Practice Question Set For A-Level
**Subject : Physics**
**Paper-3 Topic : Practical Skills**



**Name of the Student**:_____
**Max. Marks : 25 Marks** **Time : 25 Minutes**

**Q1.**

Genuine crystal balls are made from clarified quartz rather than glass. A student was given a small crystal ball and wanted to know whether it was genuine.

The student measured the diameter of the crystal ball using vernier calipers with a resolution of 0.01 cm.
She measured the mass of the crystal ball using a balance with a resolution of 1 g.

The table gives the densities of clarified quartz and glass.

| Material | Density / kg m$^{-3}$ |
|---|---|
| Clarified quartz | 2650 |
| Glass | 2590 |

Determine whether the crystal ball was genuine.

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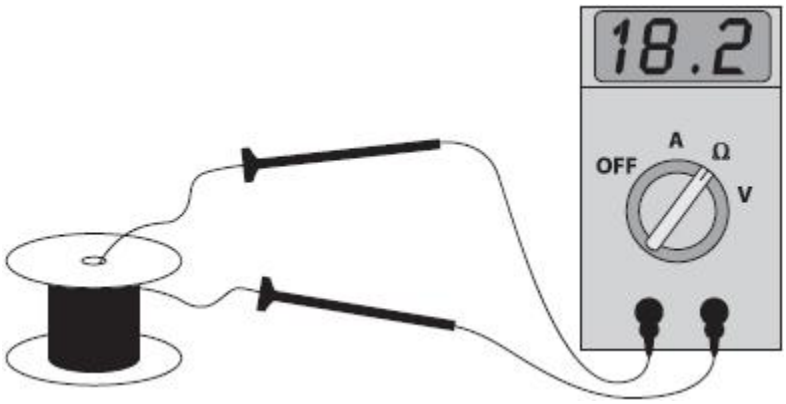
**(Total for question = 6 marks)**

**Q2.**

A student carried out an experiment to determine the resistivity of nichrome wire.

He used an ohmmeter to measure the resistance of a length of nichrome wire as shown.




The diameter of the wire was measured as 0.27 mm ± 0.01 mm.
The length of the wire was measured as 1.25 m ± 0.05 m.

Calculate the minimum value of resistivity possible from the student's data.

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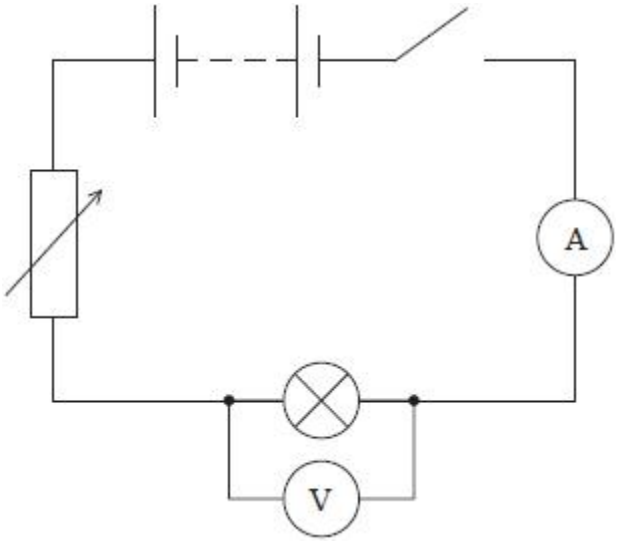
Minimum resistivity = .....

**(Total for question = 4 marks)**

**Q3.**

A student set up the circuit shown and measured the current *I* through the filament lamp for a range of values of potential difference (p.d.) *V*.




The student's data is shown in the table.

| *V* / V | *I* / A |
|---|---|
| 3.0 | 0.6 |
| 4.0 | 0.75 |
| 6.0 | 1.00 |
| 8.0 | 1.20 |
| 10.0 | 1.35 |
| 12.0 | 1.5 |

Using the circuit shown the student was unable to obtain data for p.d.s less than 2.5 V.

Draw a diagram of a circuit the student could have used to enable a full range of p.d.s from 0 to 12 V to be investigated.

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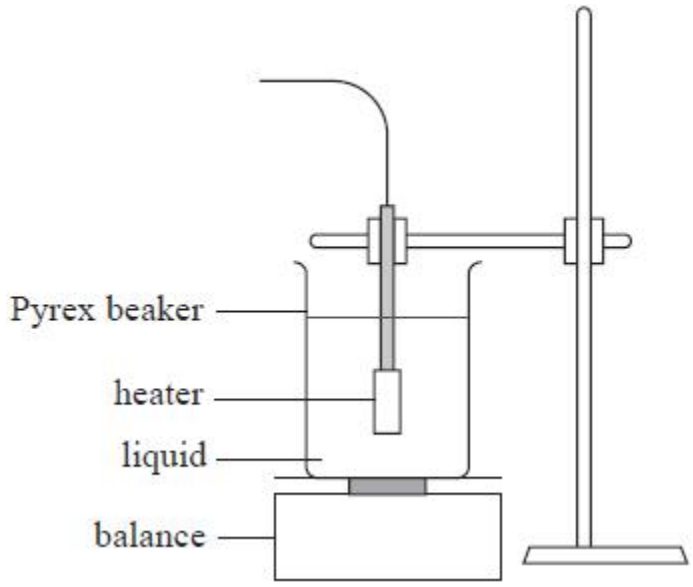
**(Total for question = 2 marks)**

**Q4.**

A student determined the latent heat of vaporisation of a liquid using an electrical heater to boil the liquid in a Pyrex beaker.

The apparatus used is shown below.




She connected the heater into a circuit and took measurements of the potential difference *V* and the current *I* for

the heater.

Complete the circuit diagram to show a suitable circuit.

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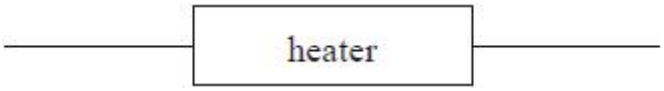
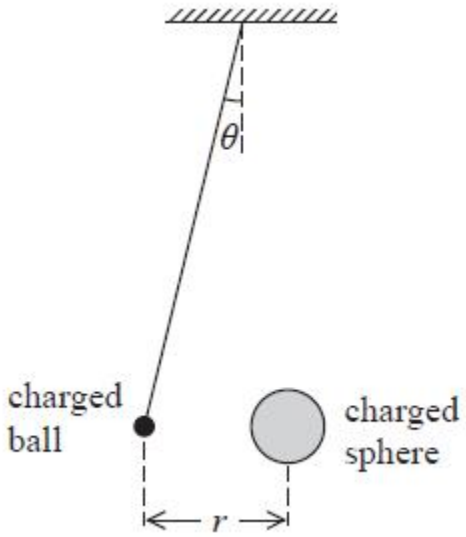



**(Total for question = 2 marks)**

**Q5.**

A student carries out an experiment to investigate the force acting between two charged objects. A lightweight negatively-charged ball is freely suspended from the ceiling by an insulating thread. The ball is repelled by a negatively-charged sphere that is placed near it on an insulated support.
The angle of deflection is $\theta$ and $r$ is the distance between the centres of the ball and the sphere.




(a) (i) Draw a free-body force diagram for the suspended ball.

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(ii) The weight of the suspended ball is $W$.
Show that the force of repulsion $F$ on the suspended ball is given by

$$F = W \tan \theta$$

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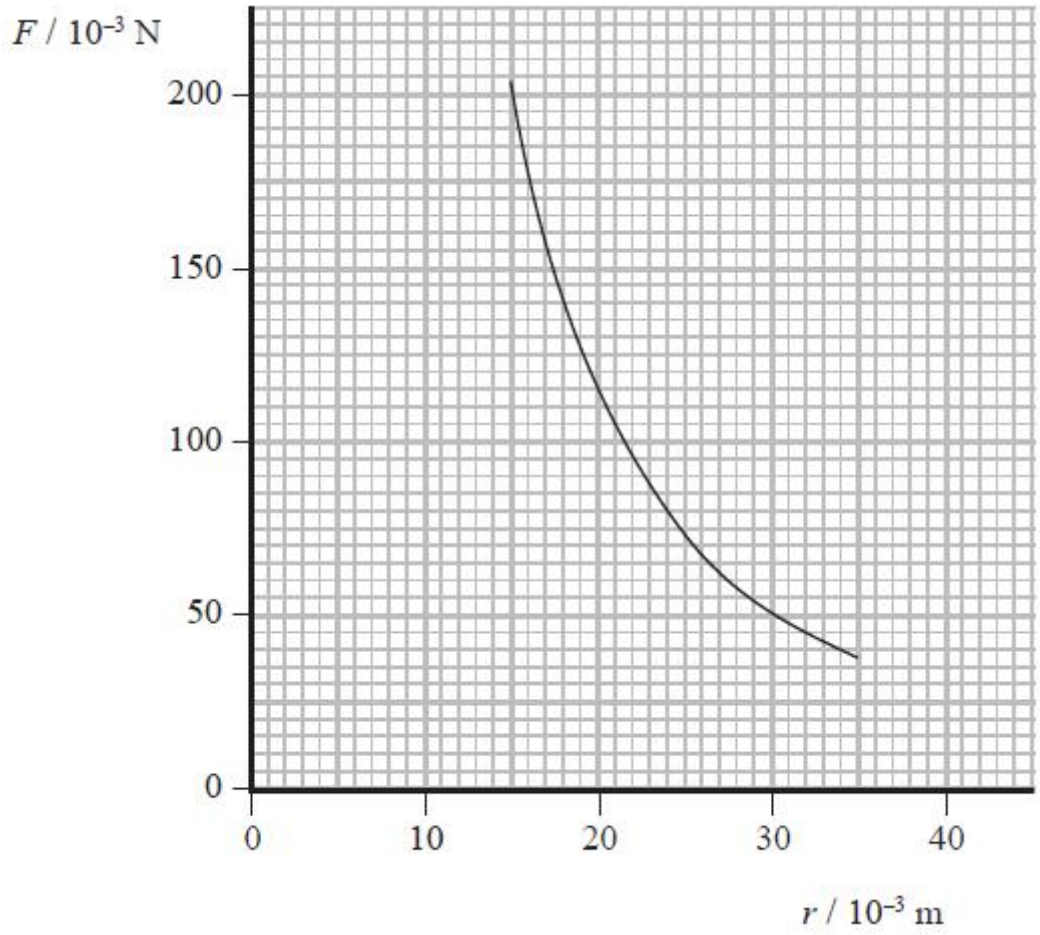
(b) (i) The student can increase the magnitude of the force by moving the sphere towards the suspended ball. She takes pairs of measurements of $r$ and $\theta$ and calculates the magnitude of the force $F$. She then plots a graph of $F$ against $r$.




Use readings from the graph to demonstrate that the relationship between *F* and *r* obeys an inverse square law.

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(ii) The charge on the sphere is 100 times greater than the charge on the ball.
Calculate the charge on the ball.

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Charge = .....

**(Total for question = 11 marks)**