



BRONZE AWARD PROJECT IDEAS



typically 10 hours of project work



Which fabrics are the best insulators?

Before you start your investigation, you should carry out a risk assessment and have it checked by your teacher. For help with this, read through our health and safety information and look out for health and safety warnings in the text.

Heat flows from hot places to cold places. Hot things cool down and the heat is transferred to something else, which warms up. Outside on a cold winter's day we usually try to reduce our heat loss by wearing extra layers of clothing. In this activity, you will compare the insulating (thermal) properties of different materials.

Getting started

Do a little research into clothing and other items such as sleeping bags and duvets to find out how their heat insulating properties are achieved. You might also want to find out what terms such as 'thermal insulation' and 'thermal conductance' mean.

Next, you should obtain some suitable samples. Ideally you should contact a manufacturer of fabrics designed to be thermal insulators or manufacturers of sleeping bags, duvets, fleece jackets or other clothing designed to keep the wearer warm. Hopefully you will be able to get some free samples of fabric!

The experiment

Devise an experiment to compare the insulating properties of your samples. For example, you could devise a test procedure that involves wrapping a layer of fabric around a 250 ml beaker of hot water and measuring with a thermometer and stop-clock how long the hot water takes to cool down.

Do this for each fabric, but make sure your tests are fair and that they enable you to make a comparison of the thermal properties of your sample fabrics. For example, consider:

- Whether you should have the same volume of water in each beaker
- If you need a lid on the beaker
- What start and finish temperatures you are going to use for measuring the cooling time. Alternatively, you could measure the temperature drop in a certain time interval.

You will need to do trial experiments before you can make your final plans.

The results

You'll need to present your results as suitable graphs or charts and discuss any patterns you find in the results. Try to relate what you find in your tests to what the manufacturers claim about the thermal properties of their fabrics.

For a similar project at Silver level try 'What fabric should you use to make cold weather clothing?'