5.3 PHYSICS (232)

5.3.1 Physics Paper 1 (232/1)

SECTION A

1. 7.6+(0.6x3);
   7.6+1.8
   9.4ml; (2 marks)

2. Frictional force is equal to the applied force but in the opposite direction, hence the net applied force is zero; (1 mark)

3. $m = \frac{w}{g}$;
   $= \frac{16.5}{1.7}$;
   $= 9.71kg$; (3 marks)

4. The gas diffuses; from the region of higher concentration to a region of low concentration. (1 mark)

5. Glass is a poor conductor; unequal expansion leads to cracking; (2 marks)

6. Oil film spreads over a large surface of the sea reducing inflow of air needed by the aquatic life;
   - Reduces the light entering
   - Beaches become dirty;
   - Poisons marine animals when taken in;
   (any two correct) (2 marks)

7. Stop rising when upthrust is equal to the weight of the balloon and its contents; (1 mark)

8. Mass of gas must be constant; (1 mark)

9. - The height of it's centre of gravity above the surface is constant;
   - Position of its center of gravity does not change. (1 mark)

10. It is within the elastic limit; because
    - the values of $\frac{F}{e}$ = constant in all the cases $\frac{F}{e}$=5;

    OR

    - a graph of force against extension is straight line through the origin;
    - conclusion from graph; (2 marks)

11. The body's velocity **decreases uniformly** from 20m/s and becomes zero after 5 seconds; the velocity then starts increasing in the **opposite direction** to a maximum value of 20m/s. (2 marks)

12. • Friction between the moving parts of the pulley system;
• Work done against friction;
• Work done lifting the moving parts of the pulley system; (2 marks)

13. (i) OA - heat gained is breaking intermolecular forces of the molecules/melt the ice without change in temperature;

(ii) AB - temperature of the water formed starts to rise until it starts to boil; (2 marks)

14. (a) Air above the plane moves faster than air below it (because of it's shape) creating a region of low pressure above the place hence plane experiences a lift; due to the pressure difference. (1 mark)

(b) At B; because the cross-sectional area is smaller hence the air moves faster in that region; (2 marks)

SECTION B

15. (a) Extrapolation of graph to cut the temperature axis;

absolute zero = 278 ± 2°c; (-272 ± 2°c to -280° ± 2°c; (2 marks)

(b) (i) When tube is horizontal pressure of air is equal to atmospheric pressure; i.e. 76cmHg. (1 mark)

(ii) (I) When vertical,
pressure of air = pressure due to mercury column+atmospheric pressure
= (24+76)cmHg
= 100cmHg; (1 mark)

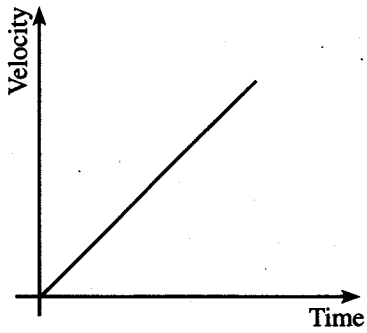
(II) PV = a constant;
76x15=(76+24)l;
$l = \frac{76 \times 15}{100}$
= 11.4cm; (3 marks)

(c) (i) To expel air; (1 mark)

(ii) Pressure of air outside the bottle is greater than the pressure of air inside; (1 mark)

(iii) Cooling causes condensation of vapour;
Creating a partial vacuum; (2 marks)

16. (a) (i)



(straight line not necessarily through the origin but with positive gradient)

acceleration;
constant acceleration; (2 marks)

(ii) Net force on the parachute becomes zero. (Sum of downward forces on it should be equal to sum of upward forces) (1 mark)

(b) (i) Net force = 2+-0.4; =-2.4N; (2 marks)

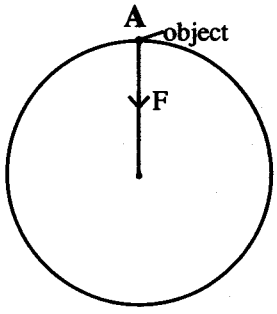
(ii) F=ma;
-2.4 = 0.2a';
$a = -12ms^2$; (3 marks)

(iii) $V^2 = u^2 + 2as$;
$s = \frac{0 - 5^2}{-2 \times 12}$;

$\simeq 1.04m$; (3 marks)

(c) (i) - Weight of object;
- Tension in the string; (2 marks)

(ii)



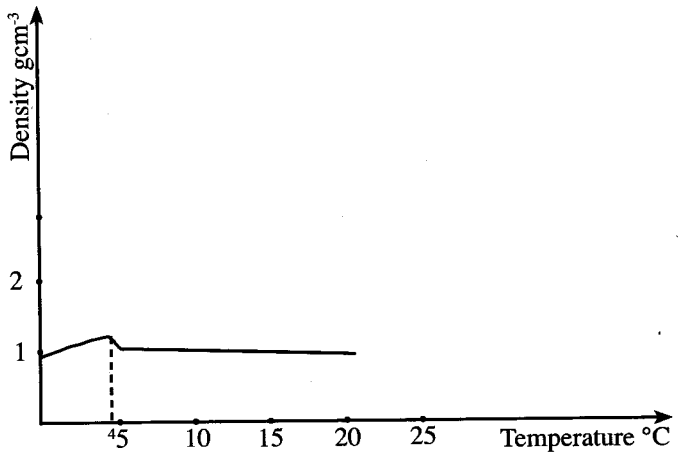
The force should be from point A to the center but not beyond

(1 mark)

17. (a) - Fire heats air around region C which expands and becomes less dense;
- The less dense air rises up the vent and emerges at A;
- Cool (more dense) air moves down the vent at B introducing fresh air into the mine (3 marks)

(b) The flask has double walls which are silverly on both sides the shiny surface is a good reflector of heat; (1 mark)

(c)



(1 mark)

(d) (i) Heat gained by water = power x time;
$= 2.5 \times 10^3 \times 4 \times 60$;
$= 6.0 \times 10^5$J; (3 marks)

(ii) $E = mc\Delta\theta$;

$$\Delta\theta = \frac{2.5 \times 10^3 \times 4 \times 60}{2 \times 4.2 \times 10^3};$$

$= 71.43^oC$; (3 marks)

18. (a) (i) Lengths BC and CD; (1 mark)

(ii) 100 x BC = S x CD;

$$S = \frac{100BC}{CD};$$ (2 marks)

(b) (i) Volume of 10g = $\frac{mass}{density}$;

$$= \frac{20}{800};$$

$= 2.5 \times 10^{-2} m^3$; (3 marks)

(ii) Upthrust = weight of water displaced

$$= \frac{20}{800} \times 100 \times 10;$$

$= 2.5 \times 10^2$N; (2 marks)

(iii) Tension = U-mg;
= 250 - 200
= 50N; (2 marks)

19. (a) (i) Valve B rests under its own weight;
- pressure in the cylinder decreases and water rises into the cylinder pushing the valve open; (2 marks)

(ii) Valve A rests under its own weight and the weight of the water; high pressure is created in the region between valve A and valve B forcing valve B to open; (1 mark)

(b) The water is lifted up by the piston ad comes out through the spout; (1 mark)

(c) $P_w g h_w = P_p g h_p$;

$h_p = \frac{1000 \times 10}{800}$;

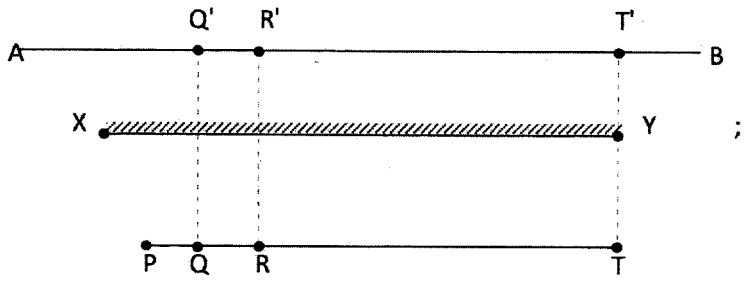
=12.5m; (3 marks)

(d) - Force applied on piston (during downstroke);

- Ability of the parts of the pump to withstand the pressure of the liquid column; (2 marks)

5.3.2 Physics Paper 2 (232/2)

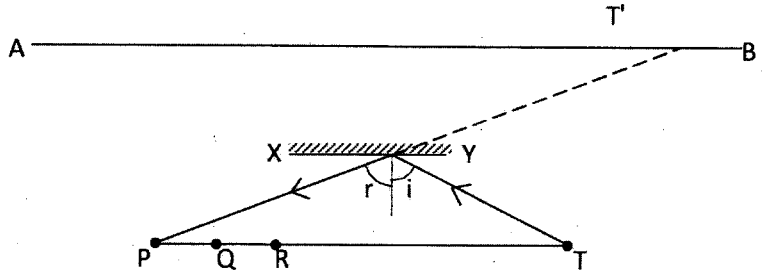
1. (a)



(1 mark)

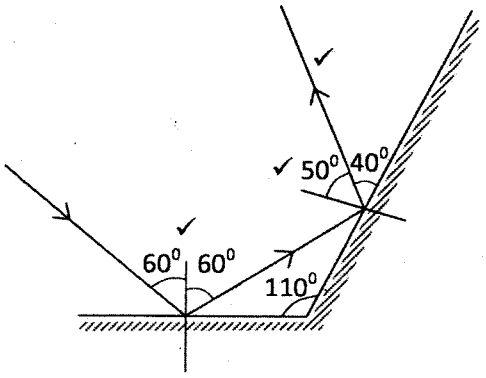
(b) T and R; (1 mark)

(c)



- Reflected ray from T and R moves towards P; (1 mark)

2.



✓- 1st reflection
✓- 2nd reflection
✓- 50⁰ (correct angle)

(3 marks)

3. $V + V + \frac{V}{2} = \frac{5V}{2}$

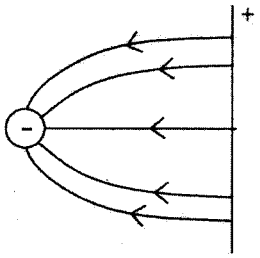
$\frac{5V}{2} = 15\ V\surd$

$V = 6V$

$\therefore \frac{V}{2} = \frac{6}{2} = 3V\surd$

(2 marks)

4.



Check correct direction of field lines. (2 marks)

5. Refractive index = $\frac{\text{real depth}}{\text{apparent depth}}$ √

$= \frac{40}{30}$ √

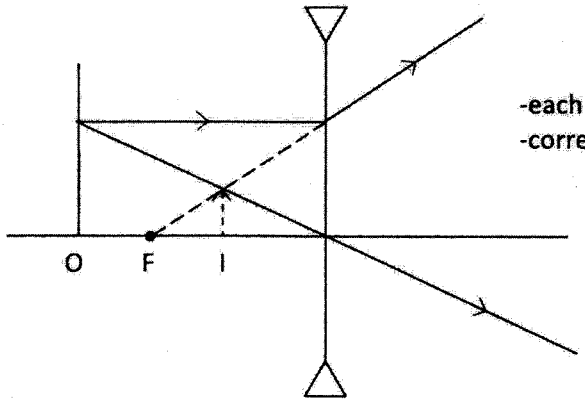
= 1.33 √ (3 marks)

6. β and γ rays; (1 mark)

7. L - south pole; (1 mark)

8. UV light ejects electrons by photo electric;
emission reducing the negative charges; (2 marks)

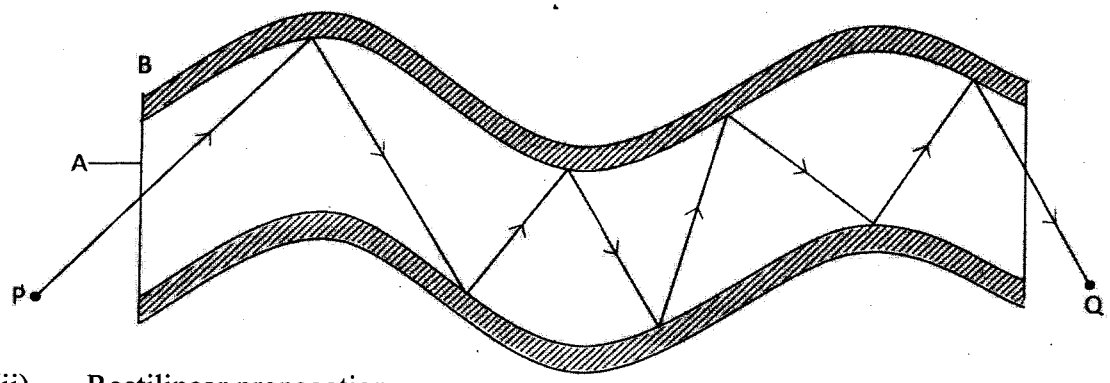
9.



-each array- ✓✓
-correct virtual diminished image ✓

(3 marks)

10. (i)



(ii) Rectilinear propagation.

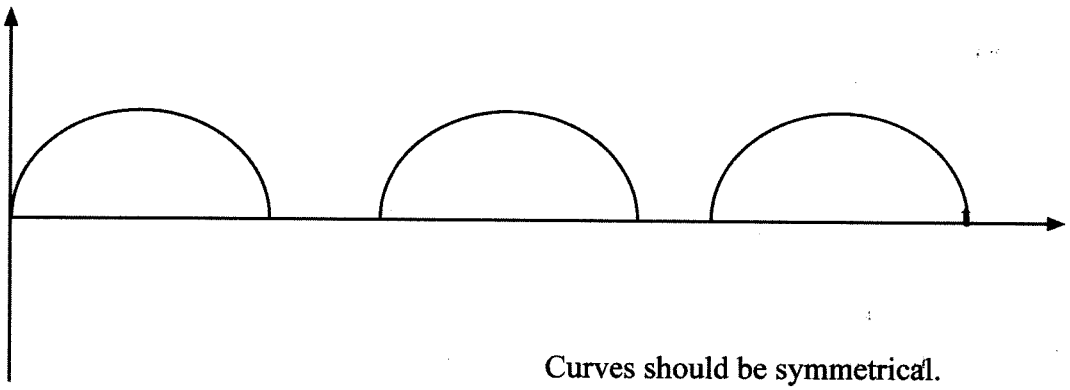
F; correct direction (1 mark)

11.

(1 mark)

12. Alternating current can be stepped up, or enhances reduced power losses; (1 mark)

13.



Curves should be symmetrical. (1 mark)

SECTION B

14. (a) (i) amplitude = 5 cm√ (1 mark)

(ii) T = 20s√

$f = \frac{1}{T}$√

$f = \frac{1}{20} = 0.05\ H_2$√ (4 marks)

(iii) $V = \lambda f$ √

$\lambda = \frac{20}{0.05}$ √

= 400 m √ (3 marks)

(b) (i) Waves at Q are in phase √ so there is constructive interference. √ (2 marks)

(ii) Waves are out of phase hence destructive interference. √ (1 mark)

(iii) Interference pattern would disappear. √ (1 mark)

15. (a) (i) V= IR√
10I = 1.5√
I = 0.15A √ (3 marks)

(ii) bulb = 0.1A√
R×0.1 = 1.5√
R = 15Ω√ (2 marks)

(b) (i) the resistance of the bulb would increase;

(ii) Current is higher hence increases; temperature increased temperature results in increased resistance; (2 marks)

(c) Number of units = (0.1 x 10 + 0.06× 10 + 0.03 ×10)
= 1.9 units;

Cost = 1.9 × 40 × 7;
= Ksh 5.32; (3 marks)

16. (a) (i) Pointer deflects upto a certain;maximum value and then returns to zero; (2 marks)

(ii) There is a deflection in the opposite direction then back to zero; As Flux in A falls, flux in B also falls and causes induced e.m.f in the opposite directions; (2 marks)

(b) (i) Current in the primary is constantly changing its direction;
so that the resulting flux (which link coils) is constantly changing its direction. Therefore alternating e.m.f is induced in the secondary coil;
(2 marks)

(ii) $\frac{Vs}{Vp} = \frac{Ns}{Np}$;

$\frac{Vs}{240} = \frac{200}{1000}$;

Vs = 48V; (3 marks)

(iii) Efficiency $= \frac{\text{Power output}}{\text{Power input}} \times 100\%$;

$= \frac{IsVs}{IpVp} \times 100\%$

$= \frac{0.8 \times 48}{0.2 \times 240} \times 100\%$;

$= 80\%$; (3 marks)

17. (a) (i) The image diminishes (becomes smaller); (1 mark)

(ii) $m = 1 \Longrightarrow \frac{V}{u} = 1$;

$V = u = 40$ cm; (2 marks)

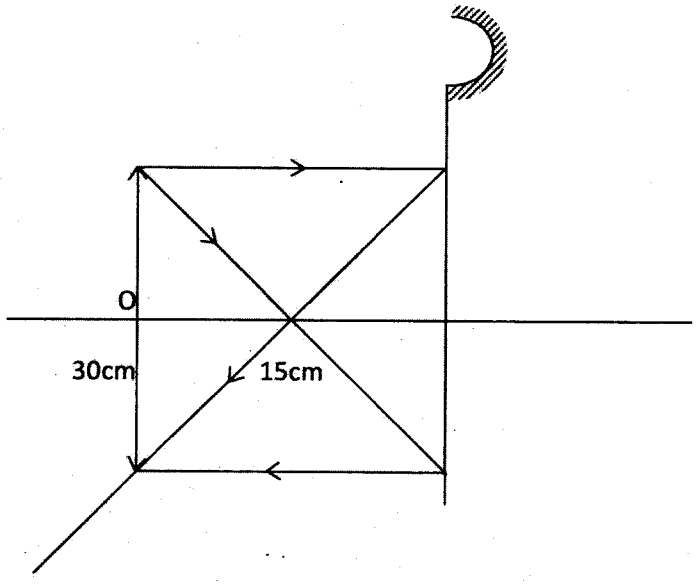
(iii) $u = 25$
$m = 4$;

$m = \frac{v}{u}$

$\frac{v}{25} = 4$;

$V = 100$ cm; (3 marks)

(b)



(3 marks)

(c) A bulb/lamp placed at principal focus will give a wide parallel beam; (1 mark)

18. (a) (i) To produce electrons; by thermionic emission; (2 marks)

(ii) To accelerate the electrons to give them enough K.E. to produce X-rays at the anode;; (2 marks)

(iii) To absorb stray X-rays, thus protecting the operator from those rays; (1 mark)

(b) Increases K.E. of electrons and hence causes X-rays of higher frequency; (1 mark)
OR
- X - ray are more penetrative
- X - rays of shorter wavelength.

(c) $E = hf$;
$= 6.63 \times 10^{-34} \times 7.5 \times 10^{14}$

$= 4.97 \times 10^{-19}$ J;

K.E = 4.97×10^{-19} 4.0×10^{-19};
$= 0.97 \times 10^{-19}$J; (4 marks)

5.3.3 Physics Paper 3 (232/3)

1 (a) $f_1 = 20\,cm \quad \pm 2cm$ (1)

(c) $f_2 = 15cm \quad \pm 2cm$ (1)

(f)

d(cm)	65	67	69	71	73	77	80	
V(cm)	37.5	33.8	31.1	29.1	27.5	25.2	24.0	±2

(6 marks)

(g) (i) Graph (6 correctly plotted points)

Labelling axes (1)
Plot (2 marks)
Curve/line on at least 4 correctly plotted points (1 mark)

(ii) I. Value of V $= 30 \pm 1$ (1 mark)

II. Slope $s = \dfrac{35 - 20}{81.25 - 63.75}$

$= -0.86$

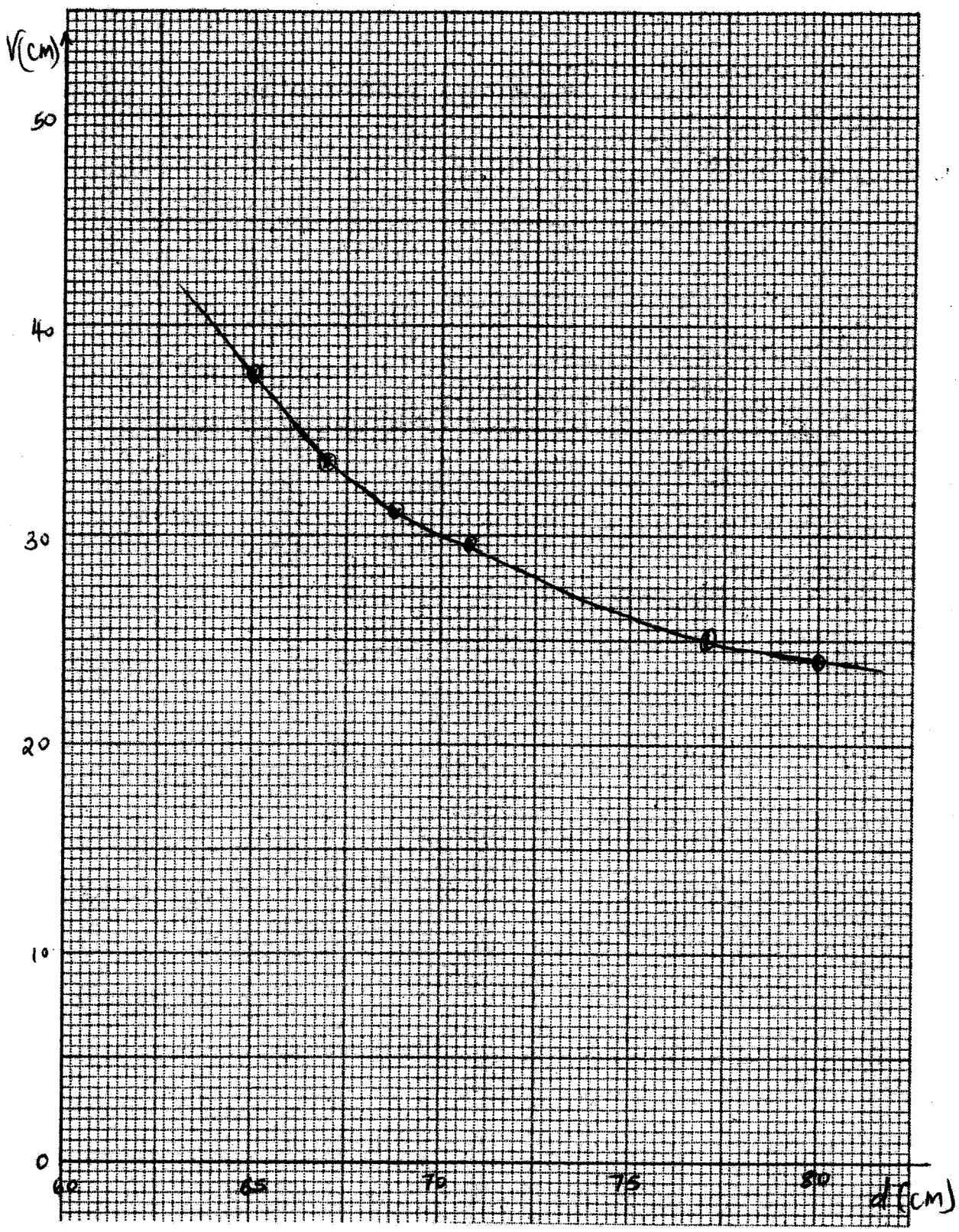
$\simeq -0.9$

No curve/line no slope (3 marks)

(iii) $K = \dfrac{-225}{(d-55)^2} = \dfrac{-225}{225} = -1$ (2 marks)

(iv) $M = \dfrac{S}{K} = \dfrac{-0.9}{-1} = 0.9$ (2 marks)

Graph 1



2. (b) (i) Maximum Voltmeter reading = 4.4 Volts (1 mark)

(ii) Voltmeter reading V_B = 3.7 Volts (1 mark)

(iii) In (i) p.d. measured is across both. (1 mark)
diode and resistor, while in (ii) p.d. is across diode only. (1 marks)

(c) V_B = 0.8 Volts. (1 mark)

(d)

V_A/V	V_B/V	$I = \frac{V_A - V_B}{1000}$ A
1.5	1.2	0.3×10^{-3}
2.0	1.7	0.3×10^{-3}
2.5	2.1	0.4×10^{-3}
3.0	2.5	0.5×10^{-3}
3.5	2.9	0.6×10^{-3}
4.0	3.4	0.6×10^{-3}

Column I = 1 mark

Values of V_B = 5 marks

Total for table = 6 marks

(e)

Axes labelled	1 mark
Scale (simple & uniform)	1 mark
Plotting	3 marks
Curve (line)	1 mark

(5 marks)

(f) I = 0.45mA, V_B = 2.3 volts

$$\therefore R = \frac{V_B}{I} = \frac{2.3}{0.45 \times 10^{-3}}$$

$$= 5.1 \times 10^3$$

$$= 5.1\,k\Omega$$

(3 marks)

GRAPH 2