THEORY

When light hits a window or glass wall, it can be reflected, absorbed (the glass heats up) and transmitted through into the room.

Low E glass has a thin, transparent coating that reflects long-wave infrared energy (or heat).

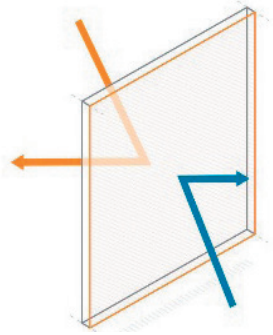
When the heat inside a house tries to escape to the colder outside during the winter, the low E coating reflects the heat back to the inside, reducing the radiant heat loss through the glass.

The reverse happens during the summer.

WHAT IS THE BEST GLASS FOR WINDOWS?

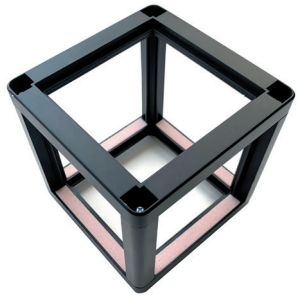
In this activity, you will analyse the effectiveness of different types of glass and determine how they allow affect the temperature of a room when a glass wall or window is in full sunlight. You will analyse the data from three types of glass: Clear glass; grey tinted glass and Low E glass

REFLECTION OF LONG WAVE INFRARED ENERGY (HEAT)

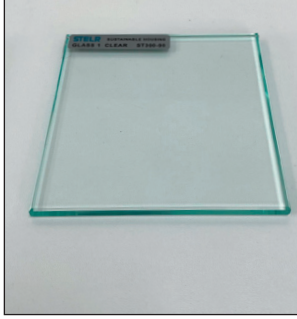


MATERIALS USED IN THIS ACTIVITY

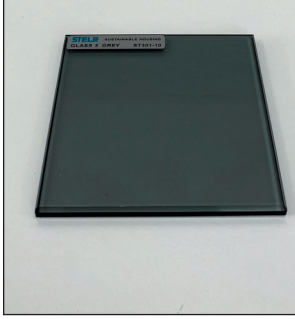
Spring loaded cube
ST 300-40



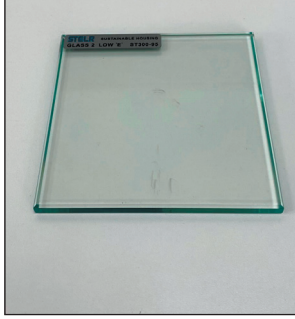
Clear glass panel
ST 300-90



Grey tinted glass panel
ST 301-10



Low E glass panel
ST 300-95



Polystyrene wall panel — insulation
ST 300-85

Temperature logger
ST 301-80

12V Power supply
ST 300-80

Temperature sensor panel
ST 300-52

You will also need the 50W Lamp and STELR Sustainable Housing placement template. The template is included at the end of this document.

WATCH > Sustainable housing wall colour investigation video on STELR's YouTube channel
MORE INFO > More sustainable housing videos on the STELR website

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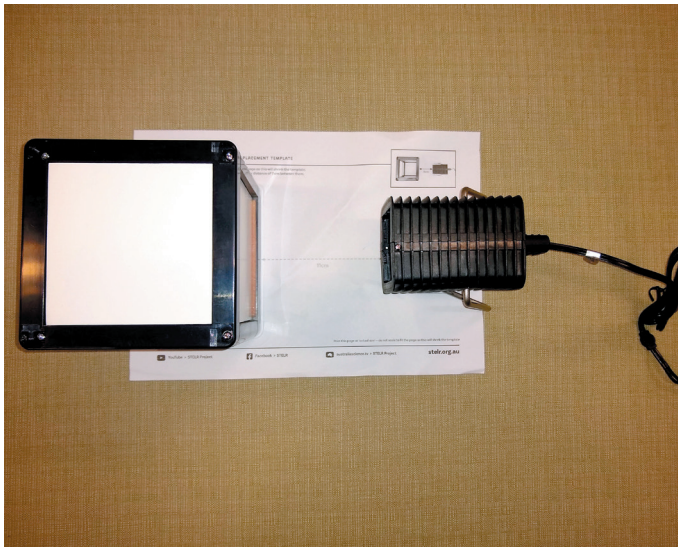
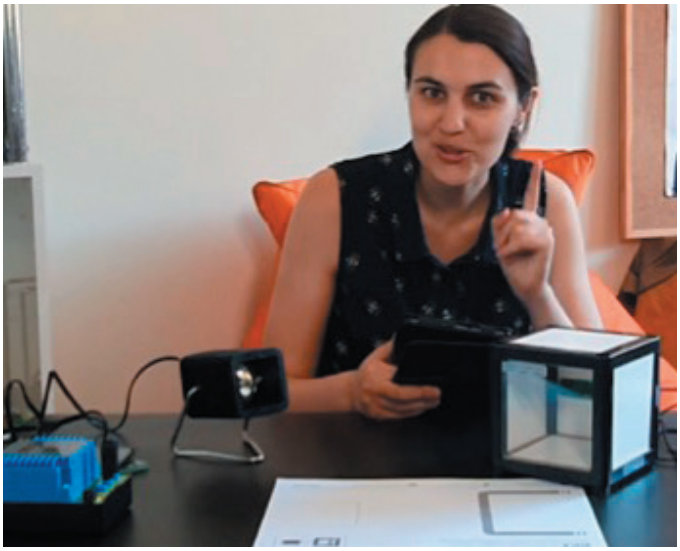


Set up of the equipment showing how to place the lamp on the template



An image of Lee Constable in action from our video investigation

WHAT LEE DID IN THE VIDEO INVESTIGATION

- Place the temperature sensor in the back wall with the sensor at the top.
- Place the glass window in the opposite face of the cube.
- Insert an insulation panel into the floor.
- Place insulating panels in the side walls and on the top to make a flat roof.
- Connect the temperature sensor to the data logger.
- Place the lamp about 11cm from the window. (You may use the placement template to help you.)
- Turn on the lamp and the data logger at the same time.
- Record the temperature every minute for five minutes on your data sheet.
- Turn off the lamp and move it away from the house. Record the temperature for a further five minutes as it cools.
- Repeat the experiment using the other two glass samples. When you are changing the glass samples, allow the warm air to escape from the house cube.
- See Lee's results on page 3. Plot graphs of the results on page 4.

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RESULTS

Time Minutes	Clear glass Temp °C	Low E glass Temp °C	Grey tinted glass Temp °C
0.0	19.0	19.0	19.0
0.5	19.5	19.5	19.3
1.0	20.0	19.9	19.7
1.5	20.5	20.3	20.0
2.0	21.0	20.7	20.3
2.5	21.3	21.1	20.7
3.0	21.8	21.5	21.0
3.5	22.2	22.0	21.3
4.0	22.7	22.4	21.7
4.5	23.1	22.8	22.0
5.0	23.5	23.2	22.4
5.5	23.8	23.4	22.6
6.0	23.8	23.5	22.6
6.5	23.7	23.4	22.6
7.0	23.6	23.4	22.6
7.5	23.6	23.3	22.6
8.0	23.6	23.3	22.5
8.5	23.5	23.2	22.5
9.0	23.4	23.1	22.5
9.5	23.3	23.0	22.4
10.0	23.2	22.9	22.4

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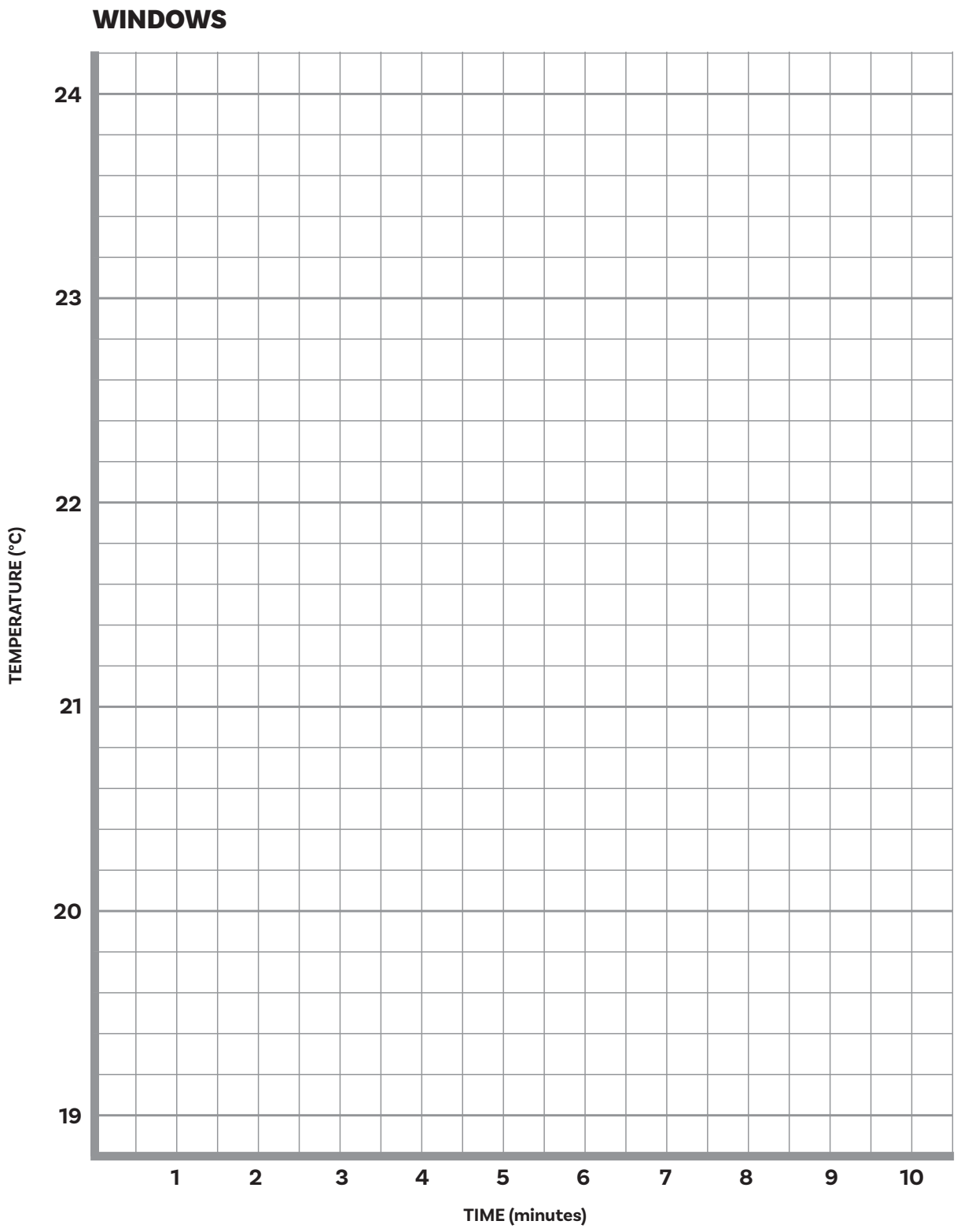
GRAPH

Plot your results on the graph below using a different colour for each glass sample.



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DISCUSSION

QUESTION 1
When the lamp was on, which glass sample caused the house to heat up the most?

QUESTION 2
When the lamp was on, which glass sample caused the house to heat up the least?

QUESTION 3
When the lamp was off, which glass sample allowed the house to cool down the most?

QUESTION 4
When the lamp was off, which glass sample allowed the house to retain the most heat?

QUESTION 5
Discuss the results with your class and decide which type of glass would be best for keeping a house:

a) Warm in winter

b) Cool in summer

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STELR SUSTAINABLE HOUSING — PLACEMENT TEMPLATE

Print this page at 'actual size' — do not scale to fit the page as this will shrink the template. Place the cube (house) directly in front of the lamp. There should be 11cm between the edge of the cube and the bulb (inside the lamp hosusing).