# ELECTRICITY SUMMARY NOTES

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| Voltage (potential difference) is the energy transferred to each coulomb of charge.  It is measured in volts (V). 1 V = 1 J per C  Current is the charge transferred per second.  It is measured in amps (A). 1A = 1 C per s | | | | **Mains Voltage:** 230V, 50 Hz  **Factors that increase resistance**  Increase:  Temperature  Length of wire  Thickness of wire | | |
| https://classconnection.s3.amazonaws.com/54/flashcards/3300054/png/equation-142D9BC12E768746E61.png | | | |  | | |
| Image result for V = I R | | |
| A.C. - alternating current  - changes direction and magnitude  http://www.bbc.co.uk/staticarchive/ca9e2a6bb03c38a88e1c8c0821289d9249a0c21c.gif - from the mains | | | D.C. - direct current - one direction only  - from a battery  Same magnitude  http://www.bbc.co.uk/bitesize/standard/physics/images/ph_elect23.gif | **Ohms Law Experiment**  Adjust resistance of variable resistor and take readings of V & I | | **Ohms Law Graph** |
| If the polarity of D.C. trace is reverse (the connections are swapped) the trace goes below the line by the same amount | | | http://www.bbc.co.uk/bitesize/standard/physics/images/ph_elect23.gif | **Resistance opposes the flow of current (Ω)** | | Gradient,  m = V/ I = R |
| Series Rules  Is = I1 = I2…  Vs = V1 + V2…  RT = R1 + R2…  Adding R = RT | Parallel Rules  Is = I1 + I2…  Vs = V1 = V2…  1/RT = 1/R1 + 1/R2… | | | **Connecting meters**  Ammeters -> series  Voltmeters -> Parallel    Ohmmeters -> no power supply | | |
| **Transistors are electronic switches** | | | | **The input voltage controls the switch.** | | |
| npn transistor  Input voltage must be 0.7V  or above to switch on the output device. | | | | n channel enhancement MOSFET  Input voltage must be 2V  or above to switch on the output device | | |
| **Output Devices**  All the components below change electrical energy into another form of energy | | | | | | |
|  | | | |  | | |
| **Input devices**  All the components below change another form of energy into electrical energy | | | | | | |
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| **Other components** | | | | **More about LEDs**  Series resistor protects LED from high current  Current flows in opposite direction the arrow | | |
| To calculate R:   1. VR = VS – VLED 2. Use R = VR/ I | | |
|  | | **High Light sensor**  Voltage across transistor increases above 0.7V, transistor switches ON  LED switches ON | |  | **Low Light sensor**  Voltage across transistor increases above 0.7V, transistor switches ON  LED switches ON | |
|  | | **Switch on Low Temperature**  Voltage across transistor increases above 0.7V, transistor switches ON  LED switches ON | |  | **Switch on High Temperature**  Voltage across transistor increases above 0.7V, transistor switches ON  LED switches ON | |
| **Voltage (potential) dividers**  These divide a supply voltage between 2 resistors | |  | | Power is the energy transferred per second  It is measured in Watts (W). 1W = 1 J per s | Energy supplied to the charges  = Charge × voltage  **Ew**  **Q**  **V** | |
| A fuse melts to break the circuit if the current is too high.  Power rating less than 720W – 3A fuse  Power rating above 720W – 13A fuse  Some appliances with a power rating less that 720W require a 13A fuse as they have a high current on switch on. | | | | | | |
| ***Power = current x voltage***  https://greycellsenergy.com/wp-content/uploads/2015/08/energy-power-time-rearranged.jpg***Power = current 2 x resistance***    ***Power = voltage 2 /resistance***  Greater current/voltage = greater power developed | | | |  | | |
| **Charges and Electric fields**  - Opposites ATTRACT    - Like/Similar REPEL | | | | A charged particle experiences a force in an electric field | | |
| Capacitors store charge on their plates. Capacitance, C, is measured in **farads** (F). Capacitors can be used **with resistors in series** **as timing devices**.  The bigger the value of the resistance and the bigger the value of the capacitor, the longer it takes to charge to Vs | | | | | | |