

Graveney School Year 11 Physics Checklist

P4 Electrostatics, Electricity and Ultrasound

NOTE: Higher Tier topics will be in italics

Sparks:

- Insulating materials can acquire positive charge - *lack of electrons* OR negative charge - *gaining electrons* after being rubbed with another insulator;
- Like charges repel, unlike charges attract;
- Electrostatic effects are due to the transfer of electrons;
- Electric shocks occur if you become charged and then Earth yourself eg. touching a water pipe after walking on a floor covered with an insulating material;
- Danger of explosions if sparks occur near flammable gas;
- Dust attracts to DVDs, TV monitors due to static;
- ***Correcting Earthing and/or insulation reduce the risks of sparking - eg lorries carrying flammable gas/liquid need to be Earthed before unloading.***

Uses of electrostatics:

- Defibrillator used to shock the heart back to a normal rhythm - paddles make electrical contact with chest, shock makes heart contract;
- Dust precipitator - high voltage plates/grid inside chimney, dust attracted to grid, falls to bottom of chimney as it builds up;
- Paint spraying - paint gun charges up paint spray particles with the same charge which repel each other, fine spray attracted to oppositely charged car body which wastes less paint giving an even coat.

Safe electricals:

- An earthed conductor can not become live.
- Resistors reduce the current flowing in a circuit.
- Resistance = Voltage / Current
- Variable resistors can be used to change the current flowing in a circuit;
- Live - brown - high voltage (240V);

- Neutral - blue - completes the circuit;
- Earth - yellow/green - safety wire stops appliance becoming live;
- Fuse wire melts if the current is too large and breaks the circuit;
- ***Fuses prevent cables/flex from overheating and causing an electrical fire;***
- ***Circuit breakers as re-settable fuses;***
- ***A wire fuse melts if too much current flows breaking the circuit and preventing an electrical fire;***
- ***An earth wire connected to the metal case of an appliance will divert electric current away from the metal case if it becomes live, preventing electric shocks.***
- double insulated appliances - plastic case - do not need earthing.

Ultrasound:

- ultrasound is too high frequency for the human ear to detect (above 20kHz);
- ultrasound is a longitudinal wave;
- know the terms;
 - wavelength*
 - amplitude*
 - frequency*
 - compression*
 - rarefaction*
- ***transverse waves - the particles of the medium move at right angles to the motion of the wave energy;***
- ***longitudinal waves - the particles of the medium move along the same direction as the wave energy;***
- ***Ultrasound scans can be used to:***
 - use in body scans - reflection from tissue layers;*
 - breaking down kidney stones;*
 - measure the flow of blood in the body*
- ***preferred to X-rays for soft tissue scans and because ultrasound does not damage cells.***

Do not keep saying to yourself, if you can possibly avoid it, 'But how can it be like that?' because you will get 'down the drain' into a blind alley from which nobody has yet escaped. Nobody knows how it can be like that.

Richard Feynman

