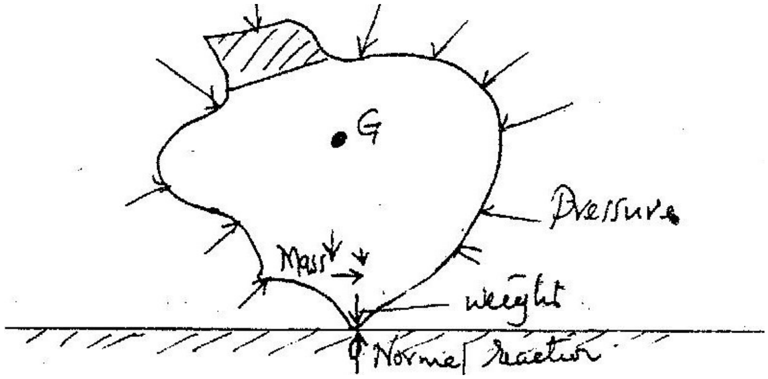
PHYSICS PAPER 232/1 K.C.S.E. 2002 MARKING SCHEME

1. 11.72/11.72 CM/0.01172M

2.



3. g moves / shifts to the right / C.O.M. moves/ shifts/ more weight or mass of he right/ weight will have a clockwise movement about O/causing greater moment of force towards right than left.

4. $R = \frac{V}{I} = \frac{0.35}{0.70} = 0.5\Omega$

$P = \frac{RA}{C} = \frac{0.5 \times 8\ 10^{-3}}{0.5} = 8 \times 10^{-3}\Omega$ m.

5. $p = F = \frac{2500}{425{,}000pg} = 250{,}000PG$

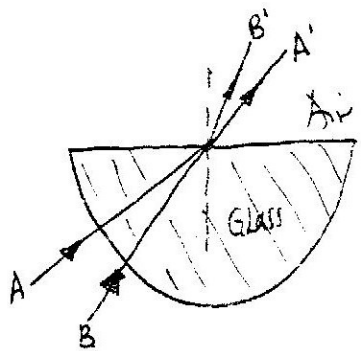
$P = \frac{F}{A}$

Total press = $\frac{2500}{0.025} = 2{,}000N/m^2$

6. -Low temperature reduces K.E / velocity of molecules
- Hence lower rate of collision / less collision -Reduction in pressure

7. Can B Good absorber of radiation.

8.



A' & B' are the refracted rays

19. (Assume no heat losses)

Heat gained = heat lost

$2 \times c \times (30 - 20) = 90 \times 15 \times 60$

$C = \frac{90 \times 15 \times 60}{20}$

C = 4050j/kgk

$E = pt = mc\triangle\theta$

$90 \times 15 \times 60 = 2 \times c\ 10$

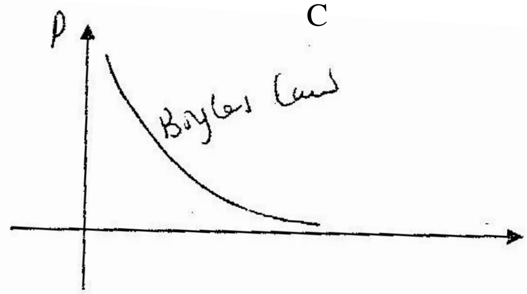
4050j / kgk = c

20. Mattress increases stopping time/time of collision increased this reduces the rate of change of momentum.

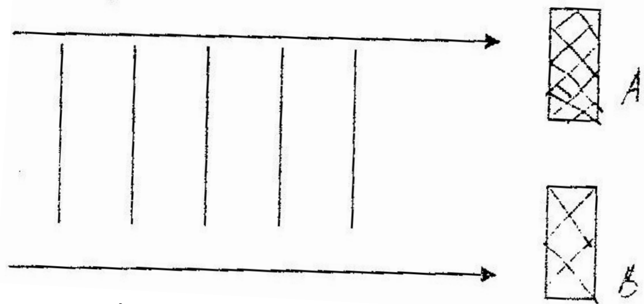
21. $C = C_1 + C_2$ $\quad$ $Q = CV$

$CT = 3x2$ $\quad$ $5\mu F$ $\quad$ $V = \frac{Q}{C}$ $\quad$ $V = 1 \times 10^{-4} = 20V$

22.



23.



24. $V = f\lambda$

$\lambda = \frac{v}{F} = {}^{330}/_{30} = 11m$

25. Law of floatation – a floating body displaces its own weight

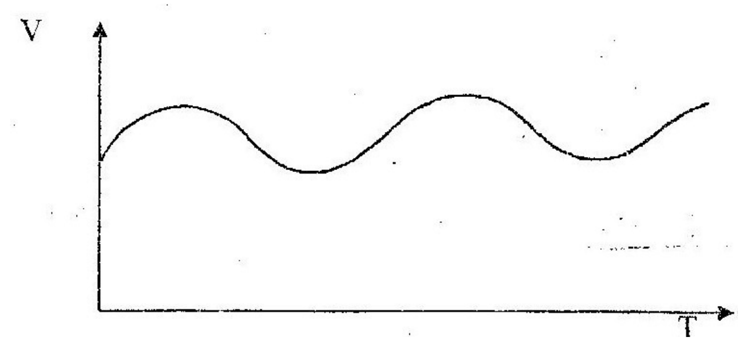
Weight of block = weight of mercury displaced

$0.250 \times g = 13.6g$

$\frac{0.25}{13.6 \times 10^3} = v$

$V = \frac{1.838 \times 10\text{-}5\ m^3}{1.839 \times 10\text{-}5 m^3} = 18.4cm^3$

28.



29.

30. $p = VI$

Kettle	Iron box	TV
$I = p/n = {}^{2500}/_{250} = 8A$	$750/250 = 3A$	${}^{300}/_{250} = 1.2A$

Total = 8 + 3 + 1.2 = 12.2A $\quad$ = Appropriate fuse = 15A

31. 107 – 42 = 65

32. Penetrating power

33. Downwards

34. Work function of metal / min energy required to eject e-1 for excess energy work function.

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1a) (speed of light in vacuum e = 3.0 x 10^8 ms^{-1})
Refractive index = speed of light in vacuum
=3.0 x 102 m/s
1.88x102 m/s
= 1.596 = 1.60

b) sin C = $\frac{1}{n}$

$\frac{1}{1,596}$

C = 38.8^0- 38.48
38.7 – 38.42

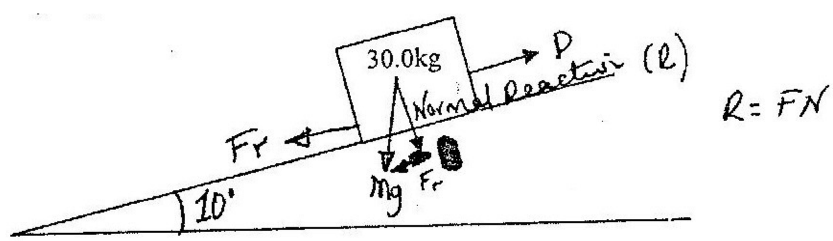
c) Sin θ = 1.596
sin 21.1
Sin θ = n
Sin 21.1

θ = 35.25$_0$ – 35.15^1
35.35$_0$- 35.21^1

2. β - βeta radiation
Force is of the circle implying negatively charged (Fleming's left hand rule)
(bi) K= alpha (ii) X= 88 Y= 288

(ci) Increase in thickness
(ii) Increase in thickness reduces the radiation reaching the Geiger tube
(iii) Increase in pressure
(iv) Increase roller pressure squeezes metal sheet (possess more) reducing the thickness of foil coming out of them.
(v) Alpha particles have little penetration very few or none pass though foil.
(vi)

3.



a i) R- to pass through the c.o.g Forces not labeled. A ward half for each
(ii) = mg Sinθ = 30.0 x 10 sin 10^0 = 52.1 N (accept 52.08, 52.08, 52.09)
(ii) A = F Net force down = Mg sin θ - friction = 52.1- 20
= 32.1

M = $\frac{32.1}{3.0}$ = 1.07M/S^2

(iii) Acceleration increases with the increase in angle

4 a i) A ice absorbs latent heat without in temperature (or ice melting no change of temperature heat goes to latent heat fusion)

B Water molecules gain K.E (increase in K.E.)

C heat is used to change water into vapour.

ii) Water has anomalous expansion, where we have maximum density at 4^0C. Anomalous behaviour/explain.

iii) Frozen seawater has a lower temperature than frozen fresh water boiling point of sea water is higher than fresh water.

(b) (heat gained $= ML + MC\theta$

$= 3 \times 336 \times 10^3 + 3 \times 4200 \times 5$

$= 1.07 \times 106J$

5 a i) Transverse waves (accept elliptical)

ii) As waves move in the medium, the particles of medium do not move: they vibrate in positions so cork does not move.

iii) Period of wave T= 0.205

$f = \frac{1}{T} = 5Hz$

$V = fx$

$X = \frac{0.30}{5} = 0.60M$

iv) Velocity decreases when depth decreases hence the x decreases (since frequency is constant wavelength decreases)

b) 1^{st} resonance $\frac{\lambda}{4}$ I_1fe $\lambda = \frac{I1_2-I_2}{2}$ OR $V= 2F (I_2-I_1)$

$f = \frac{V}{2(I_2-I_1)}$ 129-77

$\frac{\lambda}{2}$= 129-77

2^{nd} resonance $3\lambda = I_2+C$ λ= 104 cm =340

$V=f\lambda$

340=fx 1.04 = 326.9 Hz.

F= 327 Hz (326.9)

a) Charles law: for a fixed mass of a gas at a constant pressure the volume is directly proportional to the absolute temperature Kelvin thermodynamics.

bi) Volume of gas trapped by drop of cone sulphuric acid, water in heated (in both) and volume (height) of gas: in tube increase as temperature rises; values of height H and T are tabulated; a graph of volume V versus temperature T^oC is plotted;

graph is straight line cutting T at – 273°C (absolute Zero); so volume is directly proportional to absolute temperature.

ii) -Short temperature range - Keeping pressure constant is difficult

ci) When θ - θT – 273k Extrapolation on graph show:

Pressure read off β = 9.7×10^4 pa

ii) p1 = 1.15×10^5 pa $\theta_1 = 52.0$°C

p2 = 1.25×10^5 pa $\theta_2 = 80.0$°C

p1 p2

To + θ1 To + θ2

1.115 x 105 1.25 x 105

To + 52 To + 80.0

To 270

- Rise in volume height - Rise in temperature
- Recording of tabulation - Graph
- Analysis of graph - Conclusion

Alternatives

P = mx + c

P = kθ + kto when K gradient.

K = Dv = (1.14 – 1) x 105

Dx 50 – 10

= $\underline{0.14 \times 10^5}$

40

= $^{14000}/_{40}$ 350pac ()

KT = Constant

C = $9.6 \text{ X } 10^4$

350 T_o = 9.67×10^4

to = 274.3 (266-284)

5. ai) μV light removes electrons on zinc plate. This lowers the excess charge constant (negative) on leaf leading to collapse/ becomes less negative (more positive)

ii) Since μv light removes electrons positive charge re attracts the electrons thus keeps the charge constant and so leaf does not collapse.

bi) Frequency of incident light / energy of proton / energy of light work function of surface

ii) From Kemax = hf - θ

h is slope of graph

Slope = $(10 – 20) \times 10^{-19}$

$(2.6 – 1.4) \times 10^{15}$

H = 6.7×10^{-34} fs

At Kemax = θ hf = 0

Extrapolation shown or

Read off $f_o = 1.07 \times 10^{15}$ Hz

Θ =$1.07 \times 10^{15} \times 6.67 \times 10^{-34}$

= 7.4×10^{-19}

c) Kemax $= hf\ \theta$

$= \frac{6.67 \times 1034 \times 5.5 \times 1014}{1.6 \times 10^{-19}}$

$= 2.29$ eV

Since hf< θ no photo elective effect

$E = hf = 6.67 \times 10^{-34} \times 5.5 \times 10^{14}$

Or $\theta = 2.5 \times 1.6 \times 10^{-19}$