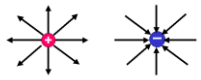
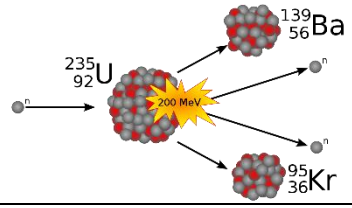
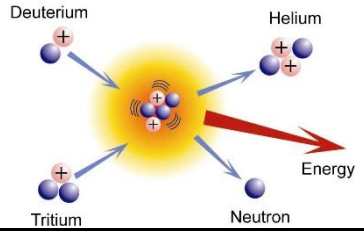
Physics P1 Triple topics only

Electrical charge is stationary	Shocks	Electric fields
When two insulating material are rubbed together, electrons move from one material to the other.	Walking on carpet causes friction. Electrons move to the person and charge builds up. When the person touches a metal object, the electrons conduct away, making a spark.	Charged objects create electric fields around them. Strongest closest to the object. The field direction is the direction of force on a positive charge. Add more charge increases field strength.



Like charges Repel
Unlike charges Attract

When you do work the temperature increases e.g. pump air quickly into a ball, the air gets hot because as the piston in the pump moves the particles bounce off increasing kinetic energy, which causes a temperature rise.	Reducing the volume of a fixed mass of gas increases the pressure.
	Halving the volume doubles the pressure.
Pressure increases if you reduce the volume because The particles gain in the kinetic energy store and so more collisions are made with the walls of the container. Pressure = force/area and as force increases the pressure also increases	pV = constant $p_1V_1 = p_2V_2$

Nuclear fission 	***One large unstable nucleus splits to make two smaller nuclei***	Neutron hits U-235 nucleus, nucleus absorbs neutron, splits emitting two or three neutrons and two smaller nuclei. Process also releases energy.	Process repeats, chain reaction formed
			Used in nuclear power stations
Nuclear fusion 	***Two small nuclei join to make one larger nucleus***	Difficult to do on Earth – huge amounts of pressure and temperature needed.	Occurs in stars

Fuel rods	Made of U-238, 'enriched' with U-235 (3%). Long and thin to allow neutrons to escape, hitting nuclei.	Sievert	Unit measuring dose of radiation
Control rods	Made of Boron. Controls the rate of reaction. Boron absorbs excess neutrons.	Background	Constant low level environmental radiation, e.g. from nuclear testing, nuclear power,waste
Concrete	Neutrons hazardous to humans – thick concreate shield protects workers.		

Uses	*Different isotopes have different half lives*	Short half-lives used in high doses, long half lives used in low doses.
Tracers	*Used within body*	Isotope with short half life injected, allowed to circulate and collect in damaged areas. PET scanner used to detect emitting radiation. Must be beta or gamma as alpha does not penetrate the body.
Radiation therapy	*Used to treat illnesses e.g. cancer*	Cancer cells killed by gamma rays. High dose used to kill cells. Damage to healthy cells prevented by focussed gamma ray gun.

Moment = force X distance
Turning effect of a force about a pivot

Levers: A small force exerted with a long lever applies a large force

Gears: Increase or decrease the rotational effect of a force

Elastic deformation The object has been stretched but returns to its original length

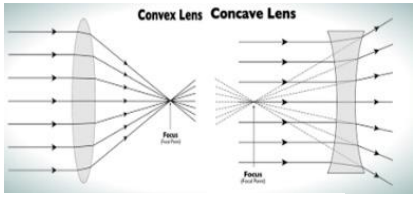
Inelastic deformation The object has been stretched but does not return to its original length

Extension The difference between stretched and unstretched lengths

One force: The object changes speed or direction

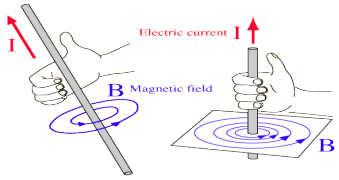
More than one force: The object changes shape

Convex produce real and virtual images
Concave virtual only



Magnification = hi/ho

$$\frac{\text{Height of the image}}{\text{Height of the object}} = \frac{I}{O}$$



Principle of moments: In a balanced system, the sum of the clockwise moments = the sum of the anti-clockwise moments

PHYSICS P2
triple only

Momentum is a vector quantity. The momentum of an object only depends on it's mass and it's velocity.
Momentum (kg m/s) = Mass (kg) x Velocity (m/s)
p = m v

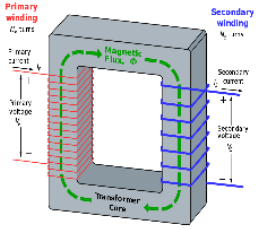
Momentum is a conserved quantity.
The momentum of a system remains the same before and after an event.

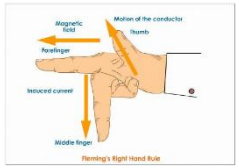
The force acting on an object is usually found using the equation F = ma However, as the acceleration of an object is found using the equation: Acceleration (m/s^2) = a = $\frac{\triangle v}{\triangle t}$

Combining the two equations gives: F = $\frac{m \triangle v}{\triangle t}$

The quantity m△v is the change in momentum of an object.
So, force is the rate of change of momentum.

Cars have air bags to reduce the injuries caused in a crash.
Air bags work by increasing the time of impact **:** it takes a person's head longer to come to a stop (compared to hitting the steering wheel).
As the time of impact increases the force acting on the person's head decreases since:
F = m $\frac{\triangle v}{\triangle t}$



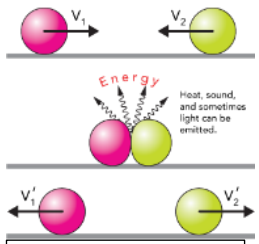


Transformers
Alternating current supplied to primary coil, making magnetic field change. Iron core becomes magnetised, carries changing magnetic field to secondary coil. This induces p.d.

Pressure and depth
Pressure on divers depends on weight of water above
Pressure = density x g x height

Upthrust : Resultant force exerted by a fluid

Atmospheric pressure: Caused by billions of air particles colliding with a surface.



Reflection
Refraction
Transmission

Pressure = Force ÷ Area

Fluid :A liquid or gas
Flows and changes shape to fill a container.

Hydraulic machineUse liquids to transmit pressure

P waves
Longitudinal
Fast
Travel through both solids and liquids

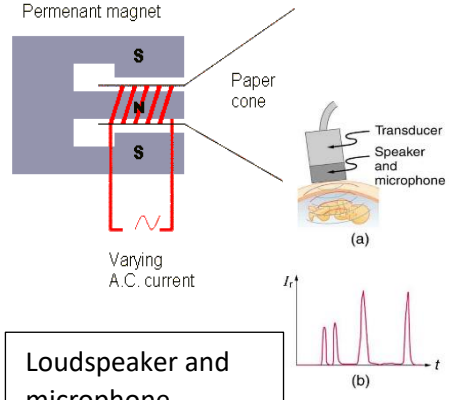
S waves
Transverse
Slower
Travel only through solids

Ultraviolet, visible light, infra-red radiation penetrate the atmosphere and heat up the Earth's

Energy lost is not at the same rate as energy being absorbed so Earth heats up.

Black body radiation
All objects absorb or reflect infrared radiation
Hotter objects emit more infrared radiation.
Constant temperature
Rate of absorption = rate of radiation
Intensity and wavelength of energy affects temperature.

Longer wavelengths are radiated back, trapped by atmosphere



Loudspeaker and microphone

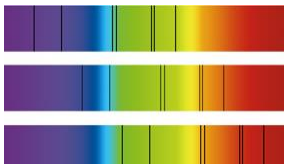
Red-shift : The observed increase in wavelength of light from most distance galaxies. Light moves towards the red end of the spectrum.

Hubble (1929): He studied light from distant galaxies; found as frequency decreases, wavelength increases.

Aristotle (ancient Greek) Earth at the centre, other heavenly bodies move around the Earth.

Copernicus (1473 - 1543) Sun at the centre, other heavenly bodies move around the Sun.

Galileo (1610) Made a telescope, looked at Jupiter, found four moons rotating around planet.



Light from star in our galaxy.
Light from star in nearby galaxy.
Light from star in distant galaxy.