

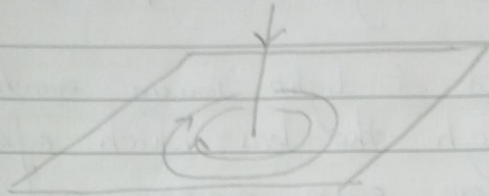
September 2015 P2B.

1 a. the plotting compass points

ii

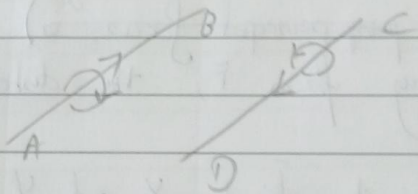
b. When current passes through the wire, a magnetic field forms around the wire.

c.



d. the magnetic field would be greater, \therefore the magnetic field ~~was~~ increased

e i.



ii. both AB and CD experience a force, but in the opposite direction.

iii. Using Fleming's LH rule, AB \downarrow , CD \uparrow , \therefore anticlockwise

iv. Fleming's L.H. Rule.

v. - increasing the current passing through the coil
- moving the poles of the magnet closer together.

vi. the wire would stop rotating.

2a. magnification

b. convex lens

c. i. screen = L, object = K.

ii. object distance = X, image distance = Y.

d. Light rays coming out of light source reach the object, pass through the lens, which refracts the light rays. These rays converge and meet to form an image on the screen.

e. Moving X towards the ^{principal focus F} lens would give a bigger value for Y (unless the ~~principal focus is~~ and if X is moved further away from F, the distance Y becomes smaller.

Hence when they move the object, X and Y will vary accordingly.

f. Perform the experiment in a dark room.

or

Make sure that the object, the lens & the screen are in line and parallel to each other.

$$\text{mag} = \frac{h_i}{h_o} = \frac{200}{600} = \frac{2}{6} = \frac{1}{3} = 0.33$$

$$\text{mag.} = \frac{d_i}{d_o} = 0.33 = \frac{45}{d_o} \quad \therefore d_{\text{object}} = \frac{45}{0.33} = 135 \text{ mm.}$$

hi. they need to move the window frame, not at infinity but ~~at~~ between $F + 2F$ of the lens.
(if they measure the distance between the lens + the image of the sharpest image obtained in the previous part, they would find F , the focal length.)

ii. Place the window frame at infinity (a large distance away from the screen/wall).
Place the convex lens close to the screen/wall, and keep moving it back or forward, until a sharp image of the window frame is formed on the screen/wall.
Measure the distance, using a ruler, between the centre of the lens + the wall/screen to find the focal length.

3i. A: aluminium block C: joulemeter
B: thermometer D: immersion heater.

ii. Q: Heat energy supplied
m = mass of the block
c = specific heat capacity of aluminium.
 $\Delta\theta$ = change in temperature. ✓

iii. 3, 5, 4, 9, 7, 1, 8, 6, 2

iv. Cover the block with lagging to avoid heat losses.
Make sure there are no loose + rusted connections.

bi. $c = 4200 \text{ J/kg}^\circ\text{C}$
 $m = 500\text{g} = 0.5\text{kg}$
 $\Delta\theta = 10^\circ\text{C}$
 $E = ?$

$E = mc\Delta\theta$
 $E = 0.5 \times 4200 \times 10$
 $E = 21,000 \text{ J}$

ii. $E = 1 \times 4200 \times 10 = 42,000 \text{ J}$
 or (double the mass, double energy)
 $\therefore 21,000 \times 2 = 42,000 \text{ J}$

iii. By conduction, the heated water gives its heat to the tea/coffee and since most probably, it is a ^{good} conductor heat will flow through it, & reach the end.

4a. alpha radiation

bi. γ

ii. α

iii. γ (line part of E.M. spectrum, see properties)

iv. β

v. α

? vi. α

vii. α

?c

di. mass number of the atom, that is, it gives the no. of protons & neutrons in the nucleus.

dii. mass number

diii. the no. of protons in the nucleus

diii. $1600 \div 2 = 800$, \therefore from graph, 7 $\frac{1}{2}$ days

e1. $60 - 30 = 2$ half lives

$$1000 \div 2 = 500$$

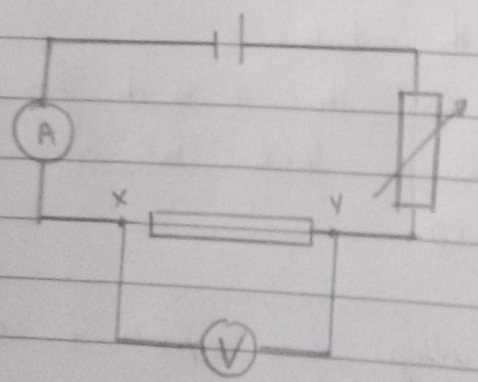
$$500 \div 2 = \underline{250 \text{ counts}}$$

ii. because the half life of Caesium 137 is very long, \therefore it takes many years to decay by half and its concentration & effects will remain for longer, hence more harm.

iii. Caesium 112 & 137 have the same proton number but Caesium 112 has less neutrons in the nucleus when compared to Caesium 137.

iv. (same proton no. but a different mass no.)
 \therefore A, B & C are isotopes.

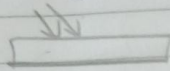
5a



b. in a variable resistor, the resistance can be varied, hence changing the current flowing through the circuit.

c. ^(low) negligible, series, high, parallel.

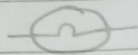
d.i. LDR



d.ii. LED



filament bulb



- ii.
- ~~measure~~ use the variable resistor to gain a current greater than 2.5 Amps.
 - if the ammeter keeps giving a reading of current which is not 0, then the components are not fused.
 - if the ammeter gives 0, then it means that the fuse melted because it exceeded the current that it can take and hence an open circuit resulted + current does not pass through the circuit.

iii. light emitting diode

- iv.
- connect the component to the circuit + read current.
 - then reconnect but reversing the contacts.
 - if current passes in both cases, then it is the filament bulb but if current passes in one direction but not in the other, then it is the LED.

ei. $V = IR$. \therefore Read voltage across component + current from ammeter; then use $R = V/I$ to find the resistance.

eii.

Ohmic conductor is a component which obeys Ohm's law which states that the V & I as long as the temp & other physical components are kept constant.

eiii

fixed resistor. (metal alloy).

iv.

filament lamp.
