

# Wrap Up - Keep Warm

*key message: if we insulate our homes, schools and offices we will need to use less heating and will save energy.*



**sese curriculum link:**

Content Strand – Energy and Forces  
Strand Unit – Heat

**skill development:**

Predicting, investigating, experimenting,  
measuring, recording and analysing.

**integration opportunities:**

SESE: Science and Geography –  
Environmental Awareness and Care  
Mathematics: Data/representing  
and interpreting data eg. Bar charts,  
line graphs

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**Key Message:** if we insulate our homes, schools and offices we will need to use less heating and will save energy. By reducing our heating needs, we help to conserve the earth's non-renewable resources such as oil, gas and coal. It also means we contribute less to acid rain (see Lesson Plans Acid Attack and Make Your Own Acid Rain) and global warming (see Lesson Plan on Renewable Energy).

## Before you start

Today we are going to explore how insulation can help us to protect the Earth's resources.

Use the season and the weather on the day to start a discussion on heat and temperature i.e. whether the day is warm or cold, what sort of clothes the children are wearing, whether the heating is on in school etc.

A concept map on the topic "Heat" could be a good introduction to this activity.

- ✦ What do you do when you are feeling cold? *The children may suggest rubbing their hands, going for a run, turning on the central heating, closing doors and windows, putting on extra clothes, etc...*
- ✦ What does putting on a coat do? *The children may suggest that the coat keeps out the cold, or that it keeps in the heat or .....*
- ✦ What sort of clothes do people living in hot countries wear? *If there are children from other countries in the class this is a good opportunity to discuss the clothes from their country, what the weather is like in their country, do they know what type of material the clothes are made from, etc.*
- ✦ Why do we use a wooden spoon to stir something hot?
- ✦ How would you keep your hot soup warm for some time if your flask was broken?

## Background

Some materials are better insulators of heat than others. Materials like metals are very good conductors of heat e.g. a metal spoon dipping into hot water, whereas cotton wool, sponge and fluffy objects do not conduct heat as well, because of the air they trap, which is a very poor conductor. Cavity walls in buildings have a layer of air in between two columns of bricks so that heat does not pass through. This acts as good insulation. Similarly fibreglass is often used in attics because the trapped air does not let the heat pass through.

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## How can we investigate insulation?

### You will need

Approx. 6 plastic beakers

6 Rubber bands

Thermometer (alcohol ones, mercury is not recommended it is poisonous)

A selection of spoons, e.g. metal, plastic and wooden

A selection of materials (they must be big enough to fit around the beakers at least once), e.g. woollen, cotton, bubble wrap, newspaper, cotton wool, plastic bag etc.

Supply of hot water

### Steps

1. Divide the children into groups and distribute items.
2. Using the collection of spoons the children should hold each type of spoon against the back of their hand or cheek; they can be asked if they all feel the same. The metal ones feel colder because metal is a good conductor of heat and lets the heat flow out of the body.
3. Pour hot water into the beakers and place the different spoons in the water. Ask the children which spoons will remain hot when we take them out. Children may suggest that the plastic might melt or that the metal spoon gets too hot to hold.
4. Wrap the beakers in one or more layers of the different materials using the rubber bands to hold the material in place.
5. Take the temperature of the water.
6. Using a watch or clock take the temperature of the water in their beaker every 2 minutes, up to 10 or 15 minutes (whatever time is agreed).
7. Record the temperature at the two-minute intervals in the recording sheet at the end of the lesson plan.

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## Discussion

- Which material kept the water the warmest?
- What was it about the material that you think made it keep the water warmer? The materials that contained more air spaces, because air is a poor conductor of heat and a good insulator.

## Did you know?

One of the best heat insulators is all around us and it's free - AIR! Ordinary air is very good at stopping heat from escaping; many materials which we use to keep warm have air trapped inside – like duvets, woollen scarves, string vests.

Households use one-third of all energy used in the EU. Grants are now available from SEAI for making your home more insulated.

Birds ruffle up their feathers in cold weather to trap air in them.

By turning down your heating by 1°C, you are reducing emissions by 10%... and saving 10% on your heating bills.

Use energy saving light bulbs or cfls instead of ordinary (tungsten) bulbs – they use one fifth of the energy and last 10 times longer.



## Safety

Care with hot water

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## Extension Activities

- ✦ The children could look around the school and identify areas that would benefit from insulation e.g. badly fitting windows or doors etc. They could then use PowerPoint to produce a presentation or a booklet suggesting changes that could be made and present it to the principal.
- ✦ Think up various ways in which heat can be kept in a house so that there is less need for fires, central heating, etc. cavity walls, double-glazed windows, fibre glass insulation in attics, place a lagging jacket on the hot water tank, close doors, cover draughts, etc.
- ✦ Wrap up one beaker of water in black material and one in white and leave them in the sun. Take the temperature of both after a while. Is there any difference? Dark objects absorb more heat (and light) than bright reflective objects. This is why white clothes are popular in hot countries. Solar panels are black because they absorb the heat of the sun which is then used to heat water or produce electricity.
- ✦ When parents are buying new electrical appliances the children should encourage them to look at energy labels on appliances: A (most efficient) - G (least efficient).

## Useful Websites

[www.seai.ie/schools](http://www.seai.ie/schools)

[www.primaryscience.ie/activities\\_introduction.php](http://www.primaryscience.ie/activities_introduction.php)

[www.epa.ie/researchandeducation/education/primary/](http://www.epa.ie/researchandeducation/education/primary/)

[www.askaboutireland.ie](http://www.askaboutireland.ie) Eco Detective Resource for Primary Schools

[www.coolkidsforacoolclimate.com/](http://www.coolkidsforacoolclimate.com/)

[www.energyquest.ca.gov/index.html](http://www.energyquest.ca.gov/index.html)

[www.eere.energy.gov/kids](http://www.eere.energy.gov/kids)

[www.learn-energy.net/education/](http://www.learn-energy.net/education/)

[www.suschool.org.uk](http://www.suschool.org.uk)

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recording sheet - photocopy and use

## Insulation

Time (minutes)	Temperature (°C)
0	
2	
4	
6	
8	
10	
12	
14	

