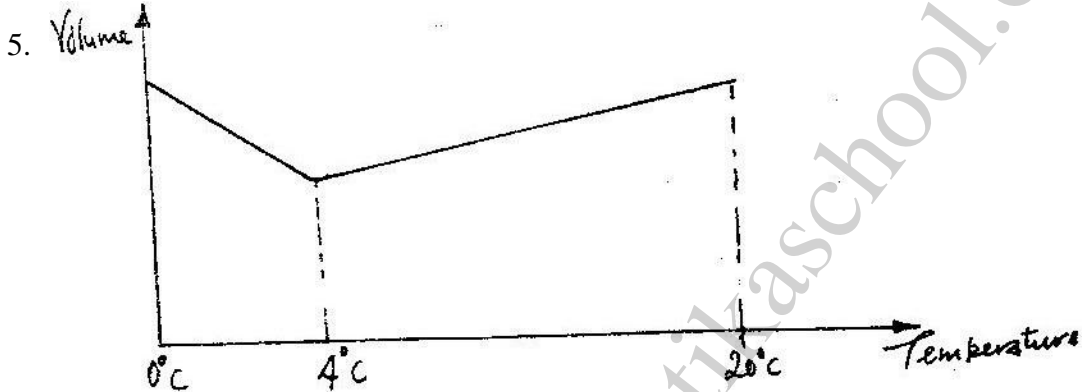


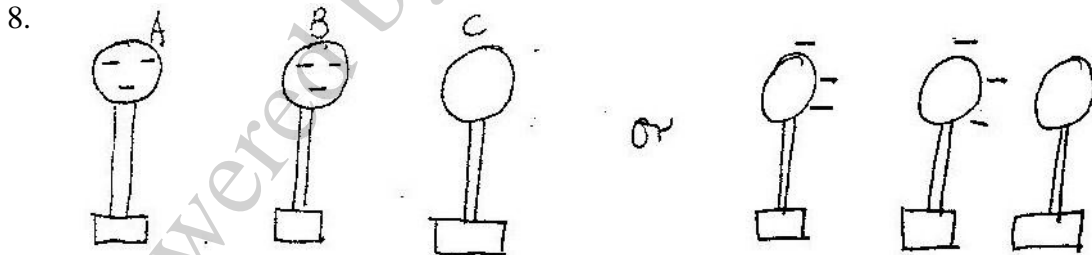
## PHYSICS PAPER 1 2004 MARKING SCHEME

1.  $15.5 + 0.33 = 15.83\text{mm}/1.583\text{cm}$
2. Air in the balloon expands/volume of balloon increases; displaces more air raising the up thrust of air;
3. i) Stability reduced/Lower /less stable  
 -Upper section heavier/hollow section becomes heavy/more massive top  
 - Raising the c.og of the block.
4. Density of water is low/It will result to a very long barometer/ very long tube



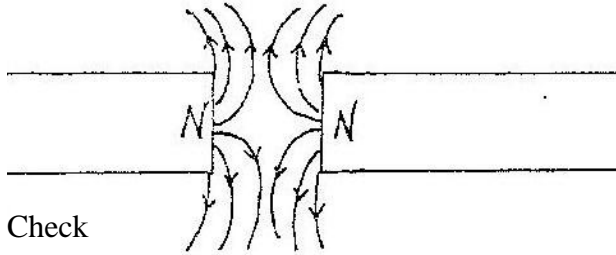
NB at  $4^{\circ}\text{C}$  graph must be curved  
 -  $4^{\circ}$  must be marked  
 - If drawn using a ruler NO mk  
 - If  $20^{\circ}\text{C}$  is marked, it must be higher than  $0^{\circ}\text{C}$

6. Wooden Block  
 Wooden block is a poor conductor of heat all the heat goes in melting the wax.
7. NB- Check correct rays with arrows.  
 - at least one angle on each reflecting surfaces must be marked.



9. To depolarize/ oxidizer/ reduces polarization/oxidizes  $\text{H}_2$  to  $\text{H}_2\text{O}$ /Changes  $\text{H}_2$  to  $\text{H}_2\text{O}$ / removes  $\text{H}_2$  (any give 1 mark)
10. Adding detergent/Impurities/increasing temp/heating (Any give 1mk)

11.



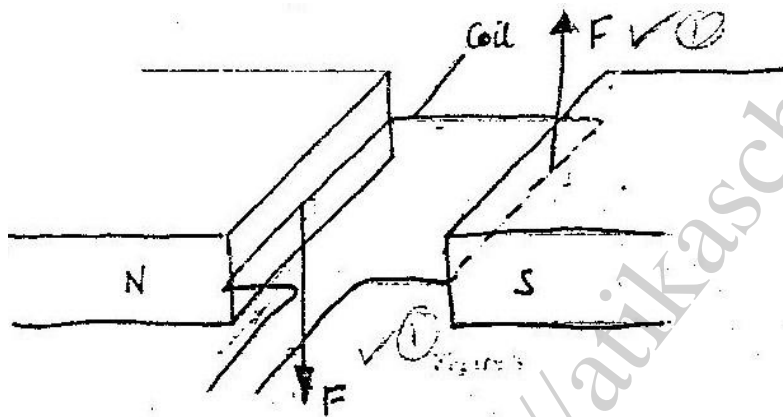
Check

- correct pattern
- correct direction

NB- at least 4 lines of forces must be shown

- Lines of forces must start at the poles.

12.



NB forces must be straight  
Lines must touch a conduct

13. Increasing current/increasing no. of turns or length of coils/ increase strength of field same as moving magnet close to core & using U shaped winding coil on soft iron core/increasing the angle between conductor and the field. (give any 2mks)

14. Sum of clockwise moment=sum of anticlockwise moments

$$W \times 20 = 30 \times 5$$

$$2w = 15$$

Higher, reducing the current.

16. Either in (10b) current from each cell is less than in (10 a)

Or

Power supplied in 10(b) is less than in 10(a)

17. Distance= Area under graph

$$= 2 \times \frac{1}{2} \times 2 \times 20$$

$$= 40\text{m}$$

$$\text{Or } s = ut + \frac{1}{2}at^2$$

$$S = 2(20) + \frac{1}{2}(-10)4$$

$$S = 20$$

$$S = 2 \times 20$$

$$40\text{m}$$

18.  $W = Fd$   
 $Mg \sin \theta$   
 $= 60 \times 10 \times 0.5 \times 4$   
 $= 1200J$

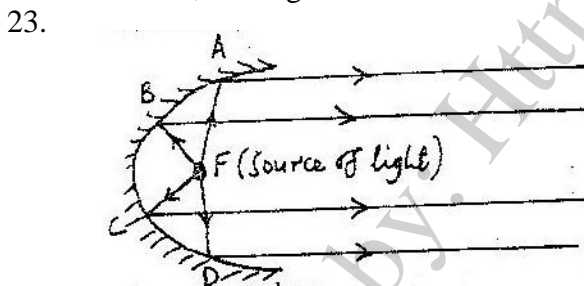
19. Electromagnetic  
 -can travel through vacuum  
 -Travel at speed of light  
 -are faster  
 - Does not necessarily  
 Refuse a material media

- Mechanical  
 - Cannot travel through a vacuum  
 - Travel at varying speeds  
 - are slower  
 - Refuse a material media

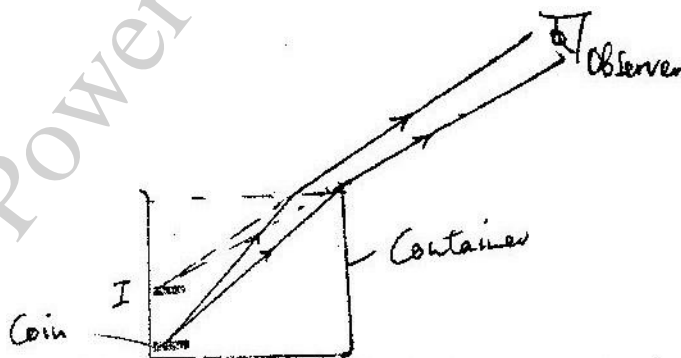
20. Either  $p = VI = V^2/r$   
 When V reduces power reduces  
 So rate of heating reduces  
 Or  $V = IR$   
 $P = I^2 R$  (reducing IR reduces power so rate of heating reduces.)

21.  $E = pt$   $t = 450 - 150 = 300s$   
 $E = 50 \times 300$   
 $I = 150,000J$

22.  $Q = ml$   
 $15000 = 0.1 \times l$   
 $l = 150,000J/kg$



24. -Correct rays must be refracted to the eye and should be diverging.  
 -Dotted lines should show image position. (-should not have arrows-must intersect within container)



25. Plasticine increases mass of body since momentum is conserve or weight of trolley/normal reaction increases so friction forces increases or Mass of trolley increases, the driving force being constant.

26. Either on closing on closing  $s_1$  while  $s_2$  open

$$Q = CV = 3C$$

When  $s_1$  is open  $s_2$  closed charge is shared between the two capacitors

$$CT = C + C = 2C$$

Since  $q$  is the same equal to  $3C_1$  the new  $p.d = V_1$

$$Q = CT V_1 = 3C$$

$$V_1 = \frac{3C}{2C} = 1.5V$$

Or

$S_1$  closed  $S_2$  open lower capacitor charges to  $3V$

$S_1$  open  $S_2$  closed lower capacitor charges the upper to same charge (p.d)

$$\text{Final pld} = \frac{3}{2} V = 1.5V$$

Or

$$Q = CV = 3C$$

$S_2$  closed charge is shared

$$CV = \frac{Q}{2}$$

$$V = \frac{QC}{2C} = \frac{3C}{2C} = 1.5V$$

27. Either  $V_1/T_1 = V_2/T_2$

$$\frac{200}{293} = \frac{V_2}{353}$$

$$V_2 = 241 \text{ ml}$$

Or  $V = KT$

$$200 = 293K$$

$$K = 0.6828$$

$$V_2 = 0.6828 \times 353$$

$$V_2 = 240.96 \text{ ml}$$

The other answers for

$$V_2 = 240.9/240.94 \text{ ml}$$

28. X-rays

-produced by fast moving electrons nucleus

-Produced due to energy changes in Level of atoms

-Produced when energy changes in Electronic structure of atoms

Gama Rays

-As a result of disintegration of

-due to energy changes with nucleus Of atoms

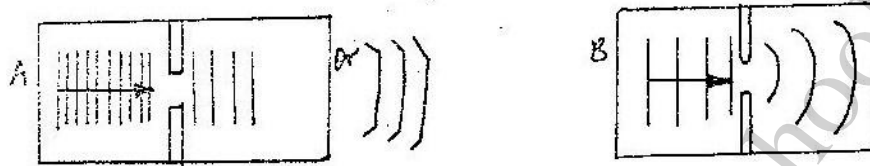
-produced due to change in nucleus Of atoms.

(Any one comparison give 1mk)

29.  $T = Mv^2/r$  or  $T \sin \theta = mv^2/r$  or  $\tan \theta = v^2/r_g$   
 $81 = MV^2/r$   $\theta = 86.46$   $V^2 = 0.499 \times 86.4$   
 $81 = 5V^2/0.5$   $r = 0.488$   $V^2 = 80.63$

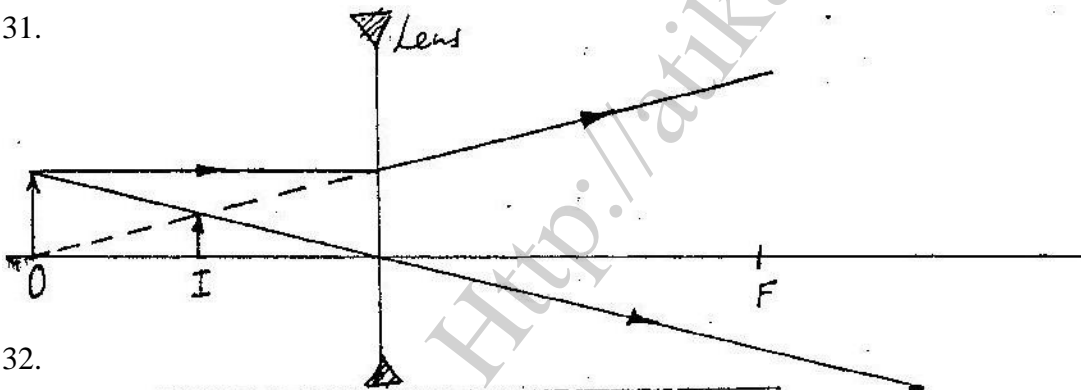
$V = 9 \text{ m/s}$   $V^2 = 0.499 \times 81 \times 0.9981/0.5$   $V = 8.979 \text{ m/s}$   
 $V^2 = 80.70$   
 $V = 8.983 \text{ m/s}$

30

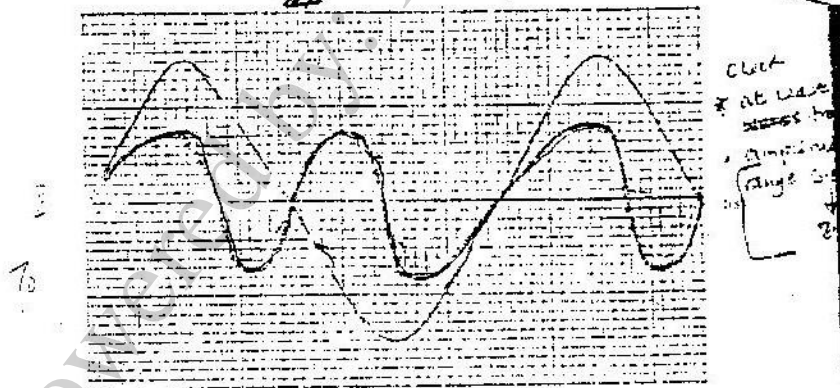


NB. At least three wave forms must be drawn.  
 Wave length (spacing) must be maintained

31.



32.

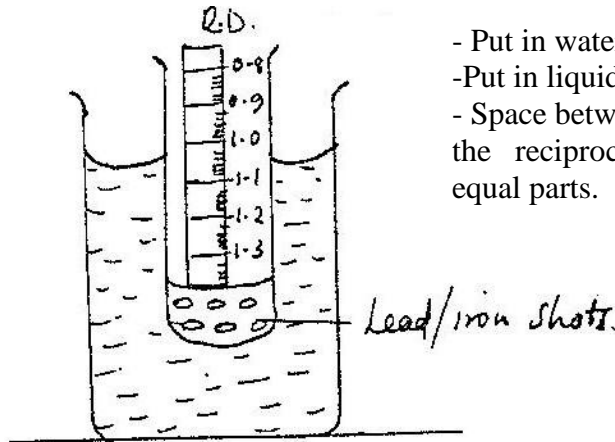


Check-at least Three complete troughs/Crest  
 - Amplitude range 6.5 squares  
 ↓  
 8.5 squares



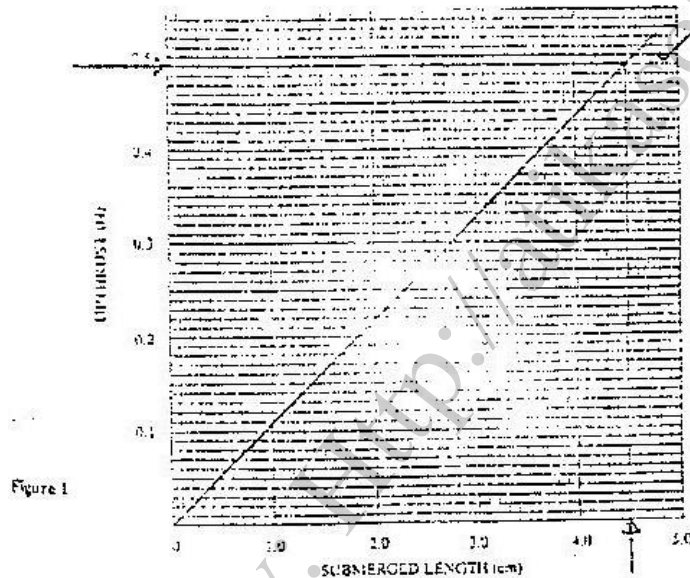
## PHYSICS PAPER 2 2004 MARKING SCHEME

1. a)



- Put in water and mark
- Put in liquid and Mark
- Space between the 2mks which represent the reciprocals of densities is divided into equal parts.

b)



- i) Up thrust = 0.49N  
 ii) Up thrust = weight of liquid displaced (Archimedes Principle) = 0.4N  
 Mass of Liquid = 0.049kg = 49g (converting m to kg or g)  
 Volume of liquid = 6.2 x 4.5  
 = 27.9cm<sup>3</sup>  
 Density = Mass/Volume = 4.9/27.9g/cm<sup>3</sup> = 1.760kg/m<sup>3</sup>

2.

- a) i) Mass  $m_1$  of melted ice/mass of water. Time  $t_1$  take  
 ii)  $Q = ml$        $Vit = ml$   
 $P = \frac{ml}{t}$        $p = Vi = \frac{ml}{t}$   
 iii) Part of heat produced by heater is wasted temperature of ice may be lower than zero.
- b) i) When oil drop is placed at the centre of tray, oil spreads on water until it is one molecule thick producing patch (monolayer)  
 ii) Volume of drop =  $\frac{4}{3}\Omega r^3 = \Omega r^2 h$  (r = radius of drop)  
 Volume of patch =  $\Omega r^2 h$  (h = Thickness of molecule)

$$\frac{4}{3} \Omega r^3 = \Omega r^3 / \Omega r^2 h \text{ (equating)}$$

$$H = \frac{4}{3} \Omega r^3 / \Omega r^2 + 2 = 4 \times (0.25)^3 / 3 \times (100)^2 \times 2.1 \times 10^{-6} \text{ mm}$$

Because oil does not necessary spread to a monolayer/ one molecule thick or Big errors in radius of oil drop and patch or errors in measurement of diameter/radius.

- iii) Put oil in a burette and read level, let 100 drops fall and read new level, obtain radius using  $\frac{4}{3} \Pi r^3 = \text{Volume}$

or

Obtain thin wire and make Kink; deep in oil and let drop form on kink use a milimetre scale to measure diameter of drop.

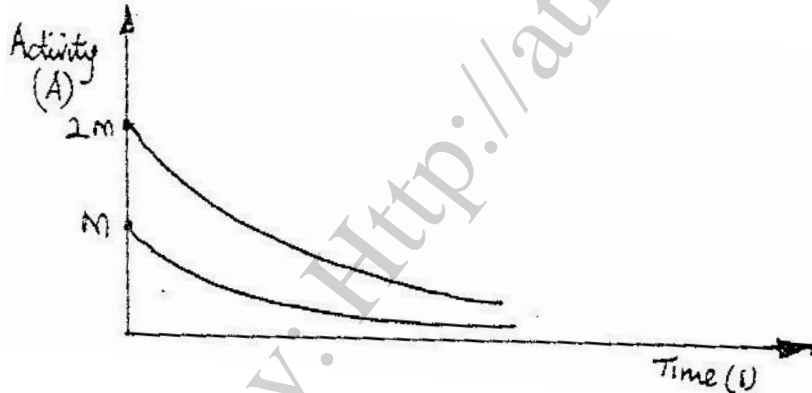
3. a) i) Produce alcohol vapour

Cools alcohol vapour below condensation temperature or cools air so that alcohol vapour condenses.

- ii) Radiation from source ionizes air along its path; alcohol condenses around these ions; forming droplets or traces; nature of traces identifies radiation.

- iii) Can detect, \_\_\_ While electroscope on , can identify nature of radiations, is more sensitive.)

- b)i)



ii) Delayed  $1 \times 10^{20}$   $\frac{1}{2} \times 10^{20}$  -  $\frac{1}{4} \times 10^{20}$   $\frac{1}{8} \times 10^{20}$   
 $= 0.125 \times 10^{20} = 1.25 \times 10^{19}$

Left  $1 \times 10^{20}$  -----  $1/8 = 0.875 \times 10^{20}$   
 (Subtraction)  $= 8.75 \times 10^{19}$  Atoms.

4. a) i) 0.30cm

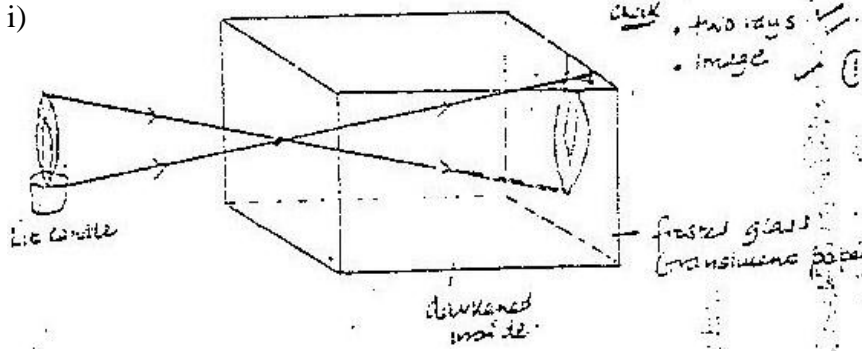
ii)  $0.65 - 0.25 = 0.4$  Sec.

iii)  $f = \frac{1}{T} = \frac{1}{0.4} = 2.5$  HZ

iv)  $V = fx = \frac{V}{x} = \frac{200}{25} = 80$ cm = 0.8m



b. i)



ii)  $m = \frac{\text{ht of Image}}{\text{ht of object}} = \frac{\text{distance of image}}{\text{distance of object}}$

$\frac{h_0}{200} = \frac{25}{5} \Rightarrow h_0 = 200 \times \frac{25}{5} = 100\text{m}$

5.

a)

- i) -Increasing no. of turns/coils  
-Increasing speed (rate) of rotation

b)

In a motion produces Eddy currents. These cause force to act on plate causing damping in B. Eddy currents are reduced by slots

c)

$R_{ms} = \frac{V_{peak}}{2}$   
 $V_{peak} = 12 \times 14142 = 16.97\text{V} = 17\text{V}$

6

a) One tuning fork is loaded with a small amount of plasticine sounding together again one can produce detectable beats.

- b) i)  $\frac{1}{f} \times 10^{-3} \text{ (H}_3^{-1})$  3.91 3.5 2.9 2.3 2.1 2..0  
12-11 0.65 0.57 0.48 0.39 0.34 0.32

ii) Slope (Gradient) =  $\frac{V}{2} = \frac{(0.67-0.10)\text{m}}{4.0-0.75} \times 10^{-3} \text{H}_3^{-1}$   
 $V = 340 \text{ m/s}$

iii) Sound waves entering tube is reflected at water surface forming standing waves with incoming waves, when an antinode is at the mouth loud sound is heard. By adjusting length of air column this can be achieved.

7.

i) Photoelectric effect- is the emission of electrons from a surface when radiated with radiations of sufficient frequency.

Correct circuit must work i.e cathode connected to (-ve) Emphasize on mA cell connected and v in parallel

ii) Slope =  $\frac{1.28-0.10}{(7.7-4.8)} \times 10^{14}$

$h = \text{Slope} \times e$   
 $= 1.18 \times 1.6 \times 10^{-19} / 29 \times 10^{14}$   
 $= 6.51 \times 10^{-34} \text{JS}$

$(5.82 - 6.66) \times 10^{-34} \text{ JSAIt} - \text{Selecting 2 pts from graph}$

- Substitution in simultaneous equs

-Value of h

-Value of  $\phi$

$f_s \text{ (Threshold Frequency)} = 4.55 \times 10^{14} \text{ (where graph cuts the axis)}$

Range  $(4.4 - 4.6) \times 10^{14}$

$$\text{Work function } \phi = 6.51 \times 10^{-34} \times 4.55 \times 10^{14}$$

$$= 2.96 \times 10^{-19} \text{J}$$

$$\text{Range } (2.56-3.06) \times 10^{-19} \text{J}$$

c)  $\frac{1}{2} m v_{\text{max}}^2 = hf - \phi$

$$hf = 6.51 \times 10^{-34} \times 3 \times 10^{15}$$

$$\text{KE max} = 1.953 \times 10^{-18} - 6.4 \times 10^{-19}$$

$$= 1.31 \times 10^{-18}$$

$$\text{Range } (1.12 - 1.31) \times 10^{-18} \text{J}$$

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