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Energy Stores

Energy can be stored in objects, or when objects are doing something. It is a quantity measured in joules (J). Examples to know: • Energy is stored in fuels as chemical potential energy • Energy is stored in anything elastic when it is stretched, as elastic potential energy • Energy is stored in any object that has been lifted up, because the object stores gravitational potential energy • Energy is stored in moving objects as kinetic energy. • Energy is stored in any object as heat energy. (Obviously, if it is cold, it doesn't store much heat energy!) This is also known as thermal energy.

Energy Transfer

An energy transfer is when energy changes from one store to another. VERY IMPORTANTLY, the total amount of energy does not change. Energy cannot be created or destroyed. All that can be changed is how it is stored. This ideas is called the law of conservation of energy.

Energy is transferred, so it changes store, in loads of situations. Examples to know: • When a fuel is burned, the chemical potential energy in the fuel ends up stored as thermal energy in the surroundings; • When an object falls off a shelf, the gravitational potential energy it stores is transferred (changed) to kinetic energy while it is falling. • When the object hits the floor, all the gravitational potential energy it had to start with ends up stored as thermal energy in the surroundings. • When a spring that's been stretched is released, the elastic potential energy it stored is transferred to kinetic energy then to thermal energy.

This shows how energy changes where it is stored twice while you use a light bulb (lamp): From chemical potential energy to electrical energy to heat (thermal) energy in the surroundings.

Key word	Definition
Energy	Energy is a quantity that is stored in many objects and situations. Anything storing energy can do work.
Work	Work is done when energy changes from one store to another.
Potential energy	Potential energy is energy stored in objects that don't seem to be doing anything. See the examples.
Chemical potential energy	Energy stored in fuels (like wood, or the gas we run Bunsen burners on) is called chemical potential energy.

Key word	Definition
Elastic Potential energy	Elastic objects, like springs or rubber bands , store elastic potential energy when they are stretched
Gravitational Potential Energy	Any object that is not on the ground has gravitational potential energy. This is because they are lifted up in a gravitational field , and could fall down.
Kinetic Energy	Movement energy. Any moving object stores kinetic energy
Thermal energy	Also known as heat energy. All objects store some thermal energy, because the particles are moving. The higher the temperature of an object, the more thermal energy it stores.
Conservation of energy	The law that says energy cannot be created or destroyed. It can only change how it is stored.
Renewable	Renewable resources are replenished (replaced) as they are used.
Non-Renewable	Non-renewable resources, like fossil fuels, are NOT replenished (replaced) as they are used.
State of matter	Matter is divided into three states; solid, liquid and gas.
Melting	Change of state from a solid to a liquid.
Freezing	Change of state from liquid to a solid.
Evaporation	Change of state from a liquid to a gas.
Condensation	Change of state from a gas to liquid.
Battery	Two or more cells joined together
Cell	Device used to generate electricity usually by transforming chemical energy into electrical
Ammeter	Device used to measure current
Voltmeter	Device used to measure potential difference (Voltage)
Current	A flow of electrical charged called electrons
Resistance	When something tries to stop the flow of electrons around a circuit.
Potential difference	The differene in electrical energy between two points (voltage)

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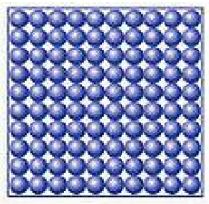
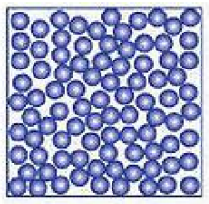
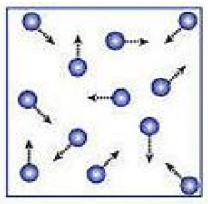
Particle Theory

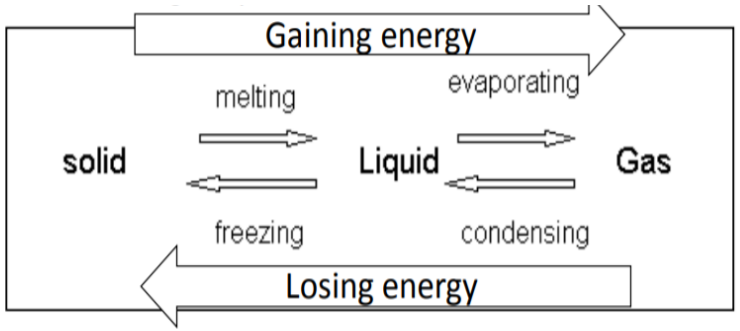

Solid


Liquid


Gas

All matter is made up of particles. Particles are found in all 3 states of matter. Particles in the 3 states behave differently.

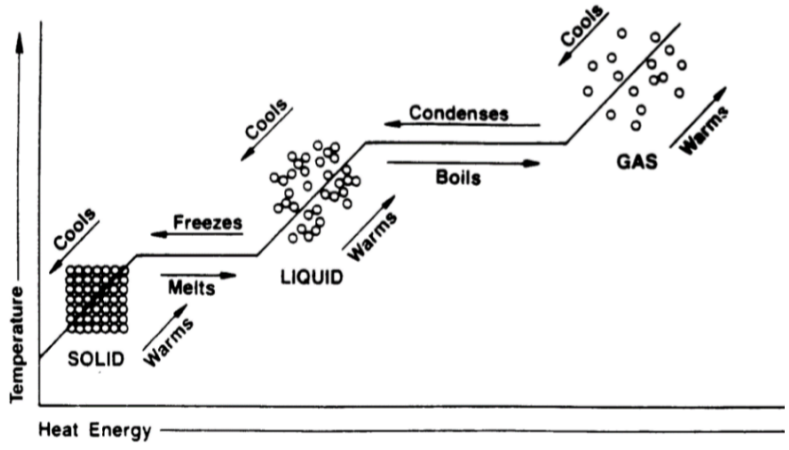
In solids, particles are arranged in a regular pattern and they can only vibrate in a fixed position. Particles in solids are not free to move. In liquids, particles can slide pass each other. They are arranged randomly. In gases, particles carry a lot of energy and they move in all directions in a high speed. Particles are far apart and are arranged randomly.



Change of State Changes of state take place when the particles gain or lose energy. When energy is applied, particles gain energy and move further apart. When energy is lost, particles become closer to each other and arrange themselves more regularly.

Interpreting the Energy-Temperature Graph

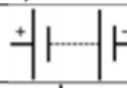
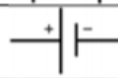
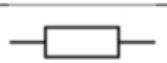
During the change of state, the temperature will stay the same until the change of state has been completed, i.e. all liquid has turned into gas, all liquid has frozen into solid, etc.



Electrical Safety

Turn off the power if you're making or chan ging your circuits Set the voltage to the low est level that will allow your circuit to work Don't use any components with exposed wi res Keep electrical components away from wa-
ter Don't get any metal objects (jewellery) away from circuits The voltage in your hom es is lower than that in overhead cables to p rotect you

This hazard symbol is used to warn of high v oltage. You should not touch anything with this symbol on.

Component	Symbol
battery	
Cell	
Bulb	
Switch (open)	
Switch (closed)	
Ammeter	
Voltmeter	
Motor	
Buzzer	
Resistor	
wire	

	Current	**Voltage (Potential Difference)**	**Resistance**
Description	Flow of electrons around the circuit	The difference in electrical energy between two points	How hard it is for the current to flow in a circuit
Symbol	I	V	R
How to measure it	Ammeter	Voltmeter	Can not be measure directly, can be calculate
Units	Amperes (A)	Volts (V)	Ohms (Ω)

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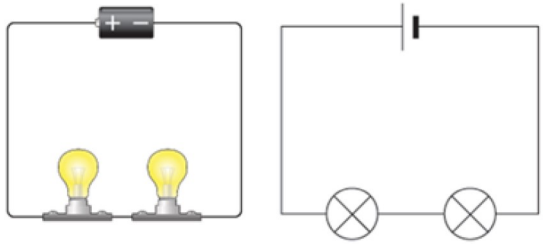
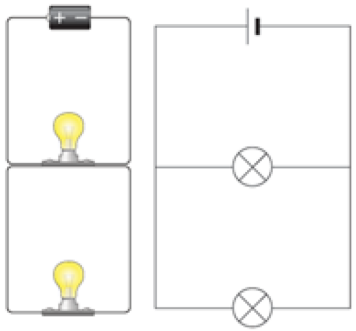
	Series	Parallel
Description	Components are connected one after another on the same loop	Componentns are connected on separate loops
Diagram		
Voltage	The voltage is shared between components	Every component has the same value
Current	Every component has the same value	The current is shared between each loop.

Calculating Resistance

Description - How hard it is for the current to flow in a circuit

Units - Ohms (Ω)

Equation - Resistance= Voltage/Current

Example -
The voltage in a bulb in 1.5V. The current flowing through the bulb is 0.75 A. What is the resistance? Resistance = Voltage/Current Resistance = 1.5/0.75 Resistance = 2Ω

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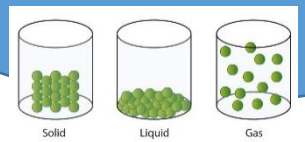
What I know from primary science:

I Learned that food is a store of energy (Y2/3)
I have compared and grouped materials together, according to whether they are solids, liquids or gases (Y4/5)
I have observed that some materials change state when they are heated or cooled, and measured the temperature at which this happens in degrees Celsius (°C) (Y4/5)
I have constructed simple series electrical circuits, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers (Y4)
I have associated the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit (Y6)
I have used recognised symbols when representing a simple circuit in a diagram (Y6).



Correctly identify energy stores. To give examples of energy changes Identify the factors involved in measuring energy transfer Understand the that food has energy in it and is measured in Joules.	Understand differences between **renewable and non-renewable** energy resources Correctly identify energy stores Give examples of energy transfers between stores	Use a particle model to explain relative conductivity of gases, liquids and solids. Use a particle model to explain relative conductivity of gases, liquids and solids.	Understand how to draw circuit diagrams and the difference between series and parallel circuits. Use a model to understand electrical current. Understand and measure the term Potential difference Understand how the resistance changes in wire	Use a model to understand electrical current Understand how to use electricity at home safely. 

Future learning

Energy stores and the definitions of GPE, KE and Elastic energy (Y9)
Thermal energy and SHC (Y10)
How energy resources are used to produce our electrical energy (Y9)
Particle model and density (Y9)

Potential difference and resistors in series and parallel (Y9)

I/V graphs and using Ohms Law. Using E=QV and P=IV (Y10)

Mains electricity and the National Grid.

Vocabulary:

Joules, Gravitational, Elastic, Chemical, Nuclear, Geothermal, Hydroelectricity, Condensation, sublimation, collisions, current, potential difference, Resistance, Ohms, Earth, Live, Neutral