

Vehicles and Pollution

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Abstract

During this lesson students will share prior knowledge about the relationship between vehicles and pollution to engage them in the study of air quality and human health. The purpose of the lesson is to engage the students in a discussion about the relationship between specific vehicles and pollution.

Objectives

Students will be able to:

- i. Describe automobiles and other items that contribute to air pollution.
- ii. Describe patterns observed in air quality and then relate those patterns to human and environmental factors.

National Science Education Standard

Content Standard D - STRUCTURE OF THE EARTH SYSTEM

- The atmosphere is a mixture of nitrogen, oxygen, and trace gases that include water vapor. The atmosphere has different properties at different elevations.

Arizona Science Education Standards

Strand 6 - Earth Science

Concept 1 – Structure of the Earth

PO 1. Describe the properties and the composition of the layers of the atmosphere.

Teacher Background (adapt to your community)

The city of Tucson is a growing metropolis. As such, with the population increase, comes an increase in vehicle emissions. The emissions themselves contain hazardous chemicals (such as benzene, particles, and carbon monoxide). Some constituents of the emissions can also interact in the presence of sunlight to create a chemical called ozone. While ozone in the upper atmosphere protects us from ultraviolet radiation, ozone near the surface of the earth can be detrimental to human health. When inhaled, ozone attacks the lining of the lungs, which can cause respiratory difficulties such as shortness of breath, dry cough, pain when taking deep breaths, wheezing, and sometimes nausea. When ozone reacts with molecules in the lungs it causes inflammation. As a result, our airways are less able to protect us against microbes, toxic chemicals, and allergens. As the body tries to repair itself by covering the affected areas, breathing becomes more difficult.

Related and Resource Websites

http://earthobservatory.nasa.gov/Library/OzoneWeBreathe/ozone_we_breathe.html

http://earthobservatory.nasa.gov/Library/OzoneWeBreathe/ozone_we_breathe2.html

Time	1 class period (45 minutes)
Preparation Time	None
Materials	Pictures of smoggy cities
Teacher Preparation	5 minutes putting pictures at the front of room.

Activity

1. As students enter the room, have pictures of smoggy cities at the front of the room with the following question... *“What do you think causes the sky to look so brown in these cities?”*
2. There are three pages of pictures included in this lesson or the teacher can obtain additional pictures from (<http://www.google.com/images>). It is an easy place to get many excellent pictures..
3. Allow students approximately 5 minutes to write down their ideas.

Asthma and Allergies Health Observance Package

4. Once students appear to have finished writing take 5 - 10 minutes to discuss the students' hypotheses as a group. Begin by taking students' ideas and recording them on a chart at the front of the room. Students should record the ideas of others.
5. Next, ask students to think about their own town. Ask them, *“What times of the year have you observed the most smog here in Tucson? What times of the year is it the clearest? On smoggy days, what time of day seems to be the worst? When does it begin to clear up? What do you think contributes to the smog here in Tucson?”* Allow students a few minutes to discuss each of these questions and write down any new thoughts.
6. Student will inevitably bring up the issue of vehicles as a primary polluter of the atmosphere. Ask them if they know what kind of pollution vehicles give off. Tell them that this week they will explore exactly how vehicles pollute the air and what type of pollutions vehicles emit.
7. Now ask students to take a few minutes to stop and think about any vehicles they have seen polluting the air. What kind of vehicle was it? Where did they see it? How much pollution did they think it gave off (this will obviously be a very qualitative answer)? Give students time to debate observations and record the observations of all classmates.

Embedded Assessment

Ask students to set up a data collection table so they can continue making observations about pollution, vehicle types, time of day, relative amount of smog, and temperature. (A sample chart is shown below) Students may add additional details on their charts if they would like. Let students know that their homework will be to record as much data as possible on this topic. If time and location permit, take students outside to begin data collection.

At the end of the week students will need these data to compose a short persuasive piece explaining what types of vehicles should be purchased by consumers concerned with air pollution or by city governments that are concerned about

(Sample chart)

Date/Time	Temperature	Amount of Smog in air	Type of vehicle visibly polluting	Relative amount of pollution from automobile *

*Explanation of rating scale: (student generated)