

WHY IS IT SO HOT WHEN I SIT NEXT TO THE WINDOW?

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Overview: Students apply window film to various windows, take temperature measurements, and graph their findings.

Objectives: Students will...

- Learn how to reflect heat energy.
- Show how glass can transmit energy.
- Demonstrate how this information can be used at home and in the community.

Subjects: Science, Math, Language Arts

Suggested Grade Level: K – 5

Time: Two to three hours on the first day and one hour a day for 4 days.

Materials: You will need to get permission to put film on some windows, windows, calculators, chart paper, various types of window film, thermometers, paper, pencils, crayons, and journals

BACKGROUND

There are teachable moments all around us. A student's question or just body language can be enough to generate a great lesson. This lesson was sparked by a student practically getting undressed (I teach first grade so this is not all that uncommon) because he was so hot sitting by a window. The morning sun was coming in the window and beating right on his chair. I asked him what was the problem and his exasperated reply was "I am cooking here!" After a brief discussion on whether or not the young man was indeed "cooking" this lesson developed.

The students had a wonderful time applying the film to the windows and taking all the measurements. They were very excited about their findings and took the data to the principal of the school. The results were then relayed to the maintenance and operations department of the school district. They in turn came out and applied window tint to all the east facing windows in our school.

PROCEDURE

Day one

1. Ask students why they think it is hotter by the window. Write their answers on the whiteboard. Discuss.
2. Have students come up with some solutions. Mention window tinting or film. List them on the whiteboard.

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3. Ask the students how the heat and the light coming from the window might affect energy usage. Explore.
4. Show the students different kinds of window film. Ask them which one they think will reduce the amount of heat coming through the window. (You can also measure the amount of light if you have access to a light meter.)
5. Have the students find some windows that all face the same direction and are in direct sunlight for a portion of the day.
6. Pick a number (at least one for each kind of tint) of windows to apply window tint film to and a number to leave uncovered as statistical control windows.
7. Apply the film to the windows.
8. Have the students' record in their science journal what their hypothesis is and record what procedures they have completed.

End of day one.

Day two through five

1. Tape a thermometer to the inside of the window and place another somewhere inside the room, near the window but not in direct sunlight.
2. Tape another thermometer to the outside of the window.
3. You will need a chart to record your data. I made one that looked like the one provided below. I made it on tag board so it would hold up.
4. Make one for each of the four days that you will gather data.
5. Gather your data and record it on the chart.
6. Have the students calculate the differences and the percent of change, record the data in their journals.
7. Discuss with the students the findings; see if any want to revise their hypothesis. Have them record their thoughts and findings in their journal or log.

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We collect our data each day at 10:00.							
Day of the week	Window tint sample room	Temperature inside on the window.	Temperature inside the room.	Difference of the inside window temperature and the inside of the room	Temperature outside of the window	Difference between the outside temperature and the inside window temperature.	Percent of change
Tuesday	B-1						
Tuesday	B-3						
Tuesday	B-5						
Tuesday	C-1						
Tuesday	C-3						
Tuesday	C-3						

NOTE: If you would like to do a shorter version of this lesson, then simply measure the temperature by the window, apply the tint, and re-measure the temperature.

PUTTING IT ALL TOGETHER

- After all the data collection is complete, have the students graph their findings. Discuss the findings.
- Did the different film make a difference? If so, how could this information be applied to their school and their home? Would they save enough energy to pay for the film?
- Have the students present their findings to the school or district administration.

Have the students talk to their parents about what they have discovered and possibility have film applied to their home.