



TAKE CARE OF TEXAS: EDUCATOR MATERIALS

## LESSON PLAN

# Introduction to Air Quality

## Objectives:

Students will be introduced to the basics of air quality and learn how to discover the current air quality in their area. They will use the Air Quality Index (AQI) to determine the cleanliness of their air and decide what precautions need to be taken on unhealthy days. By using AirCompare, they will observe and compare the average air quality in two counties.

## Prerequisites:

Print out enough "Intro to Air Quality" Worksheets for the number of students in your class.

## Duration:

30 Minutes

## Materials:

- A computer, smart phone, or tablet
- "Intro to Air Quality" Worksheet
- Video: TCEQ Ozone Action Day Forecasting (<https://www.youtube.com/watch?v=UwoJgdwXaBo>)

## Introduction:

Texas is known for its wide, open skies and bright summer days. However, hot weather and pollutants from cars, trucks, and factories can cause our air to become dirty and unhealthy, especially for Texans who are sensitive to air pollution. The two main things that can cause the air to become unhealthy are **ozone** and **particulate matter**.

### What is Ozone?

**Ozone** is a gas that forms when three oxygen molecules bond together. It performs a very important job in our upper atmosphere by protecting the earth from the sun's harmful rays. This blanket of ozone is called the **ozone layer**. However, when ozone is in our lower atmosphere, where we breathe air, it can be harmful to humans. Show students [TCEQ Ozone Action Day Forecasting](#) for some more details about ozone and ozone action days. Have students share with a partner or group and explain what ozone is and what action days are.



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## What is Particulate Matter (PM)?

**Particulate matter** is a mixture of small particles and water droplets in the air. When it is present in large amounts, it can mix with ozone and other dangerous pollutants to become **smog**. This is unhealthy for people to breathe, especially if they have asthma or other health conditions that might make them sensitive to air pollution.

## How Do We Measure Air Quality?

Scientists measure **air quality** and let us know when it is safe to play outside. By tracking the amounts of ozone and particulate matter, they can determine how clean or dirty our air is. To make it easy to understand, scientists created a color chart. This chart is called the **Air Quality Index (AQI)**. The colors move from green to purple, with green being healthy, clean air and purple being very unhealthy air.

## How Can Texans Help?

The easiest way for us to limit our personal air pollution is to walk or ride our bikes instead of driving short distances, turning off lights when we leave the room, and compost our grass and yard waste. We can also plant native plants and shade trees to help clean the air.

## Procedure:

View the EPA's [AirNow](#) webpage on a computer.

1. Find your town or region on the map. What color is it?
2. Find another city on the map. What is the name of the city? What color is it?
3. List three Green cities that you can see on the chart.
4. List two Yellow cities that you can see on the chart.
5. Find an Orange city. Write it below.
6. What are the health concerns for Orange ozone days?
7. Why is it important for scientists to track air quality?
8. Why is it important for us to know how to read the AQI chart?

Now, visit the EPA's [AirCompare](#) webpage.

1. Select your county and record how many unhealthy days you had in the most recent year. If your county is not there, you can use the closest county to your own.
2. Compare your county to a friend or family member's county. Which one of your counties had the highest number of unhealthy days?
3. If air quality is affected by high temperatures, where in the United States would we expect to see the highest amount of unhealthy days?
4. List actions you can take to reduce your personal impact on air quality.



## Glossary:

- **Air Quality** – the degree to which the air we breathe is free of pollution.
- **Air Quality Index (AQI)** – a chart used to communicate how clean or dirty the air is using colors.
- **Ozone** – a highly reactive inorganic gas formed by three oxygen atoms.
- **Ozone Layer** – a blanket of ozone molecules that resides around 6 to 30 miles above the earth’s surface.
- **Particulate Matter** – a mixture of solid and liquid pollutants in the air.
- **Smog** – air pollution that reduces visibility. It can be a mixture of smoke, fog, sulfur dioxide, or carbon dioxide.

## Applicable TEKS:

- **3<sup>rd</sup> Grade** – §112.14.b. 2A,D; 3A,C; 5C; 10A
- **4<sup>th</sup> Grade** – §112.15.b. 2A,B,D; 3A,B,C; 9A; 10A; 11A
- **5<sup>th</sup> Grade** – §112.16.b. 2B,C,D; 3A,C; 11

## References:

- Center for Innovation in Engineering and Science Education. “**Air Pollution: What’s the Solution?**” Stevens Institute of Technology. Hoboken, New Jersey. [ciese.org/curriculum/airproj/](http://ciese.org/curriculum/airproj/)
- Environmental Protection Agency. **AirNow**. [gispub.epa.gov/airnow/](http://gispub.epa.gov/airnow/)
- Environmental Protection Agency. **AirCompare**. [www3.epa.gov/aircompare/](http://www3.epa.gov/aircompare/)
- Environmental Protection Agency. **Actions You Can Take to Reduce Air Pollution**. [www3.epa.gov/region1/airquality/reducepollution.html](http://www3.epa.gov/region1/airquality/reducepollution.html)

**Note:** Some of these references are from external sources and may not reflect the views of the TCEQ. Before using a reference, please verify that it is appropriate for your students.

## Additional Materials:

- Take Care of Texas Video Series
  - [Understanding Air Quality](https://www.youtube.com/watch?v=-cPvfSC9ntE) (https://www.youtube.com/watch?v=-cPvfSC9ntE)
  - [What Causes Air Pollution](https://www.youtube.com/watch?v=yq-gOnzNEPw) (https://www.youtube.com/watch?v=yq-gOnzNEPw)
  - [How Can I Reduce Air Pollution](https://www.youtube.com/watch?v=DggMi6FdZck) (https://www.youtube.com/watch?v=DggMi6FdZck)