Alvl P1: electricity (ch9) Cheat Sheet

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Definitions

potential difference	the measure of how much energy is transferred by each coloumb of charge
current	the rate of flow of charge
resistance	the measure of how much a component resists the flow of current
resistivity	how resistive a material is to the flow of charge
emf	energy supplied to each unit charge

Series and Parallel circuits

	series	parallel
pd	shared across componenets	equal
current	same for all components	split at branches
resistance	sum of resistances	reciporacal

Variable reisistors

Themistor:
T increases = R decreases
LDR:
Light increases = R decreases
--both of these can be used a potential dividers

Power, AC/DC, rms

AC - alternating current
eg mains electricity
DC - direct current
eg. a battery
rms:
root means squared- average of variables
P av = V rms I rms
mains uk: V rms = 230V
X rms = Xo / $2^{1/2}$

EMF

Emf is the total energy a battery has however the measured value will be smaller
this is due to internal resistance.
V = W (by the charge) / Q
E = W (on the charge) / Q

Laws

Kirchhoffs 1st law	charge and current is conserved at any junction in a circuit
Kirchhoffs 2nd law	the sum of the emfs must equal the sum of the pd drop in a closed loop

resistance

ohms law:
current and pd in an ohmic conductor held under constant physical conditions are directly proportional (resistance is the constant of proportionality)
V = IR **<<for a fixed resistor only**
resistance is not constant for objects such as filament lamps
- this is due to the delocalised electrons colliding with the ironic lattice
- this causes them to vibrate more and increase temperature
you can reverse the cell to obtain negative values for I and V
diodes only let current flow in one direction-
> low resistance = forward direction
> high resistance = backward direction
no current flows until it reaches breaking voltage on either side (-ve/+ve)
superconductors- material that resistance decreases to 0 at the critical temperature
Resistivity:
how to work it out
1. measure the diameter of the wire with a micrometer and calculate the cross-sectional area
2. change the L of the wire by moving one crocodile clip
3. use wire of material for which resistivity does not change much eg nichrome
4. calculate R from V/I for each length
Variable resistors:
rheostat > change the current, can never turn the bulb off (permanently connected)
potentiometer > change the voltage, can turn the bulb off (doesnt have to be connected)
situations:
if you have two different identical circuits with a resistor each, one has 20R and the other R, what is the similarities and differences:
S- voltage is the same at the end of both
D- current is different, R would have more current as R is lower than 20R
D- physical difference would be R is hottoer as its being hit by more current, quicker
if you have a circuit with parallel resistors, with two in series, if the proportions between the resistors on each side of the parallel circuit is the same then no current flows as theres no voltage
-> *no potential difference*
parallel circuit. one branch has an ideal voltmeter and resistor, other branch has two resistors, battery has 5 V. as it is an ideal voltmeter is has infinite resistance. this means one side of the branch has 5V and the otherside has 0V, this means the resistor has next to it has no voltage passing through it therefore is not included when working out total resistance of the circuit.