

# Air Quality

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**Objective:** To study the breathable air in your classroom.

**Grade Level:** 9-12

**Subject(s):** Earth Science, Life Science

**Prep Time:** 10 – 30 minutes

**Duration:** One class period

**Materials Category:** Special

National Education Standards	
Science	1c, 2, 4e, 5b, 7a, 7e
Mathematics	
Technology (ISTE)	
Technology (ITEA)	
Geography	

## Materials:

- Student Sheets
- Petroleum jelly
- Microscopes
- Microscope slides
- Popsicle sticks, plastic butter knife, or small wooden spoons
- Clock or watch

## Related Links:

Yale-New Haven Teachers Institute—Where, Oh, Where Is All The Clean Air?  
<http://www.cis.yale.edu/ynhti/curriculum/units/1986/6/86.06.04.x.html#k>

## Supporting NASAexplores Article(s):

Fighting Pollution With Space Lasers?  
[http://www.nasaexplores.com/show2\\_article.php?id=04-037](http://www.nasaexplores.com/show2_article.php?id=04-037)



# Air Quality

## Teacher Sheet(s)

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### Pre-lesson Instructions

- Duplicate the Student Sheets (one per group).
- Divide class into groups of three. This group size can be varied to match the number of available microscopes you have.
- Provide each group with three microscope slides and accessibility to petroleum jelly, popsicle sticks or plastic butter knife (to spread the petroleum jelly on the slide), and a microscope. Students can use their watches or the classroom clock to time the experiment.

### Background Information

Air, like water, is essential for life. Air pollution, like water pollution, is a problem that threatens us all. We are aware that air and water are the most precious of our natural resources. We need clean air and accessible water to carry on normal life functions. In past generations, the amounts of fuels burned in home and industry have greatly increased. This increased burning has also increased the amount of impurities discharged into the air. And since a pollutant is an impurity, we cannot have clean air as long as it is being bombarded with impurities.

Since man discovered how to use fire, he has continuously polluted the atmosphere. The process of combustion or burning provides us with power, but in using this process, we pour much waste material into the atmosphere. For example:

- Ancient Romans complained of odor and soot deposits on clothing and crops due to coal burning, wood burning, and oil lamp usage.
- During the middle ages and the colonial period, similar complaints of odors and soot deposits were registered as a result of burning of fuels.
- The Industrial Revolution produced an increase in the number of cities, homes, and factories, causing an increase in the amounts of fuels burned to run the factories and heat the homes.





Only recently has air pollution been considered a serious threat to our biophysical environment. This threat is caused mostly by the rapid growth of our population and the expansion of our technological activities. This same growth has created new waste products harmful to the health and growth of living things. It also reduces the beauty of many places, as well as causing a greater burden to the economy.

Today's activity will have the students testing the air quality in their classroom and around the school. The activity calls for three different areas, but you can make this activity individual and compare the results as a class. Encourage the students to place the slides on their side or at angles. The petroleum slides do not have to be simply facing up, especially if they are testing an air conditioner or heating vent.

## Guidelines

1. Read orally the 9-12 NASAexplores article, "Fighting Pollution With Space Lasers."
2. Distribute the Student Sheets.
3. Have groups prepare three microscope slides with petroleum jelly.
4. Have groups determine three places they would like to check the air quality. One should include a place outside the classroom, as well as two places inside the room.
5. Leave the slides there for at least 15 minutes.
6. Retrieve the slides, and have the groups observe each slide.
7. If time allows, return the slides to the same place for 15 more minutes.
8. Retrieve the slides again, and have the groups observe each slide.
9. Instruct groups to record their observations before and after the slides were left.



## Discussion / Wrap-up

- Discuss some of the pollutants that could be in the air.
- Discuss ways of determining whether the air is polluted or not.
- Discuss how your body filters the air you breathe.

## Extensions

- For extended time periods, leave slides overnight to be checked the next day.
- For more accurate results, repeat this experiment for different climate days (hot and cold temperature, high and low humidity, cloudy or sunny, etc.). How do the results compare?



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## Student Sheet(s)

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Today's activity will have you testing the air quality in your classroom and around the school. You will place microscope slides covered in petroleum jelly around your classroom and the school. The petroleum should catch the particles that are in the air. The petroleum slides do not have to be simply facing up, especially if you are testing an air conditioner or heating vent.



## Materials

- Petroleum jelly
- Microscopes
- Microscope slides
- Clock or watch

## Procedure

1. Obtain three microscope slides, microscope, and petroleum jelly. Be very careful with the microscope.
2. Double-check the microscope to be sure it is working properly. Clean the lenses if necessary to be sure a good quality image can be seen.
3. Using the plastic or wooden spoon or knife, spread a thin layer of petroleum jelly onto each slide. Try to make each slide as identical as possible.
4. Place each petroleum slide under the microscope, and record your observations.
5. As a group, brainstorm where you think the air quality in the room would be the worst/best. Place two of your petroleum slides somewhere in the room. If you want to prop the slide up on its side, you can.
6. Place the third petroleum slide somewhere outside of the room. Your teacher will tell you places that you are allowed to go (due to time constraints).
7. Record where you placed each slide in the chart.
8. Wait 15 minutes, and then retrieve your slides. Be sure you remember where each slide goes.
9. Place each petroleum slide under the microscope, and record your observations.
10. Return each slide to the same place you found it for 15 more minutes.
11. Retrieve each slide, remembering where you had placed it.
12. Place each petroleum slide under the microscope, and record your observations.



Place	Observation 1	Observation 2	Observation 3

13. Answer the following questions:

- a. Which of the three areas you checked had the worst air quality?
- b. Does this surprise you? Explain.
- c. Which of the three areas you checked had the best air quality?
- d. Does this surprise you? Explain.
- e. What could cause inaccuracies in this experiment?
- f. How could this experiment be improved to remove any bias or subjective data?
- g. What could be done to improve the air quality at your school?

