wymondham high

Yr 8 Science P2.2 and P2.3

Section 1- Energy

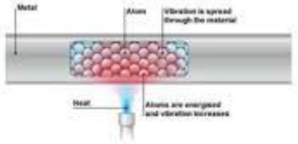
Energy is measured in **joules** (J). 1000 J = 1 **kilojoule** (kJ)

The **law of conservation** states that energy cannot be created or destroyed; it can only be transferred. Energy can be stored in various ways chemical, thermal, kinetic, elastic, electric, light, sound and gravitational potential.

When thermal energy is transferred to the surroundings we say the energy has **dissipated**.

Section 2 - Conduction

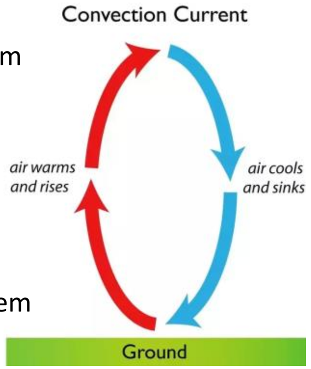
When particles are heated they begin to vibrate, this causes them to collide; passing on the energy. Materials that let energy pass through them easily are called **conductors**. Materials that are difficult for energy t pass through are called **insulators**.



Heat energy is conducted through the solid in this way. As the atoms of the solid gain kinetic energy the temperature of the solid increases.

Section 3 - Convection

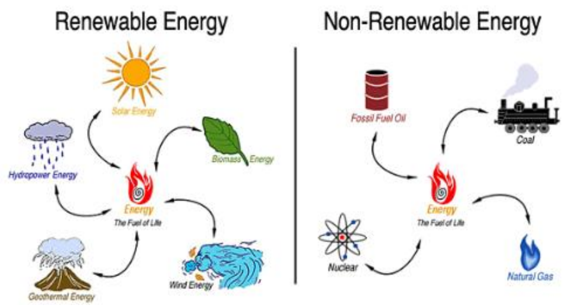
When particles are heated they begin to vibrate this allows them to move apart; becoming less dense. The heated particles rise. As they cool the particles move closer together becoming denser; this causes them to sink. This creates a **convection current**.



Section 4 - Radiation

This type of heat transfer does not involve particles. Heat is transferred by infrared radiation; this is how energy is transferred from the Sun. All objects **emit** infrared. Infrared ca be transmitted, reflected or absorbed.

Section 5 - Energy resources



Section 6 - Power & work

Power is measured in **watts** (W). 1000 W = 1 **kilowatt** (kW).

You can calculate your energy usage in kW/hour

$$\text{power (W)} = \frac{\text{energy (J)}}{\text{time (s)}}$$

Sometimes energy is transferred by doing **work** e.g. lifting a book against the force of gravity.

$$\underset{(J)}{\text{work done}} = \underset{(N)}{\text{force}} \times \underset{(m)}{\text{distance}}$$

To make the work easier you can sue a **lever**. This increases the force you are using. E.g. opening a paint tin with you hand or a screwdriver.

Gears work in a similar way; they are turning levers. Gears can be used to increase the force, change direction or go faster

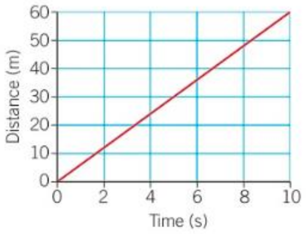
Section 7 - Speed

$$\text{speed (m/s)} = \frac{\text{distance travelled (m)}}{\text{time taken (s)}}$$

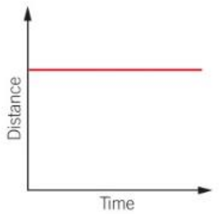
The speed that the runner is travelling at any time during the race is the **instantaneous speed**. This is the speed that you see on the speedometer in a car.

You can work out the **average speed** by dividing the *total* distance by the *total* time that it took to run the race. This average speed makes it easier to compare how fast different people, or boats, or cars, travel.

A distance time graph can be sued to plot the movement of an object. You can use these graphs to calculate speed. **Acceleration** tells us how quickly an object is speeding up.



▲ A distance–time graph for a constant speed.



▲ A distance–time graph for a stationary object.

Section 8 - Pressure

Pressure in gasses is created by the collisions between gas particles and their container. This means that decreasing the volume of the container would increase the pressure; as there would be more collisions. Increasing the temperature also increases the pressure as the particles have more energy so collide more. As you pump gas into a container it becomes **compressed**.

Pressure in liquids acts In all directions. Liquids are **incompressible**. Liquid pressure creates **up thrust** liquid particles collide with the bottom of the object pushing it up.

Pressure in solids is created by the weight of an object exerting a force on a surface. You can reduce pressure by increasing surface area.

Pressure in solids can be calculated using the formula below:

$$\text{pressure (N/m}^2\text{)} = \frac{\text{force (N)}}{\text{area (m}^2\text{)}}$$

Section 9 -Turning forces

The effect of a turning force is called a **moment**. Turning forces act around a **pivot**. The **law of moments** states that an object is in equilibrium when the clockwise moment is equal to the anticlockwise moment.

To calculate moments you use this formula: Moment (Nm) = force (N) x perpendicular distance from pivot (m)

▲ These apples are in equilibrium because the clockwise moment equals the anticlockwise moment.