

**NIH SEPA Environmental Health Investigators
Measuring Skills and Tools Curriculum: Lesson 7
Grade Level: Middle School
Duration: 1 hour**

Air Pollution Introduction

Next Generation Science Standards

Disciplinary Core Ideas:

ESS3.C: Human impacts on Earth systems

Crosscutting Concepts:

Cause and Effect

Stability and Change

Science and Engineering Practices:

4: Analyzing and Interpreting Data

Objectives

1. Students will know how to describe air pollution.
2. Students will understand how air pollution affects their environment and health.
3. Students will know how to use scientific tools to collect and analyze particulate matter data.

Materials

- Smartboard/projector
- National Geographic Air Pollution 101 [video](#)
- Particulate matter [image](#)
- PurpleAir Monitor
- Other air monitoring sensors (Dylos DC1700, Sidepack AM250, etc.)
- “PurpleAir Dataset Analysis” sheet (1 per student)
- Laptop/tablet (1 per pair)
- PurpleAir Monitor printed datasets (2 per pair if do not have laptops)
- Poster board and markers and/or construction paper (1 per group for extension only)

Activities

Bellringer: Watch the National Geographic “Air Pollution 101” [video](#) (0:00-1:41 and 3:00-3:37 mins). Briefly discuss the video. Emphasize the definition of air pollution: a high concentration of certain substances that causes the atmospheric environment to become toxic enough to have adverse impacts on living things, such as plants and animals. Ask students, “What are some substances that are responsible for air pollution or air pollutants?” Air pollutants can be gaseous, liquid, or solid in form and can come from natural and human sources. (5 minutes)

Lecture: Share the [image](#) of particulate matter size on a smartboard and discuss. Particulate matter is material suspended in air in the form of tiny solid particles or liquid droplets. We will focus on PM2.5 for this session. (10 minutes)

Activity: Show the class a PurpleAir Monitor and any other air monitoring sensors such as the Dylos/Side pack monitors and discuss their basic function and purpose in collecting particulate matter data.

Share the [map](#) of the PurpleAir Monitors that are set up throughout the United States and discuss. Identify any monitors that have been set up outside of or near your school. Click on the circle that represents a local monitor and talk through what the charts mean, and how to get to the numerical dataset as well.

Divide the students into pairs and give each pair a laptop (or printed dataset) and PurpleAir Dataset Analysis sheet. In their pairs, students will choose two PurpleAir monitors from the map to explore. They should look at the datasets in both the chart, as well as the spreadsheet format and write down the trends they observe in their datasets. The students should also develop their ideas as to why these trends exist. They will also compare the two datasets and offer explanations for the similarities and differences they observe between the two. (30 minutes)

Discussion: Come back together and have the class discuss each pair’s analysis of the datasets. Discuss why the two locations may have different PM2.5 measures. Would these trends be the same if the students were looking at a different particulate matter size? (15 minutes)

Extension

Show students an Air Quality Health Index (AQHI) [chart](#) and have them work in their groups to make one of their own. Discuss how their data they looked at by the PurpleAir monitors fits on this chart. What does the AQHI reveal about the air quality in their community? (30 minutes)



Resources

Basic information and graphic representation of particulate matter size comparison is on the EPA Particulate Matter (PM) Pollution [webpage](#).

PurpleAir Monitor information, map, and datasets can be found on their [website](#).

Air Quality Health Index (AQHI) basic information and map is on the EPA webpages: [Interactive Map of Air Quality Monitors](#) and [Air Quality Index \(AQI\) Basics](#).

Name(s): _____

PurpleAir Dataset Analysis

Write your observations of particulate matter trends and thoughts to why those trends exist for each PurpleAir Monitor dataset.

PurpleAir Monitor #1: _____

Observations	Possible Reason(s)

PurpleAir Monitor #2: _____

Observations	Possible Reason(s)