

Air Strips Lesson Plan



Grades: 6-8

Subject: Science

Time: 2 Class Periods (1 Week Apart)

Student Objectives

- Define particulate matter.
- Collect particulate matter from the air in test areas around the school.
- Analyze the particles collected and draw conclusions about the airborne particulate pollutants.

Materials

- Poster board or cardboard
- Scissors
- Rulers
- Clear tape (e.g. packing tape)
- String
- Magnifying glasses
- Hole punch
- Permanent markers
- Optional: compasses, dissecting microscope, balance, quarter
- Student directions sheet (included)

Background Information

Our atmosphere is almost completely made up of invisible gaseous substances. Most major air pollutants are also invisible gaseous substances, although large amounts of them concentrated in areas such as cities can be seen as smog.

However, one easily visible air pollutant is particulate matter (PM), especially when the surfaces of buildings and other structures have been exposed to it for long periods of time or when it is present in large amounts.

Particulate matter is made up of tiny particles of solid matter and/or droplets of liquid. Natural particulate matter tends to be less of a problem to human health and the general wellbeing of the environment than that which is manmade. Natural sources include volcanic ash, pollen, and dust blown about by the wind. Diesel fuel burned by vehicles on the road as well as coal and oil burned by power plants and industries are the chief sources of manmade particulate pollutants. However, not all sources are large-scale. The use of wood in fireplaces and wood-burning stoves also produce significant amounts of particulate matter in localized areas, although the total amounts are much smaller than those from vehicles, power plants, and industries.

Particulate air pollutants can be harmful to plant life and to animals and human life when the pollutants are inhaled. Discoloration of buildings and other structures is also caused by particulate pollutants; this is unsightly and quite expensive to cleanup. Because it can have harmful and serious effects, particulate matter is one of the six criteria pollutants – a pollutant for which the government has established laws and air quality standards.

Setting the Stage

- Ask the students how we know air pollution exists. Are air pollutants visible?
- Have students give examples of visible air pollutants (e.g., smoke, dust, smog, etc).
- Define PM for the students by sharing the “Background Information”

Activity

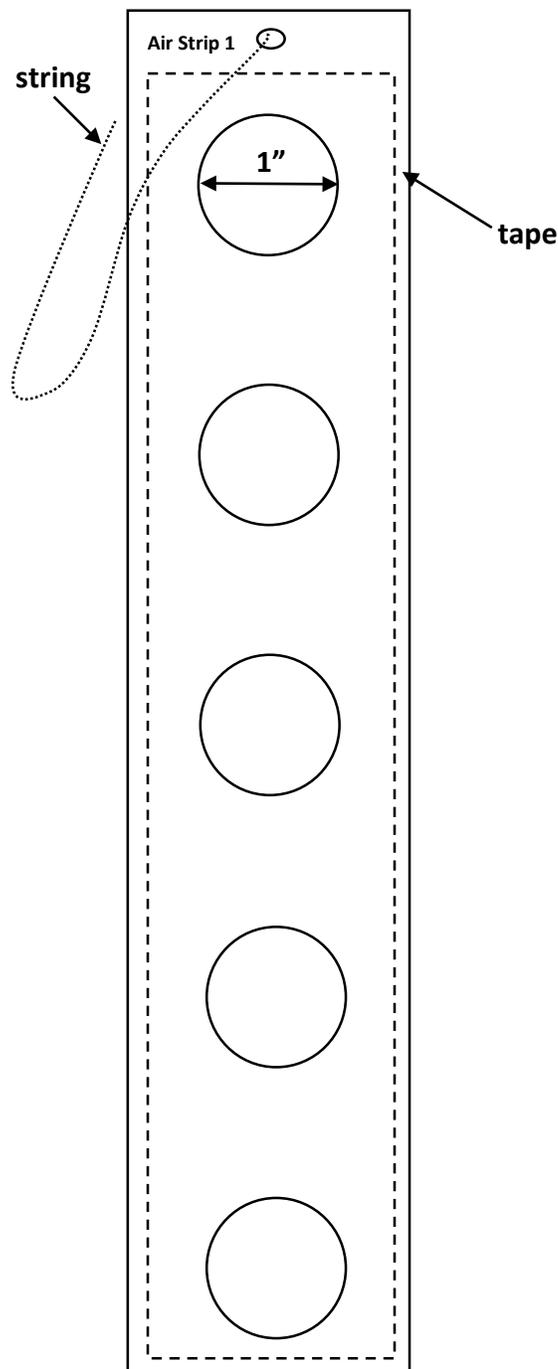
1. Give each student a copy of the student directions sheet (included). Provide the materials to make the strips and have the students follow the directions. Make an air strip yourself. Use this strip to show the students how their finished products should look, then use it as a control in step 4 for comparison with the test strips exposed to the air for 1 week. *NOTE: Each student should make at least one air strip, more if there is time.*
2. Have the students hang the strips at different places around the school, both inside (e.g., hallways, cafeteria, bathrooms, classrooms, gym, kitchen, etc.) and outside (e.g., trees, walkways, entrances, etc.). Give each student tape to secure the air strip’s string to a stable surface at the selected sites. The air strips should be able to move freely without bumping other surfaces. *NOTE: All air strips should be carefully labeled with date, location, and student’s name.*
3. Have the students check the weather forecast to make sure that the air strips will not get wet in the rain. If the forecast calls for rain, bring the air strips in for that period of time before returning them outdoors.
4. After one week, have the students collect the strips. Tell them to be careful not to touch the sticky side of the tape.
4. Have the students visually compare the control air strip to the air strips used to collect particulate matter.
5. Distribute magnifying glasses and have the students try to identify as many particles on the tape as possible. Dust, ash/soot and/or other particles may be present. Depending upon the time of year, pollen may also have been collected. *OPTIONAL: You may choose to have the students use dissecting microscopes instead of, or in addition to, magnifying glasses.*
6. Ask the students to draw conclusions about the particulate air pollutants in the test areas. Are there differences in the particles based on where the air strips were placed?
7. Have each student develop a chart or graph using the information gathered by the class and write a summary paragraph about the activity.

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Student Directions

1. Using a ruler to measure, cut a strip of poster board or cardboard that is 2 inches wide and 10 inches long.
2. Cut 5 holes, each about an inch in diameter, in the strip. Use the ruler to find a round object of the right diameter or use a compass to draw the circles. *(NOTE: A quarter is about 1 inch in diameter.)*
3. Use a hole punch to put a small hole in one end of the strip. Tie a string through the hole; the string will be used to hang the strip at a selected site.
4. Put a long piece of clear tape over one side of the strip. Be sure to completely cover all 5 holes. (Depending upon the width of the tape, you may need 2 or more pieces.) The sticky side of the tape will collect particulate matter from the air. Make sure you do not touch the sticky side of the tape over the holes.
5. Before hanging the air strip at a selected site, use a permanent marker to write the date, location and your name on the top edge of the strip.



Extension

- Place air strips in a variety of other places for a week. Have the students compare the PM collected from the different areas.
- Post new air strips daily and compare them to determine if the day of the week makes a difference in the amount of PM collected. Have the students consider possible factors such as weather, industrial schedules, etc.