

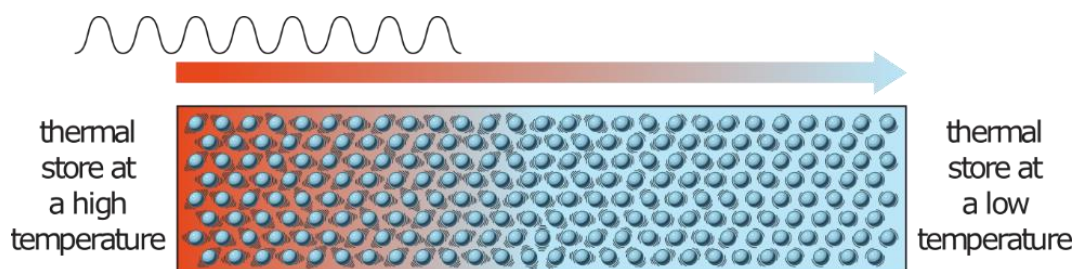
## Energy transfer

Energy can be transferred by conduction, convection, or radiation.

### Conduction

In **conduction** particles transfer energy by colliding with other particles when they vibrate.

Energy transfer happens until the two surfaces are at the same temperature. If you keep one surface warm by heating it then you will maintain the temperature difference. The solid will continue to conduct.



### Conductors and insulators

A metal is a good **conductor** of energy. Energy is transferred through it very quickly.

Energy is not transferred very easily through materials like wood. Wood and many non-metals are poor conductors. They are **insulators**. This does not mean that they do not conduct at all but that energy is transferred very slowly through them.

Liquids are poor conductors.

Gases do not conduct well at all because their particles are much further apart than the particles in a solid.

#### Quick question

State what an insulator is.

## Convection

When you heat soup in a pan it all heats up, not just the layer in contact with the bottom of the saucepan. This is what happens:

- The soup that is in contact with the bottom of the pan gets hotter so the particles there move faster.
- The particles in the hotter soup move further apart, so the soup becomes less dense.
- The hotter soup rises (floats up) and cooler, denser soup takes its place.



This is called a convection current. Convection also happens in gases.

## Radiation

Very hot things give out light as well as **infrared radiation**. Some people call infrared 'thermal radiation' or 'heat'.

The Sun emits lots of different types of radiation, including light and infrared. Both light and infrared radiation travel as **waves**.

You need particles to transfer energy by conduction and convection. You don't need particles to transfer energy by radiation. Light and infrared reach the Earth from the Sun by travelling through space. Space is a vacuum. There are no particles in a vacuum.

Radiation can be transmitted, absorbed, or reflected, just like light.

Dark colours absorb infrared, and light-coloured and shiny surfaces reflect infrared.

### Quick question

State what happens when infrared hits a shiny surface.