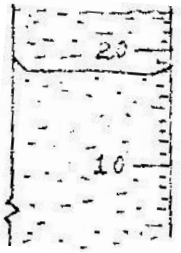
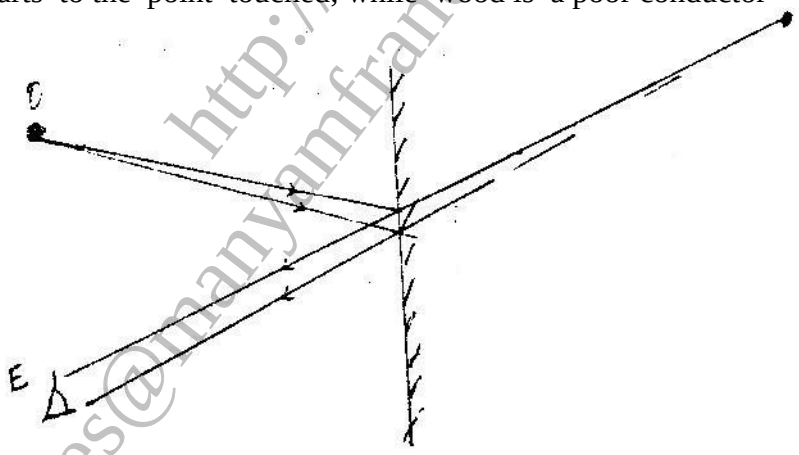
PHYSICS PAPER 232/1 K.C.S.E 2000 MARKING SCHEME

1. 

2. Acceleration of gravity on Jupiter is higher than that of earth, so a bag of saw dust must be less massive if the greater acceleration on earth is to produce the same pull as sugar bag on earth.
3. Beaker becomes more stable because the position of C.O.G is lowered on melting or water is denser than ice.
4. On earthing negative charges flow to the leaves from earth to neutralize positive charges when the rod is withdrawn the leaves are left with net negative charge.
5. Since the system is in equilibrium let A be the area of piston and P the pressure of steam

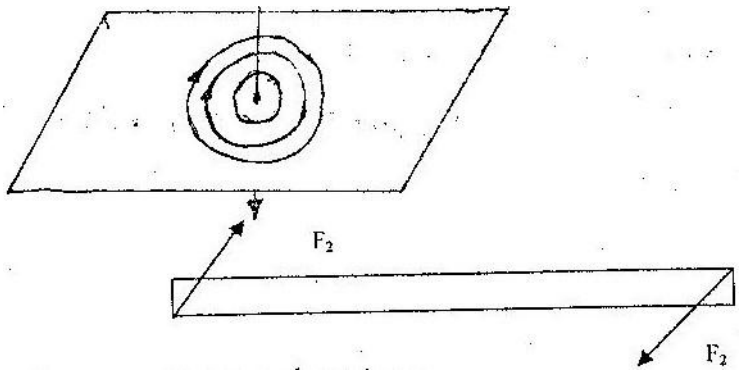
   $P \times A \times 15 = W (15 + 45)$

   $2.0 \times 10^5 \times 4 \times 10^4 \times 15 = W \times 60$

   $W = 20N$
6. Particles of gases are relatively far apart while those of liquids and liquids are closely parked
7. Since the strip is bimetallic when temperature rises the outer metal expands more than the inner metal; causing the strip to try and fold more; this causes the pointer to move as shows
8. This is because metal is a good conductor, so that heat is conducted from outer parts to the point touched; while wood is a poor conductor
9. 

10. Can withstand rough treatment
    Do not deteriorate when not in use
11. Struts are DE, DC, AD, BD Ties are BC; AB
12. The keepers become magnetized thus neutralizing the pole, this reduces repulsion at the poles, thus helping in retention of magnetism

13.

14. 

Force F_2 at the ends perpendicular and turning to opposite to F_1

15. VR = 4;
16. Efficiency of the system

Efficiency $= \frac{M.A}{V.R} \times 100 = \frac{100}{20} \times \frac{1}{4} \times 100 = 89.3\%$

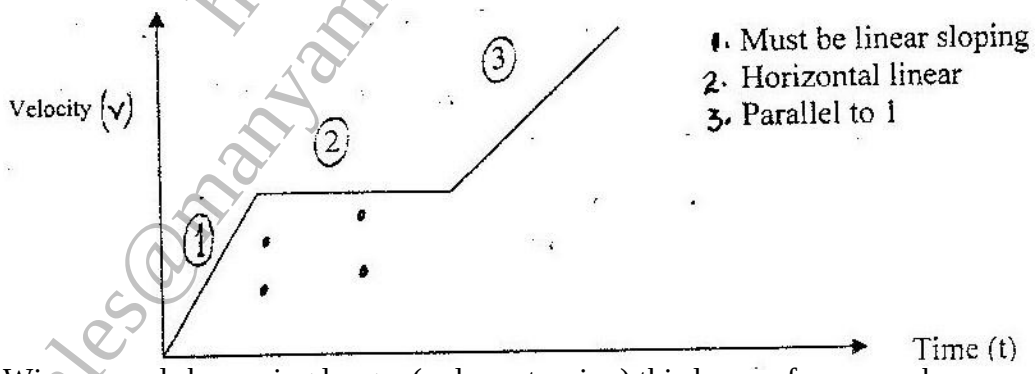
$= 89\%$

17. Sound waves
18. Let A's represent current through the Anometers using Kirchoffs Law

$$A_1 + A_2 = A_3$$

But $A_1 = A_2$
So $A_1 = A_2 = \frac{1}{2} A_3$
Similarly $A_4 + A_5 = A_3$
So that $A_4 = A_5 = \frac{1}{2} A_3$
So $A_1 = A_2 = A_4 = A_5$

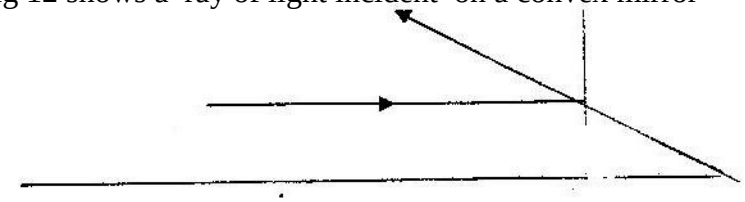
19. $P = \frac{V^2}{R}$; $40 = \frac{240^2}{R}$ $R = 1440\Omega$

20. 

21. Wire expands becoming longer (reduces tension) this lowers frequency hence pitch.

22. Boiling point of spirit is lower than that of water. Specific heat capacity is lower than that of water.

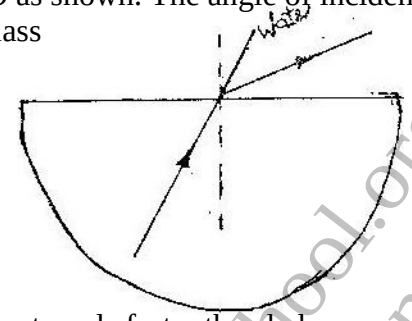
23. Fig 12 shows a ray of light incident on a convex mirror



Reflected extended backwards to cut axes at 1.5 cm

$\therefore f = 1.5 \times 2 = 30$ cm

24. Fig 13 shows a semicircular glass block placed on a bench. A ray of light is incident at point O as shown. The angle of incidence, i is just greater than the critical angle of glass

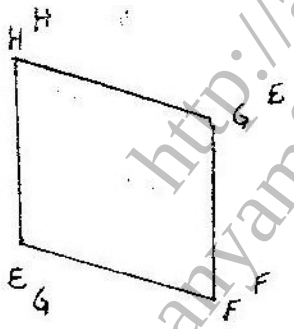


25. The air above paper travels faster than below causing lower pressure above. Excess pressure causes paper to be raised.

26. Combined capacitance = 1.5 μF

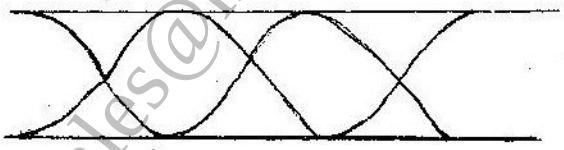
= CV = 1.5 x 3 = 4.5 μC.

27.



Correct orientation either of those shown

28.

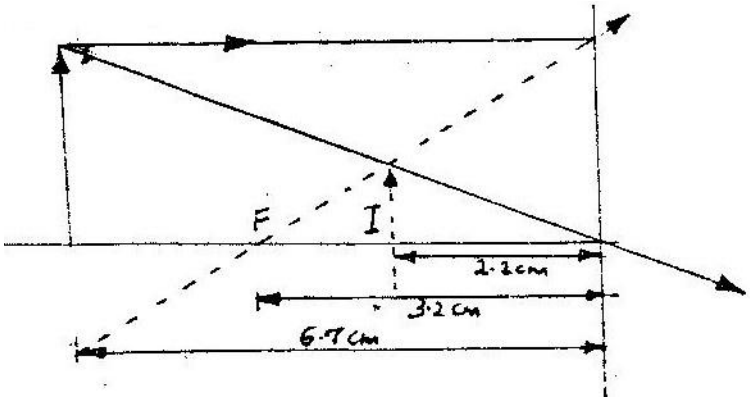


correct resonance shape.

29. Microwave / cooker/ telephone/ radar etc

30. U.V removes electrons from zinc surface so leaf will not only collapse if electroscope was negatively charged.

31.



32. Number of turns/ strength of magnetic field

33. To reduce eddy currents in the armature

34. Difference in energy of the state/ nature of atoms

35. X – rays produces - Hard X – rays are produced

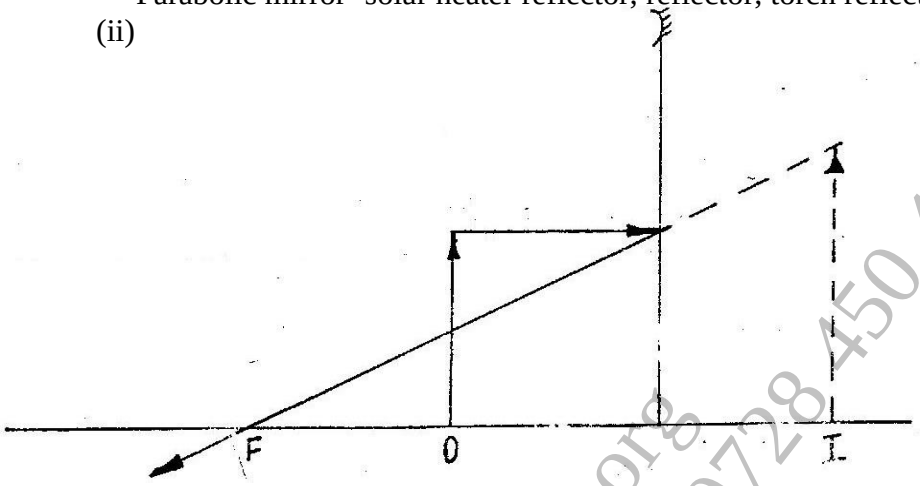
36. From 300 – 150 = 74 S 200 – 100 = 76 S
Average = 75 ± 1 other values on the graph could be used

Donor impurity is the atom introduced into the semiconductor(doping) to provide an extra electron for conduction.

PHYSICS PAPER 231/2 K.C.S.E 2000 MARKING SCHEME

1. (a) (i) Convex mirror – driving mirror/ supermarkets mirrors
Parabolic mirror- solar heater reflector, reflector, torch reflector etc.

(ii)



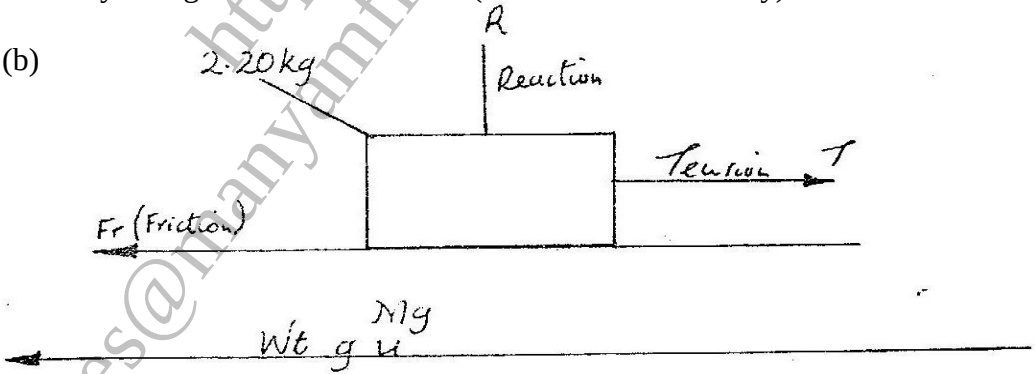
(b) (i) V= 45 M = 3.5 (from graph) m = v/u ⇒ 3.5 = 45/u
U = 12.9 cm ± 0.4

(ii) Choosing convenient value of 'm'

M = I, V = 20 =u	M= v/f-1	M = v/f	-1/f= 1/45+ 1/12.9
1/f = 1/20 + 1/20	v= 45m = 3.5	m= 0 = f = v	
f= 10cm	f = 9.8 – 10.3	f= 10 cm	f = -10cm

2. (a) Initially the balls accelerates through the liquid because terminal viscosity is greater than viscous and upward forces after sometimes the vicious forces equals mg and the balls move at constant velocity. The difference due to the fact that the viscosity $L_1$is greater than that of L_2 (coefficient of viscosity)

(b)



(ii) (I) A. plot the graph of acceleration against the mass m
See graph paper
Graph 5 marks
Plot 2 marks
Axes 1 mark
Scale 1 mark
Line 1 mark

(II) Intercept = μg

Intercept = 2.80 ± 0.2 (from graph)

$M = \frac{2.80 \pm 0.2}{10}$

$M = 0.28 \pm 0.02$

3. (a) When temperature rises, K.E/speed of molecules of the gas increases. Since volume is constant this increases the rate of collision, with the walls of the container, and increase in collision increases pressure.

(b)

(i) Length of column of dry air — Temperature

Length/ height of the head — Volume of air

(ii) Temperature is varied and values of L and T. Measured and recorded; a graph of L versus T. (A) is plotted. This is a straight line cutting T axis at O (A) (or -273^0C) since tube is uniform L α T.

(iii) The water bathy allows the air to be heated uniformly.

(c) $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$ $= \frac{1.5 \times 10^5 \times 1.6}{285} = \frac{1.0 \times 10^5 \times V_2}{273}$

$= V_2 = 23m^3$

4. (a) (i) Easily magnetized and demagnetized

(ii) $\frac{V_p}{V_s} = \frac{N_p}{N_s}$ $\frac{240}{V_s} = \frac{500}{50}$

$V_s = 24$; $V = V_{PR}$

$V_{QP} = 1/3$; $V_{PR} = 8$ V

(b) Volume of A displaced = 6.0 x 12 cmcm^3 or P = G * g

Mass = $12 \times 10^6 \times 800$ = 0.0096 kg F = PXA ans = 0.09N

Weight = mg = 0.096N

(ii) Volume of B displaced = 6.0 x 3 = 18 cm^3

Weight = 18 x 106 x 1000 x 10 = 0.18N

(iii) Weight of block = weight of third displaced

0.096 + 0.18 = 0.276

Mass = 0.027 kg

$\text{Volume} = \frac{0.0276 \text{ kg}}{42 \times 10^{-6} m^3}$

=657 kgm^{-3} can also be in g/cm^3

5. (a) When whirled in air centripetal force is provided by bottom of container because of the holes, there is no centripetal force on water on the water, so it escapes through holes leaving clothes dry.

(b) (i) I Centripetal force equals force of friction

$F = Mw^2r = 0.4$

$W^2 = 0.4$ or $F = Mw^2r$

0.1×0.08 $0.4\ 0.1\ w^2 \times 0.08$

$W = 7.07$rad/s $W = 7.07$ rad/s

II $F = Mw^2r = 0.1 \times 7.07^2 \times 0.12$

$= 0.60$N

Force required $= 0.60 - 0.40$

0.20N

(ii) The block will slide this is because although the frictional force is greater centripetal force would be needed to hold it in place.

SECTION II

6. (a) Conditions of interference: Waves must equal frequency and wavelength; to be in phase or have constant phase relationship (comparable amplitude)

(b) Walking along PQ creates path difference between waves from L_1 L_2 when the path difference is such that the waves are in phase of full of wavelength loud sound is heard, when the path difference is such that the waves are out of phase. (½ of odd ½ λ) low sound is heard.

(ii) $L_1 A - L_2 A = \lambda$

From the figure $L_1A = 18.5$cm + 0.1

$L_2 A = 18$ cm + 0.1

$L_2A = L_1 A = 0.5$ cm + 0.2

Using scale given $\lambda = 0.5 \times 200$

$= 100$cm

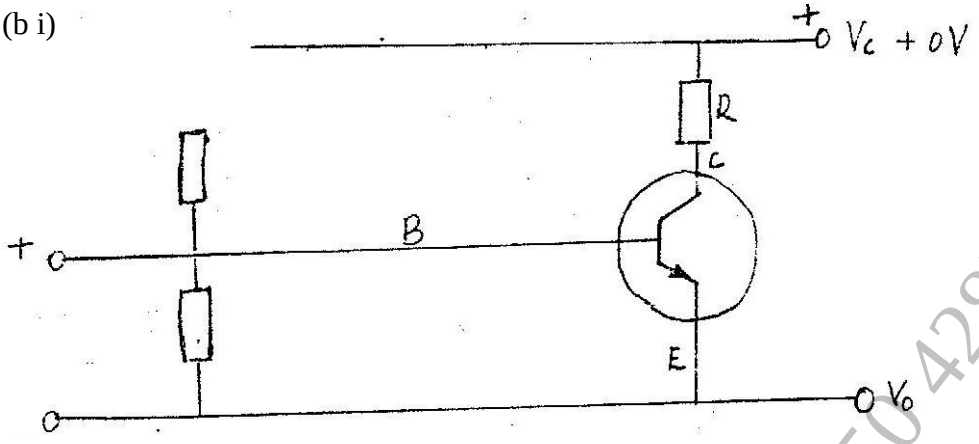
$V = f\lambda \quad = 350 \times 1$

$350m^{-1}$

(iii) The points interferences are closer; higher frequency $\Rightarrow$shorter wavelength; so if takes shorter distance along PQ to cause inference.

7. (a) Pure semi- conductors doped with impurity of group 3, combination creates a hole (positive), this accepts electrons.

(b i)



(i) At V_e E = 0

$V_{cc} = I_c R_L$

$L_c = 9/1.8$ K Ω $l_c = 10$

$V_eE = V_{cc} = 9$

(ii) Δl_c = (see graph) = 3.5 – 1.2 = 2.3 mA

$B = \frac{\Delta l_c}{\Delta l_c}$

2.40A

40 μ A

= 60.