***Physics notes:***

***Paper 1 – Required Practical’s:***

**Practical 1 – Specific Heat Capacity:**

**A close up of a sign

Description automatically generated**Specific heat capacity of a substance is the amount of energy required to raise the temperature of 1 kg of the substance by 1°C

**Method:**

1. Place a beaker on a balance and set it to zero
2. Add oil to the beaker and record the mass of the oil
3. Place a thermometer and an immersion heater into the oil
4. Read the starting temperature of the oil
5. Wrap the beaker in insulating foam to reduce thermal energy transfer to the surroundings
6. Connect a joulemeter to the immersion meter
   1. Tells us how much electrical energy passes into immersion meter
7. Wait for 30 minutes
8. Read the number of joules and the final temperature of the oil
9. CHANGE IN THERMAL ENERGY = MASS X SPECIFIC HEAT CAPACITY X CHANGE IN TEMPERATURE
10. Rearrange for SHC and calculate it

A close up of a device

Description automatically generated**Sources of inaccuracy:**

* Thermal energy could pass out of the beaker and into the air
  + Use an insulator
* Not all thermal energy passes into oil
  + Ensure that the immersion heater is fully submerged
* Incorrect reading of the thermometer
  + Use and electronic thermometer probe
* Thermal energy may not be spread through the oil
  + Stir the oil

A close up of a sign

Description automatically generated**Practical 2 – Thermal Insulators:**

**Method:**

1. Put a small beaker inside of a larger beaker
2. Boil water using a kettle
3. Put 80 cm3 of boiling water into the smaller beaker
4. Put a cardboard lid (with a hole in it) over the beaker
5. Put a thermometer in the hole, making sure the bulb is in the hot water
6. Record the starting temperature of the water and start a stopwatch
7. Record the temperature every 3 minutes for 15 minutes
8. Repeat this with different insulating materials in between the small and large beaker
   1. If measuring how the thickness of a material affects thermal insulation
      1. Repeat with different amounts of newspaper wrapped around it
9. Record the results into a table

A close up of a logo

Description automatically generated**Practical 3 – Resistance:**

* Resistance of a circuit can depend on a number of factors such as whether it’s a parallel or series circuit, or the length of the wire
  + You can investigate the effect of wire length with the method below:

**Method:**

1. Attach a crocodile clip to the wire level with 0 cm on the ruler
2. Attach the second crocodile clip to the wire e.g. 10 cm away from the first clip
   1. Write down the length of wire between the clips
3. Close the switch and record the current through the wire and the potential difference across it
4. Open the switch and move the second crocodile clip e.g. another 10 cm away from the first clip
5. A close up of a logo

   Description automatically generatedClose the switch again and measure the new length, current and potential difference
6. Repeat steps 3,4,5 for a number of different lengths of wire
7. Plot a graph of resistance against wire length and draw a line of best fit
8. The graph should be a straight line through the origin, this means that the resistance is directly proportional to the length
   1. The longer the wire, the greater the resistance
9. If the line doesn’t go through the origin, it could be because the first clip isn’t attached to 0
   1. This is a systematic error

**Practical 4 – Current / PD Characteristics:**

* Current / PD Characteristics refers to a graph which shows how the current flowing through a component changes as the potential difference across it is increased
  + A close up of a clock

    Description automatically generatedLinear components have I-V characteristics that’s a straight line
  + Non-linear components have a curbed I-V characteristic

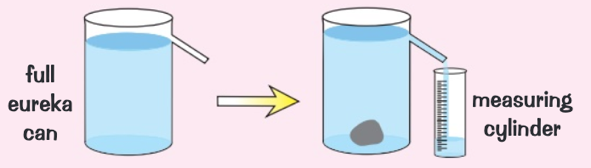
**Method:**

1. Set up the test circuit like the one on the right
2. Begin to vary the variable resistor
   1. This alters the current flowing through the circuit and the potential difference across the component
3. Take several readings from the ammeter and voltmeter to see how the PD across the component changes as the current changes
   1. Repeat each reading twice to get an average pd at each current
4. A picture containing clock, object

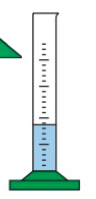
   Description automatically generatedSwap over the wires connected to the cell so the direction of the current is reversed
   1. This means the voltmeter and ammeter should have negative values
   2. We continue taking readings of potential difference and current
5. Plot a graph of current against voltage for the component
6. The I-V characteristics you get for an ohmic conductor, filament lamp and diode should look like this

**Practical 5 – Density:**

**Density of a solid - Method:**

1. Use a balance to measure its mass
2. Find the volume of the shape
   1. If it is a regular solid, measure the length, width and height using a ruler and calculate its volume
   2. If it is an irregular solid, submerge it into a eureka can which is filled with water
      1. The volume of water displaced by the object is the volume of the object
3. Find density using D = M/V

A picture containing text

Description automatically generated**Density of a liquid – Method:**

1. Place a measuring cylinder on a balance and zero the balance
2. Pour 10ml of the liquid into the measuring cylinder and record its mass
3. Pour another 10 ml into the measuring cylinder
   1. Repeat the process until the cylinder is full
      1. Record the total volume and mass each time
4. For each measurement, use the formula D = M / V to find density
   1. Remember that 1 ml = 1 cm3
5. Take an average of your calculated densities
   1. This will give you a value for the density of the liquid