

Heat and Sound Investigation Ideas

These ideas can be carried out at home if necessary.

- How much time does it take a kettle to boil water with different amounts of water in it (say, 200mL, 400mL, 600mL, 800ml, 1000mL.
- Three identical ice blocks are removed from the freezer. One is placed onto a metal surface (like an oven tray, one is placed onto a wooden or plastic surface (like a chopping board) and one is placed between two tea towels. Take a picture every two minutes for 20 minutes and determine how the surface affects the speed at which the ice block melts. If you can weigh the ice remaining after 20 minutes, try to!
- Download a dB (decibel meter) app onto your phone. Record the sound level 30 cm from another phone. Place a tea towel over the ringing phone and repeat with more and more tea towels. How is the sound level affected?
- With a dB app, measure the sound level of a speaker from 1 metre away. What happens to the sound level as you get further away? (2 m, 3 m up to 10 m) Probably best done outside to avoid the issue of reflections within a room.
- If you have a thermometer or a central heating remote control unit with a built-in thermometer...

Turn on your central heating. In the smallest room you have that actually has a duct, wait for 2 minutes and measure the temperature at 10 cm above the floor (in the middle of the room), 1.5 metres above the floor, and as close to the ceiling as you can get. You may need to leave the remote control in position for a minute to ensure that the built-in thermometer has time to adjust. Repeat for 20 minutes.

- Using a thermometer (most of you won't have a school-type 0-100°C thermometer but you may have an oral body-temp thermometer. If so, you can test the effectiveness of a can holder (or stubby holder). Heat up about 150 mL of water to about 42°C (the normal limit of the human body thermometers) and pour it into an empty drink can or bottle. Record the temperature every minute for 15 minutes. Repeat the experiment (making sure you cool the can back down to normal), but wrap the can with a can holder or a tea towel or cloth or something.
- Three clear glasses. Pour 4°C water (from the fridge) into one, hot tap water into the second and boiling hot water into the third. Drop a drop of food dye into each and take a photo every minute for 10 minutes.
- If you have a decent infrared thermometer place a black T-shirt and a white T-shirt (that were both in the fridge) out in the sun. Record the temperature of the T-shirts every minute for 15 minutes. How does the colour of the T-shirts affect the temperature rise.
- Freeze 2 equal volumes of water, in two different open plastic containers, one wide and flat (so that it has a large surface area) and the other more squarish (so that it has a smaller surface area). After the water has frozen (a day or so later), remove from the freezer and allow to melt. Which one melts quicker? Take a photo every 2 minutes for 30 minutes. Weigh the remaining ice blocks if you can.
- Leavening Bread. What difference does temperature make to the time that bread dough takes to rise? Mix 300 grams of flour and 1 teaspoon of yeast. Add approximately 180 mL of lukewarm water. Make the dough and knead the dough for 10 minutes. Break into three identical roundish sections (kind of like a hamburger bun). Measure the width of each one. Place one in the fridge (4°C), one on the kitchen bench (which will be about 20°C), and one in a container that is in another container of hot water from the tap (about 50°C). Take a photo every 5 minutes for 40 minutes. Which dough rises the most? Which dough widens the most?

(To not let this food go to waste: After the prac, let the two losers rise in the winner's circumstances. When all three doughs have risen, gently knead the dough for 1 minute to "degas" it. Shape the dough into a nice shape, place onto oiled baking tray, let it rise again for another 40 minutes, and then bake at about 200°C for 25-30 minutes. Mmmmm, fresh bread.)