

THEORY

Conduction is one of three ways heat can be transferred through a material. Heat is transferred by conduction when particles are heated, vibrate more and then pass on their energy to the particles around them.

WHAT IS THE BEST INSULATION?

In this activity we test the effectiveness of different types of insulation to determine how good they are for insulating a house.

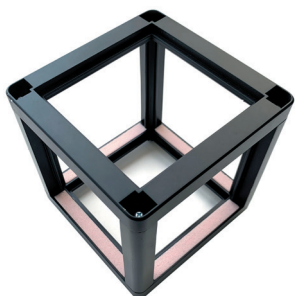
Materials that do not conduct heat very well make good insulation. Air is a poor conductor. Roof insulation consists of fibreglass fibres that trap a lot of air. Many types of outdoor clothing (puffer jackets) also provide insulation for your body by trapping air between fibres – often feathers and down.



MATERIALS USED IN THIS ACTIVITY

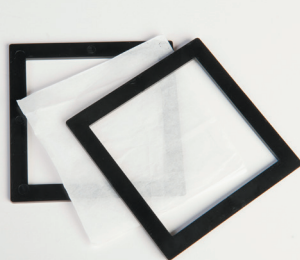
Spring loaded cube

ST 300-40



Frame panels

ST 300-40



Polystyrene wall panel – insulation

ST 300-85



Temperature sensor

ST 300-52



Temperature logger

ST 301-80



12V Power supply

ST 300-80

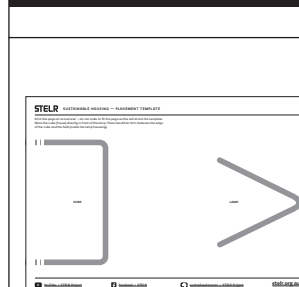


50W lamp

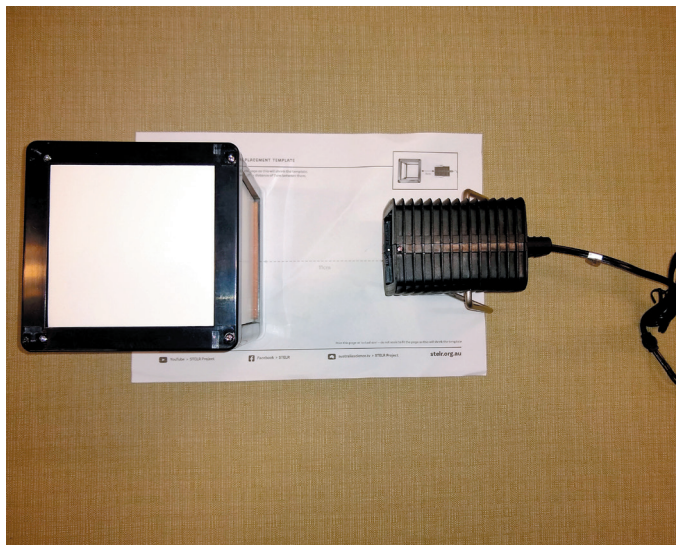
ST 300-61



Placement template



You will also need the STELR Sustainable Housing placement template. This is included at the end of this document.



WHAT LEE DID IN THE VIDEO INVESTIGATION

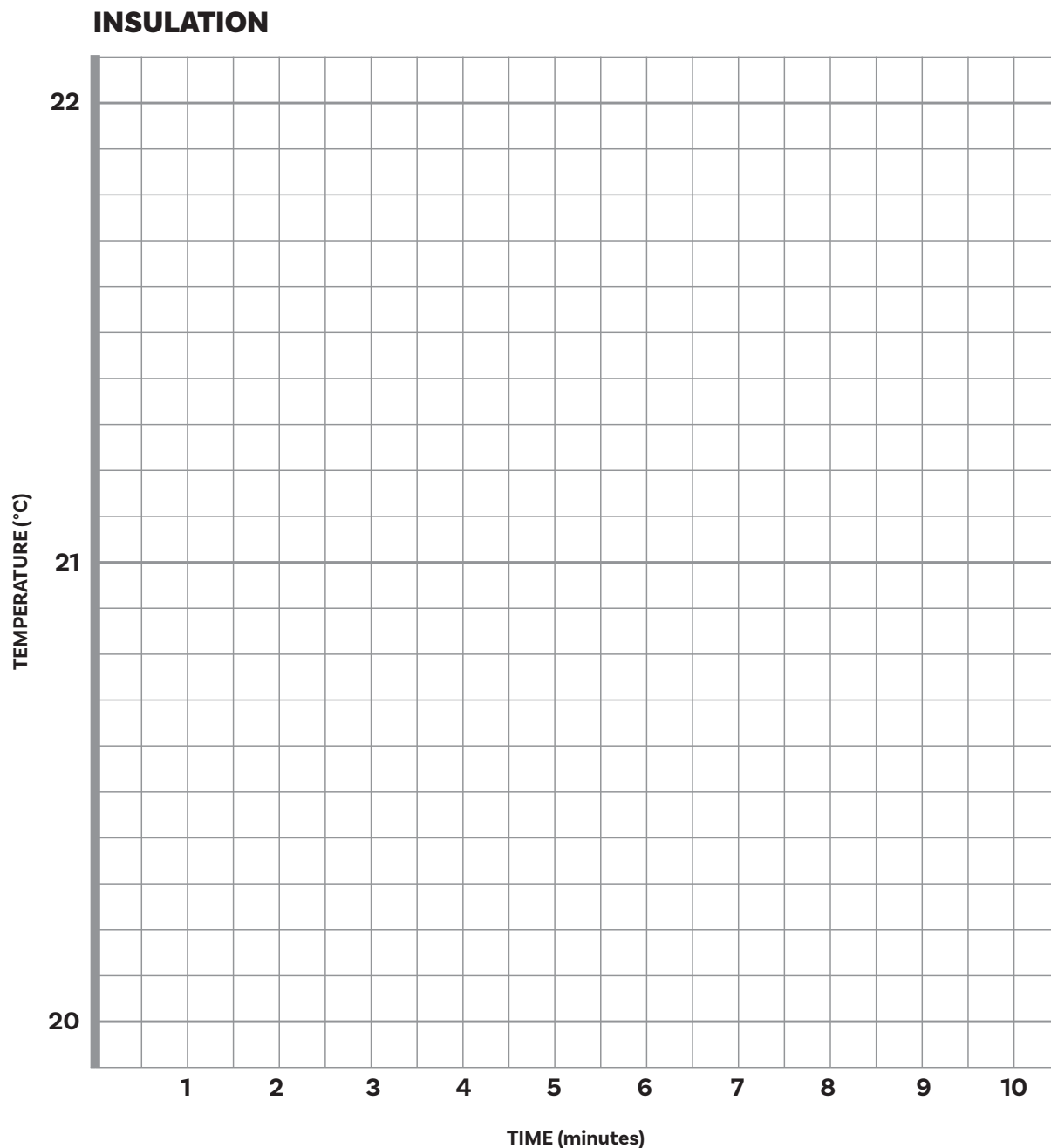
- Place the temperature sensor panel in the back wall of the cube with the sensor at the top.
- Place the frame with an insulation sample in the opposite face of the cube. Place different insulation samples in the frame for each test.
- Insert a white insulation panel into the floor.
- Place white insulating 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 11cm from the insulation sample using the template.
- Turn on the lamp and the data logger at the same time.
- Record the temperature every 30 seconds for five minutes.
- Turn off the lamp and move it away from the house. Record the temperature for a further five minutes as it cools.
- Replace the insulation in the frame with a different sample. Repeat the experiment.
- See Lee's results on page 3. Plot graphs of the results on page 4.

RESULTS

Time Minutes	Cardboard Temp °C	Foil Temp °C	Wools Temp °C
0.0	20.0	20.0	20.0
0.5	20.1	20.0	20.0
1.0	20.2	20.1	20.1
1.5	20.2	20.1	20.1
2.0	20.3	20.1	20.1
2.5	20.5	20.2	20.1
3.0	20.6	20.3	20.1
3.5	20.7	20.3	20.1
4.0	20.8	20.4	20.1
4.5	21.0	20.5	20.2
5.0	21.2	20.6	20.2
5.5	21.3	20.7	20.3
6.0	21.4	20.8	20.3
6.5	21.4	20.8	20.3
7.0	21.5	20.8	20.3
7.5	21.5	20.9	20.3
8.0	21.5	20.9	20.3
8.5	21.4	20.9	20.3
9.0	21.4	20.9	20.3
9.5	21.4	20.9	20.3
10.0	21.3	20.9	20.3

GRAPH

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



DISCUSSION

QUESTION 1

Which insulation allowed the house to heat up quicker (up to 5 minutes)?

QUESTION 2

Which insulation allowed the house to cool down quicker (after 5 minutes)?

QUESTION 3

Which material is the best insulator? Why?

QUESTION 4

What do you think would happen if you wrapped a wall panel in shiny foil and repeated the experiment?



THIS ACTIVITY
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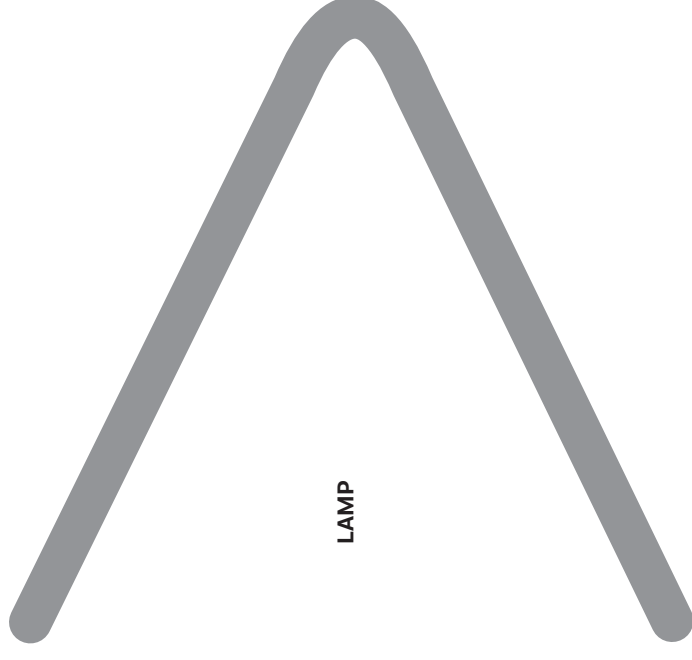
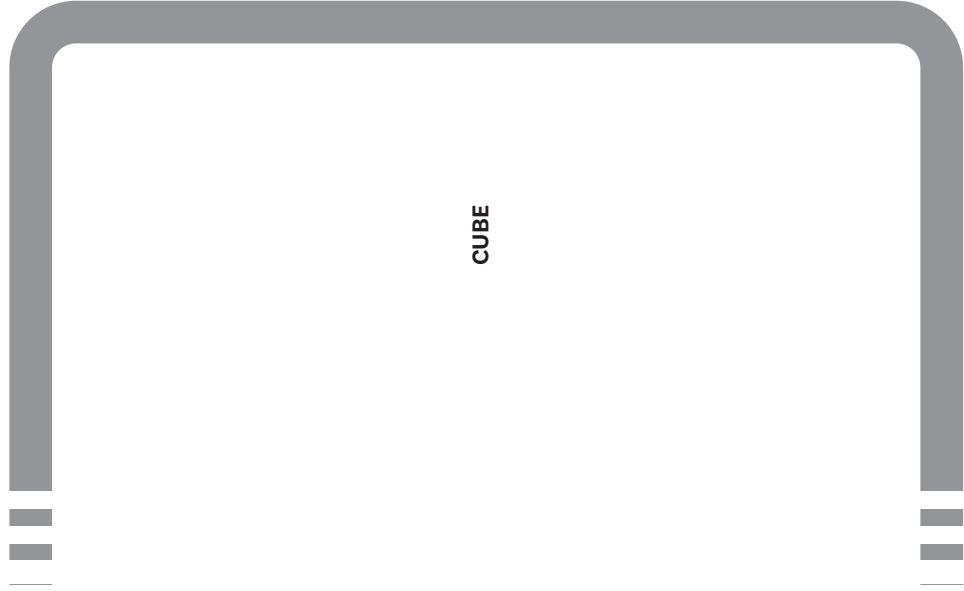
STELR

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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 housing).



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