

INVESTIGATING HEAT LOSS THROUGH WALLS

*Lesson from the Green School's Tool Kit Manual for use in conjunction with the tool kit

Objective: Students will take temperature measurements at various places along the inside wall of the building to look for areas of heat loss.

Suggested Grade Level: Can be modified for grades 3 – 9

BACKGROUND

When it is cooler outside than inside a building, the difference in temperature causes heat to be conducted through the wall. This results in heat moving from inside the building to outside.

Insulation slows down this transfer of heat. Measuring the temperature on the inside wall gives an indication of how well the insulation is working. The closer the inside wall temperature is to room temperature, the better the insulation. Gaps or holes in insulation will be “visible” as areas where the surface temperature is closer to that of the outside temperature.

The window will provide examples of poor insulation, especially if the window frames are metal. These areas will demonstrate high thermal conductivity, with inside temperature readings being the closest to outside temperature.

If a bookcase, tapestry, or other such item covers a portion of the wall, it can be used as an example of extra insulation. If your school has metal framing, the frames will show clearly in the investigation because metal is a high conductor of heat.

EQUIPMENT

Infrared thermometer (from Green Schools Tool Kit) to measure wall/window temp
Humidity/Thermometer pen (from Tool Kit) to measure air temperature

ADVANCE PREPARATION

This investigation assumes that the temperature inside the building is higher than outside and that students will take temperature measurements inside. If your climate is such that it is hotter outside than inside, adjust the steps accordingly.

Plan to do this investigation on a day when there is at least a 20⁰F difference between the inside and the outside air temperatures. You will also need to select a suitable interior length of wall for conducting the investigation.

LEADING THE INVESTIGATION

Follow the investigation as described on the student page, either as a whole class or in small groups.

FOLLOW UP

- Students examine other wall areas of the school for possible heat loss. The infrared thermometer will allow them to measure hard-to-reach places, such as the tops of windows and corners of large rooms like the gymnasium or auditorium.
- Students Look for other sources of heat loss. Scour the outside of the building for such things as penetration holes for wiring, plumbing, or ventilation.

Investigating Heat Loss Through Walls

Question

Where and how does a wall leak heat?

Your prediction:

On the back of this paper, sketch a picture of the wall you will be scanning. Include any windows, doors, or other features. Place arrows to show where you predict heat may be leaking out.

Equipment

Infrared thermometer to measure wall temp

Humidity/Temperature pen to measure air temp

Procedure

1. Use the humidity/thermometer pen to measure the inside and outside air temperatures.

Inside air temperature: _____

Outside air temperature: _____

2. Using the infrared thermometer, scan a section of wall. Record the temperature for each location on your wall sketch. Look for temperature changes near the windows, near the top of the wall, in the corners, or in smaller sections of the wall.

- Are there any places where the temperatures are close to those outside?
- What variations did you observe across the span of the wall?
- How uniform is the wall temperature? How well insulated do you think this wall might be?

3. Scan a window and its frame, noting the temperatures on your sketch.

- How close is the window surface temperature to the outside temperature?

Why is the window surface temperature closer to the outside temperature than other parts of the wall?