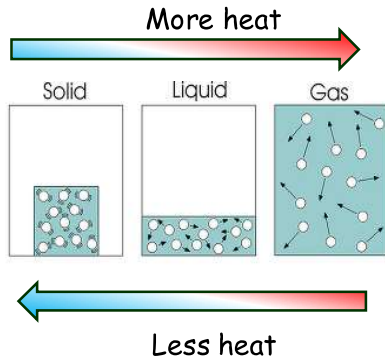
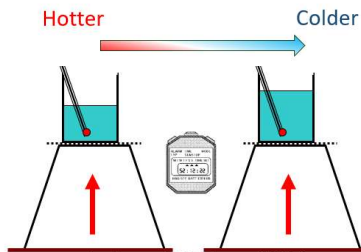


Matter - Heat



- Heat always travels from hotter things to colder things.
- Sometimes the colder thing is the air around the hotter thing.



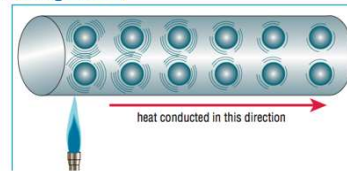
- Temperature is how HOT or COLD something is.
- Temperature is measured in degrees Celsius ($^{\circ}\text{C}$)
- **HEAT** is a form of **ENERGY**. Energy is measured in **JOULES**

Heat Definitions

Average energy held by each particle in a material	Temperature
The unit of energy	Joule (J)
This make things happen	Energy
The sum of the energy in a material	Heat
A unit of temperature	$^{\circ}\text{C}$

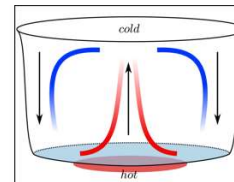
Conduction

- When a material is heated, the vibration of the particles increase as their kinetic energy increases.
- In a solid these particles vibrate against other particles besides them, the kinetic energy is then passed along as the particles are close together.
- The kinetic energy of the particles in a material is what we call heat. [Twig video](#)



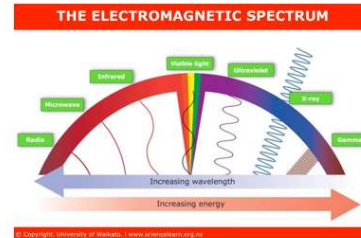
Convection

- When a material is heated, the vibration of the particles increases as their kinetic energy increases.
- In a liquid or a gas (a fluid) particles are more free to move than solids and as they hit other particles, the gaps between the particles grow.
- This means the heated fluid becomes less dense and moves upwards.
- This creates convection currents in the fluid.



Radiation

- If there is no gas, liquid or solids present, we are in a vacuum.
- In a vacuum, like space, there are no particles to collide to pass energy, so heat energy moves through a vacuum differently.
- In this case heat energy moves as **infra-red** radiation.
- Infra-red radiation is an electromagnetic wave.
- Infra-red radiation does travel in gases as well.



Insulators

- Some materials do not conduct heat well.
- These materials are known as insulators.
- In insulating materials the heat is not transferred easily.
- Many insulators are non-metallic materials filled with tiny air spaces. Air is a good insulator.



Matter - Density

What is Density?

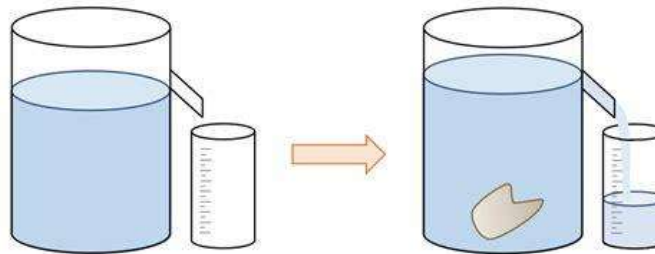
- Whether an object will float or not depends on its mass **and** its volume.
- The **density** of an object is the ratio of mass to volume.

- Density = mass ÷ volume

$$D = \frac{m}{V}$$

Size of an object?

- We need to measure the size of our objects.
- **Volume** is the measurement of an objects size in 3 dimension (length, breadth and height)
- It describes how much space an object takes up.
- We can measure the volume of an object by finding out how much fluid it **displaces** from a container called a **Eureka can**.



Real world

- An example of where density change is useful is shown below:



A diver can change the volume of their buoyancy vest by adding or losing air. This allows them sink or float when they want to.