skills and cooperative skills

Background

Clean Air Action helps people to protect themselves and others from ground level ozone pollution by teaching them about things they can do to reduce pollution on Clean Air Action Days.

Clean Air Action Days are the hot, sunny days that meteorologists forecast as being the most likely to produce excessive amounts of ground level ozone in the air we breathe. They occur during ozone season, between March 1 and October 31, when West Michigan has the most sun and the most heat. The Michigan Department of Environmental Quality's team of meteorologists calls Clean Air Action Days based on weather conditions. Certain weather conditions, like sun and heat, are part of the conditions that

turns pollution into ozone. On Clean Air Action Days, people can really help to make a contribution by reducing the amount of pollution they put into the air.

Ground level ozone is unhealthy in the air we breathe. It can hurt our eyes, noses and lungs. It is especially bad for people who have asthma or other breathing problems, people who work or play strenuously outdoors or for the elderly.

Procedure

1. Look at other alphabet books. (Recommended: "Animalia" by Grahame Base.)

2. Assign letter of the alphabet to individuals, partners, or groups.

3. Have students do research to find the core word for each page, if brainstorming does not help them agree on a particular word. Research can include Clean Air Action materials in your teacher resource kit, internet search, or visiting the school library.

4. Have the students create sentences for each of the pages that include nouns, verbs, adjectives, and adverbs plus other words if wanted or necessary. The sentences should explain the word's role in Clean Air Action

5. The students will work together designing the pages of the book, putting pictures of the words/activities/etc. in context, and including other relevant Clean Air Action words that begin with the same letter.

6. When they are finished, students will share their pages, explaining their work to class.

Linking the activity with Clean Air Action

1. Following Clean Air Action tips are as easy as 1-2-3. Teaching people about ozone and Clean Air Action is as easy as A-B-C.

2. Even when it's not ozone season in Michigan, we can still take Action! by helping teach people about ozone, pollution and activities that stop them. That's a year round job.

Glossary

Air Quality Index (AQI) – is a number used by government agencies to communicate to the public how polluted the air currently is or how polluted it is forecast to become. It often is color coded.

Airshed - a geographic area sharing the same air.

Asthma – A lung disease that can make it hard to breathe.

Asthma Action Plan – A plan written by a doctor. It has a list of any daily medicines. It tells how to know when asthma is getting worse. It tells what to do to keep asthma under control.

Camouflage – Colors that allow an animal to blend in with its surroundings.

Clean Air Action Day - A Clean Air Action Day will be called when weather forecasters have predicted that conditions will be conducive to the formation of ozone or high levels of particulate matter. On a Clean Air Action Day, West Michigan residents will be asked to take certain voluntary actions to protect their health and reduce emissions.

Communicate – To say something to someone. Chameleons change color to communicate. They change color when they see another chameleon. They also change color if they are in danger or if they are hot or cold.

Inhaler – A special tube that contains medicine for the lungs. It is used to treat asthma. An inhaler that is used to stop symptoms of an asthma attack is called a quick relief inhaler.

Ozone – Too much ozone in the air makes it dirty. Ozone is formed when pollutants coming out of cars and factories are cooked by the hot sun. Ozone is more of a problem in the summer.

Pollutant – Pollutants are what make the air dirty or polluted. Sometimes you can see pollutants and sometimes you can't. Ozone is a pollutant that you can't see. Dust and soot are pollutants that you can see. Dust and soot are also called particle pollution.

Teacher Evaluation Form

Your feedback is necessary to make these resource guides a success.
Remain anonymous, if you wish, but please do complete the following items and return this form to the West Michigan Clean Air Coalition:

Name _____

School _____

Address _____

City _____ State _____ Zip _____

Phone Number (____) (____ - _____) Email:_____

Please tell us what grade level and/or subjects you teach: _____

Total number of students participating in class using Clean Air Action classroom materials _____

Circle which Clean Air Action Resource Guide(s) you used.

K-5 Grade 6-8 Grade 9-12

Please rate your agreement with the following statements using a scale of 1 to 5.

(1) Clean Air Action background information is complete and helpful.

1 = strongly disagree 2 = disagree 3 = neutral 4 = agree 5 = strongly agree

(2) Clean Air Action classroom science activities are useful and relevant to class room needs.

1 = strongly disagree 2 = disagree 3 = neutral 4 = agree 5 = strongly agree

(3) Clean Air Action classroom science activities are complete and easy-to-follow.

1 = strongly disagree 2 = disagree 3 = neutral 4 = agree 5 = strongly agree

(4) Clean Air Action classroom activities are easy to integrate into daily lessons.

1 = strongly disagree 2 = disagree 3 = neutral 4 = agree 5 = strongly agree

(5) Activities are well-received by students.

1 = strongly disagree 2 = disagree 3 = neutral 4 = agree 5 = strongly agree

(6) It is worthwhile to teach about Clean Air Action in my classroom.

1 = strongly disagree 2 = disagree 3 = neutral 4 = agree 5 = strongly agree

(7) I will use Clean Air Action classroom activities and lessons again next year.

1 = strongly disagree 2 = disagree 3 = neutral 4 = agree 5 = strongly agree

What did you like best about the Clean Air Action Teacher Resource Kit? (Please give us an idea of what worked well for you.)

Please give us an idea of what did not work well for you, any information you felt was missing, etc.)

What changes would most help you meet you teaching needs? Please use a separate sheet for additional comments if necessary.

Fax or send completed form to West Michigan Clean Air Coalition c/o Grand Valley Metro Council 40 Pearl Street NW – Suite 410 Grand Rapids, MI 49503 Phone (616) 776-7696 Fax (616) 774-9292