Heat and Temperature

Ideas about heat

What is temperature?

Temperature is a measure of how hot or cold an object is.

It is determined by the **average kinetic energy** of the particles in the object.

Temperature is measured in degrees Celsius (°C).

- The freezing point of pure water is defined as 0 °C (at sea level).
- The boiling point of pure water is defined as 100 °C (at sea level).

Temperature can be measured by a variety of different thermometers. These include liquid in glass, digital, thermocouple and bimetallic strip thermometers.

What is heat?

Heat is the energy transfer that takes place between objects of different temperatures.

Heat is measured in joules (J).

Heat transfer only occurs when there is a temperature difference between substances. Heat always moves from an area of **higher temperature** to an area of **lower temperature**. Once the temperatures are the same, heat transfer stops.

Types of heat transfer

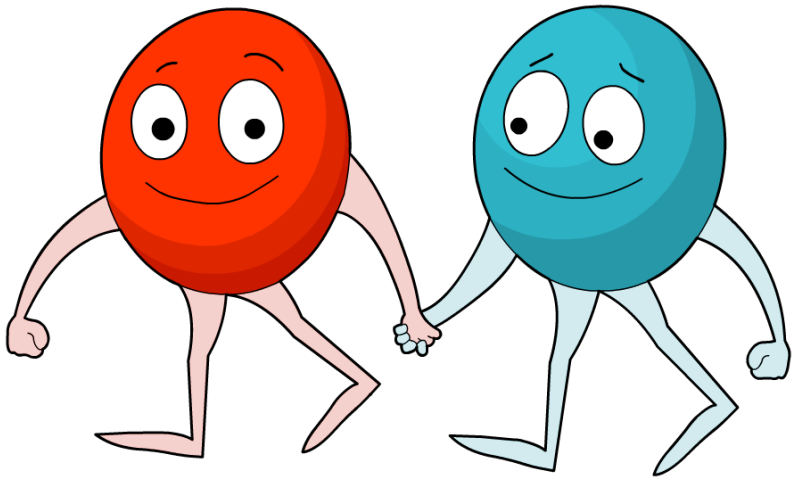
Heat transfer can take place in three different ways:

- **conduction**, which mainly occurs in solids
- **convection**, which only occurs in liquids and gases
- **radiation**, which occurs through any material or even through a vacuum.

The particle model

The differences between hot and cold objects – and between solids, liquids and gases – can be explained by the **particle model**.

- All substances consist of particles (atoms or molecules).
- The particles are tightly packed in a solid or spaced further apart in a liquid or gas.



- The particles are attracted to each other; some strongly and others weakly.
- The particles move around, i.e. they have **kinetic energy**.
- The kinetic energy of particles increases with temperature.