# 3.1 Lessons Hot and Cold

**Lesson 1 Hot and Cold**
**Equipment needed:**

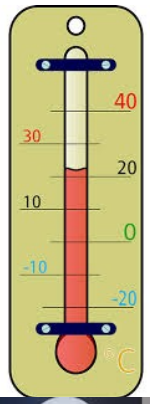
- Bowls of hot, warm and cold water.
- Thermometer

Q. What weather do you like best hot or cold?
Q. What do you like to do on these days?
A. Some may have a direct answer but most would say "Well that depends." If it's a very hot day in summer I'd like to go to the beach or pool to be cold or cooler. If it's a cold winters night I want to be hot or warmer tucked up in bed or beside a fire.
Hot and cold are both good for certain things.

Q. Do you like a hot or a cold drink best? Why?
Again some might say that depends on the weather or time of day.

Hot and cold are both just descriptions of the temperature of something like a drink or the weather. These are really comparison words because what we call cold may not be cold to someone like an eskimo.
Hotter means it has a higher temperature. Colder means it has a lower temperature.
e.g. Its hotter outside means the temperature outside is higher.

**Temperature** measures how much heat something has. Heat is a form of energy which usually comes from the sun.




Q. Can you name other sources of heat?

A. Fires, Heaters, Lamps and Microwave ovens all make things hot.

**2. Measuring Temperature**
When we say something is hot or cold we are really just comparing the temperature. It is even better to say exactly how much the temperature measures. This is done by using a thermometer.

Thermometers measure the heat in degrees Celsius or in symbols °C.
So that if we measured our temperature, we would be about 37°C.

Some thermometers use liquids inside a closed tube that rise when it gets hot. These are often used as clinical or body thermometers for checking if you have a fever.
Today most thermometers are digital and give the number exactly e.g. cooking thermometers in ovens and temperature gauges in motor cars used if the car gets hot.

***Explore:***
***A Hand Thermometer***

1. Measuring temperature using your hands:
   - Have 3 bowls half full with water, one hot (about 40°C), one warm (about 25 °C), one cold (about 10 °C).
   - Test them in pairs using left and right hands; start with Hot and Warm, then Warm and Cold.

   Q. How does the warm one feel compared to the others?

2. Measuring temperature with a thermometer.
   - Measure the temperature of the 3 bowls of water and record each one.

| Bowl 1 | Bowl 2 | Bowl 3 |
|---|---|---|
| | | |

   Q. How does the temperature match your hand thermometer?

**Lesson 2 Heating Up**
**Equipment needed :**

- lamp or heater
- Thermometer
- various material types in the class; metal, plastic wood etc.)

Q. How do things get hot?

A. Basically hot things can warm up cold things.

Heat can move from one place to another. It moves best when two things are touching but it can also move slowly through the air. It continues to move through different objects like a chain reaction. (Like Dominos that knock each other down)

***Explore 1. Measure the temperature near a lamp or heater:***

1. Try different positions for the thermometer near a hot lamp

   **(Safety Warning: Do not touch or get to close to the lamp)**

Q. What did you notice about temperature and nearness to the source of heat?

Hot things will cool down too unless you keep them hot.

***Explore 2. try touching different materials in the class particularly metal, plastic, wood, the floor etc.***

Q. What did you find was the coolest material?

If you touch something cold like metal or water then you too will get cold because your heat goes into them. (*its important to know that cold doesn't move only heat!)*

Things that make heat like fires will only stay hot as long as there is plenty of wood to burn. Heaters will only stay hot as long as there is plenty of electricity. Because they are giving away all their heat! Heat is energy and it eventually gets lost. Even the Sun but it will take a very long time!

When things get hot they have to absorb the heat. Some things get hot quickly others tale a long time.

***Do Investigation 3.2  Investigating Heat of the Sun?***

**Lesson 3 Keeping it warm.**

Q. What do you do to keep yourself warm?

Certain materials are good to keep warm because they stop the heat from leaving our bodies such as woollen jumpers or plastic coats. These are called insulators.

Q. Can you think of any other ways that help to keep warm other than the type of material we wear?

A. dark colours are warmer, keeping the air out keeps you warm such as closing all the windows, keeping moving helps us to keep warm such as running, rubbing our hands together or shivering! Try it!

Heat moves through objects but for some materials it moves more easily.
So materials like metals and glass let heat travel through them. These are called **good conductors** of heat .
For example: if you touch a metal pot or glass with hot water, they feel hot too!

Plastic or foam don't feel anywhere near as hot because they are called **good insulators** of heat**.** This means they stop heat from moving through them**.**

For example: If your cup was an insulator it stops heat from getting out and not only hurting your hand but also keeping your drink hot or cold.

***Do Investigations:***
***3.3 Investigating insulating materials for cups***

***Lesson 4 Stop it from Melting!***

*Have you noticed how quickly your ice block melts on a hot day?*

*If you **can't** eat your ice block straight away what can you do with it?*

*A. Put it in a fridge or esky.*

*Fridges and Eskies have a way of keeping things cold. In a fridge the temperature is around 4*°C *The freezer is even colder( -20*°C)

Q. What is melting and freezing?

**Melting**
At certain temperatures solid become liquids when you melt them e.g. ice becomes water at 0°C and ice blocks melt.

**Freezing**
Liquids become solids when you freeze them e.g. water becomes ice at 0°C and you form an ice block.

You can keep things cold with the same materials you keep them hot.
Q. What are these called?
***A. Insulators***

In the next investigation find some materials that will keep an ice block cold

***Do 3.4 Investigation Keeping it Cold***