P5 Energy and Waves

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Clever **K**ids **E**njoy **G**etting **T**aught **W**ays **F**or **H**acking **E**nergy

Chemical **K**inetic **E**lastic **G**ravitational **T**hermal **W**aves **F**orces **H**eating **E**lectric current

Stores of energy — Transfers of energy

Keyword	Definition
Chemical Energy	Energy that is stored in chemicals is in the Chemical store.
Kinetic Energy	If an object is moving, then there is energy in the Kinetic store.
Elastic Potential Energy	Energy stored in squashed, stretched or twisted materials.
Gravitational Potential Energy	The energy stored by an object lifted up against the force of gravity. Also known as GPE.
Wave Energy Transfer	Energy transferred by light or sound
Forces Energy Transfer	Energy transferred by forces such as pushes, pulls, friction, magnets, electrostatic
Heating Energy Transfer	Energy transferred between thermal stores by heating
Electric Current Energy Transfer	Energy transferred by electric current in a circuit
Conservation of Energy	Energy cannot be created or destroyed It can be stored, dissipated or transferred from one form into another.
Thermal Energy Store	All objects have a Thermal store, the hotter the object the bigger the store is.
Energy dissipation	Energy is dissipated by heating, increasing the internal energy store of the surroundings
Frequency (f, Hz)	the number of wave crests passing affixed point each second
Amplitude (A, m)	the maximum distance moved by an oscillating object from its equilibrium position
Wavelength (λ, m)	the distance from one wave crest to the next
Time period (T, s)	the time taken for one whole wave to pass

Further Reading:
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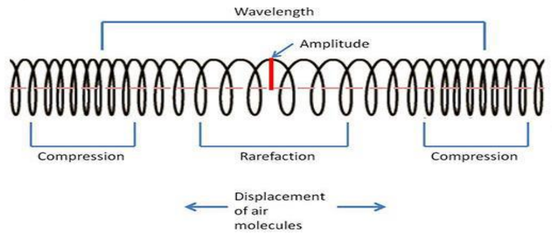
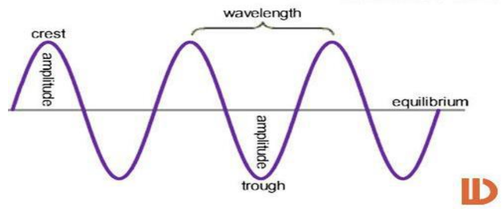
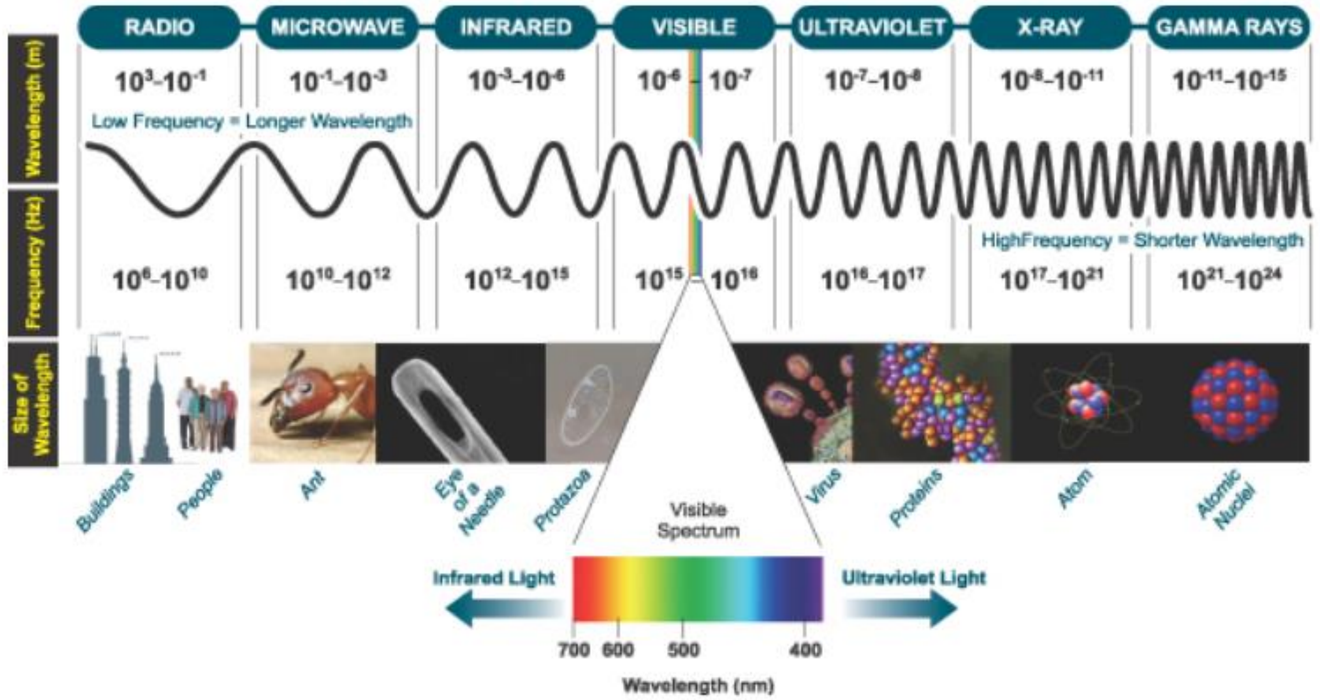
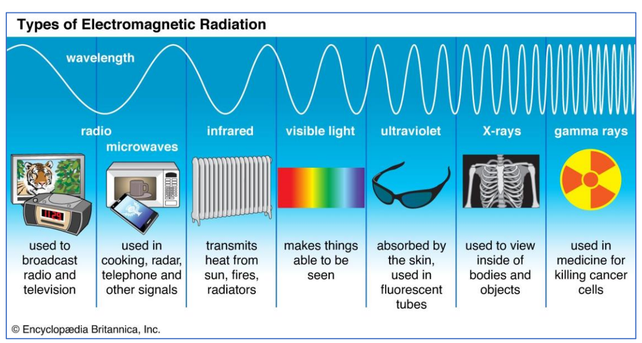
Longitudinal Waves
In longitudinal waves, the vibrations are parallel to the direction of the energy transfer.
Examples are: Sound Waves, Ultrasound Waves, Seismic, P-Waves.



Transverse Waves
In transverse waves, the vibrations are at right angles to the direction of energy transfer.
Examples include: Ripples on water, vibrations on a guitar string and a Mexican Wave. Electromagnetic waves such as light waves, micro waves and radio waves.







Equations	
Work done = force x distance	W = f s
Wave speed = frequency x wavelength	v = f λ
Efficiency = useful output energy transfer / total input energy transfer	
Period = 1 / frequency	

P6 Electricity, Matter and Forces

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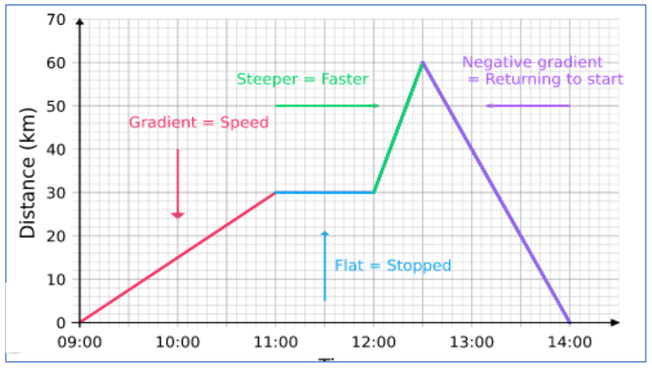
Keyword	Definition
Ammeter	A device used to measure electric current.
Ampere	Unit of current. E.g. The current in the bulb is 4 amps or amperes (A).
Cell	A store of chemical energy that can be transferred as an electric current in a circuit.
Charge	charge is provided by the electrons, the more electrons the more charge
Electron	Sub atomic particle which flows in a circuit carrying a negative charge.
Ohms	The unit of electrical resistance. Unit is Ω
Resistance	The opposition in an electrical component to the movement of electrical charge through it. Resistance is measured in ohms.
Potential Difference	The potential difference (or voltage) of a supply is a measure of the energy given to the charge carries in a circuit.
Volt	Unit of voltage. E.g. the voltage across the lamp was 6 volts (V).
Voltmeter	A device used to measure potential difference or voltage.

Equations		
charge flow = current x time	Q = I t	Charge, Columbus, C Current, Amps, A Time,. Seconds, s
potential difference = current x resistance	V = I R	Potential difference, Volts, V Current, Amps, A Resistance, Ohms, Ω
energy transferred = charge flow x potential difference	E = Q V	Energy, Joules, J Charge, Columbus, C Potential difference, Volts, V
density = mass / volume	p = m / V	Density, kg/m³, g/cm³ Mass, Kilograms/Grams, kg /g Volume, m³/cm³
distance travelled = speed x time	s = v t	Distance, meters, m Speed, m/s Time, Seconds, s
acceleration = change in velocity / time taken	a = Δv / t	Acceleration, m/s² Change in velocity, m/s Time, Seconds, s
Resultant force = mass x acceleration	F = m a	Force, Newtons, N Mass, Kilograms/Grams, kg /g Acceleration, m/s²



Further Reading:
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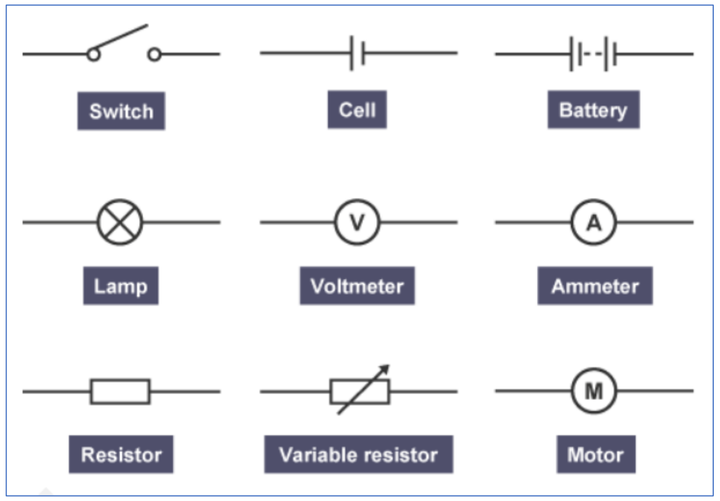
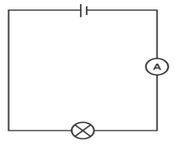


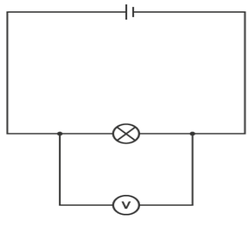
Electric charge
Some particles carry an electric charge. In electric wires these particles are called electrons. An electric current is a flow of charge, and in a wire this will be a flow of electrons. For an electric current to flow we need:
•Something to transfer the energy to the electrons, such as a cell, battery or power pack.
•A complete path for the electrons to flow through (a complete circuit).

Current



Current is measured in amperes (A). 20A is a bigger current that 10A. An ammeter is used to measure the current. The ammeter must be connected in series.

Potential Difference



Potential difference is a measure of the difference in energy between two parts of a circuit. The bigger the difference in energy, the bigger the potential difference.
Potential difference is measured in volts. A 230V is a bigger potential difference than 12V.
A voltmeter is used to measure the potential difference, and must be in parallel.

Resistance
The wires and other components in a circuit reduce the flow of charge through them –this is resistance.
The resistance increases when you add more components in series.