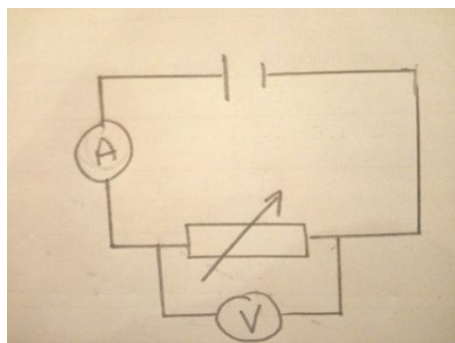# Physics Sept 2013

## Paper IIB

1ai)  current, proportional, voltage

1aii)  4, 2, 3, 1

1aiii)



1aiv)  A graph of voltage against time is plotted, and if a straight line results, it obeys Ohm's Law.

1bi)  $4\Omega$

1bii)  0.75 A

1biii)  2.25 W

1biv)  It is transferred into heat energy in the heating up of the wires

1bv)  if in series, the current would be less, since the total resistance would be greater ($18\Omega$)
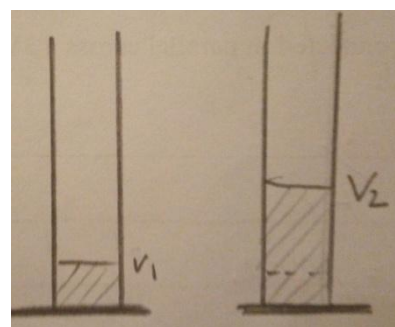

2ai)  Fill measuring cylinder with volume of water $V_1$

Put ring in water and measure new volume $V_2$

Volume of ring = $V_2 - V_1$



2aii)  lower the ring gently with a non absorbent string

Read volume from bottom of meniscus at eye level to avoid parallax errors
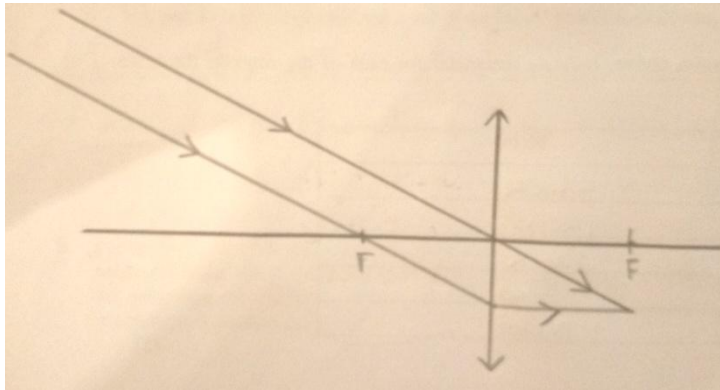

2b)  10.5, 7.9, 10.5, 8.9, 8.9

2ci)  7.87 g/cm³

2cii)  Ring 1 silver,    Ring 2 iron,    Ring 3 silver,    Ring 4 nickel,    Ring 5 nickel


3ai)  convex

**3aii)**   inverted, diminished
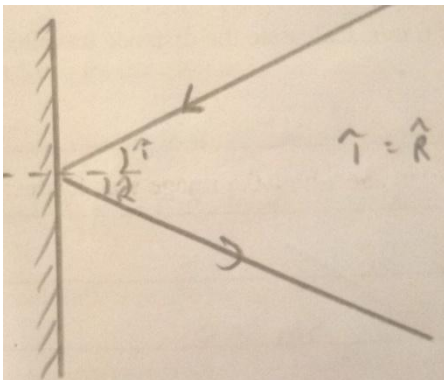
**3aiii)**   focal length

**3aiv)**



**3b)**   it may damage the retina since there would be too much exposure to UV light

**3c)**   F, F, T, F, F, F, T, T

**3di)**



**3dii)**   virtual, laterally inverted, same size, same object distance as image distance

**4ai)**   0

**4aii)**   4 m/s$^2$

**4aiii)**   4.5m

**4aiv)**   1.5 s

**4av)**   90 J

**4avi)**   60W

**4bi)**   15N →

**4bii)**   3 m/s$^2$

**5a)**   Source C since it is not stopped by the cereal and the cereal box and so it is slowed down by them. Also, its half life is neither too short nor too long.

**5b)**   if half life is too short, than radiation levels would start decreasing and conclusions are not reliable

**5c)**        **Radioactive source is made to pass through box. If radiation detected by GM tube is lower, than the cereal level in bow is high, but if radiation detected by GM tube is the same, than the cereal level is low**

**5di)**        **Beta β since it is the only one that can partly pass through aluminium**

**5dii)**        **Source C since gamma would all pass through, while alpha would be totally stopped by the aluminium**

**5e)**        **The converyor belt must be behind a lead wall or provide protective clothing to the machine operators**

**5f)**        **yes, because of the background radiation that is always present around us**

**5gi)**        **80 counts per minute**

**5gii)**        **half life is the time taken for half the radiation to decay**

**5giii)**        **2 days**

**5giv)**        **10 counts per minute**