

A Hot Topic

Residents of large cities, particularly cities with few grassy or wooded areas, often deal with summer temperatures that are warmer than those in surrounding, greener locations. When temperatures become dangerously high, as they have in some U.S. cities during recent summers, health concerns arise.

A local community action group in your city is concerned about the lack of trees and other vegetation in the areas of the city that are currently under development. The community action group has commissioned your scientific research team to study the relationship between air temperature and various infrastructure materials. You have also been asked to determine the impact that adding vegetation in city areas might have on the air temperature. The community action group plans to use your findings to help convince the city council to incorporate the use of green space in future city planning.

In this activity, you will design an experiment to study the impact of materials such as concrete, asphalt, brick, wood, and grass on the temperature of the surrounding air.

OBJECTIVES

Design an experiment to test the effects of building materials and grass on local air temperature.

Compare the effects of building materials, paving materials, and vegetation on air temperature.

Show that materials commonly used for city infrastructure can cause changes in local air temperatures within communities.

MATERIALS

- pen and paper or clipboard
- thermometers

Procedure

1. With your teacher's help, identify locations on school property where the following may be found: paved areas (may include concrete, asphalt, or gravel), various building materials (may include brick, stone, aluminum or vinyl siding, wood, or concrete), roofing materials (may include asphalt, shingle, rubber roofing, clay tile, or wood shingle), and grassy areas (should include both sunny and shaded areas).
2. Which areas do you think are hottest? With your group, formulate a hypothesis that states the relationship between various materials and the air temperature near them.

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3. Design a procedure to test your hypothesis. Tell how you will measure the air temperature near each location.
4. Decide what materials you will need. Add the materials list to your experimental plan.
5. Are there any safety cautions you should follow during your experiment? Add them to your procedure.
6. What data will you record? Construct data tables to organize your data. Make sure the table matches your procedure.
7. Show your procedure to your teacher. Once you have your teacher's approval, follow your procedure. Remember to follow all the safety cautions.
8. Follow your teacher's instructions for handling and placing the thermometers. Record your observations and data in your data table. Estimate the temperature to the nearest 1/2 degree Fahrenheit.
9. Be sure to have one control location that will serve as the ambient temperature for your experiment.

Analysis

1. **Identifying/Recognizing Patterns** Review the data you collected. Compare the air temperatures you recorded. Which materials resulted in the most and least temperature difference from the ambient air temperature? Identify and describe any patterns you see in the data.

2. **Explaining Events** What explanation can you give for the differences in ambient temperatures near the various materials?

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3. Analyzing Results Does the data support your hypothesis? Explain.

Conclusions

4. Evaluating Methods Do you think the methods you used in this lab gave reliable results? How might you improve your methods to get more accurate results?

5. Applying Conclusions Use the results of this lab to explain why city planners should incorporate green areas into their plans.

6. Defending Conclusions Draft a letter to the community action group that commissioned your study. Report your results. Provide information that the group can present to the city council to support the request for more green areas in the city.

Extension

1. Research and Communications Contact your local planning board to find out if your community has any laws requiring builders to incorporate green areas in their development plans. Report your findings to the class.