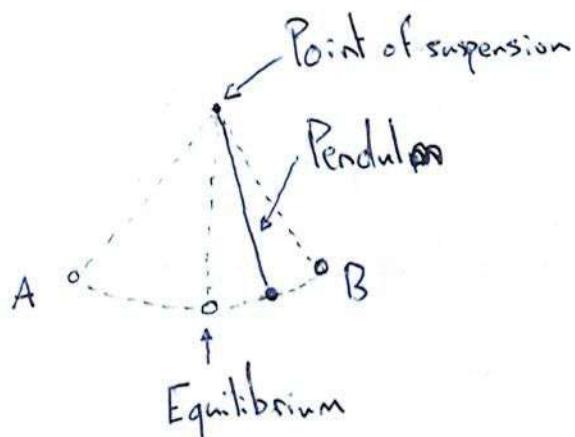
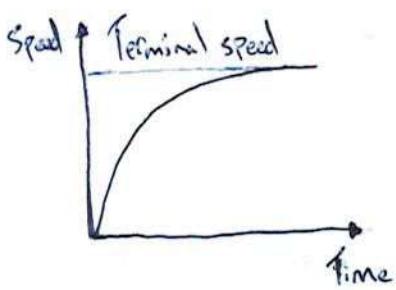


Unit-1

Micrometer - measure very short distances accurately

Stopwatch - can be used to time oscillations

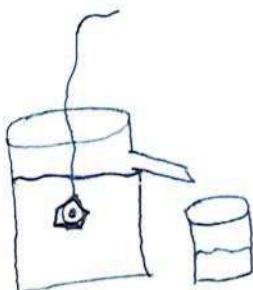
$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} \quad / \quad s = \frac{d}{t}$$



Velocity - speed in a given direction

$$\text{Acceleration} = \frac{\text{Change in velocity}}{\text{Time taken}} \quad / \quad a = \frac{v-u}{t}$$

Terminal Velocity - when the force acting on an object is equal to it causing it to reach a constant speed

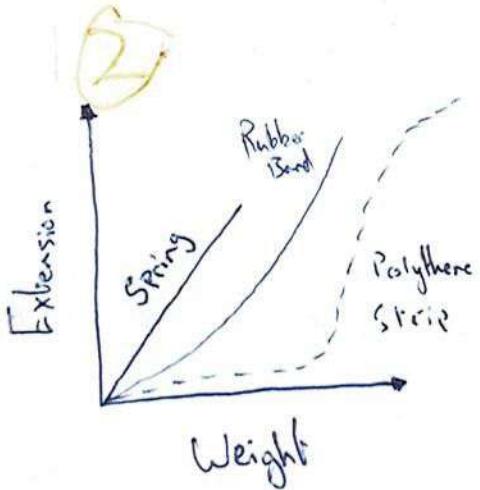
Unit 2

Measure volume of irregular objects

Weight = Mass \times Gravitational field strength

$$W = m \times G$$

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}} \quad / \quad \rho = \frac{m}{V}$$



$$\text{Resultant Force} = 250\text{N}$$

$\xleftarrow{1000\text{N}}$ $\xrightarrow{750\text{N}}$

$$\text{Tension} = \text{Extension} \times \text{Spring Constant}$$

$$f = x \times k$$

$$\text{Resultant Force} = \text{Mass} \times \text{Acceleration}$$

$$f = ma$$

$$\text{Momentum} = \text{Mass} \times \text{Velocity} / p = m$$

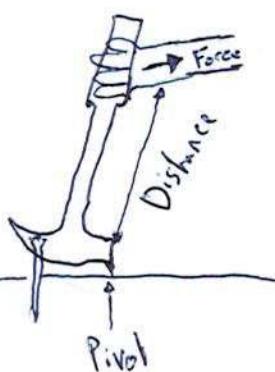
Extension - change of

length from initial length

$$(\text{Mass A} \times \text{Velocity A}) = - (\text{Mass B} \times \text{Velocity B})$$

$$\text{Impulse} = \text{Force} \times \text{Time} / F t = mv - mu$$

Unit 3



$$\text{Moment} = \text{Force} \times \text{Perpendicular distance to Pivot}$$

$$m = f \times d$$

Centre Mass - mass is concentrated at one point in an object

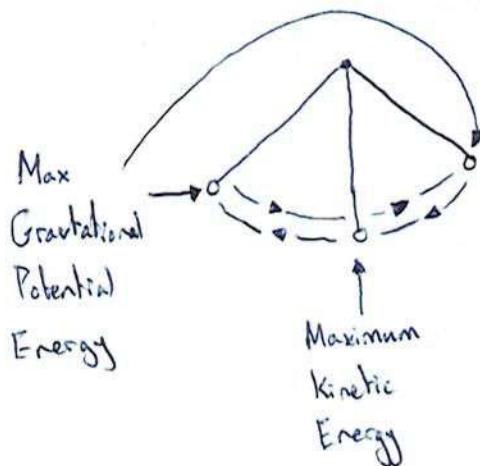
Sum of clockwise moments = Sum of anticlockwise

$$W_1 d_1 = W_2 d_2$$

Vector - physical quantity

Unit 4

Physics 3



Conservation of energy - energy cannot be destroyed

Kinetic E - motion	GPE - position
Chemical E - reactions	Electrical - current
Nuclear - nucleus of an atom	

- Efficiency - measure of how much supplied to a device is usefully used

$$\text{Efficiency} = \frac{\text{Useful power output}}{\text{Useful power input}} \times 100\%$$

Nuclear Fission - Uranium atom

Collides with a neutron and splits releasing energy

Nuclear Fusion - when 2 nuclei are forced together to form a single larger nucleus

Work Done = Force \times Distance

$$\Delta W = F \times d$$

Change of GPE = mgh m = mass

h = vertical height g = gravitational potential energy

$$\text{Kinetic Energy} = \frac{1}{2} \times \text{mass} \times \text{velocity}^2$$

$$KE = \frac{1}{2} mv^2$$

$$\text{Power} = \frac{\text{Energy}}{\text{Time}} \quad | \quad P = \frac{E}{T}$$

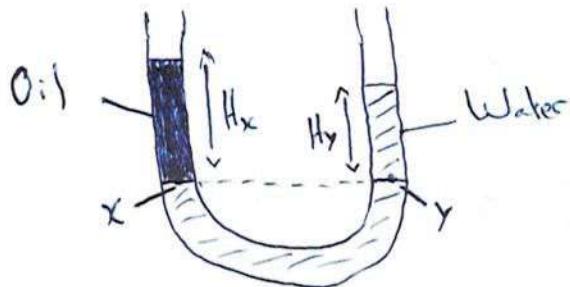
Unit 5

Unit 5 - Pressure

(4)

Pressure = (force per unit area)

$$\text{Pressure} = \text{Force}/\text{Area} / P = F/A$$



Pressure in a liquid = height \times density \times GPE

$$P = h \rho g$$

Pressure \times Volume = Constant

$$PV = \text{Constant}$$



Solid



Liquid



Gas

Unit 6 - Thermal Physics

Types of
thermometers

Liquid-in-glass

Property

Thermal expansion
of a liquid

Thermocouple

Voltage between 2
different metals in
contact

- The fixed points of
the Celsius scale are
ice point (0°C) and
steam point (100°C)

Specific latent heat
of fusion or vaporisation = $\frac{\text{Energy} / E}{\text{Mass} / m}$

$$E = mc(\Delta T)$$

m = mass

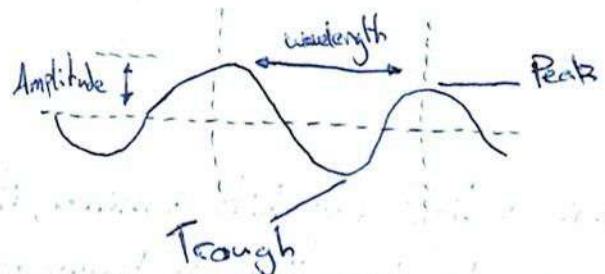
E = energy supplied

c = specific heat
capacity

ΔT = temperature

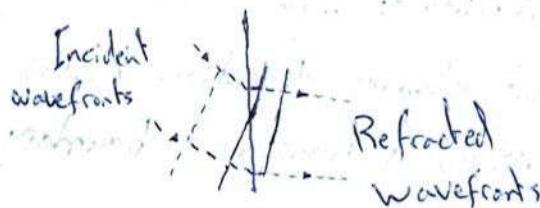
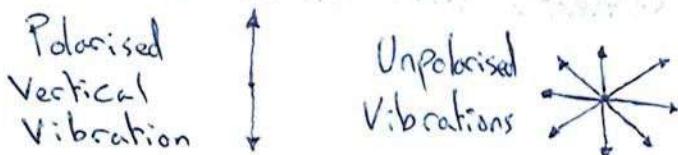
Unit 7

Physics (5)



$$\text{Speed} = \text{frequency} \times \text{wavelength} / V = f\lambda$$

Frequency = number of waves passing a point in a second



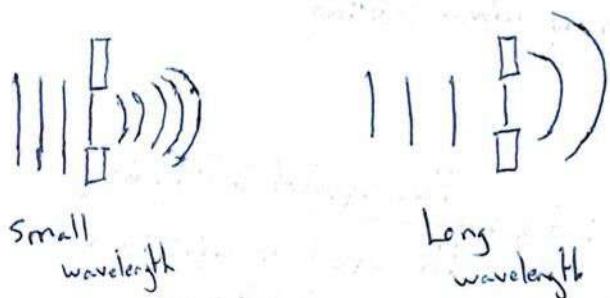
Transverse = Perpendicular vibration

Longitudinal = Parallel vibration

Reflection = plane waves reflect at the same angle as the incident waves

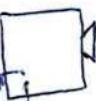
Refraction = change of direction and speed of waves when they cross a boundary

Diffraction = spreading of waves when they pass through a gap



Unit 9

Compression



Loudspeaker

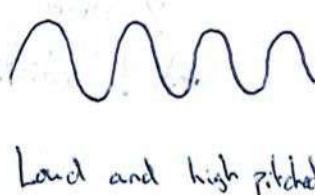
Rarefaction

Compression = part of a sound wave where air molecules are pushed together

Ultrasound = sound waves above upper limit of human hearing (20Hz - 20,000Hz)

Echo = reflection of sound from smooth surface

$$\text{Distance} = \frac{1}{2} \times (\text{speed} \times \text{time}) / d = \frac{1}{2} vt$$

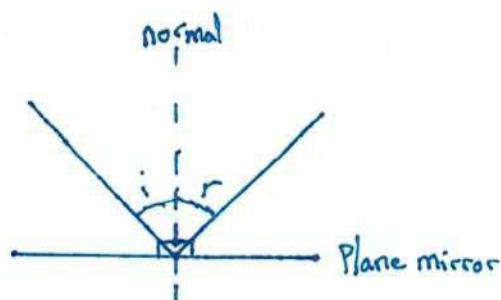


Quiet and low pitched

Amplitude = loudness Frequency = Pitch

Unit 8 - Light

6



- When a light ray hits a mirror, it changes direction. This is known as the law of reflection as the light ray reflects from the mirror

$$(i) \text{angle of incidence} = (r) \text{angle of reflection}$$

When light travels:

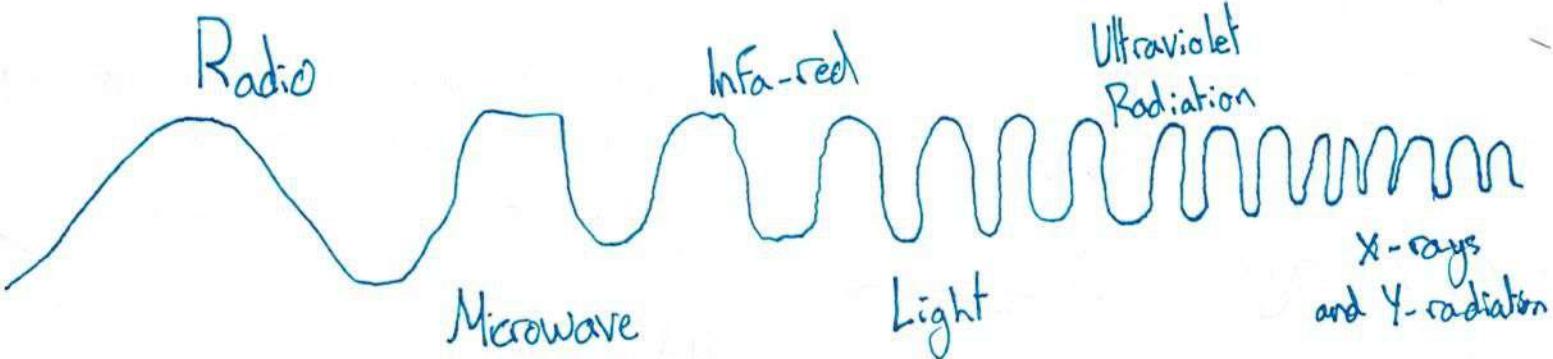
- From air to glass, it refracts towards the normal because it slows down when entering
- From glass to air, it refracts away from the normal because it speeds up when leaving

Refractive index = $\frac{\text{the speed of light in air}}{\text{the speed of light in a substance}}$

$$n = \frac{\sin i}{\sin r}$$

Refraction of light - when a ray of light changes direction because it crosses a transparent boundary

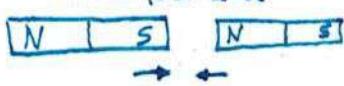
Refractive index (n) - measure of the change of direction of a ray when it passes from air into a substance
e.g. the refractive index for water is 1.33 and for glass it is 1.50, so glass reflects light more



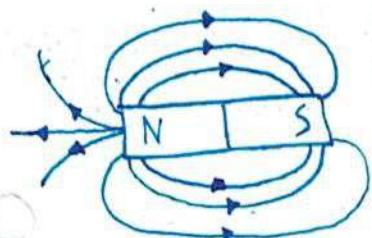
Physics

Unit 10 - Magnetism

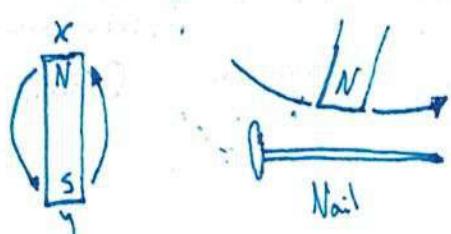
unlike poles attract



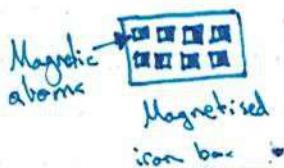
like poles repel



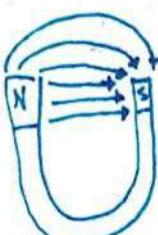
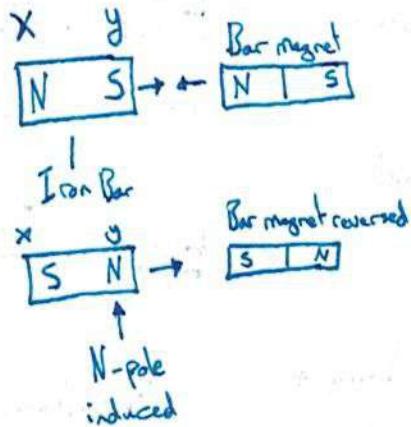
Magnetic field



Magnetic field line



Induction



- Like poles repel; unlike poles attract

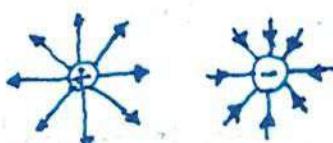
- A ferrous material is one that contains iron. Any ferrous material can be magnetised or demagnetised

- Magnetic forces are due to the interaction of magnetic fields between 2 magnets

- An iron or steel bar can be magnetised by repeatedly moving a bar magnet along the bar in the same direction.

- A 'hard' magnetic material is harder to magnetise and demagnetise than a 'soft' magnetic material

Unit 11 - Electric charge



Electrical Field Pattern

Charge flowing = current × time
(in coulombs) (in ampere) (in seconds)

$$Q = IT$$

- Like charges repel, unlike charges attract

Coulombs - measurement for charge

- A conductor can hold charge only if it is insulated from the ground

- An ammeter is connected in series with a electrical circuit to measure it's current in ampere (A).

Unit 12 - Electrical Energy

(8)

Voltmeter - used to measure the emf of a battery and is connected in Parallel with it

EMF - the amount of charge produced by a battery measured in Volts

$$\text{EMF} = \frac{\text{Electrical energy (joules)}}{\text{Charge (Coulombs)}}$$

$$\text{Resistance} = \frac{\text{Potential Difference (Volts)}}{\text{Current (amperes)}}$$

$$R = \frac{V}{I} \quad V = IR \quad I = \frac{V}{R}$$

$$\text{Power supplied} = \text{Current} \times \text{Potential Difference}$$

(Watts), (amperes) (Volts)

Unit 13 - Circuit components



Cell



Switch



Ammeter



Voltmeter



Heater



Indicator lamp



Diode



Fixed resistor



Variable resistor



Fuse



Electric bell

Components in Series:

1 - The current is the same in each component

2 - Resistance adds up to give total resistance

3 - Pd across components add to give total Pd

Fuse - melts if too much current passes through it which cuts off the circuit

Physics

Physics 9.1

Unit 13 - Circuit components

$$\text{Combined resistance} = \frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \dots + \frac{1}{R_n}$$

Components in Parallel

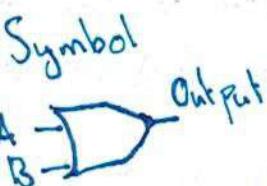
- 1 - The current from each branch is less than from the power supply
- 2 - Current from the power supply is the sum of current from the branches

Branches - Components that are in parallel with the circuit

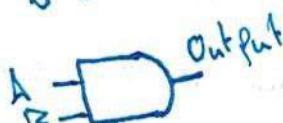
- The bigger the resistance of a component, the smaller the current

Logic circuits

Gate



Or



And

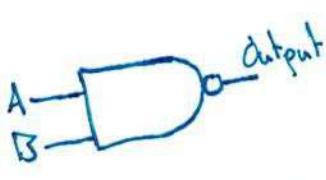


Nor

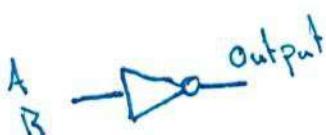
(not and or)

Nand

(not and And)



Not



Logic Gate - digital circuit that gives an output voltage determined by the input voltage

Analogue circuit - can vary between maximum and minimum ~~voltage~~ voltage

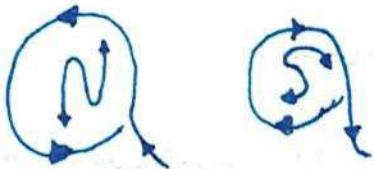
- Common electrical hazards include damaged insulation, cables overheating, overloaded sockets and damp conditions

Circuit breaker - an electromagnetic switch that cuts off current in a circuit if too much passes through it

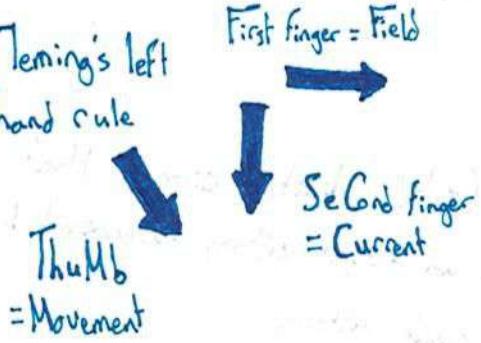
Unit 14 - Electromagnetism

(10)

Solenoid rule



Fleming's left hand rule



Solenoid - a long coil of wire

- Increasing or reversing the current in a Solenoid increases the strength or reverses the direction  The magnetic field lines

Force factors

1. Force is increased  by using a stronger magnet or increasing the current
2. The direction of the force is reversed if the direction of the current or the magnetic field is reversed
3. The force is greatest when the wire is perpendicular to the magnetic field

Physics

11

Unit 15 - Radioactivity

Radioactive atoms - contain unstable nuclei that emit radiation to remain stable

Background radiation - Air (33.6%), Food and drinks (15.6%), Cosmic (13.0%), Ground (16.0%), Medical (21.0%), Nuclear weapons/reactors (0.8%)

Radiation	Material	Range
Alpha	Paper	10 CM
Beta	Aluminium sheet	1 m
Gamma	Concrete	Unlimited

Gamma radiation - is uncharged because it is an electromagnetic radiation, so it is also not effected by magnetic fields and electric fields. It has the greatest penetration effect but gets weaker as it spreads out more.

Alpha particles - consists of two protons and neutrons so it is positively charged. It has the greatest ionising effect because it has ~~the~~ a greater mass than beta and gamma.

Beta particles - consists of electrons so it is negatively charged and can easily be deflected. It has a greater penetration than ~~than~~ alpha.

(12)

12. *Thlaspi* sp. cf. *T. glaucum*

Leaves glaucous, smooth
petioles glaucous, petioles
with small white hairs,
petioles glaucous.

Leaves glaucous, smooth
petioles glaucous, petioles
with small white hairs,
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The next note

Leaves glaucous, smooth
petioles glaucous, petioles
with small white hairs,
petioles glaucous.

GCSE Physics

(B)

1. Radioactivity

- A radioactive nucleus is unstable and emits radiation

The three main types are:

- Alpha - Strongly ionising radiation (only travels a few centimetres)
- Beta - Penetrating and ionising radiation
- Gamma - Strongly penetrating radiation (weak ionising radiation)

- Background radiation:

- Space and Sun (cosmic rays)
- Building materials
- Radioactive nuclei in plants and animals
- Radioactive waste and power stations (nuclear)

- Ionising radiation breaks molecules or atoms into ions

- X-rays and ultra-Violet radiation are ionising too

- Gamma radiation is used in sterilisation and treating cancer

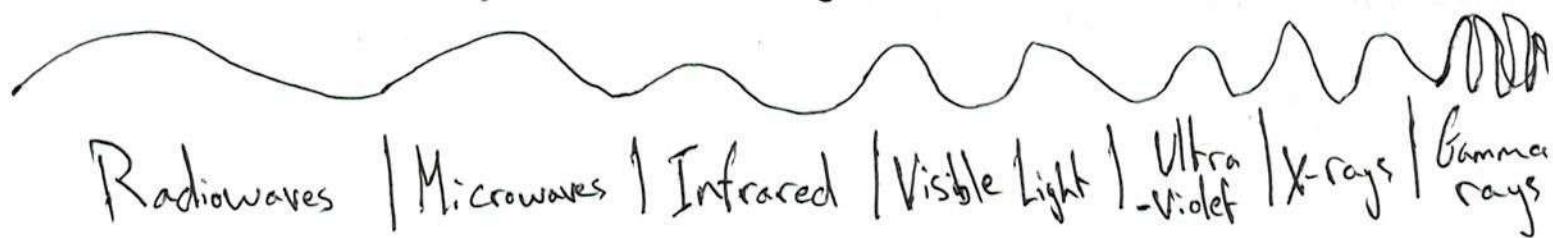
- Alpha radiation is used in smoke detectors

- Beta radiation is used in tracers and paper thickness detector

- The half-life is the average time taken for half of the active nuclei to decay from an isotope

- Some isotopes, like Uranium, absorb a neutron and become very unstable causing them to split into two equal nuclei. This is called nuclear fission W4
- A lot of nuclear energy is then released
- 2 or 3 neutrons are released as well causing a chain reaction because they can strike more isotopes, like uranium, and cause more fission
- This process can be used to generate electricity if controlled by control rods. A nuclear reactor in a power station does this

Electromagnetic spectrum - The distribution of electromagnetic radiation according to frequency or wavelength



Radio waves - Used to broadcast radio and television

Microwaves - Used in cooking and radar telephone

Infrared - Transmits heat from sun, fires, radiators

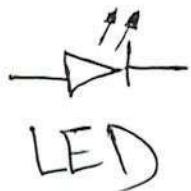
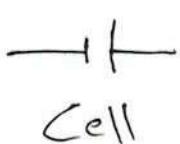
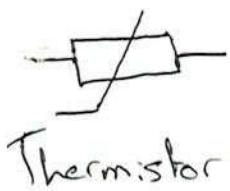
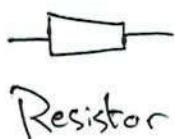
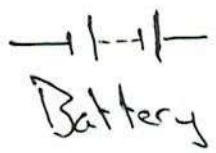
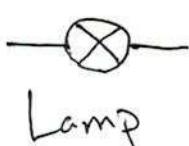
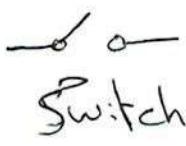
Visible Light - Makes things visible

Ultraviolet - Absorbed by the skin, used in fluorescent tubes

X-Rays - Used to view inside the body

Gamma Rays - Used in medicine for killing cancer cells

Circuit



Alpha particles - ~~They~~ Are a type of ionizing radiation. ~~They~~ ⁽¹⁶⁾ They are basically a helium nucleus that consists of two neutrons and two protons with no electrons. It is emitted from various radioactive substances or isotopes.