KCSE 1997 PHYSICS PAPER 232/1 MARKING SCHEME

1. Volume = 7.4 – 4.6 cm
   2.8cm
   Density = $\frac{\text{mass}}{\text{Volume}}$
   = $\frac{11g}{2.8\ cm^3}$
   = $3.9gcm^{-3}$

2. F_1 and F_6

3. Either altitude or latitude/ radius of earth changes/ acceleration due to gravity from place to place away from the earth

4. Balance: meat + 0.5 kg on one side and 2 kg on the other:

5. $H_1\ P_1g = h_2\ p_2g$
   $H_2 = \frac{1.36 \times 10^4 \times -64}{8 \times 10^2}$
   = 1088cm;/ 10.88m.

6. Volume of 1 molecule = $\frac{18cm^3}{6 \times 10^{23}}$

   Diameter of the molecule = $18cm^3$
   6×10^{23}
   $\sqrt[3]{\frac{18cm^3}{6 \times 10^{23}}}$
   = 3.1×10^8 cm
   = 3.11×10^8

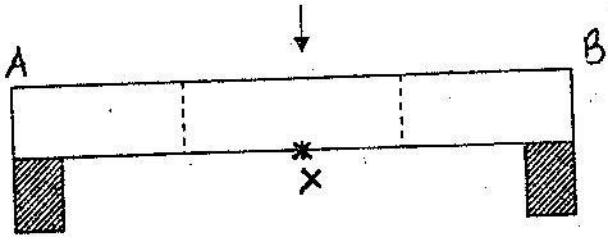
7. Glass is a bad conductor of heart, the difference in temperature between the inside and the outside cause unequal expansion

8. Adhesion of water to glass is greater than cohesion

9. The rate of cooling depends on the rate of evaporation
   Rate of evaporation depends on the surface area
   Surface area A, < surface area B for evaporation

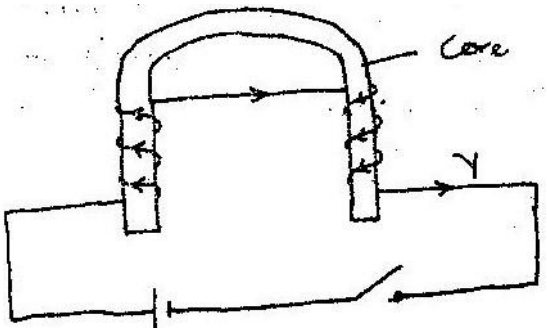
10. A ray from A A ray from B
    Relative positions of A and B correctly drawn

11. Solar cell (photovoltaic) photocell/ photo electric cell

12. 

13. Soft magnetic materials loose their magnetism easily while hard magnetic materials retain magnetism longer

14. Q = It Q = 0.5 x 4x x 60; = 120C

15. 

16. d= speed x t; 340 x 2; 680m

17. At low speeds the speed is streamline
At high speed the flow is turbulent

18. $\frac{V_r}{V} = \frac{l}{l_r}$

$\frac{240}{6} = \frac{30}{l_r}$ $l_r = 0.75A$;

19. $mgh = \frac{1}{2} mv^2$ OR $V^2 = U^2 + 2as$;
$h = \frac{1}{2}$ $S = V^2 = 36$
$= 18m$; $2as \quad 2(10)$
$S = ut + \frac{1}{2} at^2$ $= 1.8m$;

20. V = f;
$V = \frac{3.0 \times 10^8 ms^{-1}}{F \quad 95.6 \times 10^6 S^{-1}}$ = 3.14m;

21. 6V

22. parallel $\frac{l}{R_P} = \frac{l}{400} + \frac{l}{400} + \frac{2}{400}$

YZI $= \frac{V}{R} = \frac{12}{60} = 0.02A$

$$I = \frac{V}{R} = \frac{12}{60} = 0.02\ A$$

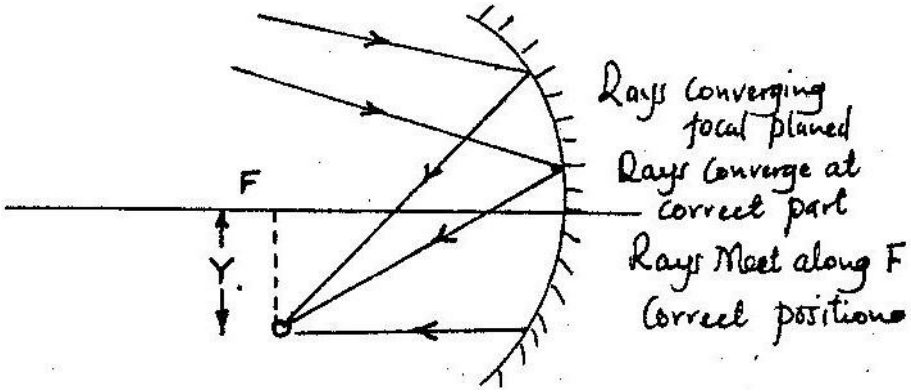
$$\frac{400}{600} \times 12 = 8V$$

23. (No of irons) x 1000) = IV

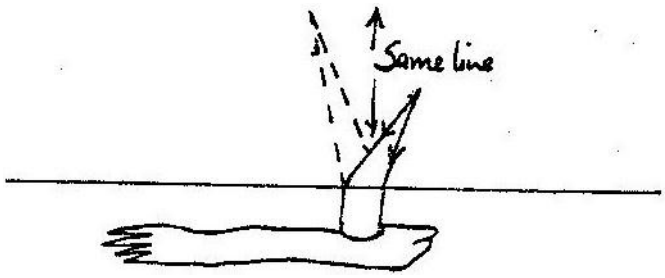
$$\text{Number} = \frac{13 \times 240}{1000} = 3.12;$$

24. Extra heat is required to change ice to water / latent heat of fusion

25.



26.



27. A trolley slows down/ motion decreases since mass increases and the momentum is conserved, the velocity goes down

28. $C_T = C_1 - C_2 = 1 = 1 + 1$

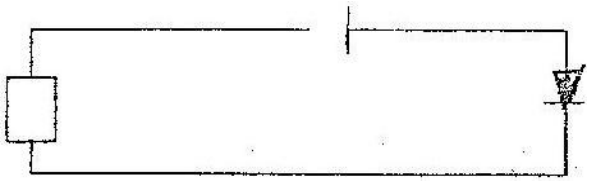
$$C_T \quad C_P \quad C_3$$

$$= C_T = \frac{C_P\ C_3}{C_P + C_3}$$

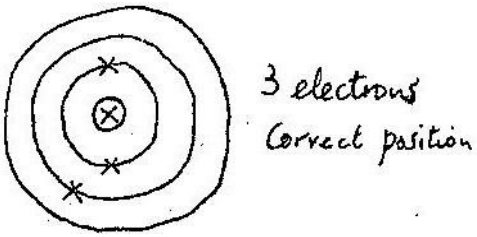
29. $^0C + 273 = -20 + 273 = 252K$

30. (a) Dark and bright fringes (b) Coloured fringes

31. Small differences in frequencies

32. 

33. By using laminated core

34. 

35. After 3 secs number decayed = ½ x 5.12 x 10^{20} = 2.56 x 10^{20}
Next 3 secs. Number decayed = ½ x 2.56 x 10^{20} = 1.28 x 10^{20}
Total number decayed = (1.28 + 2.56) x 10^{20}
= 3.84 x 20^{20}

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MARKING SCHEME.

1. i) -To make and beak contact / circuit
- It bends and straightens or the metals expand differently.

ii) Current flows, heating takes place, temperature rises, strip is heated and bends way from contact ; disconnects heater; temperature; drops reconnected heater or completes circuit.

b) Let final temperature be θ_2

Heat lost by water = $4200 \times 0.2 (20- \theta_2)$

Heat lost by glass = $0.2 \times 670 \times (20 - \theta_2)$

Heat gained by ice = $0.04 \times 334 \times 10^3$

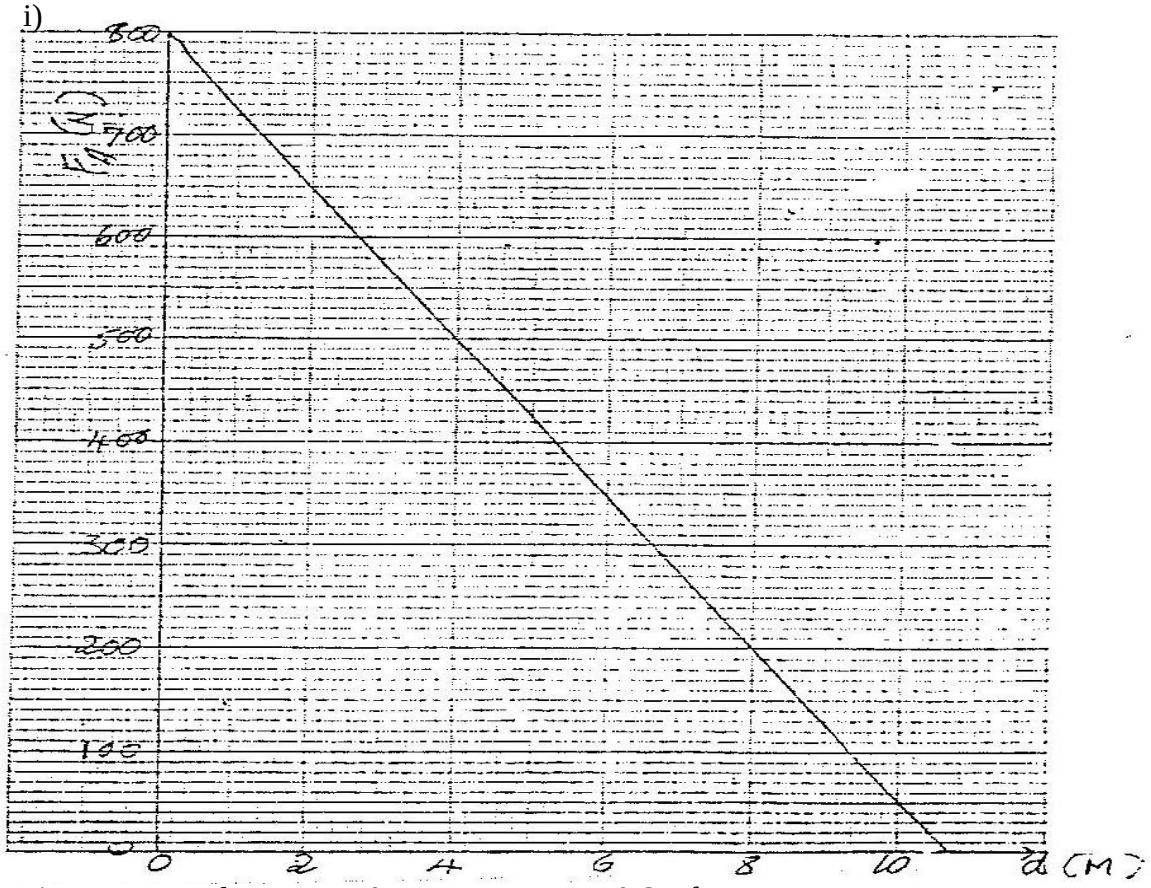
Heat gained water = $0.04 \times 4200 (\theta_2 – 0)$

Heat lost = Heat gained.

$4200 \times 0.2 (20 - \theta_2) + 0.2 \times 670 \times (20 - \theta_2) = 0.04 \times 334 \times 103 + 0.04 X 4200 (\theta_2 – 0)$

$\theta_2 = 5.36^oC$

2(a) i)



ii) Extrapolation F4 – 0 — 10.6m force is zero

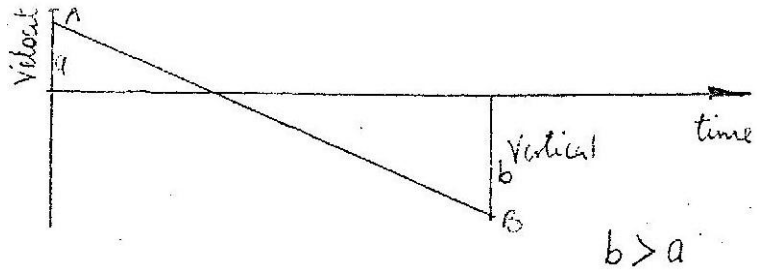
Leading x axis = 10.6 + 0.2 — 10.6 -8

Intercept 10.6

10.6 – 8 = 2.6 — = 2.6m away from B

b) $10w + (10x60) = 2.0 \times 40 \Rightarrow 10w + 6x = 80 \quad w = {}^{x}/_{10} = 2N$

3a)



b) i) $V = u + at$ Deceleration = $\frac{u - v}{t}$

$0 = 20 + 2a$ OR $= \frac{20 - 0}{2}$

$a = -10ms^{-2}$ $= 10ms^{-2}$

ii) Stopping time = 2.2s Total time stop = 2.2 sec

Before stopping = $0.2 \times 20 = 4m$ $S = ut + {}^{1}/_{2}\, at^2$

$\frac{10 - 202}{2(-10)} = \frac{400}{20} = 20$ $= (20 \times 2.2) + {}^{1}/_{2} \times 10 \times 2.2^2$

$20 + 4 = 24m$ $= 19.8m$

4a) AB: $(2000 \times 20) + (600 \times 200) + ½ \times 10 \times 4000) + (½ \times 30 \times 4000)$

$40000 + 120000 + 60000$

Total 200000J = 200KJ

b) $6000 \times 0.6 = 3600w$

c) Power Input = $\frac{3.0 \times 10^5 \times 10 \times 360}{60 \times 60} = 3.0 \times 10^5 wx$

Total = $(3 + 2\_ \times 10^3 = 5.0 \times 10^3 kw$ Eff. ${}^{3}/_{5} \times 100 = 60$

5a) Amount of current No of coils / shape of core / X – core

b) i) End of coil facing up becomes a south pole and the metre rule is pulled down / attraction occurs. Or Rule tips; core magnetized; top of core becomes south pole; attracts magnet.

ii) The metre rule to have appointer attached to read zero when switch S is open. Use rheostat to vary current to maximum and calibrate accordingly.

c)HF $= hf_o + ½\, mv^2$

$= (3.2 + 82) \times 10^{-19} = 11.2 \times 10^{-19}$ $f = \frac{11.2 \times 10^{-19}}{6.63 \times 10^{-19}}$

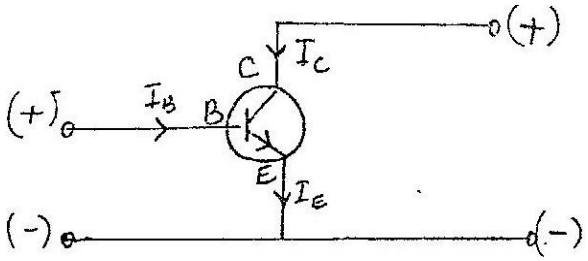
$\lambda = c = \frac{3.0 \times 10^8 \times 6.63 \times 10^{-34}}{F \qquad 11.2 \times 10^{-9}} = 1.76 \times 10m$

SECTION 2

6ai) Semiconductors – conducting is by holes Conductors – conducting is by electrons

ii) Semiconductors – silicon, germanium Conductors – copper , tin iron.

b)i)



ii) $I_B = \frac{0.5}{100} \times 2 = 0.01$ mA $I_C = 2 - 0.01 = 1/99$MA

$I_E = I_C + I_{rs}$

iii) $I_B = \frac{0.5 \times 4}{100} = 0.02$mA $I_c = 3.98$mA

$\triangle I_b = 0.02 - 0.01 = 0.01$

$I_C = 4 - 0.02 = 3.98$mA $\triangle I_c = 3.98 - 1.99 = 1.99$

$h_{FE} = \frac{3.98}{0.02} = 1.99$

$\triangle I_c = 3.98 - 1.79 = 1.99$

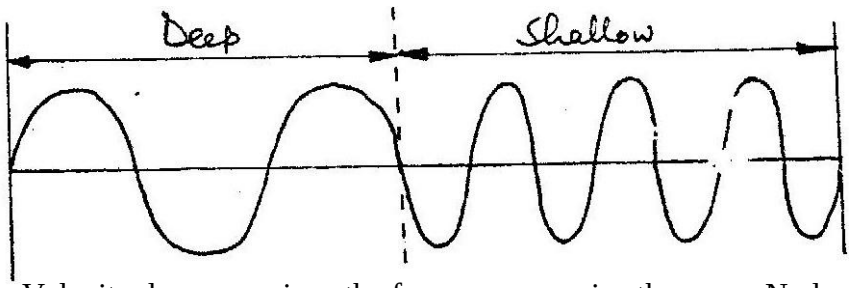
$\triangle I_b = 0.02 - 0.01 = 0.01$

$HFE = \frac{\triangle Ic}{\triangle Ib} = \frac{1.99}{0.01} = 1.99$

$\frac{\triangle I_c}{\triangle I_b} = \frac{1.99}{0.01} = 199$

7a(i) Transverse – particles in the wave perpendicular to the direction of the wave.
Longitudinal – particles move in the same direction as the wave.

b)i)



ii) Velocity decreases since the frequency remains the same. No loss of energy therefore amplitude does not change.

c) a) Frequency = $^{30}/_{60} = 0.5$ Hz

b) Speed = $^{6}/_{2} = 3$m/s $\lambda = V/f$ $^{3}/_{0.5} = 6$m

d) A long AA' – loud and soft sound (constant)
a long OO' – loud and solid.