

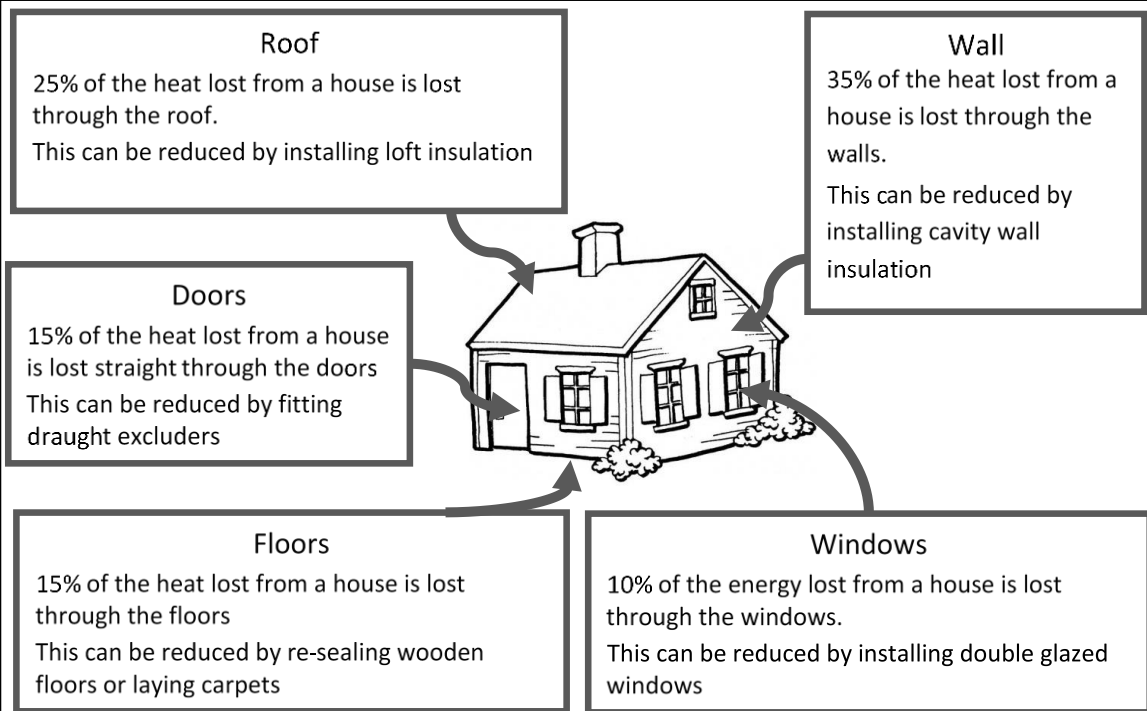
**Section 1: Key Terms and Definitions**

1.	Closed System	No net (overall) change in the energy of a system. All energy transfers take place within the system only.
2.	System	Object or group of objects
3.	Conservation of Energy	This law states that energy cannot be created or destroyed, it can only be transferred from one energy store to another.
4.	Joules	Unit of energy: One joule (1J) of work is done when a force of one Newton (1N) causes a displacement of (1M) 1 Joule – 1 Newton-metre
5.	Specific Heat Capacity	The energy needed to raise the temperature of 1kg of a material by 1°C.
6.	Friction	A contact force. Work to overcome this is mainly transferred to thermal energy. Friction in machines always results in unwanted energy transfers.
7.	Work Done	Another way of describing energy transfer, work is done when a force moves an object
8.	Output Energy	The energy given out by a device, can be useful or wasted.
9.	Input Energy	The energy supplied to a device
10.	Useful Energy	Energy transferred in device into the intended energy store to allow it function.
11.	Wasted Energy	Energy that is not transferred in a way that is useful. In most devices, the wasted energy will be transferred to the thermal energy store.
12.	Non-Renewable	A resource for which there is a limited supply which cannot be easily replaced. These resources will run out.
13.	Renewable	Resources that can replenish themselves or for which the supply is so large it isn't believable that they could run out.
14.	Dissipation	Energy being transferred to the stores of surrounding objects (usually wasted thermal energy)
15.	Lubrication	A method of reducing unwanted energy transfers by application of a lubricant (e.g. oil) to reduce friction. Occurs in machines.
16.	Insulation	A method of reducing energy transfers by the use of insulators (non-conductive material) Occurs in buildings.

**Section 2: Energy Stores**

1.	Chemical	Energy stored in chemical bonds waiting to react. Fuels and foods store energy this way.
2.	Elastic	Describes the energy stored in a springy object when you stretch or squash it
3.	Electrostatic	Energy stored by the attraction or repulsion of electric charges
4.	Gravitational	Energy stored by raising objects up against the force of gravity
5.	Kinetic	Energy stored as a result of objects moving.
6.	Magnetic	Energy stored as a result of attraction or repulsion in a magnetic field.
7.	Nuclear	Energy stored in the nuclei of atoms. Can be released by the fusing or splitting of nuclei.
8.	Thermal	Energy stored as a result of the temperature of a substance. Often stored as a result of the vibrations of movement of particles within the substance.

**Section 3: Reducing Heat Loss from a House**



# KNOWLEDGE

# Physics Paper 1 Topic 1: Energy

# ORGANISER

## Section 4: Energy Pathways

1.	Mechanical	Energy transferred by forces acting on objects
2.	Electrical	Energy transferred when an electrical charge moves
3.	Radiation	Energy transferred by electromagnetic radiation
4.	Heating	Energy transferred when an object is heated.

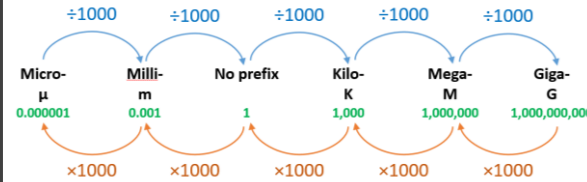
## Section 5: Internal Energy

Internal Energy is slightly different, it is a combination multiple energy stores within a substance. All objects have internal energy. This includes:

- energy caused by the movement of particles in the object, sometimes called thermal energy
- energy due to the bonds between particles, sometimes called chemical energy

## Section 6: Power

Power is the rate of energy transfer. It is usually measured in Watts, one Watt is the transfer of one joule of energy per second. More powerful devices can transfer a lot of energy and it is necessary to be able to convert units of different sizes



## Section 7: Efficiency

- The efficiency of a device is the proportion of the total input energy that is transferred in useful ways given as a decimal or percentage.
- No device can be 100% efficient.
- Machines waste energy due to friction between moving parts, resistance in electrical circuits and noise.
- To improve efficiency, it is important to reduce the amount of energy wasted. For example, car engines use oil as a lubricant to reduce the friction between the moving parts of the engine.

## Section 8: Energy Resources

Resource	Renewable?	Uses	Advantages	Disadvantages
Fossil Fuels (coal, oil, gas)	Non-renewable	Electricity, Transport, Heating	Reliable – electricity can be generated all of the time. Relatively cheap	Produces carbon dioxide, a greenhouse gas that causes global warming Can produce sulphur dioxide, a gas that causes acid rain
Nuclear Fuel	Non-renewable	Electricity	Produces no Carbon Dioxide when generating electricity. Reliable – electricity can be generated all of the time.	Produces nuclear waste that remains radioactive for thousands of years. Expensive to build and decommission power stations
Biofuels	Renewable	Heating, Electricity	Carbon Neutral Reliable – electricity can be generated all of the time.	Production of fuels may damage ecosystems and develop a monoculture.
Wind	Renewable	Electricity	No CO <sub>2</sub> produced whilst generating electricity.	Unreliable – may not produce electricity during low wind. Expensive to construct.
Hydroelectricity	Renewable	Electricity	No CO <sub>2</sub> produced whilst generating electricity.	Blocks rivers stopping fish migration. Unreliable – may not produce electricity during a drought.
Geothermal	Renewable	Electricity, Heating	Does not damage ecosystems. Reliable method of electricity generation	Fluids from the ground may contain greenhouse gases such as CO <sub>2</sub> and Methane. These contribute to global warming.
Tidal	Renewable	Electricity	No CO <sub>2</sub> produced whilst generating electricity.	Unreliable – tides vary May damage tidal ecosystem e.g. mudflats.
Waves	Renewable	Electricity	No CO <sub>2</sub> produced whilst generating electricity.	Unreliable – may not produce electricity during calm seas
Solar	Renewable	Electricity, Heating	No CO <sub>2</sub> produced whilst generating electricity.	Unreliable – does not produce electricity at night. Limited production on cloudy days. Expensive to construct.