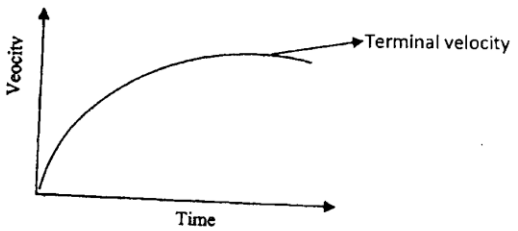
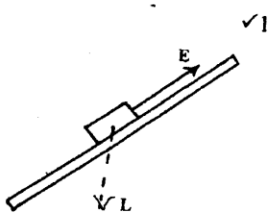
www.eeducationgroup.com

KABONDO DIVISION JOINT EXAMINATION - 2015
232/1 PHYSICS
MARCH / APRIL 2015
Form 4
MARKING SCHEME

1. M.S.R = 8.5mm ✓
   Actual reading = 8.96 – 0.5 = 8.46mm✓
   S.S.R = (0.01 x 46) = 0.46mm ✓
   = 8.96mm✓
2. The ball expands when heated and cannot go through the ring✓, but when left on the ring for sometime it heats the ring causing the ring to expand hence it passes through. ✓
3. Upthrust and frictional forces ✓
4. Glass flask expands first, creating more volume for water✓. Water then expands more increasing its level in the tube. ✓
5. Speed is the distance covered per unit time, while velocity of the speed is in a specified direction. ✓
6. Pressure is inversely proportional to the speed/ speed increases as pressure decreases.
7. Upthrust = weight of water displaced by the metal
   Wt of water displaced = wt in air – wt in water – (3 – 2) = 1N ✓
   Mass of water displaced = $\frac{1}{10}$ = 0.1kg ✓
   Density of water = 1000kgm^{-3}
   Vol of the water displaced = $\frac{0.1}{1000}$ = 0.001m^3✓
   Therefore volume of metal = 0.001m^3
8. - The force of friction providing the centripetal force is not reliable.
   - To avoid wear and tear on tyres
   - It prevents skidding.
   - The speed of the vehicle can be increased without skidding. (any one correct)
9. Air is compressible ✓
10. Light materials at the upper part make the building stable✓. Heavier base lowers the centre of gravity. ✓
11. From A to B, potential energy changes to kinetic energy ✓ B to C, Kinetic energy changes to potential energy. ✓
12. Each spring experiences a force of $\frac{30}{2}$ = 15N ✓
    f = ke ✓ e = $\frac{f}{k} = \frac{15}{3}$ = 5cm each spring extends to 5cm ✓
13. To reduce heat loss by radiation ✓
14. 

15. a) Ratio of the work output to the work input expressed as a percentage.

b) i)



ii) V.R = $\frac{1}{\sin 30^0}$ ✓1 = 2 ✓1

iii) Efficiency = $\frac{MA}{VR}$ x 100%

$\frac{65}{100} = \frac{MA}{2}$ x 100% ✓

$\Rightarrow$MA = 1.3✓

c) i) P = $\frac{F \times S}{t}$ ✓1 = $\frac{50 \times 10 \times 5}{60}$ ✓1 = 41.67W✓

ii) On impact the potential energy of the water converted to internal energy raising the temperature of the water. ✓

16. a) It's the point at which the weight of the body seems to act from ✓

b) The glass becomes more unstable ✓ since the C.O.G is now raised. ✓

c) Correct position of the C.O.G

d) ΣC.M = Σ A.C.M

0.3x + 2.0 x 0.1 = (30 x 0.2) + 2 x 0.1 ✓

0.3x = 6.2 – 2.0 ✓

x = 14N ✓

e) i) At equilibrium, the sum of clockwise moments about a point equals the sum of anticlockwise moment about the same point.

ii) 50 x 2 = w x 0.5 ✓

w = $\frac{50 \times 2}{0.5}$ ✓

= 200N✓

17. a) It is defined as the quantity of heat required to raise the temperature of a unit mass of a substance by one Kelvin.

b. impurities

pressure

c. I (i) Q= MC T

= 0.5 x 4200x (80-T)

= 168000-2100T

(ii) Q =168000-2100T +600

=168600-2100T

II. Heat lost = Heat gained

168600- 2100T =1x4000(T- 25)

T= 43.9^{0}C

www.eeducationgroup.com

d) $Mgh = MC\Delta\theta$ ✓1

$$\Delta\theta = \frac{mgh}{mc}$$

$$\Delta\theta = \frac{gh}{c} \checkmark$$

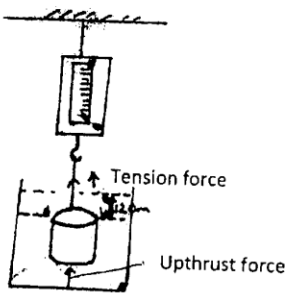
$$\Delta\theta = \frac{10 \times 120m}{4200} = \frac{1200}{4200} = 0.29^0c \checkmark$$

$= 240C - 0.29^0C$

$= 23.71^0C$ ✓

18. a) A floating body displaces its own weight of the fluid in which it floats. (1mark)

b) i)



ii) Up thrust = 1.5N

Mass of water displaced = 0.15kg ✓ (1mark)

Density of water 1000kg / m3 ✓ (1mark)

Volume of displaced water = $\frac{0.15kg}{1000}$ = $1.5 \times 10^{-4}m^3$ or $150cm^3$✓ (1mark)

iii) Apparent weight

Mass of the block = $\rho \times v$

$= 2.5 \times 10^3 \times 1.5 \times 10^{-4}$

= 0.375kg ✓ (1mark)

Real weight = 3.75N

Up thrust = 1.5N

Apparent weight = 3.75 – 1.5 (2marks)

= 2.25N

19)a When temperature rises, the kinetic energy of gas molecule also increases.

The speed of the molecule also increases

Since the volume is constant, the rate of collision of the particles with walls of the container also increases.

This increases the pressure of the gas.

b. i) Length (L) of column of dry air.

- Temperature✓
- Length / Height of the bead. ✓
- Volume of the enclosed air. ✓

Ii Temperature is varied and corresponding values of L and T are measured and recorded.

- A graph of L versus T is plotted.
- The graph is a straight line cutting T axis at OK (or – 273°C)

e) $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

$P_1 = 1.5 \times 10^5$pa; $P_2 = 1.0 \times 10^5$ Pa

$T_1 = (12 + 273)$ K = 285k; $T_2 = (0+273)$ k = 273k

$V_1 = 2.6m^3$; $V_2 = ?$

$\frac{1.5 \times 10^5 \times 26}{285} = \frac{1.0 \times 10^5 \times V_2}{273}$ ✓

$\Longrightarrow V_2 = 3.736m^3$ ✓

www.eeducationgroup.com

KABONDO DIVISION JOINT EVALUATION TEST- 2015
232/2 PHYSICS
MARCH / APRIL 2015
Form 4
MARKING SCHEME

1. - Increase the size of the object (1mark)
   - Reducing the distance of the object from the pin-hole. (1mark)
2. - Large currents can be drawn form them
   - They can be kept in a discharged condition for a long time
   - They are lighter than lead-acid accumulators. (2marks)
3. $R_T = \frac{6 \times 2}{6+2} + 6$

   $= 7.5\Omega$ (1mark)

   $I_T = \frac{V}{R_T} = \frac{6}{7.5} = 0.8A$ (1mark)

   $= 0.6A$ (1mark)
4. i) Positive charge (1mark)
   ii) The leaf divergence initially reduced because the positive charges on the leaf and the metal rod are neutralized by electrons from the cap. (1 mark)
5. Current flows in the circuit and the electromagnet gets magnetized✓ attracts A which in turn moves up to establish the contacts. This completes the circuit hence the bell rings.
6. $Q = It$

   $= 12 \times 2.5 \times 60$ ✓1

   $= 1800C$✓ (2marks)
7. a) Wavelength $\lambda = 20cm = 0.2m$✓ (1mark)

   Frequency $f = \frac{v}{\lambda} = \frac{16\,m/s}{0.2\,m}$ ✓$= 80Hz$✓ (2marks)
8. $\text{Period (T)} = \frac{0.025}{3/2}$

   $= \frac{0.05}{3}$

   $f = \frac{1}{T} = \frac{1}{0.05/3}$

   $= \frac{3}{0.05} = 60\,Hz$
9. Diffraction would be more pronounced ✓
   Diffraction not pronounced✓
10. Increase tension✓
    Reduce the vibrating length✓

    $P = \frac{V^2}{R}$

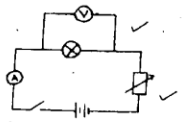
    or $R = \frac{V^2}{P}$
11. $= \frac{240 \times 240}{2000}$

    $= \frac{24 \times 24}{20}$

    $= 576\Omega$

www.eeducationgroup.com

12. a)



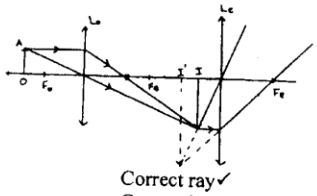
b) Scale – 1
Plotting -2 (7 – 8 points)
1 (5 – 6)
(4 – below)

c) Gradient or slope ✓✓of tangent at 0.4A. That is 5.54Ω✓

13. a) A point on the principal axis at which rays, parallel and close to the principal axis converge after refraction through the lens. ✓

b) A real image is formed when rays of light meet but a virtual is formed when rays of light appear to meet but do not actually meet. ✓

c)



Correct ray✓
Correct image I✓
Correct image I^1✓

d) i)

$\frac{1}{u}(cm^{-1})$	0.050	0.040	0.033	0.029	0.025	0.022
$\frac{1}{u}(cm^{-1})$	0.017	0.027	0.033	0.038	0.042	0.044

Scale -1✓

Axes -1✓
Plotting -2
Focal length = 15.4 (15.6 – 15.15)✓

14. a) - Ray travels from a optically medium to an optically rarer medium;
- Angle of incidence in the denser medium is greater tan the critical angle of the medium;

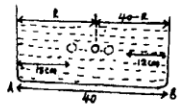
b) $\eta = \frac{1}{\text{Sin C}}$

$\eta = \frac{1}{\text{Sin } 42.5}$

$\eta = 1.4$;

c) - View internal organs of the body (medicine)
- Communication cables – have higher carrying capacity, thinner and lighter.
(For any one)

d)



$\eta = \frac{\text{Real depth}}{\text{Apparent depth;}}$

$\frac{R}{18} = \frac{40 - R}{12}$

$2R = 120 - 3R \quad = R = 24\text{cm}$

The bubble is R = 24cm from end A or 40 – 2A = 16 from end B;

15. a) i) Longitudinal – particles of transmitting medium vibrate in the direction of the wave,while transverse particles move perpendicular to that of wave motion.

b) i) $2.5 \times v = 400 \times 2$; or $v = \frac{d}{6} = \frac{400 \times 2}{2.5}$

$V = 320$ m/s;

ii) $t = \frac{2(x - 400)}{320}$; or 2d = speed x time

$= 320 \times 4.5$

$t = 2.5 + 2$; $= 1440$

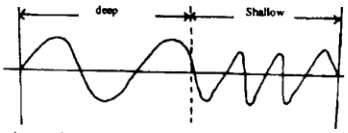
$d = \frac{1440}{2}$

$\longrightarrow \frac{2(x-400)}{320} = 2.5 + 2$

$x = 1120$M; $x = 720 + 400$

$= 1120$

c) i)



ii) Velocity reduces; and wavelength decrease; since the frequency remains the same.
No loss of energy therefore amplitude does not change.

16 a) - Area of overlap of plates - Distance of separation of the plates - Nature of the dielectric material	1-deny for area 1-plates only Any two correct
b) i) Capacitors in // $1+2+3=6\mu F$ Capacitors in series $\frac{6 \times 3}{6 \times 3}\mu F$ $= 2.0\mu F$ $= 2.0 \times 10^{-6}F$	1 mark 1mark 1mark Accept $2.0\mu F$ or 2.0×10^{-6}
ii) $Q = CV$ $= 2.0 \times 10^{-6} \times 10$ $= 2.0 \times 10^{-5}C$	 1mark correct substitution Deny for 2 x 10=20
iii) $E = \frac{1}{2} CV^2$ p.d across $3\mu F$ capacitor = 6.667 p.d across $2\mu F$ = 3.333 $\Longrightarrow E = \frac{1}{2} \times 2 \times 10^{-6} \times 3.333 \times 3.333$ $= 1.111 \times 10^{-5}J$	1mark 1mark 1mark 1mark

KABONDO DIVISION JOINT EXAMINATION PHYSIC PP3 MARKING SCHEME

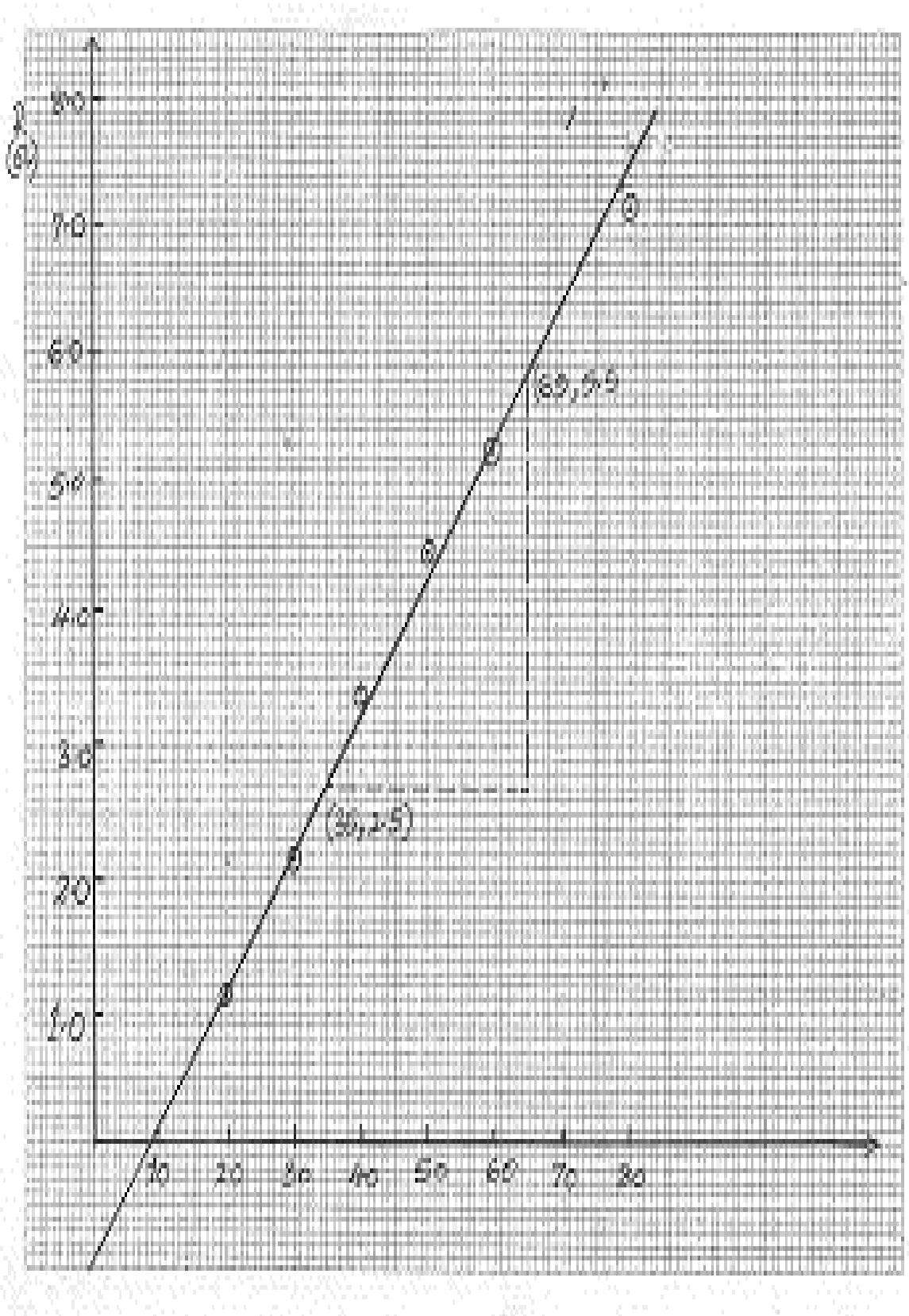
1 a) i) d1 = 0.23mm d2 = 0.25mm d3 = 0.25mm

$$Average\, d = \frac{0.23+0.25+0.25}{3}$$
$$= 0.25mm$$

Length L (cm)		20	30	40	50	60	80	
P.d (v)		0.10	0.20	0.30	0.35	0.45	0.60	3mks
Current	I(MA)	94	92	92	88	86	85	1mk
	I(A)	0.094	0.092	0.090	0.088	0.086	0.085	1mk
$R = \frac{V}{I}\Omega$		1.06	2.17	3.33	3.98	5.23	7.06	3mks

ii)
$$slope = \frac{\Delta R}{\Delta L}$$
$$= \frac{5.8-3.8}{65-35}$$
$$= \frac{3.0}{30}$$
$$= 0.1\Omega cm^{-1}$$

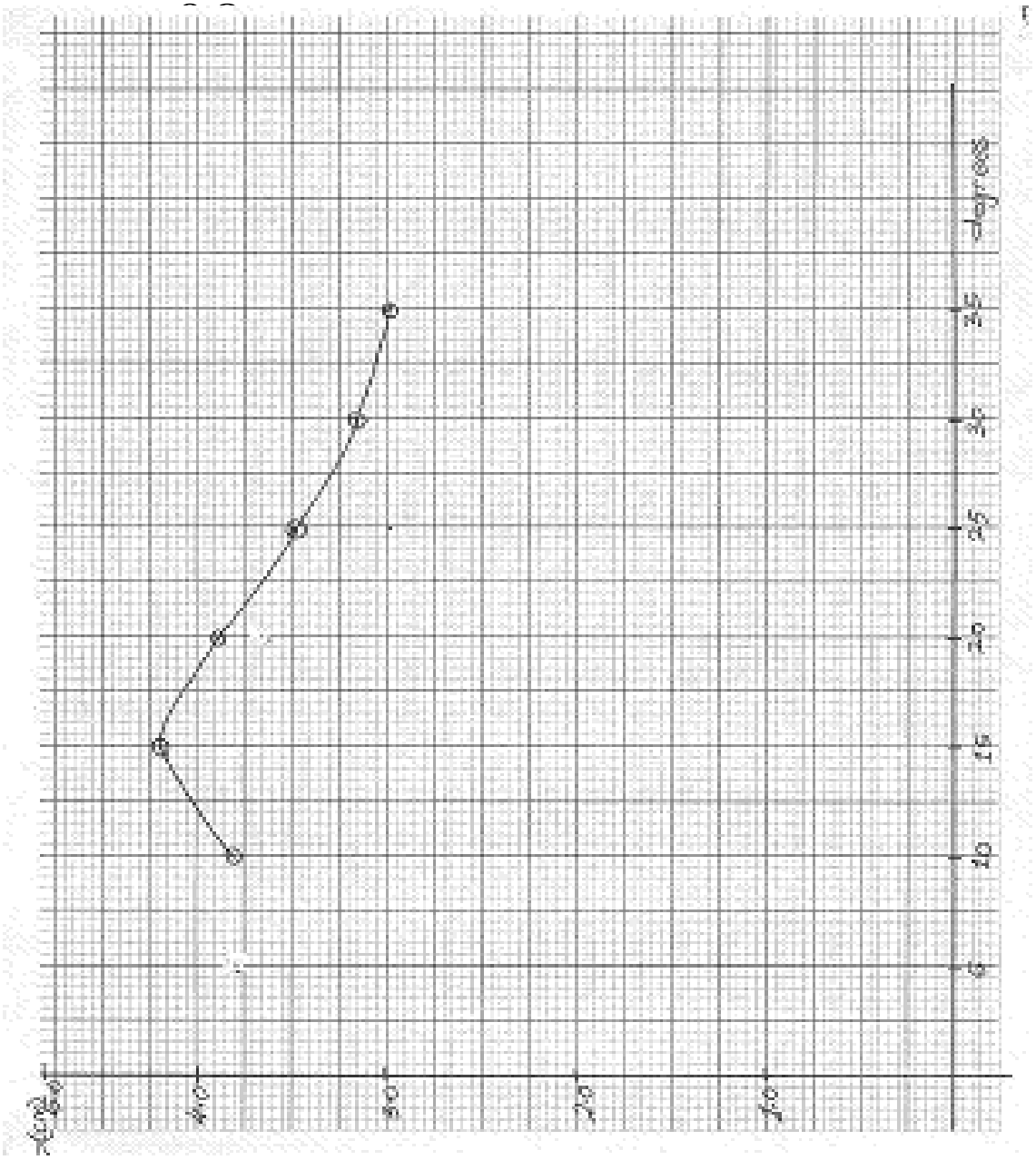
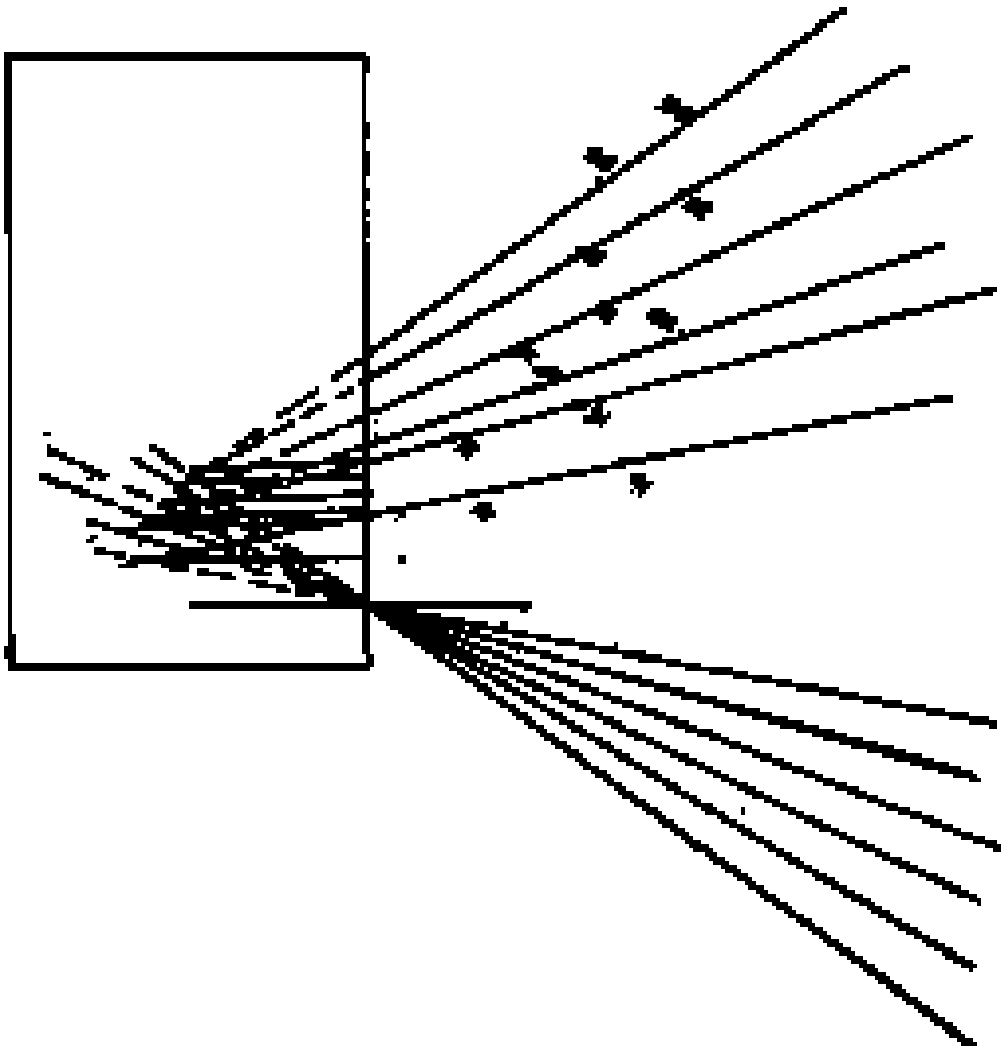
iii)
$$R = \frac{\rho l}{A}$$
$$Gradient = \frac{\rho}{A}$$
$$0.1 = \frac{\rho}{3.142x0.0125^2}$$
$$\int = 0.1x3.142\,x0.0125^2$$
$$= 4.9x10^{-5}\Omega cm$$


80
70
60
50
40
30
20
10
10
20
30
40
50
60
70
80
(60, 72)
(30, 25)

® (degree	10	15	20	25	30	35
X(cm)	3.8	4.2	3.9	3.5	3.2	3.0

2 x) X_{max} = 4.2cm

xi) W = 6.0 $\pm$0.1 cm

$$n = \frac{W}{X_{max}}$$

xii) $= \frac{4.2}{6}$