

Air Monitoring Lesson Plan



Goals and Objectives

Students will learn about air quality monitoring and apply the knowledge to determine the source of air pollution in a neighborhood.

**Time
Required**

**One 50-60 minute
period.**

Standards

Grade 6, Science, 6.L2U3.11

Use evidence to construct an argument regarding the impact of human activities on the environment and how they positively and negatively affect the competition for energy and resources in ecosystems.

Grade 8, Science, 8.E1U3.8

Construct and support an argument about how human consumption of limited resources impacts the biosphere.

Grades 9-12, Science, Essential HS.P1U3.4

Obtain, evaluate, and communicate information about how the use of chemistry related technologies have had positive and negative ethical, social, economic, and/or political implications.

Materials	<ul style="list-style-type: none"> • Computer, projector, and sound for the Air Monitoring Video • Class set of Student Activity Guides
Lesson Preparation	<ul style="list-style-type: none"> • Print a class set of Student Activity Guides • Ensure technology for the Air Monitoring Video is working <ul style="list-style-type: none"> -The video can be found on YouTube here: bit.ly/35sxtKk -The video is also on the bottom of this page: CleanAirMakeMore.com/education/k-12/
Lesson Procedure	<p>Introduction</p> <ul style="list-style-type: none"> • Tell students that today they are going to learn about air quality and how air pollution is measured. Ask students to define air pollution and identify common sources. <p><i>Answers: Air pollution is anything in the air that can harm humans or the environment. Common sources are car emissions, smoke, dust, and businesses.</i></p>
	<p>Part 1: Air Monitoring Video (30 minutes)</p> <ul style="list-style-type: none"> • Handout the Student Activity Guides. Tell students they are going to learn from an air quality expert. Students will complete Part 1 as they watch the video. • Start the video at 2 minutes to skip the introduction. • After the video, ask students to share what they learned and review the answers to Part 1.
	<p>Part 2: Solve the Mystery (20-30 minutes)</p> <ul style="list-style-type: none"> • Tell students they will use what they learned to act as an air quality inspector. Air pollution in a neighborhood is making the residents sick. It is your job to solve the mystery and stop the air pollution at its source. • As a whole class read the introduction to Part 2: Solve the Mystery. • Students may work with a partner or in small groups to complete Part 2. <p>Optional Extension: After students have identified the source of the pollution and written their conclusion, they will brainstorm how they could stop the dust pollution.</p> <p><i>Possible Answer: Apply gravel or water to the dirt to help stabilize the soil.</i></p>

Part 1: Air Monitoring Video



Name: _____ Date: _____

Answer Key

Directions: Answer the questions below as we watch the video on air monitoring at the Maricopa County Air Quality Department.

1. What is the main job of the Air Monitoring Division?

The purpose of the Air Monitoring Division is to measure the air quality in Maricopa County.

Are the following statement true or false?

True 2. Smoke, dust, and vehicle exhaust are causes of air pollution.

False 3. You can always see pollution in the air.

True 4. Weather can impact air quality.

False* 5. Ozone pollution comes directly out of your car.

* Ozone forms when car emissions (NOx) and Volatile Organic Compounds (VOC) react with sunlight.

6. What are two things you can do to help improve air quality?

Possible answers include: Bike, walk, or ride public transportation instead of driving. Carpool. Fuel up your car after dark. Avoid Idling your car. Try to use less electricity.

Part 2: Solve the Mystery

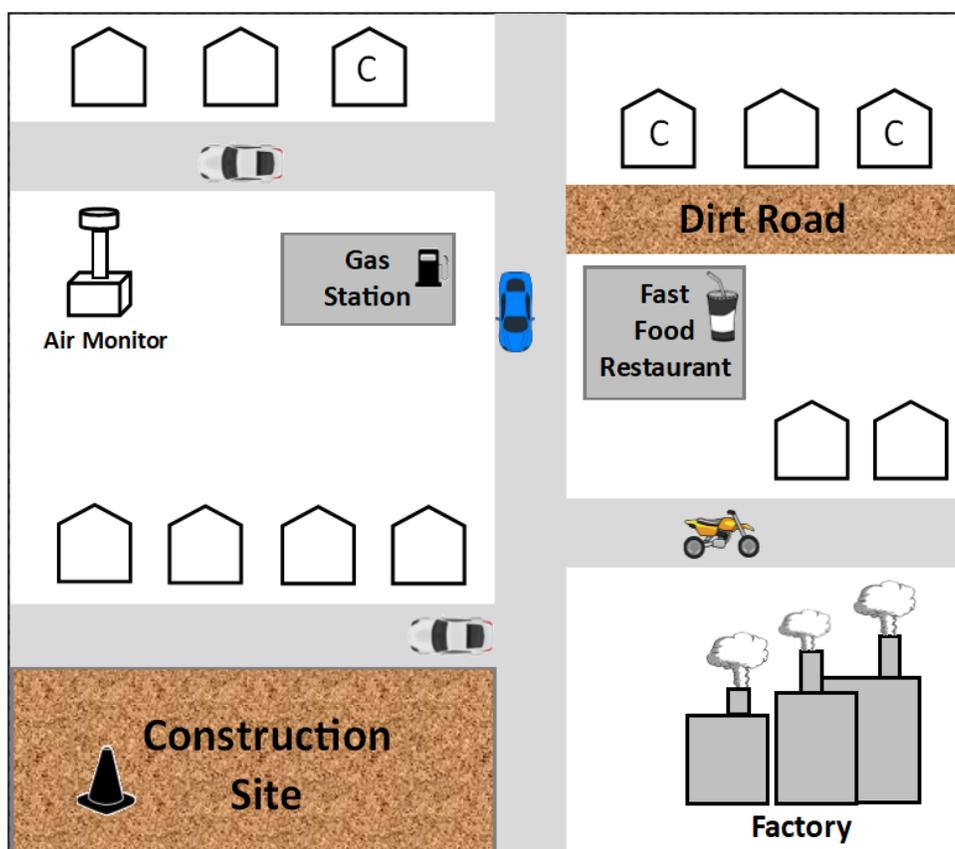
Name: _____ Date: _____

Answer Key

Step 1 - Introduction: A new housing development is being built near a factory. Since the neighborhood is still developing, there is a construction site and an unpaved road.

You are an air quality inspector and have received 3 complaints from residents who live in the neighborhood. Their houses have been marked with a "C" on the map. The residents believe that smoke from the factory is causing health problems such as: headaches, coughing, and asthma attacks.

Your job is to figure out if smoke from the factory is making the residents sick, or if something else is responsible!



Step 2 - Observations: Use the map to make observations about the neighborhood.

1. List all possible air pollution sources found on the map. (Hint: sources can be anything that cause smoke, dust, or gasses to go into the air).

Answers include: factory, restaurant, gas station, construction site, dirt road, cars on the road

2. Find the houses marked with a "C." The residents in these houses complained about health problems and factory smoke. Which air pollution sources are located near these houses?

The residents who complained live near the gas station, restaurant, and dirt road.

Part 2: Solve the Mystery (Continued)



Step 3 - Collect and Analyze Data: There is an air monitor in the neighborhood. You look up the air quality data from the monitor and discover the following levels of air pollution:

Type of Pollution	Pollution Level
PM 2.5 (Smoke)	Low (Healthy)
PM 10 (Dust)	High (Unhealthy)
Ozone (Gas)	Low (Healthy)

3. Which type of pollution is at a high or unhealthy level?

PM10 (Dust)

4. Based on the data, is it likely smoke from the factory is responsible for the health problems in the neighborhood? Use the map to identify other sources that could be causing the health problems.

Since the air monitoring data shows smoke is at a low level, the factory is most likely not responsible for making the residents sick. The data shows there is a high level of dust in the air. Based on the sources that cause dust, either the construction sites or dirt roads could be the cause.

Step 4 - Claim, Evidence, Reasoning: Which source is responsible for the health problems in the neighborhood? Explain why you chose this source using evidence to support your claim. What test could you perform to prove that you are correct?

Example Answer:

The air monitor in the neighborhood shows that dust is at a high or unhealthy level. In the neighborhood there are two sources of dust: construction sites and dirt roads.

The residents who complained live near the dirt roads and do not live near the construction sites. I believe cars driving on the dirt road are the cause of the unhealthy levels of dust in the neighborhood.

To test if I am correct, I could drive to the dirt road and see if there is a lot of dust forming when cars drive on the road. I could also use a portable air monitor to collect data on the levels of dust near the road.

Note: There are other possible answers. Ensure students use reasoning and evidence to support their claims.