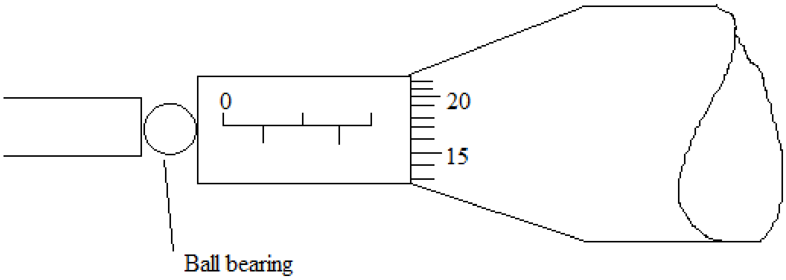
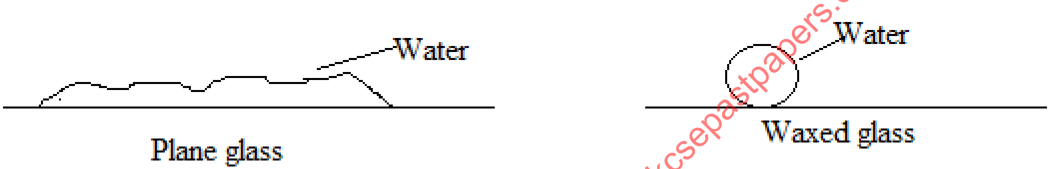
CEKENAS
FORM 4 END OF TERM II PHYSICS
EVALUATION EXAM
PAPER 1
TIME 2HRS
SECTION A (25 MKS)

1. A ball bearing of mass of 1.5 x 103-3 is held between the anvil and spindle of micrometer screw as shown below.



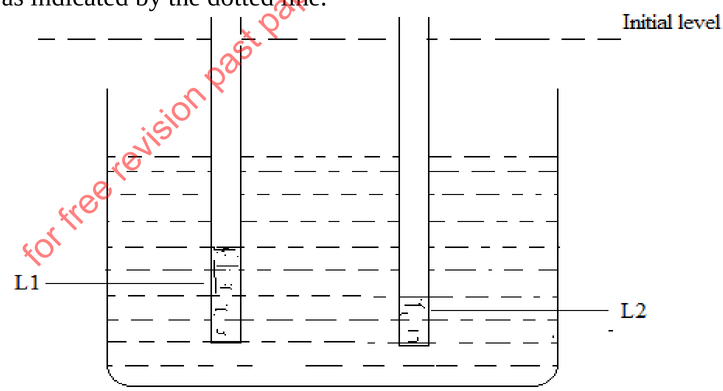
The reading between completely closed jaws without any object them is 0.10mm. What is the diameter of the ball bearing? (2mks)

2. Find the density of the ball bearing in question 1 above correct to 3 significant figures (3mks)
3. Figure 2 below shows the appearance of water when poured on plane and on a waxed glass.



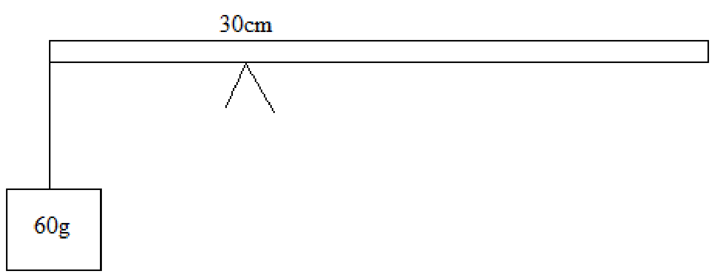
Explain the appearance (2mks)

4. Explain why it is easier to walk on muddy ground wearing a flat healed shoe than while wearing sharp pointed shoe. (1mk)
5. Smoke particles observed through a microscope to move random. Explain this observation (2mks)
6. Figure 3 below shows the levels attained by two liquids L1 and L2 after the temperature was lowered. The liquids were initially at the same level as indicated by the dotted line.



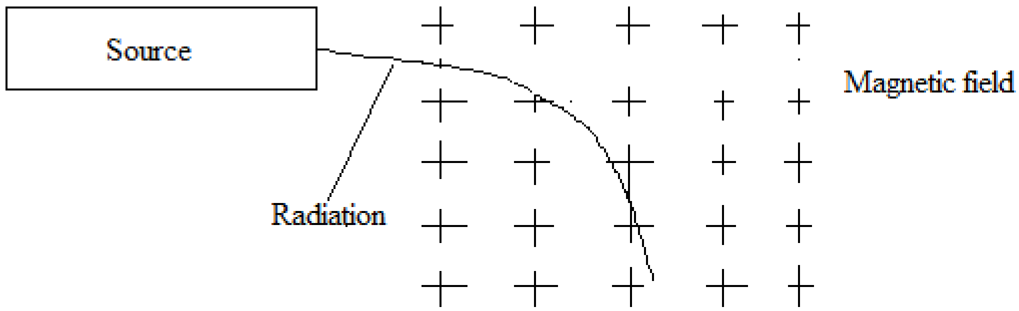
a) Mark on the diagram the levels of the liquid when the temperature is raised above the initial temperature. (1mk)
b) Give a reason for your answer in (a) above. (1mk)

7. Give a reason why heat transfer by radiation is faster than heat transfer by conduction (1mk)
8. Figure 4 below shows a uniform metre rule
Balanced by a mass of 60g suspended at 0 cm mark. If the pivot is at 30 cm mark, Calculate the weight of the metre rule (3mks)



ii) Calculate the cost of using all the electric irons everyday for 3hours daily.
(If the cost of electricity is sh. 15.00 per kilowatt hour.) (2mks)

15. The figure 7. below shows a path followed by a radiation from a radioactive source after entering a magnetic field. The magnetic field is directed into paper and perpendicular to the plane of the paper



a) Identify the radiation (1mk)

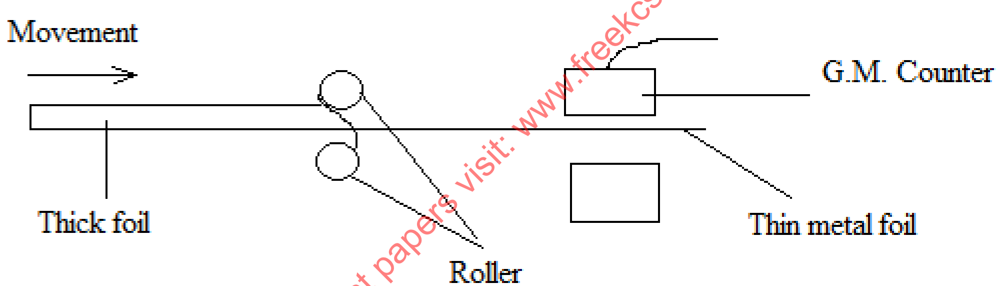
b) In nuclear reactions below, Identify the radiation Y

$$^{232}_{90}A \longrightarrow {}^{228}_{88}B \longrightarrow {}^{Z}_{X}C$$

i) Y ______________________________ (1mk)

ii) State the values of : Z X (2mks)

c) The diagram below shows an application of radio activity in industry as a thickness control gauge



i) State the change in metal foil that will lead to decrease in Geiger Muller counter readings (1mk)

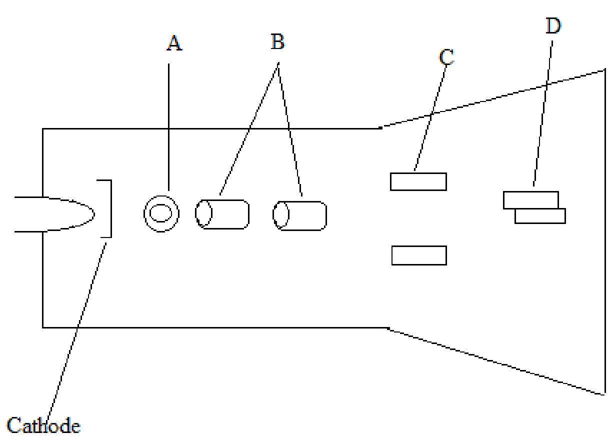
ii) State the change in roller pressure that should be made as a result of the decrease in the reading (1mk)

iii) Explain why a source emitting alpha particles is not suitable for this device (1mk)

d) The half-life of a radioactive sample is 98 minutes. How long does it take for the activity of a sample of the substance to reduce to 1/32 of its original (3mks)

16.

a) The figure 8 below shows a cathode ray oscilloscope



i) Name parts labelled:- A B (2mks)

ii) What is the function of the part labeled A B

CEKENAS
PHYSICS PAPER 3
CONFIDENTIAL

1. Provide the following apparatus;
- Two metre rules 100cm
- Two stands and two clamp
- Two bosses
- Three pieces of thread (at least 30cm each)
- One optical
- A piece of cello tape about 4cm
- A spring of k=10N/M AND LENGTH OF ABOUT 5cm
- One mass of 100g
- A stop watch
- Switch
- 2 new dry cells
- 7 connecting wires atleast 4 crocodile clips
- Resistance wire mounted on mm scale SWG 28
- Ammeter 0-1A
- Voltmeter 0-5v
- Cell holders
- Jockey

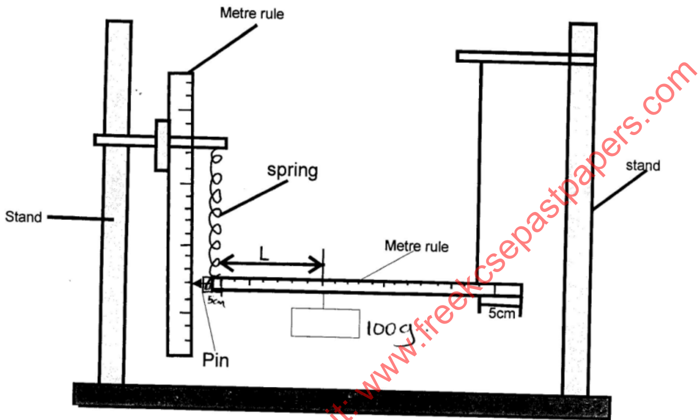
2. Provide the following apparatus
- Meter rule
- Knife edge about 15 cm high
- Two pieces of thread 30cm long
- 500ml beaker
- 2 identical 100g masses
- Liquid L cooking oil about 450 ml per student

CEKENAS
PHYSICS
PAPER 3
TIME: 2 ½

1. You are provided with the following apparatus.
- Two metre rules (one metre rule)
- Two stands and clamps
- Two bosses
- Three pieces of thread (at least 30 cm, 30cm, 30 cm)
- A spring
- A piece of cellotape or plastacine
- One mass 100g
- A stop watch
- Optical pin

Proceed as follows

i) Set the apparatus as shown in the figure below. Attach the optical pin (to act as the pointer) at one end of the metre rule using a cellotape



ii) Suspend one end of the metre rule with a thread at 5cm mark from the other end
iii) Suspend the other end with a spring also 5cm from end so that the metre rule is horizontal.
iv) Hold the other ruler vertically on the bench so that it is near the end with a pointer as shown in the diagram above.
v) Read the pointer position , L_o=-------------------- cm (1mk)
vi) Hang on the horizontal metre rule, the 100g mass at a length, L=10 cm from the spring. Record the extension,e, of the spring in the table below.
vii) Displace the mass slightly downwards and release it to oscillate vertically. Take time for oscilllations and record in the table below.
viii) Repeat for other position of L, of the mass

NB/- Before taking the reading, ensure the oscillation is steady

Complete the table below (6 mks)

Length L (cm)		10	20	30	40	50
Extension	Cm					
	M					
Time t(s), for 20 oscillations						
Period time T(s)						
$T^2(S^2)$						

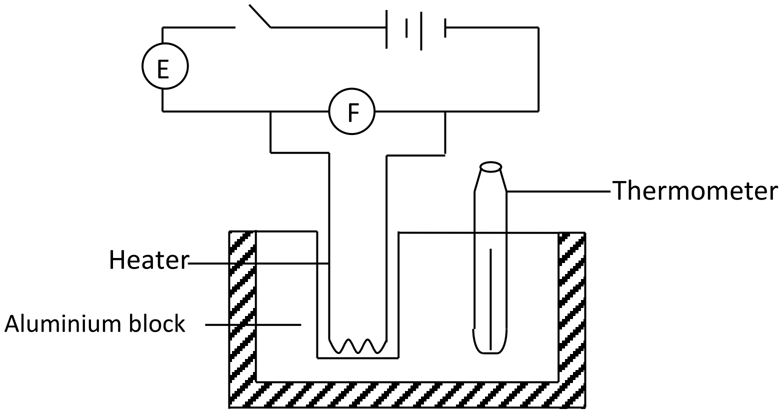
ix) Plot the graph of extension e(m) against $T^2(s^2)$ (4marks)
x) Calculate the slope of the graph (2mks)
xi) Given that $e=\frac{RT^2}{4\pi^2}+C$ (3mks)

2. You are provided with the following
- A switch
- Two dry cells
- 7 connecting wires. One with a crocodile clip at one end and the other with jockey at one end
- Resistance wire attached to a mm scale
- An ammeter (0-3A)
- A voltmeter (0-5V)
- A cell holder
- A jockey

SECTION B (55 MARKS)

14. (a) State and explain one factor that affect thermal conductivity of a body. (2 mks)

(b) In an experiment to determine the specific heat capacity of a metal, the set up below was used.



(i) What are the measuring instruments labelled E and F (2 mks)

(ii) What other measuring instrument not indicated in the diagram is needed in the experiment. (2 mks)

(c) In the experiment the following data was recorded.

Voltimeter reading = 24V
Ammeter reading = 2.0A
Mass of the block = 1.02kg
Initial temperature of block = 25^0C
Final temperature of block = 41^0C
Time for heating = 300 seconds

Use the information to calculate the specific heat capacity of the block. (3 mks)

(d) Some hot water was added to three times its mass of cold water at 10^0C and the resulting temperature was 20^0C. What was the temperature of the hot water? (3 mks)

15. (a) A butcher has a beam balance and masses of 0.5kg and 1.5kg. How would he measure 1kg of meat on the balance at once. (1 mk)

(b) A mixture consists of 80cm^3 of water and 120cm^3 of liquid X. If the density of water and liquid X are 1.0g/cm^3 and 0.8g/cm^3 respectively. Calculate the density of the mixture (3 mks)

(c) (i) Why is mercury more suitable for use in a simple barometer than water. (2 mks)

(ii) Determine the pressure exerted at the bottom of a lake which is 60m deep, if the density of sea water is 1030kg/m^3. (2 mks)

(d) (i) State one assumption made when the size of the molecule of oil is estimated. (1 mk)

(ii) An oil drop of volume 2mm^3 is introduced on the surface of water, it spreads to form a patch whose area is 40cm2. Determine the size of the molecule of oil. (2 mks)

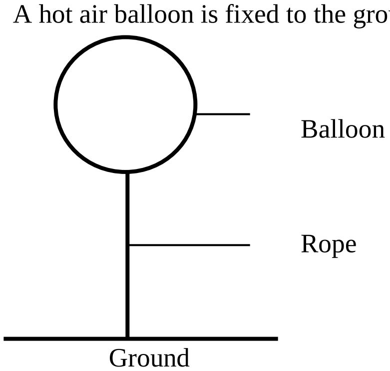
16. (a) State the law of floatation (1 mk)

(b) A rod of cross-section area 3.0cm^2 and length 16cm vertically upwards in a liquid of density of 1.1g/cm^3 with its length of 7cm above the surface. Determine

(i) weight of the rod. (3 mks)

(ii) the depth it will be submerged if put in a liquid of density 0.8g/cm^3. (2 mks)

(c) A hot air balloon is fixed to the ground on a windless day as shown in the figure below.



The balloon contains 1600cm^3 of hot air of density 0.7g/m^3. The mass of the balloon fabric is 400kg and density of surrounding air is 1.3kg/m^3. Calculate

(i) weight of hot air in the balloon. (2 mks)

(ii) total weight of the balloon (1 mk)

(iii) weight of the air displaced (2 mks)

(iv) the tension in the rope (2 mks)

17. (a) In the study of gas laws what is s.t.p? (1 mk)

(b) A firm container of volume $300cm^3$ is filled by a gas at a pressure of 2 atmospheres and a temperature of 300C. If the gas is cooled to 2.3 atmospheres, calculate its temperature. (3 mks)

(d) (i) Define the term angular velocity (1 mk)

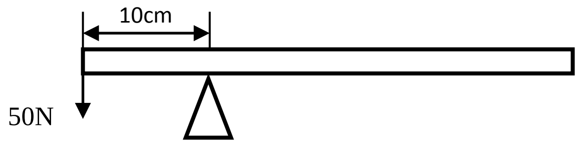
(ii) A particle on a wheel is to be released to fly away when the wheel revolves at a rate of 4 revolutions per second. If the wheel has a radius of 1.5m, determine the

(I) angular velocity of the wheel. (2 mks)

(II) the linear speed of the particle when it flies away (2 mks)

18. (a) (i) A system can be said to be in equilibrium. Explain the meaning of the term 'equilibrium' in this context. (2 mks)

(ii) A uniform half metre rod is balanced on a knife edge by a force of 50N placed 10cm from one end as shown in the figure below.



Determine the weight of the rod. (2 mks)

(b) (i) A person of mass 60kg walks up 50 stairs each of length 30cm in 150 seconds, calculate the average power of the person. (3 mks)

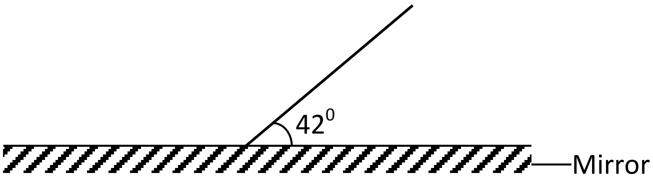
(ii) A horizontal force of 14N is applied on a wooden block of mass 2kg placed on a horizontal surface. It causes the block to accelerate at $6m/s^2$. Determine the frictional force between the block and the surface. (2 mks)

(c) The radius of the larger wheel of a wheel and axle machine is 12cm and that of the smaller wheel is 4cm. What is the velocity ratio of the machine. (2 mks)

KIRINYANGA
232/2
PHYSICS
PAPER 2
(THEORY)
JULY/AUGUST 2017
TIME: 2 HOURS.

SECTION A (25 MARKS)

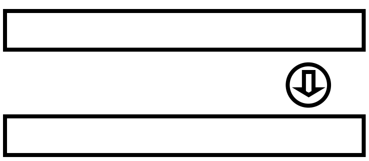
1. The figure below shows a ray of light incident on a mirror.



Determine the angle of reflection when the mirror is rotated 10^0 anticlockwise. (2 mks)

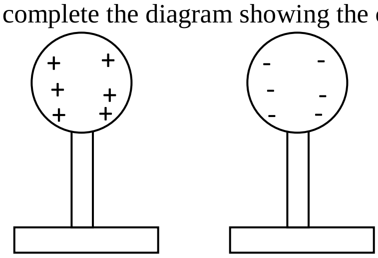
2. A soldier standing some distance from a cliff blows a whistle and hears its echo 0.9 seconds later. How far is the cliff from the soldier? (Take speed of sound in air = 330m/s) (3 mks)

3. The figure below shows two bar magnets and a plotting compass.

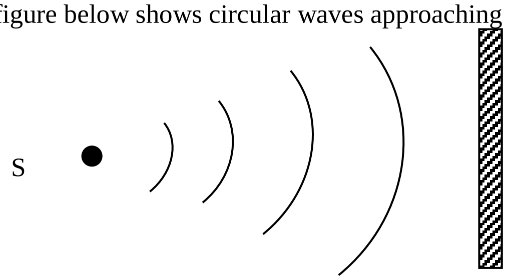


Draw the magnetic field pattern round the bar magnets indicating the polarity of each. (2 mks)

4. Other than the thickness of a conductor, state any other factor that affects the resistance of an ohmic conductor. (1 mk)
5. Explain how local action reduces the e.m.f in a simple primary cell. (1 mk)
6. The figure below shows two charged spheres A and B if the two spheres are brought into contact and then separated, complete the diagram showing the charge distribution on the two spheres after separation.



7. A pendulum bob takes 1.5 seconds to move from its mean position to a maximum displacement position. Calculate its frequency. (3 mks)
8. State two factors that affect the capacitance of a capacitor. (2 mks)
9. State two application of a convex mirror. (2 mks)
10. The figure below shows circular waves approaching a plane barrier in a uniform medium.



Sketch the reflected waves on the same figure (2 mks)

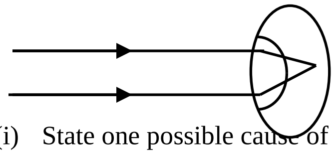
11. An electric kettle has an element of resistance 30Ω. It is operating from a 240V main supply. Determine its power rating. (3 mks)
12. The following is part of a radioactive particles emitted in stages (i) and (ii).

$$^{238}_{92}u \xrightarrow{(i)} {}^{234}_{90}Th \xrightarrow{(ii)} {}^{234}_{91}Po$$

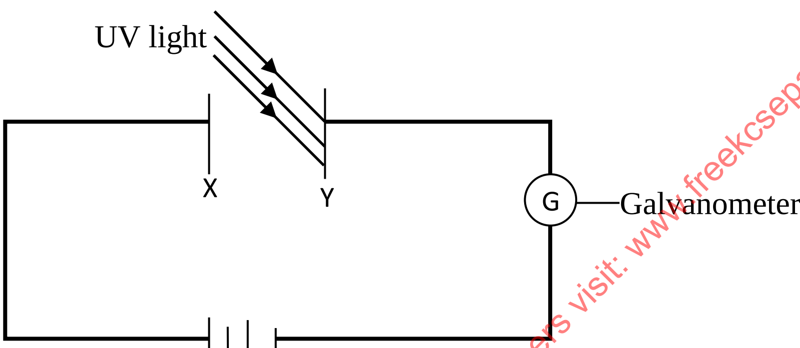
Identify the radioactive particles emitted in stages (i) and (ii) (2 mks)

SECTION B (55 MARKS)

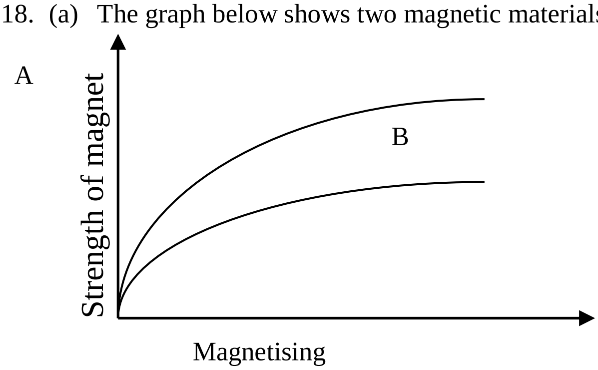
13. An x-ray tube produces x-rays whose wavelengths vary from 6.0×10^{-13} to 9.0×10^{-13}m. Determine
    (i) The range of frequency of x-rays (2 mks)
    (ii) The highest energy of x-rays (3 mks)
    (Take $C = 3.0 \times 10^{8}$ m/s and $h = 6.4 \times 10^{-34}$Js)
14. The following coil of transformer has 10,000 turns and the secondary coil has 10 turns. The transformer is connected to a 240V a.c sources. Determine
    (i) the output voltage (2 mks)
    (ii) the output current when the primary coil has a current of 0.5A(Assume there are no energy loss) (2 mks)
15. (a) The figure below show an eye defect.



    (i) State one possible cause of the defect. (1 mk)
    (ii) Draw on the same diagram to show how the defect can be corrected. (1mk)
    (iii) State the type of defect above. (1 mk)
    (b) An object O placed infront of a converging lens L_o forms an image I on the other side of the lens. Another converging lens L_e is placed such that the two form a compound microscope.
    (i) Draw a ray diagram of the set up to show how the final image is formed. (2 mks)
    (ii) State the reason why the focal length of L_o must be greater than L_e. (1 mk)
16. (a) The figure below shows metal plates X and Y. Metal Y is illustrated by ultra-violet radiation.

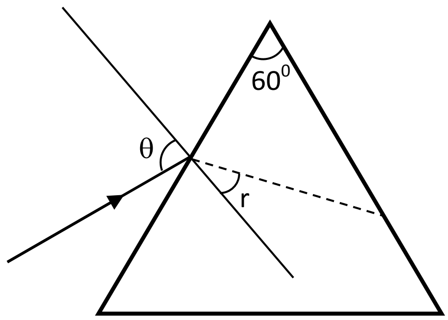


    (i) State the observation made on the galvanometer. (1 mk)
    (b) A material has a work function of 2.0eV. Determine the largest wavelength of incident radiation that can cause photoelectrons to be emitted from its surface.
    ($C = 3.0 \times 10^{8}$ m/s, $h = 6.6 \times 10^{-34}$ Js, 1eV = 1.6×10^{-19} J)
17. (a) State Ohm's law (1 mk)
    (b) A starter coil has a current of 6A passing through it. If the p.d across it is 12V, determine the resistance of the starter coil. (2 mks)
    (c) The graph below shows the voltage current relationship for a certain conductor.
    (i) Determine the resistance of a conductor. (2 mks)
    (ii) State with a reason whether the conductor obey Ohm's law. (2 mks)
18. (a) The graph below shows two magnetic materials.



    (i) Which material is easier to magnetise? (1 mk)
    (ii) Which material forms a stronger magnet? (1 mk)
    (iii) State one application of each material (2 mks)
    (b) Differentiate between hard and soft magnetic materials (2 mks)
    (c) State one property of a magnet. (1 mk)

19. The figure below shows the paths of a ray light through a glass prism. The speed of light in the prism is 2.0×10^8 m/s.

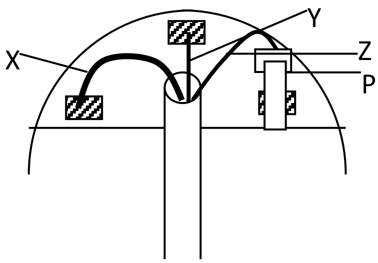


(a) Determine the refractive index of the prism material. (2 mks)
(Take speed of light in vacuum, C = 3.0 x 108m/s)

(b) (i) Show on the same diagram the critical angle, C (1 mk)
(ii) Determine the value of the critical angle, C (2 mks)

(c) Given that r = 320, determine angle θ (2 mks)

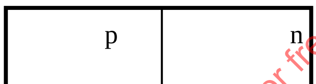
20. The figure below shows a three pin plug.



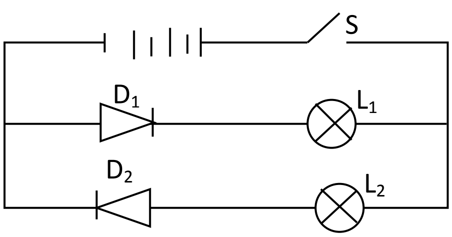
(a) Identify the wires X, Y and Z. (3 mks)
(b) Give the colour code of the wire connection marked Z. (1 mk)
(c) Give a reason why the pin marked Y is normally longer than the other two pins. (1 mk)

21. (a) Draw the trace on a graph paper to show the wavelength of an a.c voltage of frequency 50HZ and peak voltage 60V. The following are the settings of a cathode ray oscilloscope. (2 mks)
(i) Time base is 5ms/div
(ii) The Y-gain is 20V/div
State the functions of the following parts of a CRO
(i) Grid (1 mk)
(ii) Anodes (1 mk)

22. (a) The figure below shows a p-n junction diode. Complete the diagram showing a circuit for reverse bias. (1 mk)



(b) Define the term ‘doping’ as used in electronics (1 mk)
(c) The figure below shows a circuit with two diodes D_1 and D_2 and lamps L_1 and L_2.



With a reason state and explain what is observed when switch S is used.

KIRINYANGA
Kenya Certificate of Secondary Education (K.C.S.E)
PHYSICS
Paper 3
July/August 2017

CONFIDENTIAL

Question 1

- ✓ One jockey or crocodile clip
- ✓ Two new dry cells (size D)
- ✓ An ammeter 0 – 1A
- ✓ A voltimeter 0 – 5V
- ✓ A cell holder
- ✓ Switch, S
- ✓ Six connecting wires at least three crocodile clips at one end.
- ✓ A resistance wire mounted on a mm scale (SWG 28)

Question 1

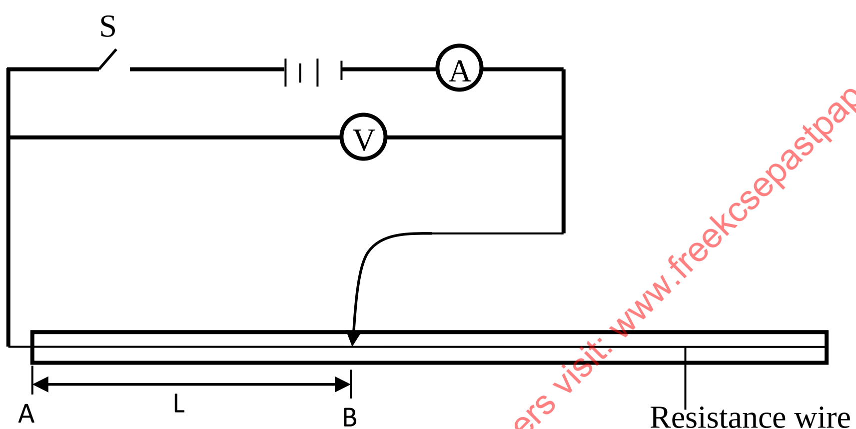
- ✓ Candle wax
- ✓ Source of heat
- ✓ Stop watch
- ✓ Boiling tube
- ✓ Thermometer
- ✓ Cork with a hole or cardboard with hole
- ✓ Water
- ✓ Trip stand
- ✓ Tube holder
- ✓ A candle
- ✓ Metre rule
- ✓ White screen
- ✓ Lens holder
- ✓ Convex lens of focal length 20cm
- ✓ Match box (To be shared

KIRINYANGA
232/3
PHYSICS
PAPER 3
PRACTICAL
JULY/AUGUST 2017
TIME: 2½ HOURS.

Question 1

1. You are provided with the following
- ✓ One jockey or crocodile
- ✓ Two new dry cells (Size D)
- ✓ An ammeter 0 – 1A
- ✓ A voltimeter 0 – 5V
- ✓ A cell holder
- ✓ Switch, S
- ✓ Six connecting wires at least three with crocodile clips at one end
- ✓ A resistance wire mounted on a mm scale

Proceed as follows
- ✓ Set up the circuit as shown in the figure below.



- ✓ Using a micrometer screw gauge, measure the diameter, d, of the nichrome wire.
  d = ……………………………… mm (½ mk)
  d = ……………………………… mm (½ mk)
- ✓ Close the switch and place the jockey/crocodile in contact with the resistance wire such that the length, L of the wire = 0.10m. Measure and record the current, I, through the wire AB and the potential difference, pd, (V) across. Record your results in table 1 below.

L (m)					
p.d (v)					
I (A)					
R = $\frac{V}{I}$(Ω)					
$\frac{1}{I}$ (A^{-1})					

- ✓ Repeat procedure (b) above for the other values of L given in the table 1 above. Read and record the corresponding values of I and V in table 1 above.
- ✓ Plot a graph of $\frac{1}{I}$ against R. (5 mks)
- ✓ Determine the slope, S of your graph (3 mks)
  Given that $\frac{1}{I} = \frac{R}{E} + \frac{r}{g}$, determine the value of

(i) E (3 marks)
(ii) r (2 mks)

QUESTION 2

PART A

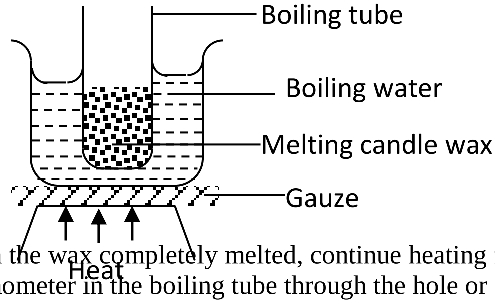
You are provided with the
- ✓ Candle wax
- ✓ Source of heat
- ✓ Stop watch
- ✓ Boiling tube
- ✓ Thermometer
- ✓ Cork with a hole or cardboard with hole
- ✓ Water

- ✓ Tripod stand
- ✓ Tube holder

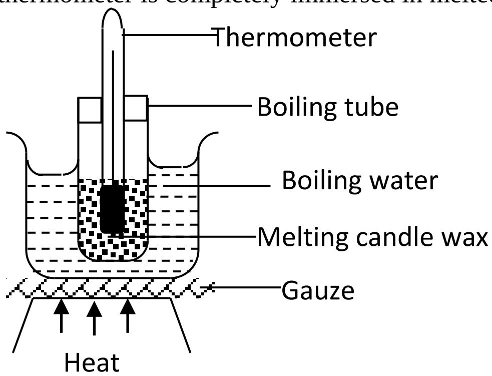
Proceed as follows:

(i) Heat the water in the beaker until it starts to boil

(ii) Place some candle wax in the boiling tube and heat the wax indirectly using the boiling water in beaker as shown in the figure below.



(iii) When the wax completely melted, continue heating for about two minutes. Meanwhile insert the thermometer in the boiling tube through the hole or cardboard. Adjust the thermometer until the bulb of the thermometer is completely immersed in melted wax.



Continue heating until the thermometer records no further change in temperature. This the maximum temperature reached. Record this temperature, as T_{max}.

T_{max} = ………………………………………….. ^0C

(iv) Now remove the boiling tube from the boiling water and simultaneously start the stop watch. Record the temperature of the cooling wax at intervals of two minutes. Record and complete Table 2 below.

Time (min)	0	2	4	6	8	10	12
Temperature (^0C)							

(v) In the axis below, plot a graph of temperature, ^0C against time, t (5 marks)

(vi) Determine the rate of cooling at t = 5 min.

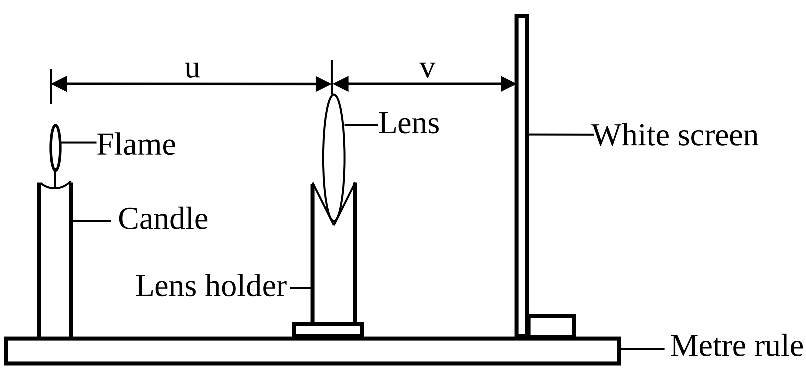
PART 2

2. You are provided with the following:

- ✓ A candle
- ✓ Metre rule
- ✓ White screen
- ✓ Lens holder
- ✓ Convex lens
- ✓ Match box (To be shared)

Proceed as follows

(a) Place the lens on a metre rule. Arrange the set up as shown in the figure below.



(b) Adjust the position of the lens so that it is a distance u = 30cm from the candle. Adjust the position of the screen until a well focused image of the flame is formed on the screen. Measure and record in the table 2, the image distance v, between the screen and lens.

(c) Repeat part (b) for other values of (u) shown in the table 3 and complete the table.

u (cm)	30	35	40
v (cm)			
$x = \frac{v}{u}$			
$y = \frac{v}{(x+1)(cm)}$			

Determine the mean value of y (2 mks)

MURANGA SOUTH A
232/3
PHYSICS
PAPER 3
JULY 2017
2½ HOURS

1.
- Two beakers 100ml.
- Complete retort stand.
- Funnel.
- Cotton wool.
- Access to water.
- Stop watch.
- A burette with a tap($50cm^3$)
- 100ml measuring cylinder.

2.
- Resistance wire fitted on a scale labelled MN. (Swa- 28)
- Switch.
- Voltmeter (0-3V) or (0-5V)
- Ammeter (0-1 A)
- Two dry cells(1.5V)
- Six connecting wires with crocodile clips on one end.

SUNSHINE SECONDARY SCHOOL
232/1
PHYSICS -231/2
Paper 1
(THEORY)
2017
2 Hours

SECTION A: (25 marks)

Answer ALL questions in this Section in the spaces provided

1. The figure 1 shows picture of a metre rule and a tree on a sunny day and their respective shadows. The shadow of the metre rule is 75cm long and that of the tree is 840cm long.

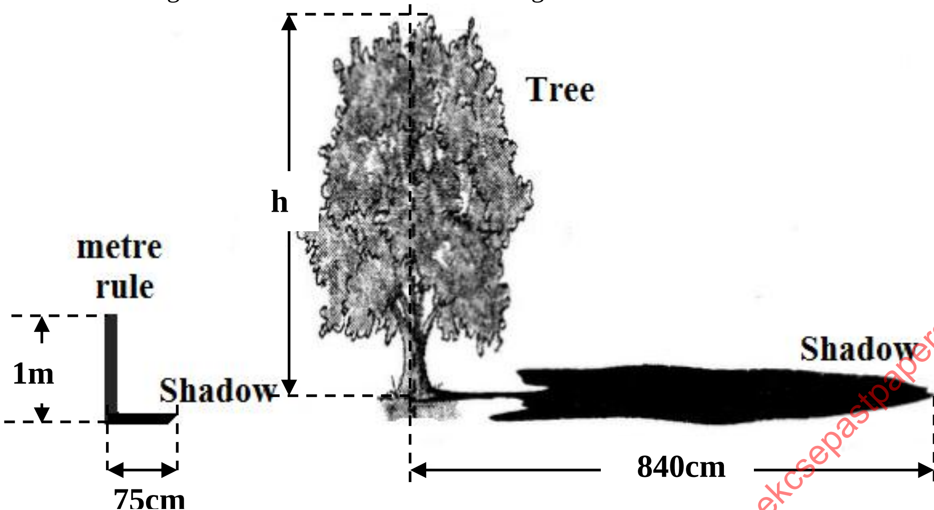
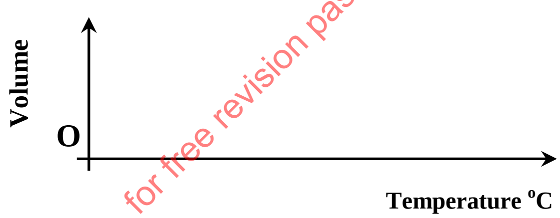


Figure 1

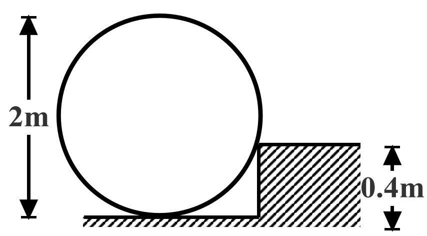
Determine the height, **h** of the tree in metres. (2 marks)

2. Same quantities of hydrogen gas and helium gas at room temperature are released simultaneously at one end of a room. State with a reason which gas is likely to be detected earlier at the other end of the laboratory. (2 marks)
3. In an experiment to investigate the unusual expansion of water, a fixed mass of water at 0^oC was heated until its temperature reached 10^oC. On the axes provided, sketch a graph of mass against temperature of water from 0^oC to 10^oC. (1 marks)



4. **Figure 2** shows a circular disc of diameter 2m and weight 300N. The disc is pulled by a horizontal force, F acting through its centre of gravity, G. the force acting against a step 0.4m high.

Figure 2



Determine the initial horizontal force, F just sufficient to turn the disc so that it will rise over the step. (3 marks)

5. **Figure 3** shows a paper tape with marks made by a ticker-tape. A is the initial mark. The frequency of the ticker timer is 50Hz. The average acceleration of the tape is $1.5ms^{-2}$.

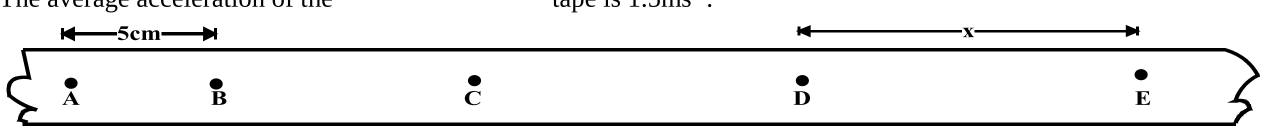


Figure 3

Determine the Length x. (3 marks)

The string breaks when the mass is at its lowest position P at a speed of 30m/s. Point P is 5m above the ground.

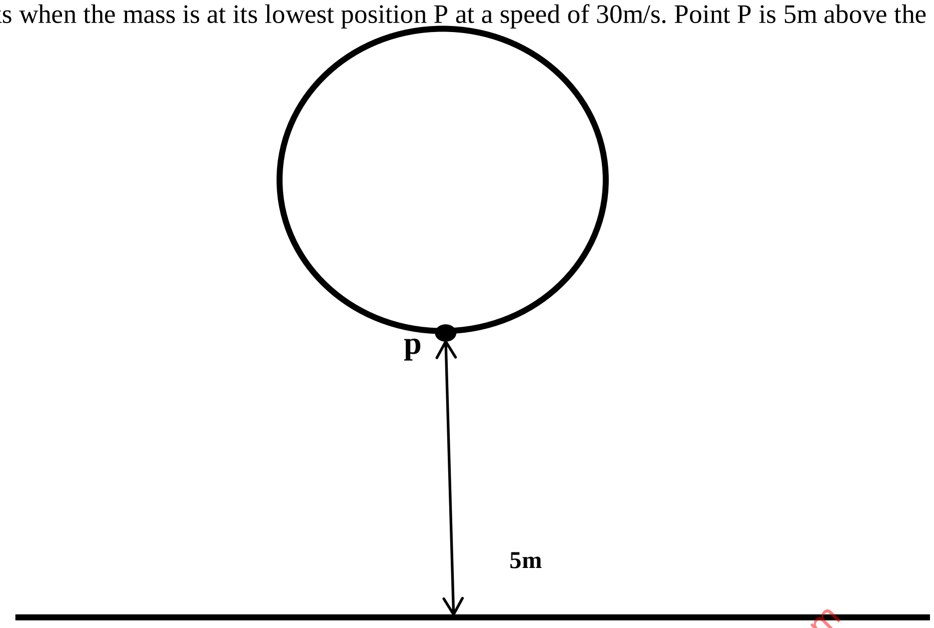


Figure 13.

a) Show on the diagram the initial direction of the mass at the point the string breaks. (1mk)

ii) The horizontal distance the mass travels before it hits the ground. (3mks)

iii) The vertical velocity with which it strikes the ground. (2mks)

SUNSHINE SECONDARY SCHOOL 2017
233/3
PHYSICS
PRACTICAL
TIME 2 ½ HOURS

QUESTION 1

You are provided with the following:

- a rectangular glass block
- 4 optical pins
- a soft board
- a plain paper

Proceed as follows:

(a) Place the glass block on the plain paper with one of the largest face upper most. Trace round the glass block using a pencil as shown below.
(b) Remove the glass block and construct a normal at B. construct an indecent ray AB of angle of incidence, I = 20^0.
(c) Replace the glass block and trace the ray ABCD using the optical pins.
(d) Remove the glass block and draw the path of the ray ABCD using a pencil. Measure length L and record it in the table below.

Angle t^0	L (cm)	L^2 (cm^2)	$\frac{1}{L^2}$ (cm^{-2})	$Sin^{-}i$
20				0.1170
30				0.2500
40				0.4132
50				0.5868
60				0.7500
70				0.8830

(6 marks)

(e) Repeat the procedure above for the angles of incidence given.
(f) Calculate the value of L^2 and $\frac{1}{L^2}$; Record in the table.
(g) Plot a graph of $\frac{1}{L^2}$ (y-axis) against $Sin^2 i$ (5 marks)
(h) Calculate the gradient, S. (3 marks)

Given that the equation of that graph is: $\frac{1}{L^2} = -\frac{1}{n^2 b^2}.\left[Sin^2 i + \frac{1}{b^2}\right]$

(i) Determine the $\frac{1}{L^2}$ intercept C and the Sin^{2+I-} intercept B.
C = ………………………………………………………………. (1 mark)
B = ……………………………………………………………….. (1 mark)
(j) Calculate the value of Q given by: (2 marks)
$Q = -\left(\frac{C}{S}\right) \div B$
(k) Hand in your constructions on the plain paper together with the answer script. (2 marks)

QUESTION 2
PART A

You are provided with the following:

- two dry cells and a cell holder
- One voltage (0 – 5v)
- One ammeter (0 – 1A) or (0 – 2.5A)
- Six resistors labeled AB
- One resistor labeled R
- a switch
- 7 connecting wires

(a) Set up the circuit as shown in figure 2
(i) Close the switch, s. Read and record the voltmeter and ammeter readings. (1 mk)
V = ………………………..volts
I = ……………………Amperes
(ii) Determine the value of R given that R = $\frac{V}{I}$ (1 mk)
(b) Set the circuit as shown in figure 3

(i) With the crocodile clip across resistor 1 as show in figure 3 above; close the switch, read and record the ammeter and voltmeter readings in table.

(ii) Repeat the procedure b(i) with crocodile clips across resistors 2, 3, 4, 5 and 6 respectively, each time recording the corresponding values for V and I in table 2.

Number of resistors	1	2	3	4	5	6	7
p.d. (volts)							
Current I (Amperes)							

(4 mks)

(c) On the grid provided plot the graph of p.d. (V) (y axis) against I (A). (5 mks)

(d) Determine the slope of the graph at:

(i) p.d. = 2.5V (2 mks)

(ii) p.d. = 2.8 V (2 mks)

(iii) What physical quantity is represented by the slope of your graph at any one point? (1 mk)

PART B

You are provided with the following:

- half-mere rule
- Knife edge (raised)
- a thread (approx. 20cm in form of a loop)
- 50g mass

(a) Determine the c.o.g. of the half-metre rule.

c.o.g. = ………………………………..cm mark (1 mk)

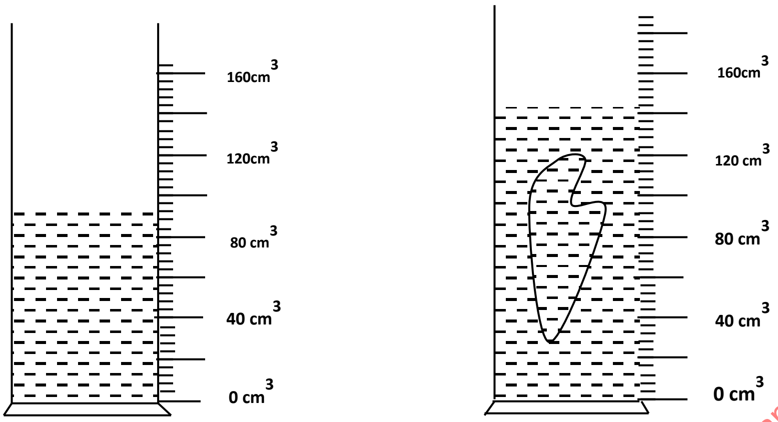
(i) Pivot the rule at 15 cm mark and balance it with the mass as shown. When it is well balanced, note and record the position of the 50g mass;

Position of 50g mass = …………………………………………..cm mark (1 mk)

(ii) Use your results to determine the weight of the rule. (2 mks)

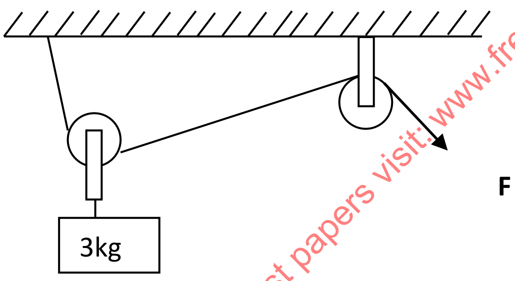
TRIAL 232/1
PHYSICS
PAPER 1
(THEORY)
TIME: 2 HOURS
JULY/AUGUST

1. "Air flow over the wings of an air craft causes a lift". Explain this statement with the aid of a labeled diagram. *(2 marks)*
2. The figure 1 below shows the change in volume of water in a measuring cylinder when an irregular solid is immersed in it.



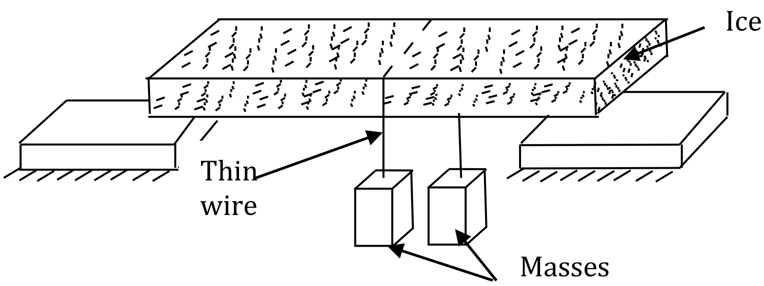
Given that the mass of the solid is 555g, determine the density of the solid in SI units *(2 marks)*

3. The simple pulley in **figure 2** is used to lift a **3kg** mass.



Through what distance must the string at F be pulled to lift the mass 0.2m high. *(2 marks)*

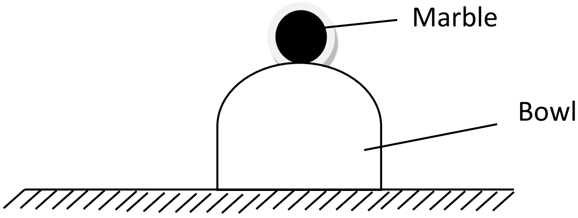
4. Two objects made of the same material and having the same mass are heated to a temperature of 35°C above that of the atmosphere and then allowed to cool in still air for 30 minutes. State one factor that will determine their final temperature *(1 mark)*
5. The thermal conductivity of a metal increases with the increase cross-sectional area of the metal. Explain how the cross-section affects conductivity using the electron movement. *(1 mark)*
6. The set up **figure 3** is used to investigate the effect of pressure on melting point. It is observed that the thin wire cuts through the ice block but it remains one piece.



Explain the observation above. *(2 marks)*

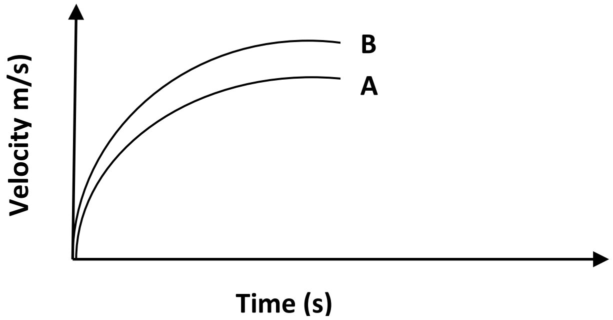
7. (a). Explain why a liquid and not a gas is used as a hydraulic machine fluid. *(1 mark)*
   (b). ***State*** the other important property of a liquid that hydraulic machines depend on. *(1 mark)*

8. **Figure 4** shows a marble placed on an inverted bowl.



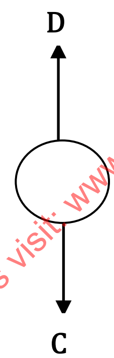
State and **explain** the type of equilibrium the marble is. *(2 marks)*

9. The **figure 5** shows the velocity time graph of two identical spheres released from the surfaces of two liquids **A** and **B**.



Give a reason why the terminal velocity of the sphere In B is higher than in A. *(1mark)*

10. **Figure 6** shows the forces acting on a rain drop which is falling to the ground



a). i). Name the force C causing the raindrop to fall. *(1 mark)*

ii). Force D opposes the motion of the drop. **State one** possible cause of this force. *(1 mark)*

b). State what happens to the drop when force C = force D *(1 mark)*

11. A man lifts a weight of 300N through a vertical height of 2m in 6 seconds. Determine the power developed. *(2 marks)*

12. A drop of methylated spirit placed on the back of the hand feels colder than a drop of water at the same temperature. *(1 mark)*

13. Figure 7 shows a suspended copper solid immersed in a fluid.

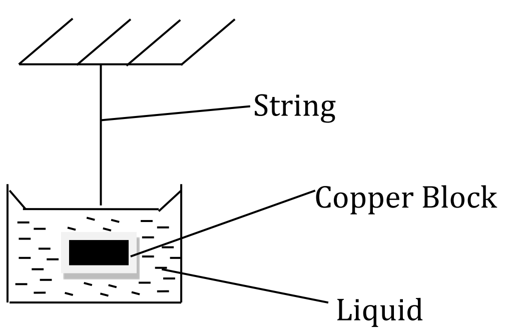


Figure 7

Explain what will happen to the tension in the string if a liquid of higher density is used. *1 mark)*

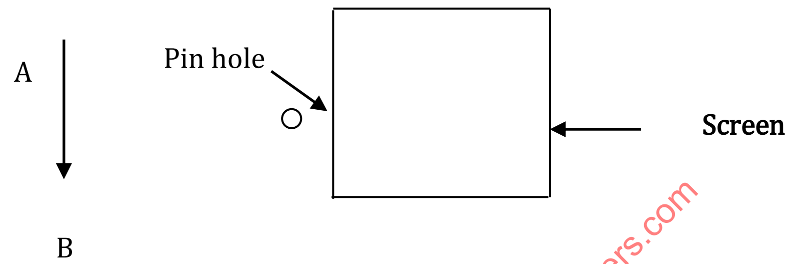
14. A bucket containing water is rotated in vertical circle of radius 80cm. What should be its velocity so that the water may not spill out. *(2 marks)*

15. A rubber ball of mass 400g strikes a wall horizontally at 6.0m/s and bounces back at 4m/s. In 0.02 second. ***Determine*** the total force it exerts on the wall. *(2marks)*

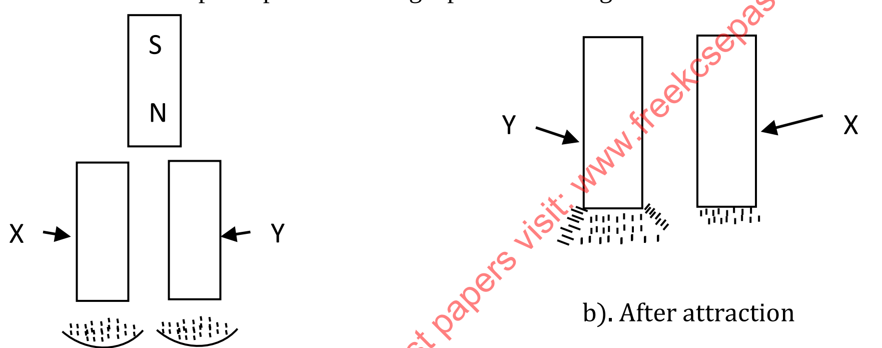
TRIAL 232/2
PHYSICS
PAPER 2
(THEORY)
TIME: 2 HOURS
JULY/AUGUST

SECTION A (25 MARKS)
Answer ALL questions

1. What causes electrical resistance in conductors? *(1mark)*
2. In determining the depth of an ocean, an echo sounder producing ultrasonic sound is used. ***Give one*** reason why this sound is preferred. *(1 mark)*
3. Figure 1 shows an object AB placed in front of a pin-hole camera. Using a ray diagram, show how the image is formed on the screen.



4. State the conditions necessary for a wave incident on a slit to be diffracted. *(2marks)*
5. Figure 2 below shows a simple experiment using a permanent magnet and two metal bars X and Y put closer the iron fillings.



a).During attraction

b). After attraction

State with a reason which bar is made from a soft magnetic material. *(2 marks)*

6. Figure 3 shows a force on a conductor carrying current when placed in a magnetic field.

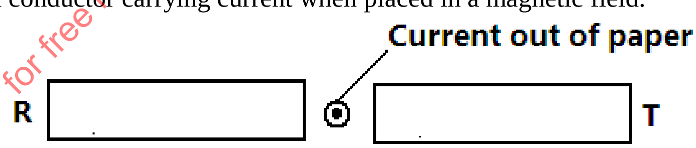


Figure 5

State the polarities **R** and **T**. *(1 mark)*

7. The period of a wave is T seconds. Its wavelength is λ metres. Show that $v = f\lambda$ where v is the speed of the wave and f is the frequency. *(2marks)*
8. A ray of light incident on the surface of a glass prism is observed as represented in the figure below.

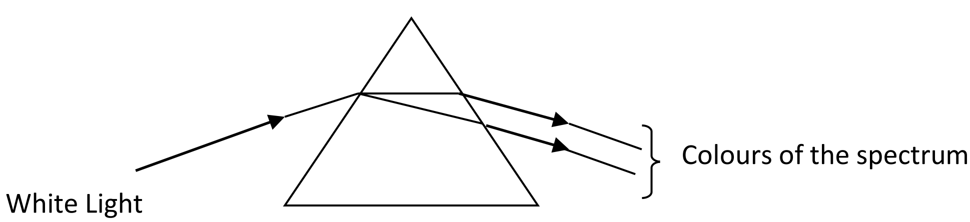
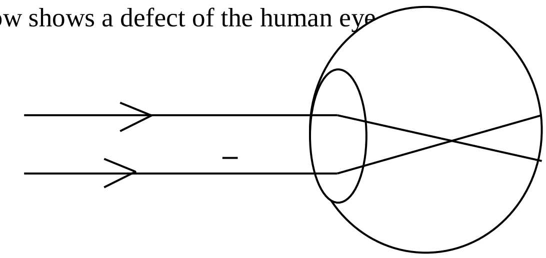


Figure 4.

Explain this observation. *(2 marks)*

9. An electric heater is rated 2kw, 240v. Determine the current flowing in it. *(3 marks)*
10. (a) State the law of electrostatic charges. *(1 mark)*
    (b) Figure 5 shows a highly negatively charged rod being brought slowly near the cap of a positively charged leaf

(a) Determine the value of angle **r**. *(3 marks)*
(b) Show on the figure the critical angle, c and determine its value. *(4 marks)*
(c) Determine the speed of light in glass given that the speed of light in vacuum,($C = 3.0 x 10^8$ m/s) *(3 marks)*
(d) On the same figure, sketch the path of the light after striking the prism if the prism was replaced by another of similar shape but lower refractive index. (Use dotted line for your answer) *(2 marks)*
(e) State Snell's law. *(1 mark)*
(f) The figure below shows a defect of the human eye



(i) State two possible causes of the defect. *(2 marks)*
(ii) Show on the diagram how the defect above is corrected. *(1 mark)*

17. a) State Ohm's law. *(1mark)*
b). A dry cell of emf E and an internal resistance of r is used to drive a current through various resistors of resistance R and the values of – and R plotted on a graph in figure 9.

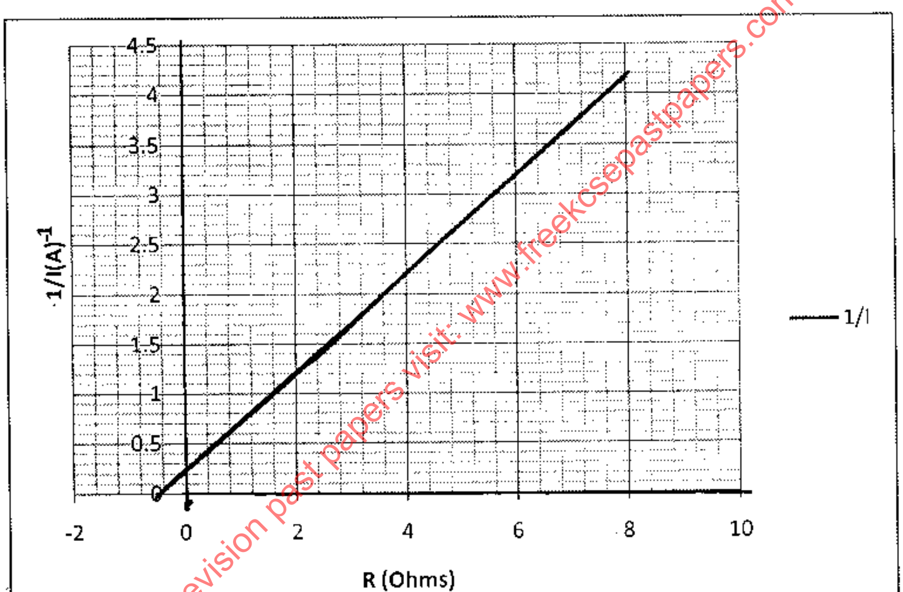
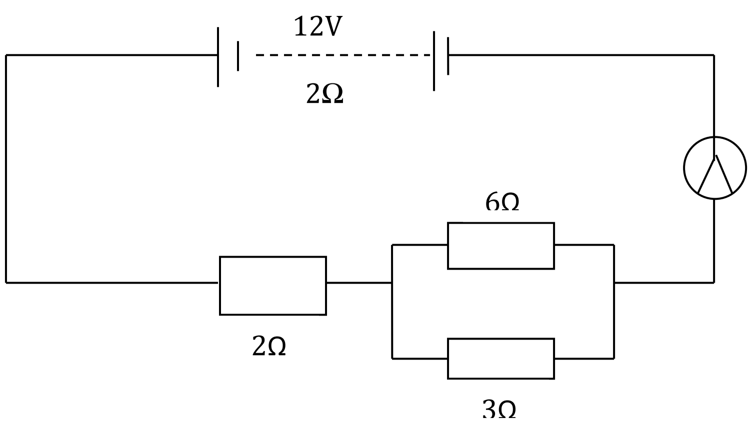


Figure 9.

The variables I and R are related by the equation – = – + –

(i) Using the graph in figure 9, determine the emf, E of the cell. *(4 marks)*
(ii) Show that the internal resistance r of the cell is given by r = -R intercept and hence determine r. *(3 marks)*
b) The circuit diagram in Fig 10 below shows a battery of e.m.f 12v and internal resistance 2. It is connected to system of resistors as shown.



(i) Calculate the effective resistance. *(3 marks)*
(ii) Find the current registered by ammeter. *(3 marks)*
(iii) Determine the current through the 6 resistor. *(2 marks)*

TRIAL 232/3
PHYSICS
PAPER 3 TIME:
2 HOURS JULY/
AUGUST

PREPARATION AND CONFIDENTIAL INSTRUCTIONS
PHYSICS PAPER 232/3

1. **You are provided with the following apparatus**:

- A candle
- A lens holder
- A convex lens
- A screen
- A metre rule
- An object

2. **Part I**

You are provided with the following:

- 250 cm^3 plastic beaker, B.
- 100 cm^3 measuring cylinder.
- 300 cm^3 of a liquid in a beaker labelled L.
- 100 g mass with a hook.
- A knife edge (wedge which is at least 20 cm tall).
- Metre rule.

QUESTION Q
A 250cm^3 plastic beaker with thread tied round its neck for easy suspension labeled B
300cm^3 of glycerine labeled L
A 100g mass with a hook
A knife edge at least 20cm tall
A meter rule
A looped piece of thread
100cm^3 measuring cylinder

Part II

You are provided with the following apparatus

- One new dry cell
- One cell holder
- Switch, K
- An ammeter
- A voltmeter
- A variable resistor, rheostat or potentiometer
- Seven connecting wires, at least 4 of which with crocodile clips
- A bulb holder
- A torch bulb 2.5V (for 2 dry cells)

TRIAL 232/3
PHYSICS
PAPER 3 TIME:
2 HOURS JULY/
AUGUST

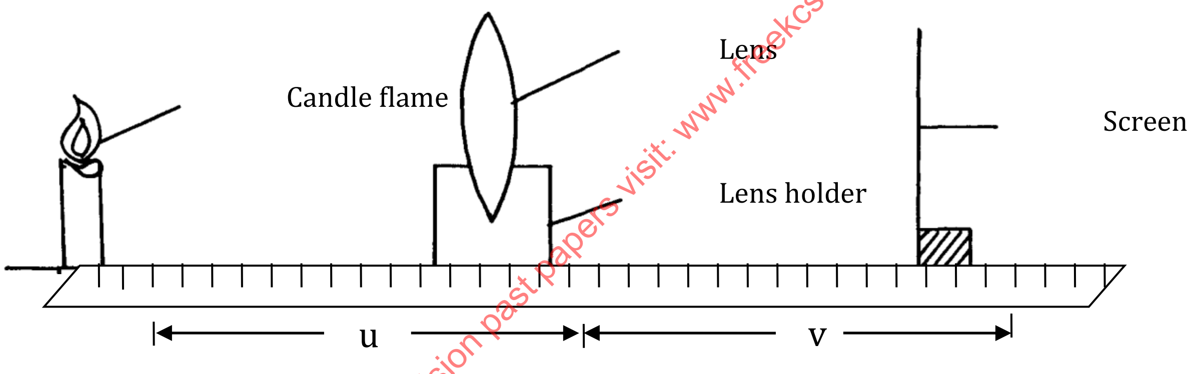
1. **You are provided with the following apparatus**:

- A candle
- A lens holder
- A convex lens
- A screen
- A metre rule
- An object

Proceed as follows:

Using an object infinity outside the room, focus its image on the screen provided. The image should be as sharp as possible and inverted. Measure the distance from the lens to the screen hcm. Repeat the same for three other values of h. Record your results and then calculate the average value of the three results, Hcm.

First reading of h--- (1 mark)
Second reading of h --- (1 mark)
Third reading of h -- (1 mark)
The average value of h(H) --- (1 mark)
Arrange the candle flame, the lens, and the screen as shown in the diagram below:



b) i) For particular value of u, adjust the position of the screen until a sharp image appears on the screen. Measure distance Vcm. Repeat the experiment for each of the other values of u, and enter the results in the table below: (7 marks)

Distance L(cm)	**Distance V(cm)**	**uv(cm^2)**	**U + v (cm)**
12			
15			
18			
21			
24			
27			
30			

(ii) Plot a graph of uv against u + v (5 marks)
(iii) From your graph, calculate the slope S (2 marks)
(iv) Calculate the value of k given that kH = S (2 marks)

2. **You are provided with the following:**

- 250 cm^3 plastic beaker, B.
- 100 cm^3 measuring cylinder.
- 300 cm^3 of a liquid in a beaker labelled L.
- 100 g mass with a hook.
- A knife edge (wedge which is at least 20 cm tall).
- Metre rule.

NAKA JOINT EVALUATION TEST.
232/3
PHYSICS
PRACTICAL
PAPER 3
Kenya Certificate of Secondary Education

This document must not be seen by the candidates whatsoever.

QUESTION 1

Each student should be provided with the following;

- Concave mirror focal length 15cm and a holder.
- Metre rule
- Candle (Non –drip) about 7cm long
- A voltmeter (0-3 or 0-5v)
- An ammeter (0 -1A)
- 10 Ω Carbon resistor
- A switch
- One dry cell and a cell holder
- Six connecting wires

QUESTION 2

Each student to be provided with the following;

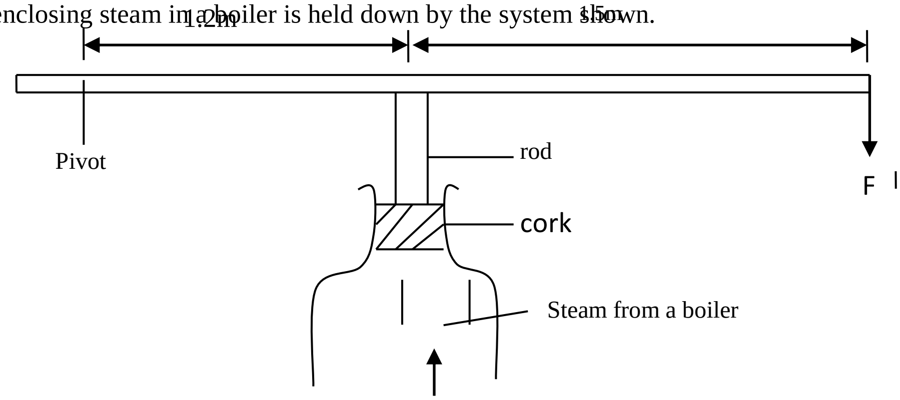
- A triangular prism (60^0 x 60^0 x 60^0)
- A piece of soft board
- Four optical pins
- A sheet of plain paper
- Four thumb pins
- Metre rule
- Retort stand, clamp and boss
- 500ml beaker ¾ full of water
- 100g mass and 50g mass
- Three pieces of thread.
- Complete mathematical set

7. In an experiment to determine the thickness of an oil molecule, an oil drop of volume 3.60×10^{-6} m^3 was observed to form a circular patch of diameter 0.016m on the surface of water covered with lycopodium powder

i). Explain why the oil drop forms a circular patch. (1mks)

ii) Determine the thickness of the oil molecule (2mks)

8. A cork enclosing steam in a boiler is held down by the system shown.



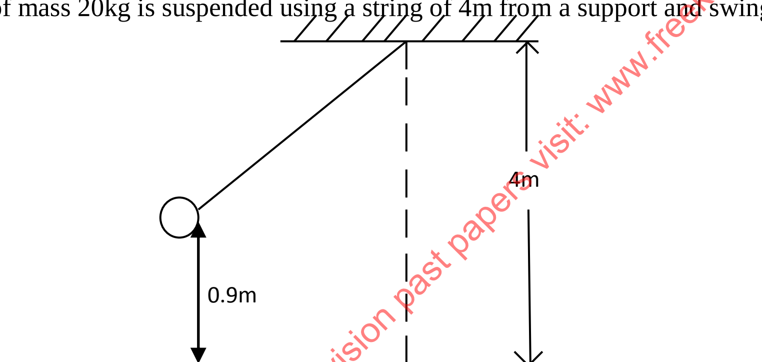
If the area of the cork is 15 cm^2 and a force (F) of 500N is needed to keep the cork in place, determine the pressure of the steam in the boiler. (3mks)

SECTION B

Answer all questions in this section in the spaces provided:

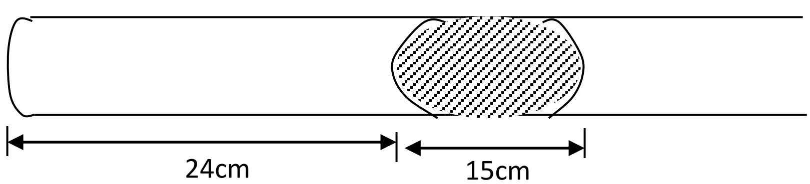
9. (a) An electric crane lifts a load of 2000kg through a vertical distance of 3.0m in 6s.
Determine:
i) Work done (1mk)
ii) Power developed by the crane (2mks)
iii) Efficiency of the crane if it is operated by an electric motor rated 12.5 Kw (2mks)

b) A bob of mass 20kg is suspended using a string of 4m from a support and swings through a vertical height of 0.9m as shown below:



Determine:
i) The potential energy of the body at its position. (2mks)
ii) Speed of the body when passing through the lowest point. (2mks)

10. (a) A glass capillary contains enclosed air by a thread of mercury 15cm long when the tube is horizontal, the length of the enclosed air column 24cm as shown.



i) What is the length of the enclosed air column when the tube is vertical with the open end uppermost if the atmosphere pressure is 750mmHg? (2mks)
ii) Explain why the mercury does not run out when the tube is vertical with the closed end uppermost. (1mk)

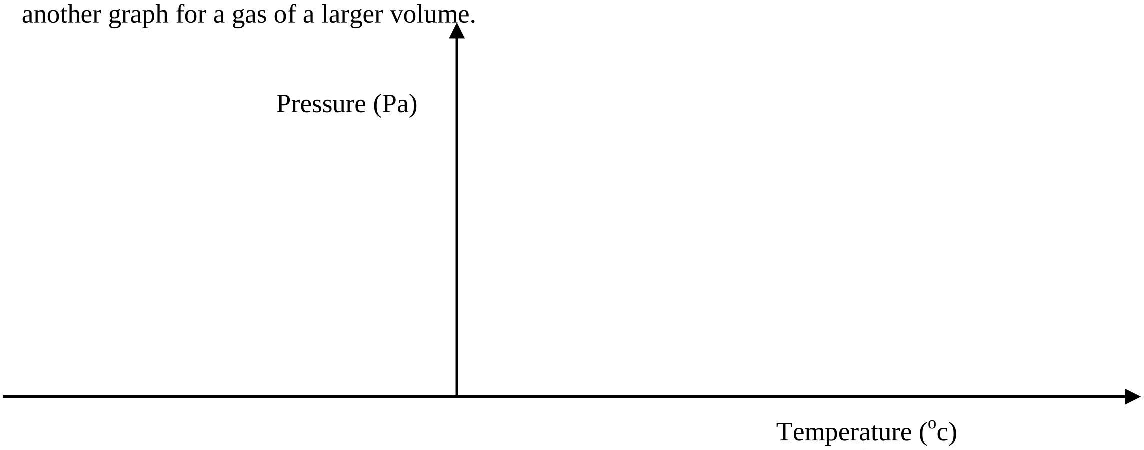
b) Explain why an air bubble increase in volume as it rises from the bottom of a lake to the surface. (1mk)

c) When an inflated balloon is placed in a refrigerator it is noted that its volume reduces, use the kinetic theory of gases to explain this observation. (2mks)

d) A certain mass of hydrogen gas occupies a volume of $1.6m^3$ at a pressure of 1.5×10^5 Pa and a temperature of 22^0c. Determine the volume when the temperature is 0^0c at a pressure of 0.8×10^5 Pa. (3mks)

e) i)State the pressure law (1mk)

ii) On the axis provided, sketch a graph of pressure against temperature on the celcius scale. On the same axis sketch another graph for a gas of a larger volume. (2mks)



11 (a) in a hydraulic press, a force of 200N is applied to a master piston of area 25cm^2. If the press is designed to produce a force of 5000N, determine the area of the slave piston. (2mks)

(b) The barometric height in a town is 70cmHg. Given that the standard atmospheric pressure is 76cmHg and the density of mercury is 13600kg/m^3, determine the altitude of the town. (density of air is 1.25kg/m^3) (3mks)

(c) In an experiment to determine atmospheric pressure, a plastic bottle is partially filled with hot water and the bottle is then tightly corked. After some time the bottle starts to get deformed.

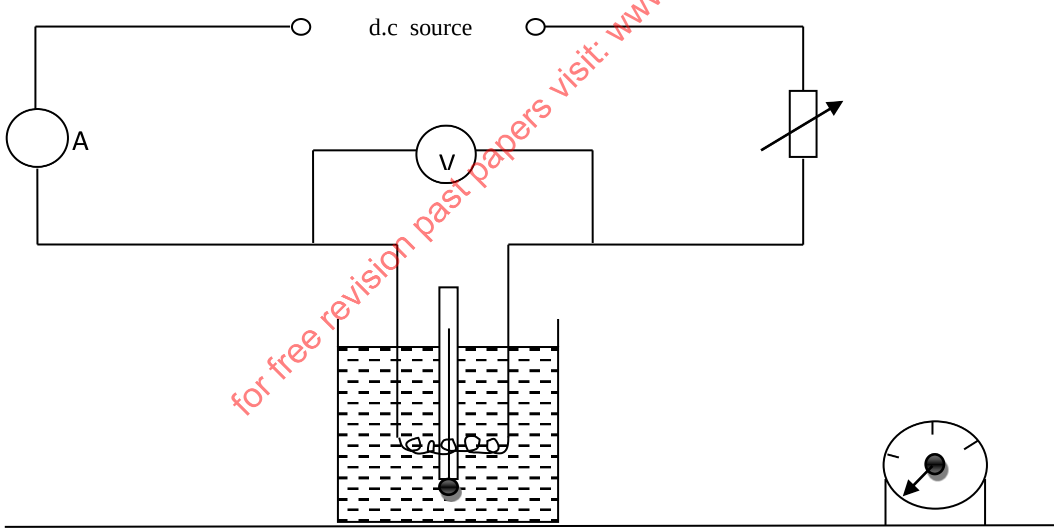
(i) State the purpose of the hot water. (1mk)

(ii) State the reason why the bottle gets deformed. (2mks)

(d) A hole of area 2.0cm^2 at the bottom of a tank 5m deep is closed with a cork. Determine the force on the cork when the tank is filled with sea water of density 1.2g/cm^3. (2mks)

12. (a) Define specific latent heat of vaporization (1mk)

(b) The illustration below is used to produce a measured rise in temperature of a liquid using electrical energy.



Explain why;

(i) The liquid will tend to be warmer at the top of the container than at the bottom. (1mk)

(ii) The temperature will eventually stop rising even though the current is still passing through the heating coil. (1mk)

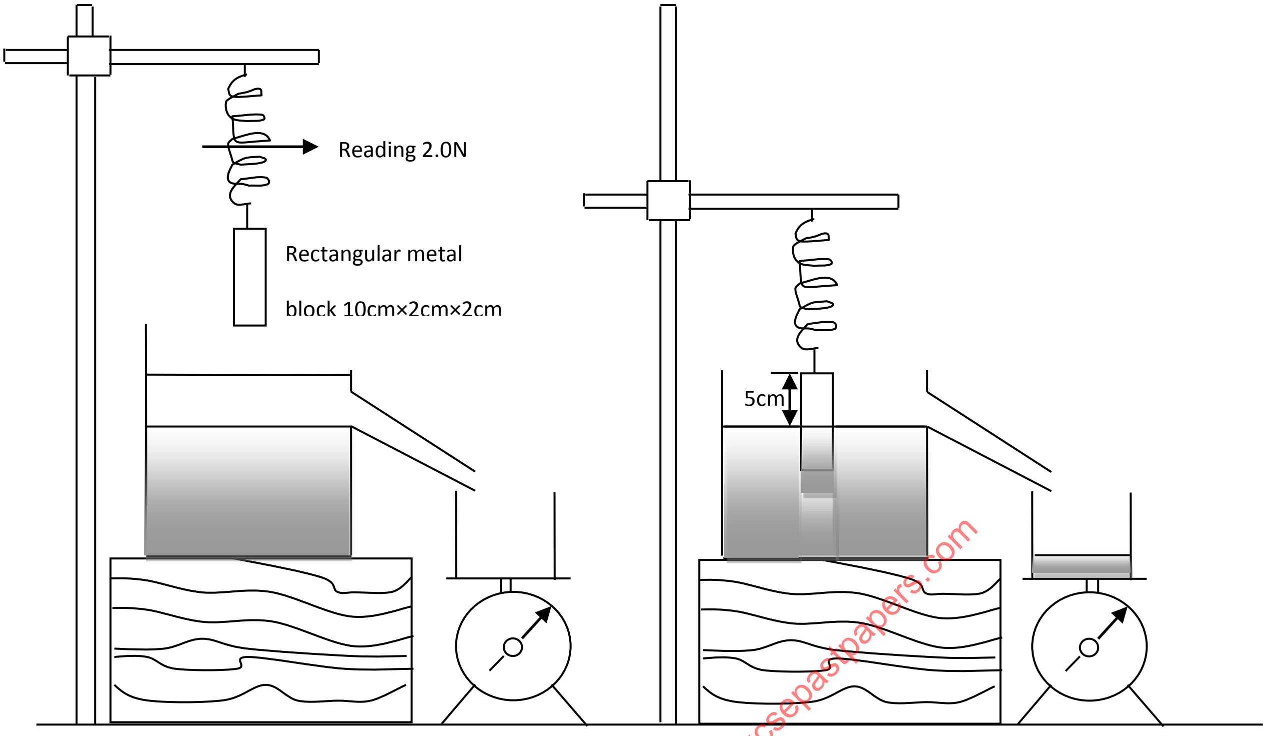
iii) if the apparatus is used to determine the specific heat capacity of the liquid, the accuracy of the experiment will be increased if the liquid is first cooled to about 5^{o}c below room temperature and the current passed until the temperature is about 5^{o}c above room temperature. (2mk)

(c). A 50W heating coil is totally immersed in100g of water contained in an insulated flask of negligible heat capacity. The initial temperature of water in the flask is 20^{o}c.

(i) Determine how long it takes for the water to boil at 100^{o}C when the heater is switched on (2mks)

(ii) After the water has been boiling for 15 minutes, it is found that the mass of water in the flask has decreased to 80g. Assuming no external heat losses, calculate a value for the specific latent heat of vaporization of water (3mks)

13. (a) The figure below shows details of an experiment performed by a student and the results taken. (take the density of water as $1.0 g/cm^3$)



i) Calculate the volume of the metal block below the water (1mk)
ii) Calculate the new reading on the compression balance after the block is halfway immersed (2mks)
iii) Calculate the reading you would expect to obtain on the spring balance (2mks)
iv) Give a statement of the principle you have used in part (iii) above (1mk)

b). Explain why the narrow stem of a hydrometer provides greater sensitivity than a wide one (1mk)

14 (a) (i) A car goes round a flat circular bend whose radius is 100m at a constant speed of 30m/s. Calculate its acceleration (2mks)

(ii) if the mass of the car is 1500kg, calculate the frictional force required to provide this acceleration. (2mks)

(b) (i) Calculate the maximum speed at which the car can go round the bend without skidding if the coefficient of friction between the tyres and the ground is 0.5. (2mks)

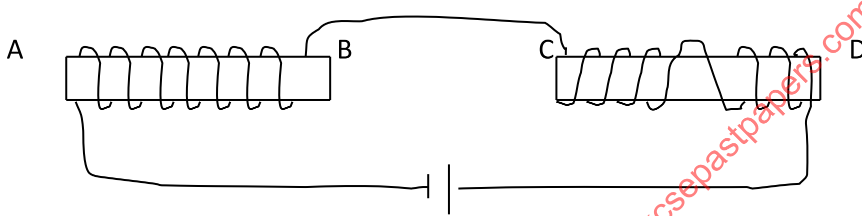
(ii) Give a reason why the driver of the car has to move through the same bend at a lower speed during a rainy day. (1mk)

MOSTA JOINT EXAMINATION

232/2
Physics
Paper 2
2017
2 hours

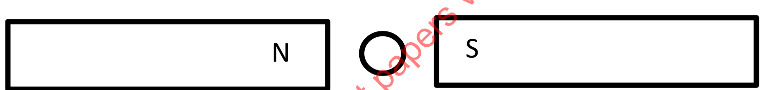
SECTION A (25 marks)

1. Describe the changes that can be observed during discharging process of a lead –acid accumulator (2mks)
2. a) Define power of a lens and give its units (2mks)
   b) An object whose height is 24cm is placed 20cm in front of a diverging lens of focal length 20cm. Determine the image distance (3mks)
3. a) Give one property of sound waves (1mk)
   b) A person claps his hands at approximately 0.5s intervals in front of a wall 90m away. He notices that each echo produced by the wall coincides with the next clap.
   i) Calculate the approximate speed of sound (3mks)
   ii) if the results obtained above were used as a basis for an experimental method to determine the speed of sound, what procedure should be adopted to obtain high accuracy in the timing part of the experiment? (1mk)
4. Identify the magnetic poles A, B, C and D in the diagram below. (2mks)



A ……………………………………………………………………………………
B ……………………………………………………………………………………
C ……………………………………………………………………………………
D ……………………………………………………………………………………

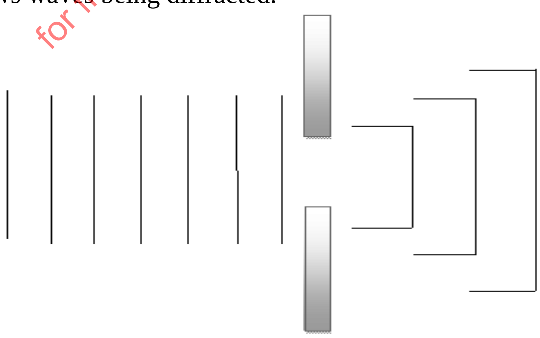
5. The diagram below shows a current carrying conductor placed in a magnetic field.



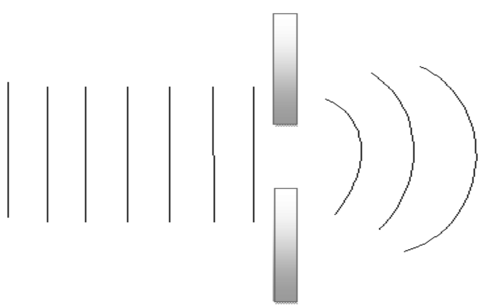
i) Show on the diagram the direction of force on the conductor (1mk)
ii) If the current through the conductor is reduced, state and explain what happens to the force in (i) above. (2mks)

6. Gamma, radio, infrared, x-rays are part of the electromagnetic spectrum.
i) Arrange these radiations in order of increasing energy (1mk)
ii) State how radio waves are detected (1mk)

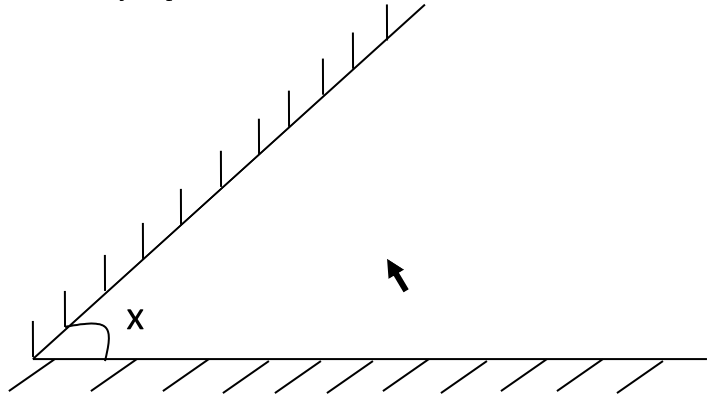
7. The diagram below shows waves being diffracted.



What adjustments should be done to obtain the wave form below? (2mks)



8. The diagram below shows an object placed in front of two mirrors inclined to each other at an angle x

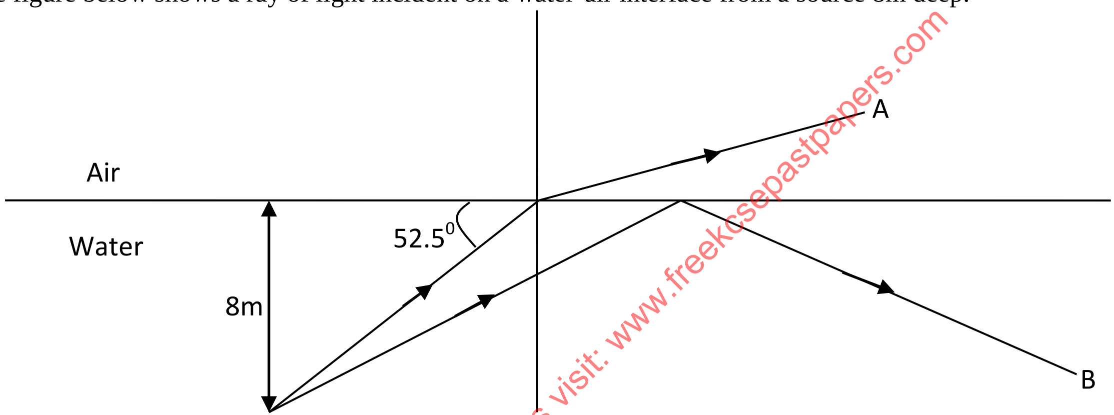


An observer sees five images, determine the value of angle x? (2mks)

SECTION B (55 marks)

9. a) State Snell's law (1mk)

b) The figure below shows a ray of light incident on a water-air interface from a source 8m deep.



i) Ray A is observed to bend as it enters the air. Give a reason why this occurs (1mks)

ii) If the refractive index of water is 1.35, calculate the angle of refraction of ray A (3mks)

iii) Find the critical angle of water (3mks)

iv) Give a reason why ray B is not travelling out of water (1mk)

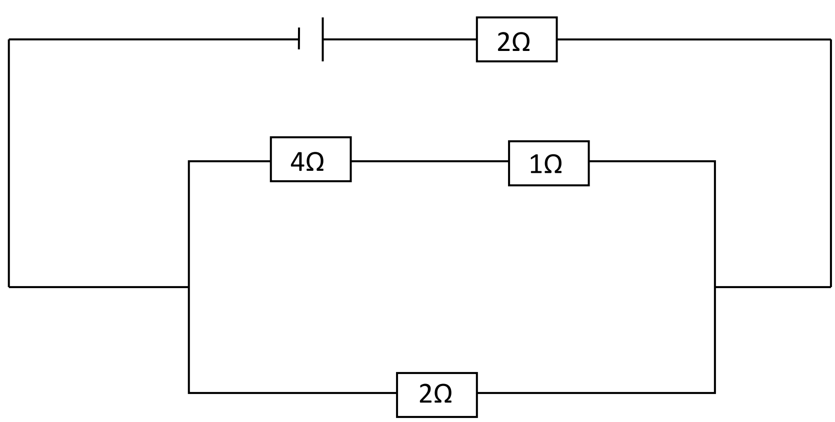
v) a fish is placed at the source of light ray. Calculate the maximum area of view on the surface of water (3mks)

10. a) define local action (1mk)

b) a charge of 4.8C flows through a lamp every second. Calculate the number of electrons involved per second. (3mks)

c) Give two differences between a primary and a secondary cell (2mks)

d) The circuit set up shown below makes a current of 1A to flow through the 4Ω resistor



Calculate;

i) The current through the 2Ω resistor (3mks)

ii) the E.M.F of the cell given that the internal resistance is negligible (3mks)

MOSTA JOINT EXAMINATION
CONFIDENTIAL
MOSTA PHYSICS
PP3 2017
QUESTION 1

- Two new dry cells size D
- An ammeter 0 – 1 A
- Voltmeter 0 – 5 V
- A resistance wire labeled XY (30 gauge) on mm scale
- Jockey
- cell holder
- switch (one way)
- six connecting wires at least three with crocodile clips at one end

QUESTION 2

- A glass block
- Soft board
- 4 optical pins
- Plain paper
- Four thumb pins
- A protractor
- 30 cm ruler

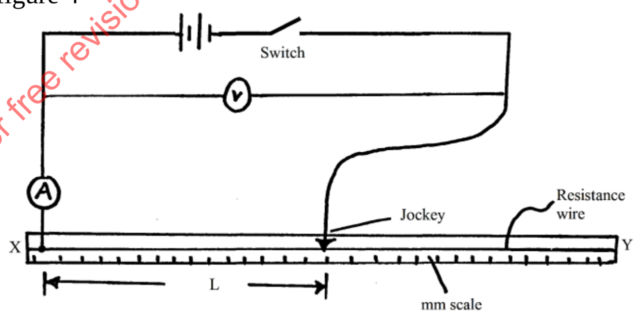
MOSTA JOINT EXAMINATIONS 2017
232/3
PHYSICS
Paper 3
2017

QUESTION 1

You are provided with the following:

- Two new dry cells
- An ammeter 0 – 1A
- A voltmeter 0 – 5V
- A resistance wire labelled XY on mm scale
- Jockey or crocodile clip
- Cell holder
- Switch
- Six connecting wires at least three with crocodile clips at one end

(a) Set up the circuit as shown in figure 4



S

Y
Figure 4

(b) Close the switch and place the jockey in contact with the resistance wire such that the length, L, of the wire XY = 0.20m. Measure and record the current, I, through the wire XY and the p.d., V, across it and enter the results in table 1

(c) Repeat procedure (b) above for the other values of L given. Read and record the corresponding values of I and V.

L (cm)	0.2	0.4	0.5	0.6	0.7	0.9	1.0
p.d. (V)							
I (A)							
R (Ω)							
$\frac{1}{I}$ (A^{-1})							

(d) Plot a graph of $\frac{1}{I}$ (y axis) against R (5mks)

(e) Determine the slope, S, of your graph (3mks)

(f) Given that I and R of the graph are related by the equation $\frac{1}{I} = \frac{R}{E} + \frac{r}{E}$, use your graph to determine the values of :

E = (2mks)

r = (3mks)

QUESTION 2

You are provided with the following apparatus

- A glass block
- Soft board
- Plain paper
- Four optical pins
- Four thumb pins
- A protractor
- A ruler

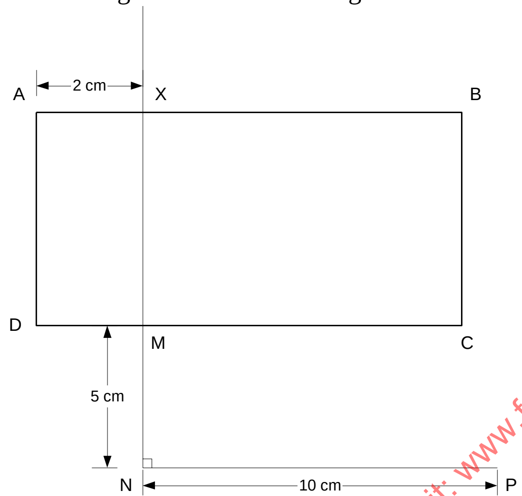
a. Fix the plain paper on the soft board using the four thumb pins.

b. Place the glass block on the plain paper (that is fixed on the soft board) Let the glass block rest on the paper from the broader face.

c. Trace the glass block using a pencil.

d. Remove the glass block.

Mark point X on one of the longer side of the traced glass block as shown in the diagram below. Point X should be 2 cm from edge A.



e. Construct a normal at X, to emerge through line DC. Let this normal meet line DC at point M.

f. Mark point N along the emergent normal, 5 cm from M.

g. Construct line NP to meet the normal at N at 90^0. Line NP is 10 cm.

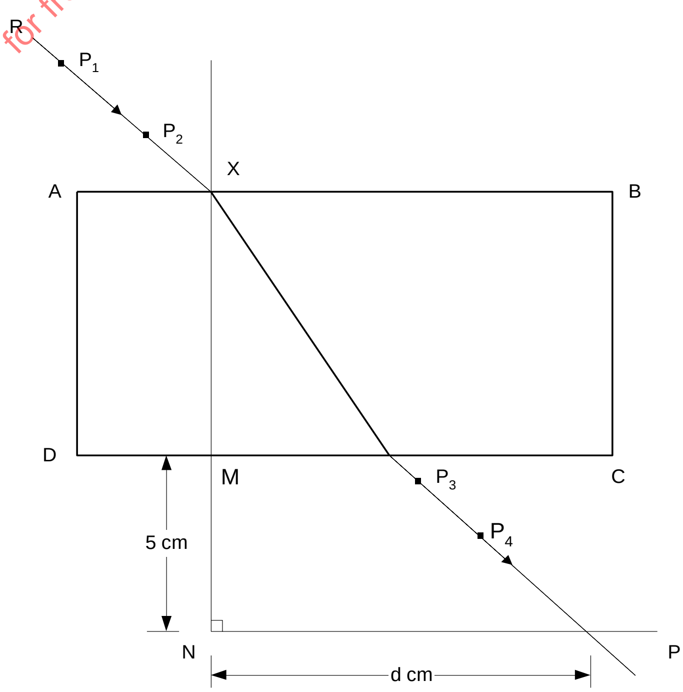
h. Using a protractor, construct an incident ray RX at an angle of incidence **i** = 10^0. Fix two pins P_1 and P_2 along RX.

i. Replace the glass block to the traced figure.

j. View the path of the incident ray RX through the glass block from face DC. Using other two pins P_3 and P_4, fix them to seem to align themselves with images of P_1 and P_2.

k. Remove the glass block and draw the emergent ray through P_3 and P_4.

l. Measure the distance of the emergent ray from point N along line NP as shown in the diagram below.



m. Record the corresponding values of d, Sin **i** and Sin^2 **i** in the table below.

n. Repeat the procedure for other values of **i**. (8 marks)

Angle of incidence **i** ^{0}	10	20	30	40	50	60
Distance d (cm)						
Sin **i**						
Sin^2 **i**						

o. (i) On the grid provided, plot the graph of Sin^2 i (vertical axis) against d. (5 marks)

(ii) Calculate the gradient of the graph. (3 marks)

p) What is the equation of the graph (2mks)

q) Give the value of d when $i=80^0$ (2mks)

WESTLANDS GRAPHICS
232/1
PHYSICS
Paper 1 (Theory)
July 2017
Time: 2 Hours

SECTION A : (25 MARKS)

Answer all questions in this section in the spaces provided.

1. A uniform wooden plank one metre long is balanced by 80N and 20N from the ends. By neglecting its weight, find the position of the fulcrum. (2 marks)

2. Figure 1 shows a portion of a vernier calliper used to measure the diameter of a metal rod. The reading on the vernier calliper when the jaws were fully closed without the metal rod was -0.12cm.

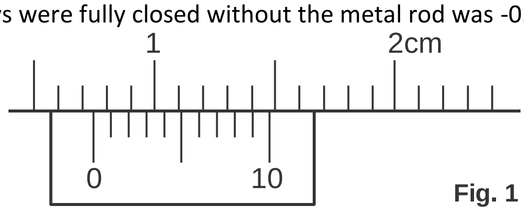
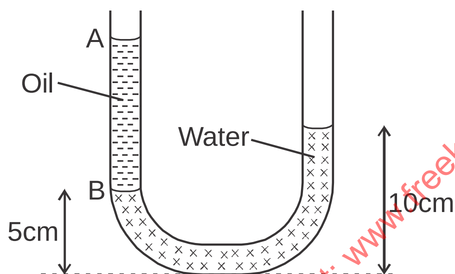


Fig. 1

Write the actual diameter of the rod. (2 marks)

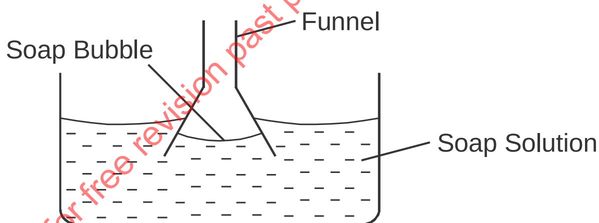
3. Figure 2 shows a U-tube containing water and oil of light density in equilibrium.



Determine the height of the oil column AB if its density is $0.6 g/cm^3$ and density of water is $1 g/cm^3$ (2 marks)

4. a) What is surface tension ? (1 mark)

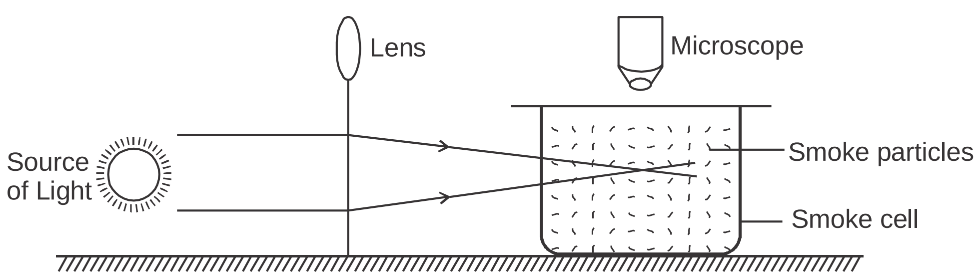
b) Figure 3 shows a funnel dipped into a soap solution.



Explain what happens to the soap bubble when the funnel is removed from the solution. (1 mark)

5. A force of 200N is applied on an object of mass 10kg resting on a horizontal surface. The object acquires an acceleration of $16 m/s^2$. Determine the frictional force acting on the object. (2 marks)

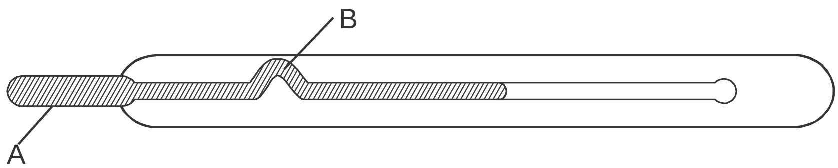
6. Figure 4 shows apparatus used to the observe the behaviour of smoke particles in a smoke cell experiment.



i) Explain the observation made. (1 mark)

ii) Explain what happens if the temperature was raised. (1 mark)

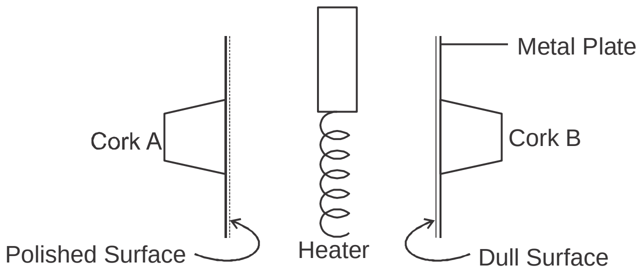
7. Figure 5 shows a clinical thermometer which is not calibrated.



i) Name the parts labelled A and B. (2 marks)

ii) On the same diagram above, mark the appropriate scale range in degrees Celsius. (1 mark)

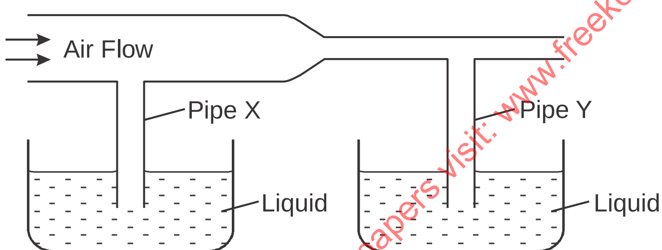
8. Figure 6 shows two corks A and B fixed on a polished plate and a dark plate with candle wax.



Explain the observation when the heater is switched on for sometime. (2 marks)

9. The stability of a body can be increased by increasing the base area and lowering its centre of gravity. State one way of lowering its centre of gravity. (1 mark)

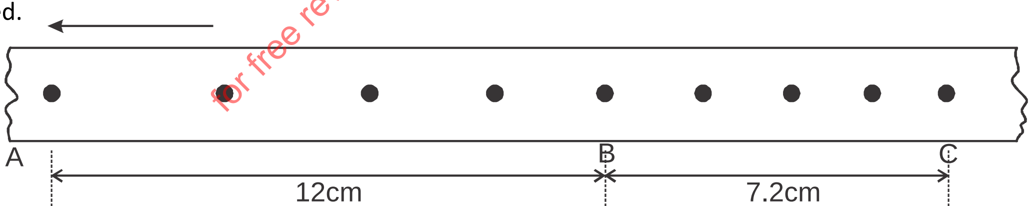
10. Figure 7 shows air flowing through a pipe of non-uniform cross-sectional area and with two pipes X and Y dipped into liquid at same level.



i) Indicate the levels of the liquid in pipe X and pipe Y. (1 mark)

ii) Explain your answer in (i) above. (1 mark)

11. Figure 8 shows dots which were made on a ticker tape attached to a trolley. The trolley was moving in the direction indicated.

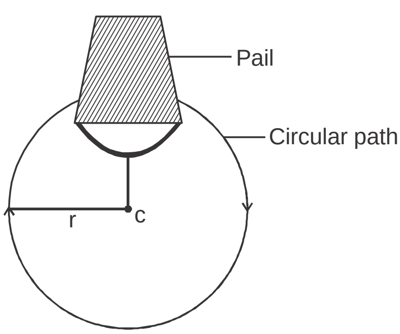


If the frequency of the source used is 20Hz, determine:

i) the velocities between AB and BC (2 marks)

ii) the acceleration of the trolley (2 marks)

12. Figure 9 shows a pail of water being swung in a vertical circle.



Explain why the water does not pour out when the pail is vertically above the centre of rotation C. (1 mark)

SECTION B : (55 MARKS)

Answer all questions in this section in the spaces provided.

13. a) State Hooke's law. (1 mark)

b) The following results were obtained in an experiment to verify Hooke's law. When a spring was extended by hanging various loads on it.

Load L, (N)	0	1	2	3	4	5	6
Length of spring (cm)	10.0	11.5	13.0	14.5	16.0	18.5	24.0
Extension , e (cm)							

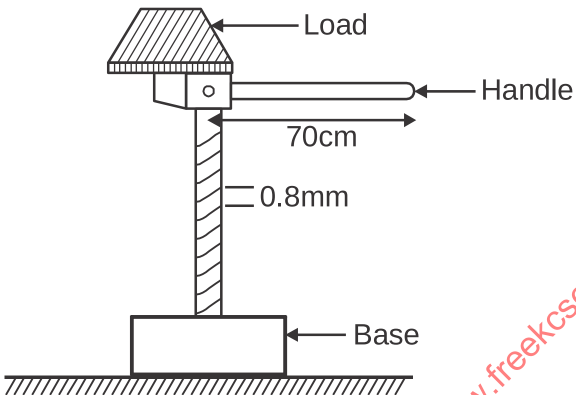
i) Complete the table above. (1 mark)

ii) Plot a graph of extension (y-axis) against load. (5 marks)

iii) From the graph, determine the spring constant k. (3 marks)

14. a) A gun of mass 4.0kg fires a bullet of mass 20g with a muzzle velocity of 600m/s. Assuming that the gun is free to move, calculate the recoil velocity. (3 marks)

b) Figure 10 shows a screw jack used to raise a load. The pitch of the screw is 0.8mm and its handle is 70cm long.



Given that the efficiency of the screw jack is 65%, calculate :

i) The velocity ratio of the machine. (2 marks)

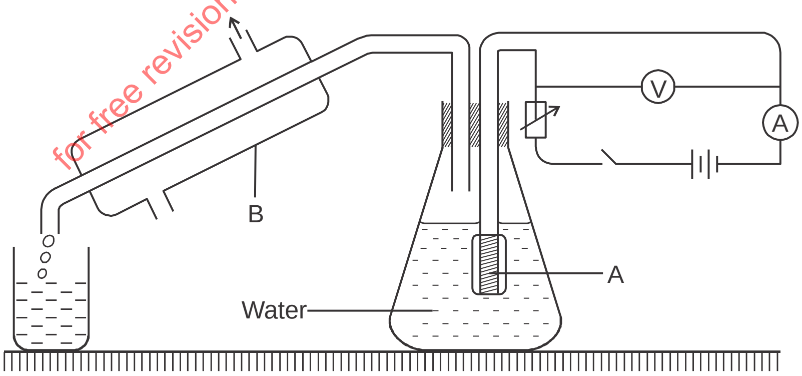
ii) The mechanical advantage of the machine (2 marks)

c) Sketch a graph of efficiency against load. (2 marks)

d) Draw a single movable pulley with a velocity ratio of two (2). (2 marks)

15. a) Define specific latent heat of vapourization. (1 mark)

b) Figure 11 shows a set up by a student to determine the specific latent heat of vaporisation of water.



i) Name the parts labelled A and B. (2 marks)

ii) State the measurements that should be taken. (2 marks)

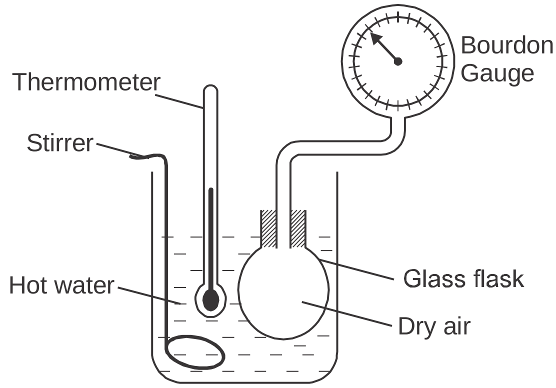
iii) Describe how the apparatus set up can be used to determine the specific latent heat of vaporisation of the liquid, stating any assumption made. (5 marks)

iv) What is the purpose of B ? (1 mark)

16. a) State the pressure law. (1 mark)

b) Explain pressure law using kinetic theory of gases. (2 marks)

c) Figure 12 shows a set up used to verify pressure law.



i) State the measurements that may be taken in the experiment. (2 marks)

ii) Explain how the measurements in (i) above may be used to verify pressure law. (4 marks)

iii) A car tyre is at an air pressure of 4.0 x 10^5N/m^2 at a temperature of 27^{o}C. As it was running, the temperature of air rises 75^{o}C. Determine the new pressure of air in the tyre. (3 marks)

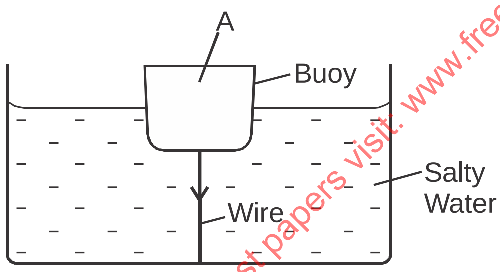
17. a) State Archimedes principle. (1 mark)

ii) An object weighs 1.04N in air, 0.64N when fully immersed in water and 0.72N when fully immersed in a liquid. If the density of water is 1g/cm^3 find the density of the liquid. (4 marks)

b) i) State the law of floatation. (1 mark)

ii) Give a reason why a steel rod sinks in water while a ship made steel metals floats on water. (1 mark)

ii) Figure 13 shows a buoy, A, of volume 40 litres and mass 10kg. It is held in position in salty water of density 1.04g/cm^3 by a light inextensible wire fixed to the bottom so that 75% of the volume of the buoy is under the surface of the water.



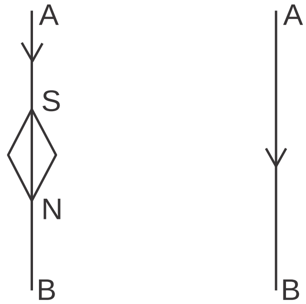
Determine the tension T of the wire. (4 marks)

WESTLANDS GRAPHICS
232/2
PHYSICS
Paper 2
July 2017
Time: 2 Hours

SECTION A : (25 MARKS)

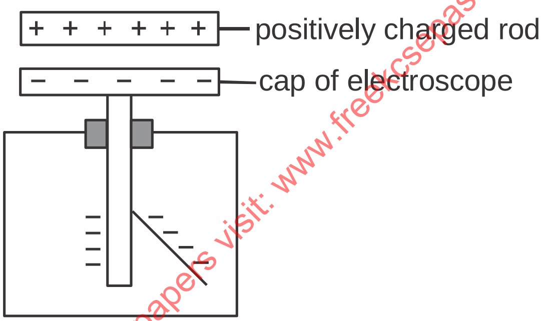
Answer all the questions in this section in the spaces provided.

1. Figure 1 shows a current carrying straight conductor placed above a compass needle.



If the current flows in the direction A to B, show in the diagram the deflection of the north pole of the compass needle. (1 mark)

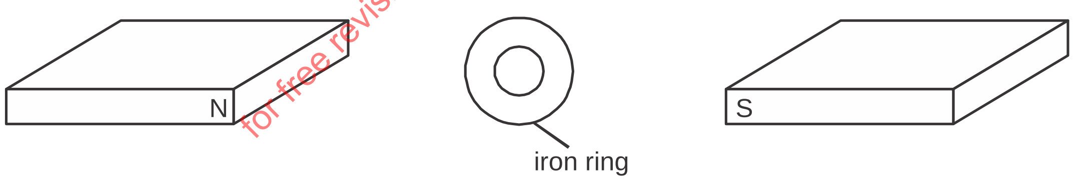
2. Figure 2 shows a highly positively charged rod being moved slowly downwards towards the cap of a negatively charged leaf electroscope. It is observed that the leaf initially falls then rises.



Explain the observation. (2 marks)

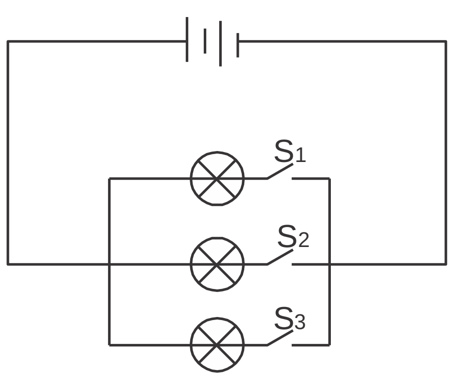
3. A certain car battery is rated 30Ah. Determine the amount of current supply in 10 minutes. (2 marks)

4. Figure 3 shows a soft iron ring placed in a magnetic field of two magnets.



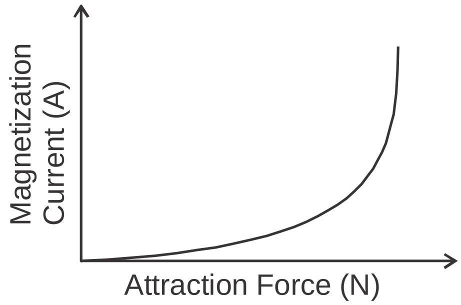
On the same diagram, sketch the magnetic field pattern produced. (2 marks)

5. Figure 4 shows a circuit diagram with three identical bulb.



State the change in the brightness of the bulbs as the switches S_1, S_2 and S_3 are gradually switched on one after the other. (1 mark)

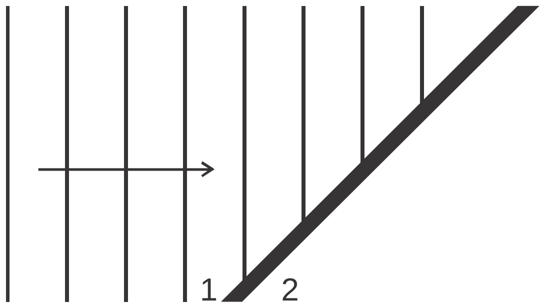
6. Figure 5 shows a relationship between the attractive force of an electromagnet and the magnetisizing current.



Give a reason for the shape of the curve in terms of the domains theory. (2 marks)

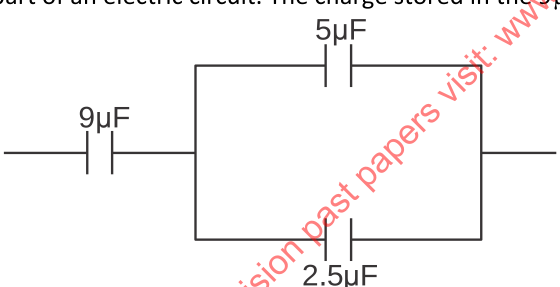
7. State two modification that can be done to a pinhole camera inorder to be used to take still photographs. (2 marks)

8. Figure 6 shows wavefronts approaching the boundary between two media.



The speed of the wave in medium 1 is lower than that in medium 2. On the same diagram complete the figure to show all the wavefronts after crossing the boundary. (2 marks)

9. Figure 7 shows part of an electric circuit. The charge stored in the 9μF capacitor is 1.4 micro coulombs. (μC)



Determine the p.d. across the 5μF capacitor. (3 marks)

10. The wavelength of a certain electromagnetic wave is 7500cm, determine its frequency.
(Take the speed d of light in a vacuum 3.0×10^8m/s) (2 marks)

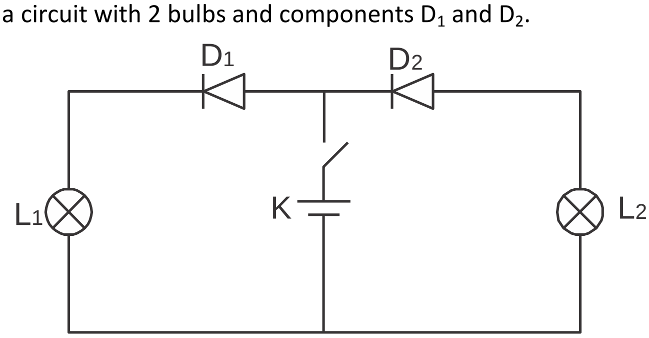
11. Uranium -234 undergoes radioactive decay represented by the equation shown below.

$$^{234}_{92}U \longrightarrow {}^{a}_{b}X + 2\alpha$$

Find the value of a and b. (1 mark)

12. State two differences between sound waves and microwaves. (2 marks)

13. Figure 8 is a circuit with 2 bulbs and components D_1 and D_2.



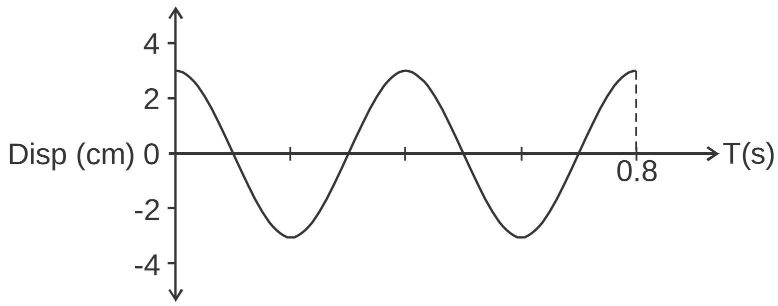
i) State the observation made when switch K is closed. (1 mark)

ii) Account for the observation made above. (2 marks)

SECTION B : (55 MARKS)

Answer all questions in this section in the spaces provided.

14. Figure 9 shows the development-time graph of a wave travelling at 4m/s.

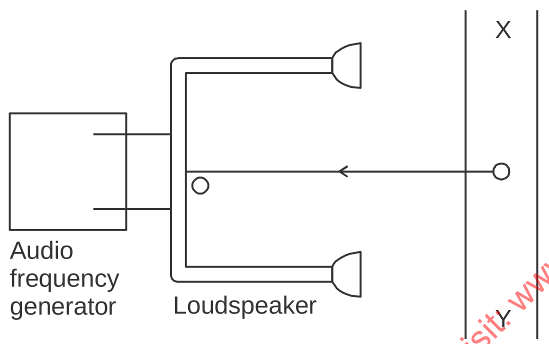


i) What is the frequency of the wave ? (2 marks)

ii) Calculate the wavelength of the wave. (2 marks)

iii) Sketch on the same axis the displacement-time graph of a wave of same frequency but 180^{o} out of phase and half amplitude. (2 marks)

b) Figure 10 shows the set up used to demonstrate interference of sound.



i) An observer O moves along XY, state the observation(s) made. (1 mark)

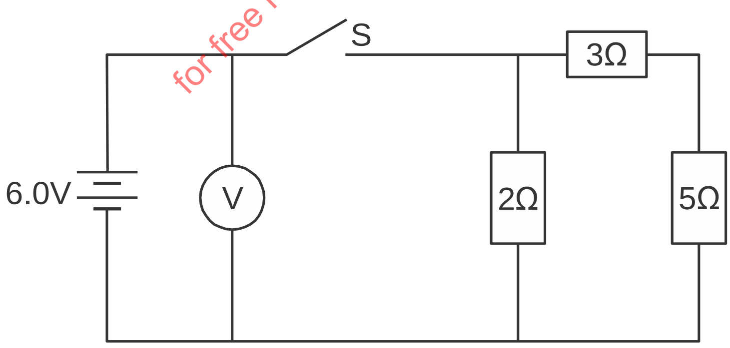
ii) Give a reason for your answer in (i) above. (1 mark)

iii) What will the observer hear when moving along the line OC ? (1 mark)

iv) Why are loudspeakers connected to some audio-frequency generator ? (1 mark)

15. a) State Ohm's law.

b) Figure 11 shows a circuit with resistors and voltmeter connected to a battery.



i) If each cell has internal resistance of 0.7Ω, determine the total resistance in the circuit. (3 marks)

ii) What amount of current flows through the 3W resistor when the switch is closed ?

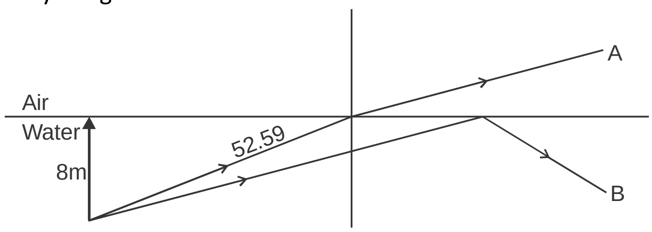
iii) What is the reading of the voltmeter when the switch S is

i) open ? (1 mark)

ii) closed? (1 mark)

iv) Account for the difference between the answers in (i) and (ii) above. (1 mark)

16. Figure 12 shows a ray of light incident on a water air interface from a source 8m deep.



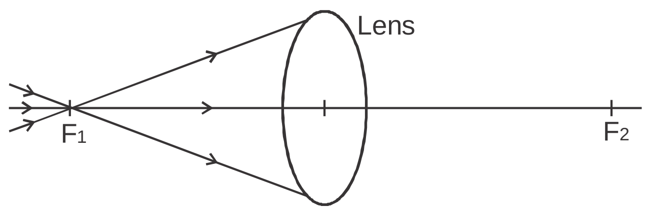
i) Ray A is observed to bend as shown when it enters the air. Give a reason for the observation. (1 mark)

ii) If the refractive index of water is 1.33, calculate the angle of refraction of ray A. (2 marks)

iii) Find the actual angle of water. (2 marks)

iv) Give a reason why ray B is not travelling out water. (1 mark)

b) Figure 13 shows a glass lens in air and its two focal point F_1 and F_2

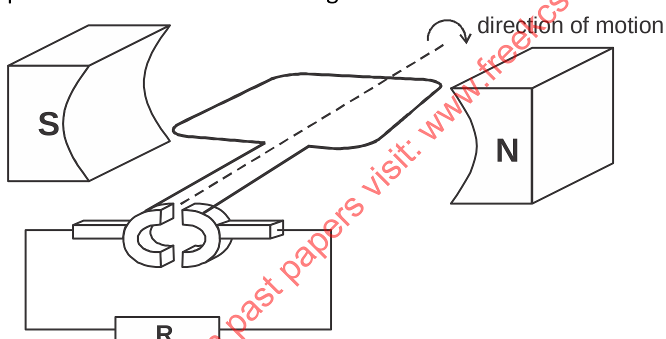


i) Three ray of light passes through F_1 to the lens, on the same figure show the path followed by the three rays through the lens and into the air. (2 marks)

ii) State one possible causes of myopia. (1 mark)

iii) State the type of lens that is used to correct myopia. (1 mark)

17. a) Figure 14 shows a simplified illustration of an e.m.f generator.

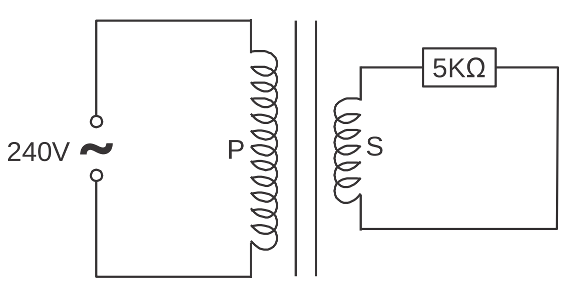


i) Show the direction of induced current through R when the coil is in the position shown in the diagram. (1 mark)

ii) State two ways of increasing the amount of induced current in this set up. (2 marks)

ii) On the axes below sketch a graph to show how potential difference across R varies with the inclination angle. The coil is initially vertical. (2 marks)

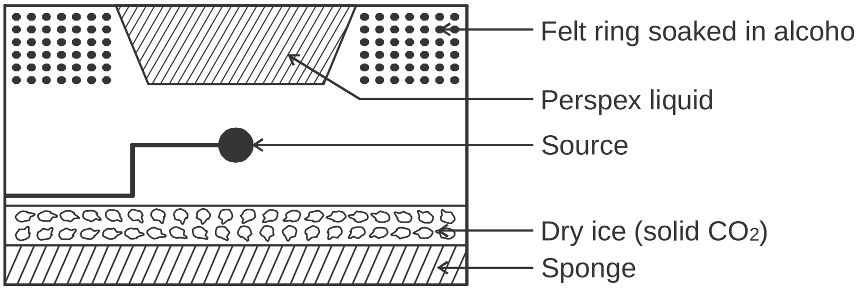
b) Figure 15 shows a step down transformed connected to a 240V mains socket. The primary coil has 4000 turns while the secondary coil has 200 turns. The efficiency of the transformer is 60% and a current of 50A flows through P.



Calculate the current through S. (2 marks)

ii) A house has three rooms each with two 240V, 60W bulb. If the bulbs are switched on from 7.00p.m to 10.00p.m daily. Calculate the cost per week for lighting these rooms at sh.8.30per kilowatt hour. (3 marks)

17. Figure 16 shows a diffusion cloud chamber for detection redioactivity.



a) State functions of the following :

i) Alcohol (1 mark)

ii) Solid CO_2 (1 mark)

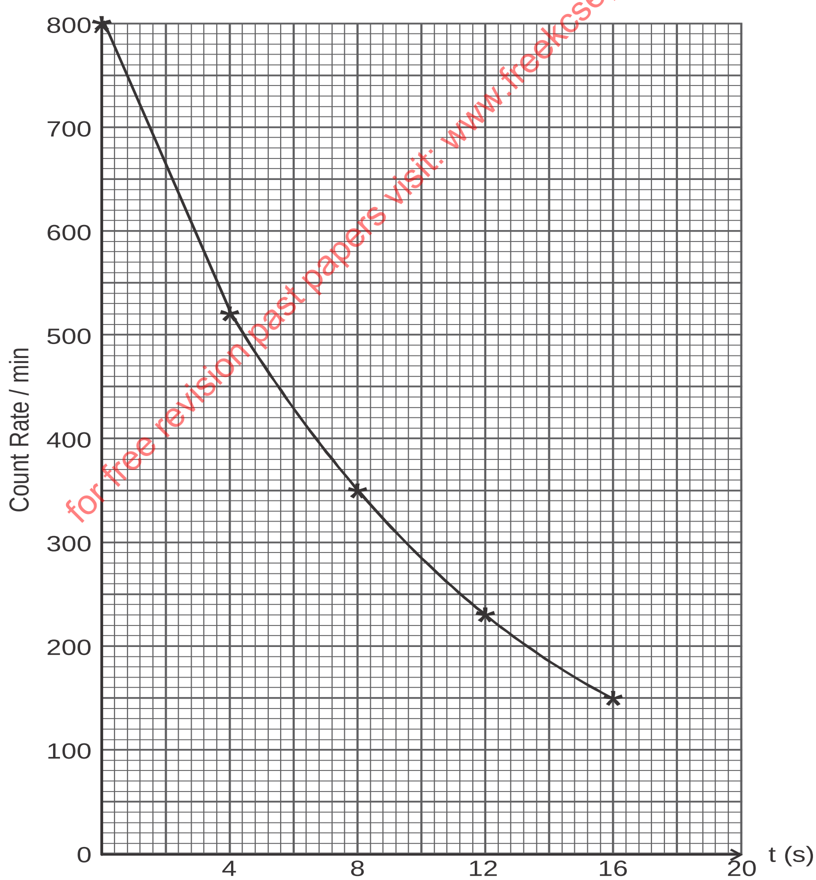
b) When radiation from the source enters the chamber, some white traces are observed.

i) Explain how the traces are formed. (1 mark)

ii) State how the radiation is identified (1 mark)

c) A leaf electroscope can be used as a detector of radiation. State two advantages of the diffusion cloud chamber over the leaf electroscope. (2 marks)

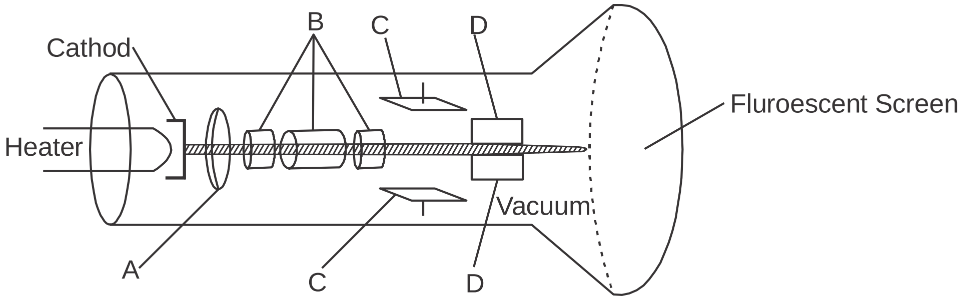
d) In an experiment with G-M tube the count rate was recorded at different times and the results obtained used to plot the graph shown below.



i) Given that when t was zero, G-M reading was 980 counts. Use the graph to determine the background radiation. (1 mark)

ii) Determine the half-life of the radioactive material. (2 marks)

19. a) Figure 17 below shows a cathode ray tube (CRO)



i) Name parts labelled A and B. (2 marks)

ii) What are the functions of A and C ? (2 marks)

iii) Give a reason why the tube is evacuated.

b) State what determines the quality of X-ray in an X-ray tube. (1 mark)

c) State one use of X-ray in an industry. (1 mark)

WESTLANDS GRAPHICS
232/3
PHYSICS
Paper 3
(Practical)
July 2017
Time: 2½ Hours

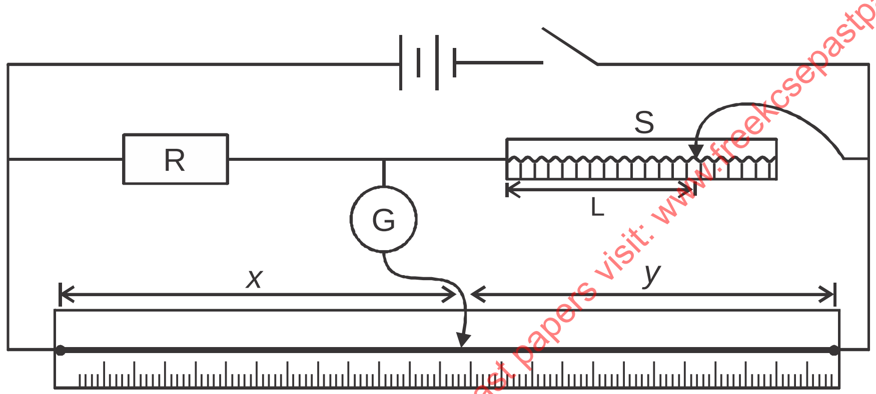
1. PART A
You are provided with the following apparatus
- one resistor labelled R
- a wire labelled W mounted on millimeter scale
- a wire labelled S mounted on a millimeter scale
- one dry cell (1.5V) and a cell holder
- one centre zero galvanometer
- one jockey
- eight connecting wires, four with crocodile clips at both ends
- a micrometer screw gauge
- a switch

Proceed as follows :

a) Determine the average diameter D, of the wire W using the micrometer screw gauge provided.

D_1 = ... mm
D_2 = ... mm (1 mark)
$D = \frac{D_1 + D_2}{2}$ = ... m(1 mark)

b) Set up the apparatus as shown in the circuit in figure 1.



Use the crocodile clips to fix L, of wire labelled S at 50cm from the end connected to the galvanometer G.

c) Close the switch and use the jockey to touch one end of the wire W, and then the other end. The deflections on the galvanometer should deflect in the opposite directions, if not check the circuit connections. Adjust the position of the jockey along the wire W until there is no deflection in the galvanometer.
Record the value of x and y
x = ... cm
y = ... cm (1 mark)

d) Repeat for other values of L in table 1 below.

Table 1

L (cm)	45	40	35	30	25	20
X (cm)						
Y (cm)						

(7 marks)

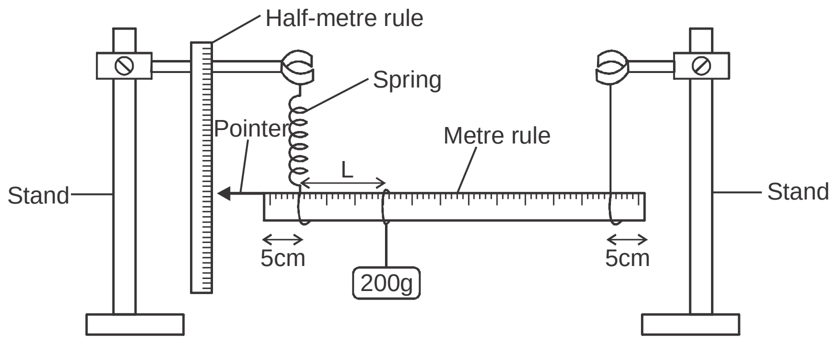
e) i) Plot a graph $\frac{y}{x}$ (s-axis) against L. (5 marks)

ii) Determine the slope, m of the graph. (3 marks)

iii) Given that $k = \frac{100D}{m}$, determine the value of k. (2 marks)

2. You are provided with the following apparatus :
- A metre rule and a half metre rule (or two metre rules)
- Two stands, two clamps and two bosses
- Three pieces of thread
- One optical pin
- One helical spring
- One mass of 200g
- A stopwatch

Proceed as follows :



a) i) Set up the apparatus as shown in the figure 3 above. Attach the optical pin using the cellotape at one end of the metre rule to act as a pointer.

ii) Suspend one end of the metre rule with a thread at 5cm mark from the end.

iii) Suspend the other end with spring also 5cm from the end so that the metre rule is horizontal

iv) Hold the other rule vertically on the bench so that it is near the end with a pointer as shown on the diagram above.

b) i) Read the pointer position, L_0 = ... cm (1 mark)

ii) Hand on the horizontal metre rule the 200g mass at a length L = 10cm from the spring and record the extension, e, of the spring in the table 2 below.

iii) Displace the mass slightly downwards and release it to oscillate vertically. Take time for 20 oscillations and record the time in table 2 below.

c) Repeat steps b(ii) and b(iii) for the other positions of L of the mass.

Table 2

Length L (cm)	10	20	30	40	50
Extension, e (cm)					
Time for 20 oscillations (s)					
Periodic time T(s)					
T^2 (S^2)					

(6 marks)

d) Plot a graph of extension e(m) y axis against $T^2(S^2)$ (5 marks)

e) Calculate the slope of the graph. (2 marks)

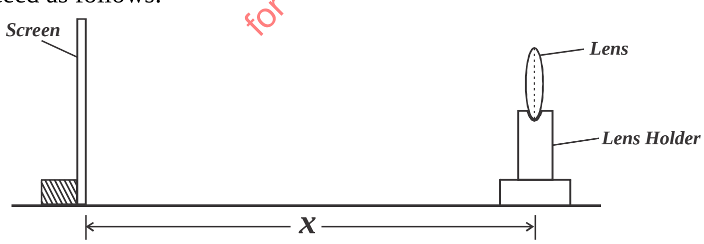
f) Given that $e = \frac{PT^2}{4\Pi^2} + C$ determine the value of P. (2 marks)

<u>PART B</u>

You are provided with the following apparatus :

- a lens
- a lens holder
- a white screen
- a metre or half metre rule

Proceed as follows:



i) Set the apparatus as shown in figure 4 above. Focus a sharp image of a distant object on the screen.

ii) Measure the distance x in cm between the lens and the screen at which a sharp image is formed.

iii) Repeat (i) and (ii) above using a different object and record your readings in table 3 below.

Table 3

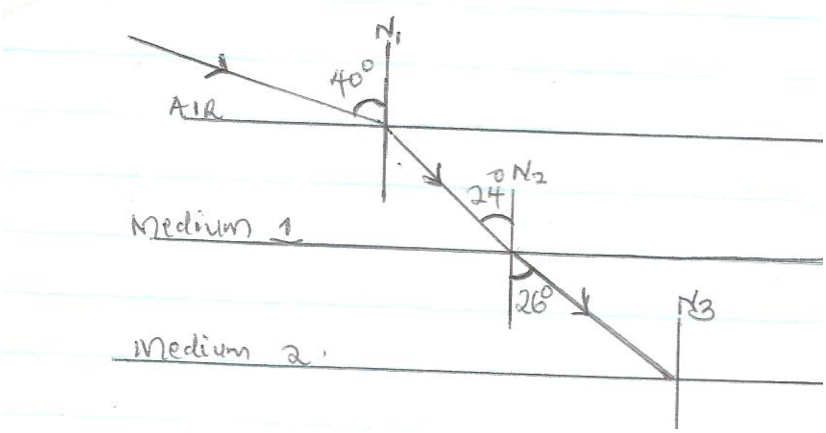
Object	Distance X (cm)
1	
2	

(2 marks)

iv) Calculate the average value of x. (1 mark)

v) What is the significance of the result obtained in (iv) above ? (1 mark)

b) A ray of light travels from air into medium 1 and 2 as shown.



Calculate :

i) The refractive index medium 1. (2 mrks)

ii) The critical angle of medium 1. (2 mrks)

iii) The refractive index of medium 2 with respect to medium 1. (2 mrks)

iv) Sketch a ray diagram to show the working of a periscope using two 45^0,45^0, 90^0 prism such that it can be used to view objects behind the observer. (3 mrks)

v) State two conditions under which total internal reflection occurs. (2 mrks)

vi) State one reason why glass prisms are preferred to plane mirrors for use in periscopes. (1 mrk)

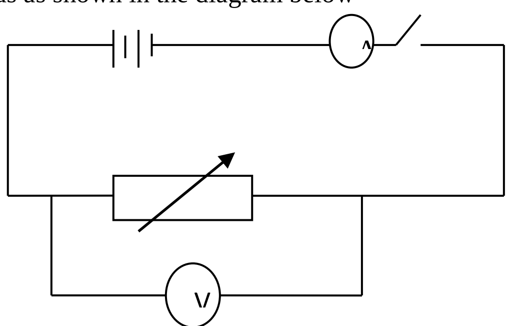
KIGUMO SUB-COUNTY CLUSTER EXAMINATION
232/3
PHYSICS PAPER 3
(Practical)
2 ½ Hours
TERM II - 2017

1. a) You are provided with the following apparatus.

- 2 dry cells
- 1 ammeter (0-1A)
- 1Voltmeter (0-5V)
- 1 variable resistor
- 1switch
- 6connecting wires

Procedure I

(i) Set up the apparatus as shown in the diagram below



(ii) Switch on and vary the current using variable resistor. Record in the table below.

V(v)	2.8	2.6	2.4	2.2
I (A)				

(iii) Plot graph of V(y-axis) against I (x-axis) (5mks)

(iv) From the graph, determine the e.m.f, **E** and internal resistance **r** of the battery given that E=V+ Ir

I. E= (1mk)

II. r = (3mks)

b) You are provided with the following.

- a meter rule
- A knife edge
- One 50g mass and a 100g
- Some thread
- Some water in a beaker.

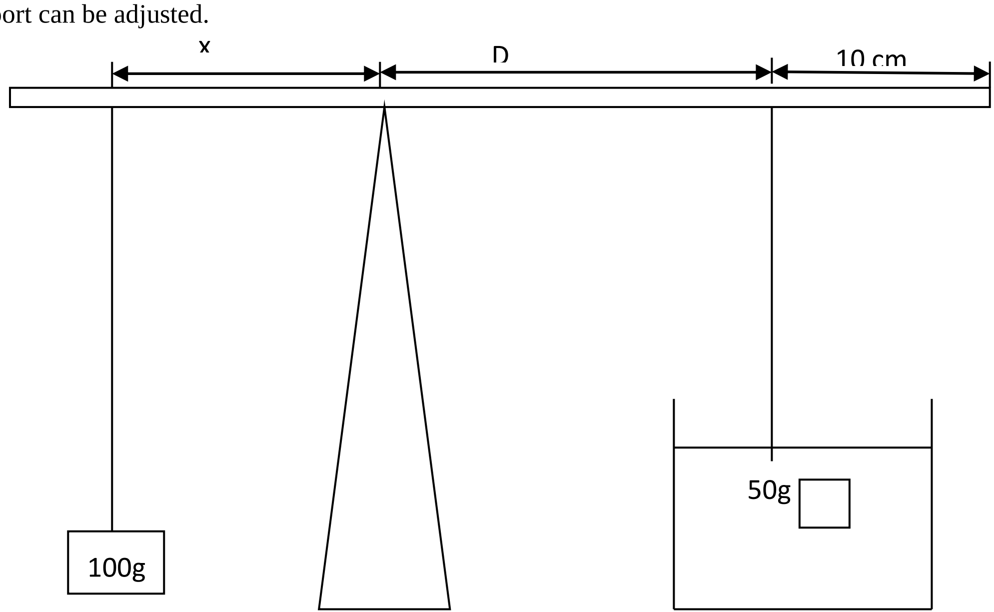
Proceed as follows:

a) balance the meter rule on the knife edge and record the reading at this point.

Balance point = _________cm (1mk)

For the rest of this experiment the knife edge must be placed at this position.

b) set up the apparatus as shown in the figure below. Use the thread provided to hang the masses such that the positions of the support can be adjusted.



The balance is attained by adjusting the position of the 100g mass. Note that the distance **x** and **D** are measured form the knife edge and the 50g mass is fully immersed in water. Record the values of **x** and **D**

X = ____________________cm (1mk)

D = _________________________cm (1mk)

Apply the principle of moments to determine the weight W_1 of the 50g mass in the water and hence determine the upthrust **UW** in water.

W_1= (2mks)
N

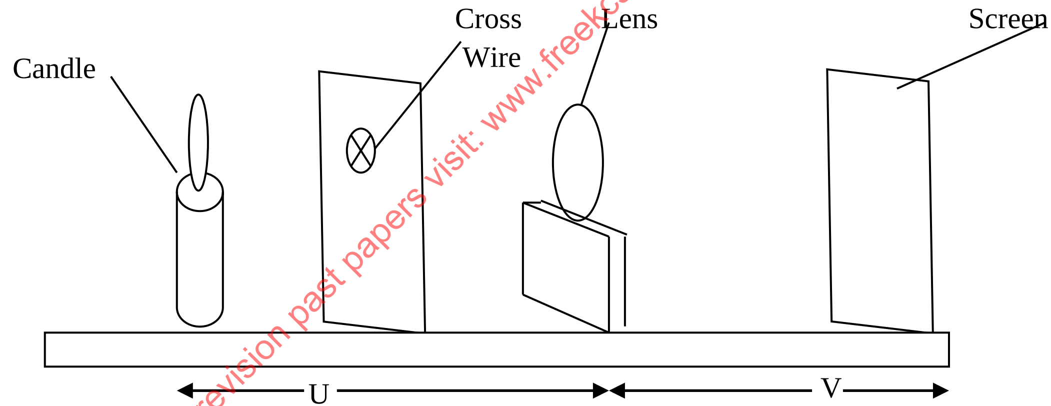
UW= (2mks)
N

2. You are provided with the following apparatus.
- One convex lens of focal length 10cm
- A lens holder
- One screen with a hole and cross wires
- One white screen
- A candle
- A meter rule

Proceed as follows

a) Using the lens provided, focus a distant objecton the screen. Measure and record the distance **D** between the screen and the lens
D= ___________________cm (1mk)

b) Arrange the apparatus as shown in the figure below. Fixing U=20cm, vary the position of the screen until a sharp image is formed on the screen. Read and record the value of V.
V= __________________cm (1mk)



c) Repeat the above for other values of U as indicated in the table. Complete the table

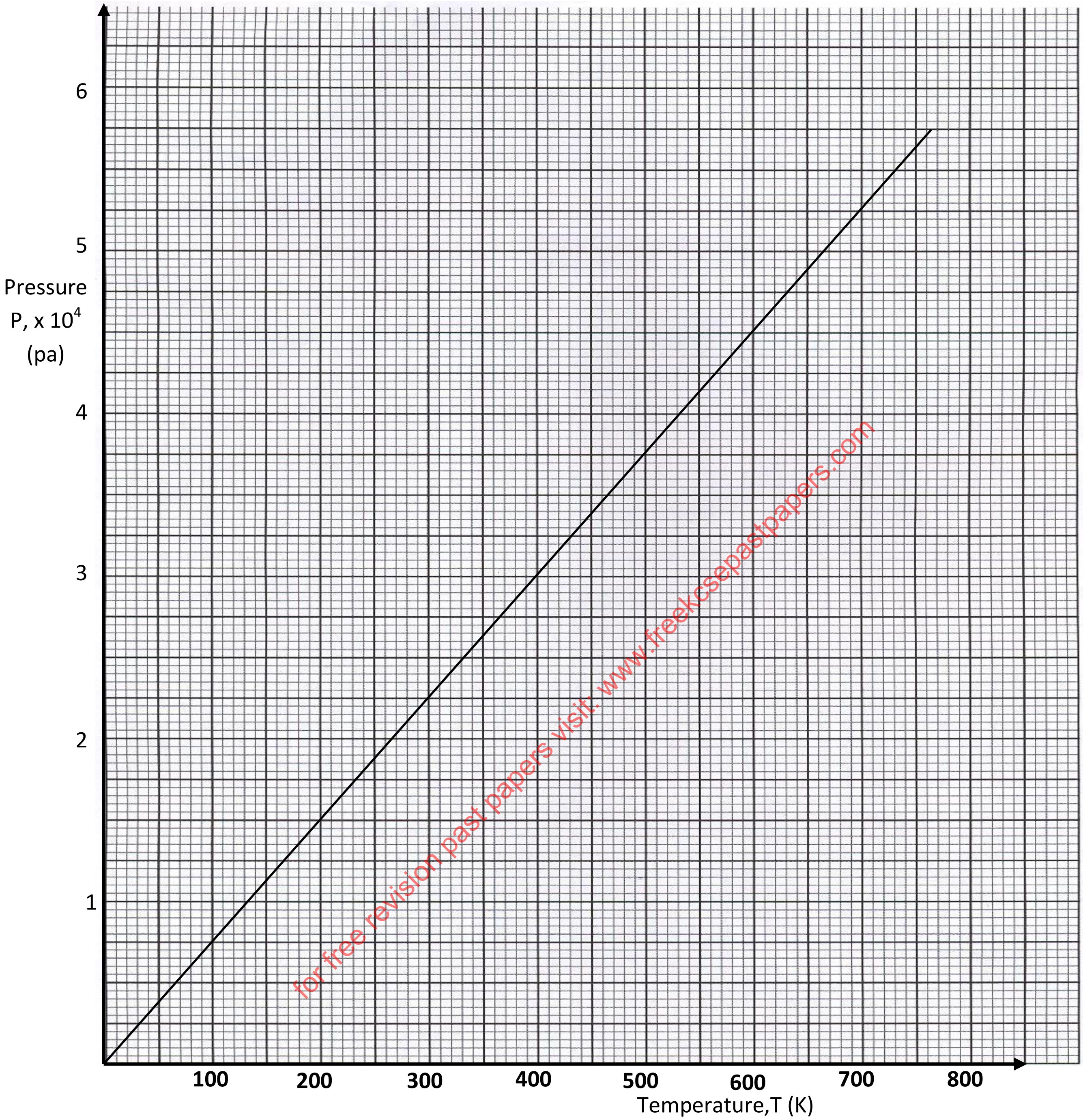
U (cm)	V(cm)	UV(cm^2)	U+V (cm)
20			
25			
30			
35			
40			
45			
50			
55			

d) (i) Plot a graph of UV(cm^2) (y-axis) against U+V (cm) (5mks)

e) Given that $n(U+V) = UV$ where n is a constant, use your graph to find the value of n. (4mks)

f) What does this constant represent? (1mk)

7. The graph below shows the relationship between pressure and temperature for a fixed mass of an ideal gas at constant volume.



Given that the relationship between pressure (**P)** and temperature (**T)** is of the form P**= kT +C** where **k** and **C** are constants, from the graph,

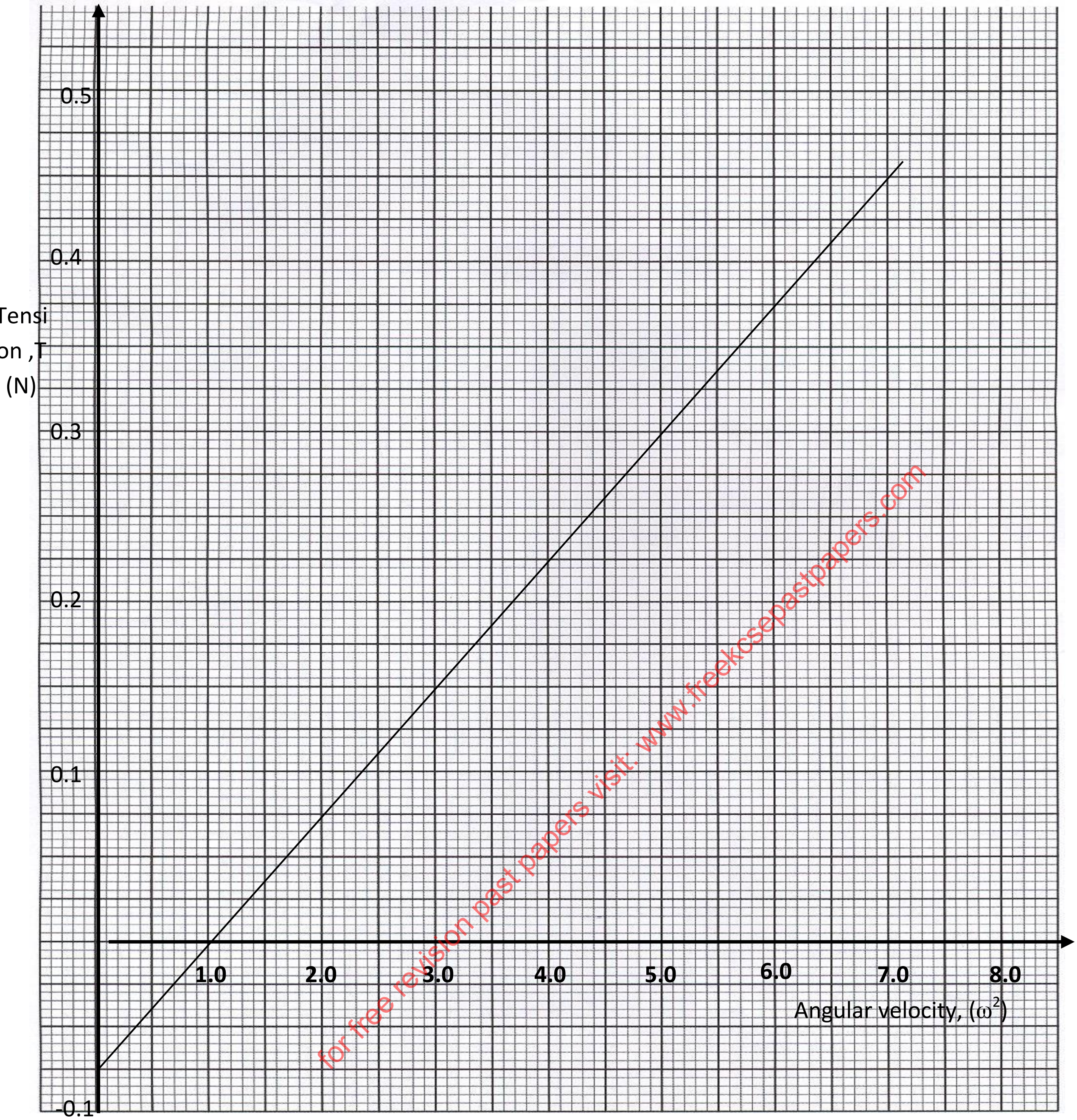
Determine the value of;

i) **C** (1mk)

ii) **k** (2mks)

8. A horse pipe of cross- sectional area 0.6 cm^2passes water at 10m/s to a nozzle sprinkler of diameter 0.8cm^2 having 40 holes. Determine the velocity of the water emitted from each hole. (3mks)

The tension **t** on the string was measured for various values of angular velocity. The distance **r** of the body from the Centre was maintained at 30 cm. A graph of tension against ω^2 was plotted as shown.



i) From the graph, determine the mass m of the body given that
T $= m\omega^2 - C$ where **C is** a constant. (3mks)

ii) Determine the constant **C.** (1mk)

iii) What is the significance of C? (1mk)

KASSU EDUCATIONAL IMPROVEMENT EXAMINATION
Kenya Certificate to Secondary Education
232/3
PHYSICS
PRACTICAL
JUNE/JULY 2017
TIME: 2 ½ HRS

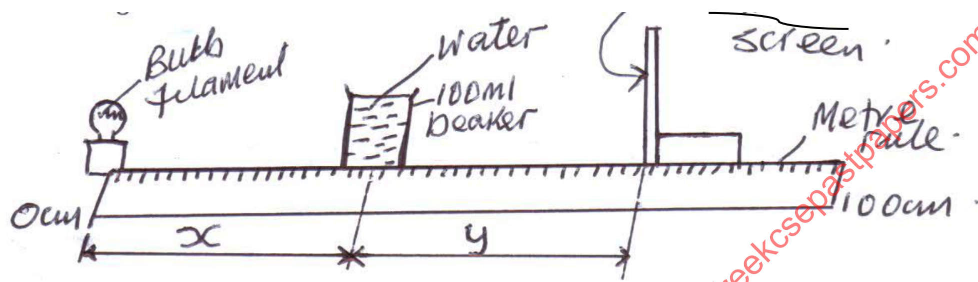
PART A

You are provided with the following;

- A lighting bulb (In a complete circuit with switch)
- 100ml beaker filled with water
- White screen.
- Metre rule
- A piece of plasticine

Proceed as follows:

(a) (i) Firmly fix the metre rule on the bench using plasticine provided.
Position a lighting bulb at a distance of 7cm from the centre of the beaker.
The bulb filament should be at a horizontal position as the middle of the vertical height of the beaker.



(ii) Switch on the bulb and adjust the position of the screen until a sharp vertical line of light is observed on the screen. Measure and record the distance y cm. Tabulate your results. **(5 marks)**

Table

Distance x (cm)	Distance y (cm)	y/x
7		
10		
15		
20		
25		
30		

(b) (i) Repeat the experiment for values of x = 10, 15, 20, 25, 30cm.
Determine the values of y/x.

(c) Plot a graph of y/x against y cm. **(5 marks)**

(d) (i) Determine the slopes S of the graph. **(3 marks)**
S =

(e) Given that $\frac{y}{x} = sy - 1$
Determine the value of y when $\frac{y}{x} = 1$. **(2 marks)**

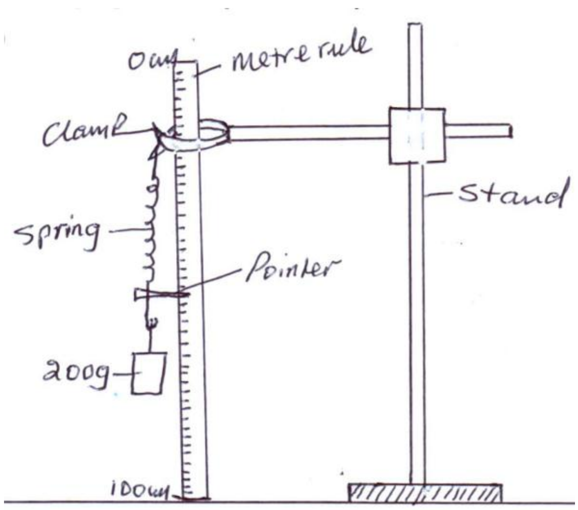
PART B

You are provided with the following;

- A helical spring with pointer
- A 200g or $2 \times 100g$ mass
- A stop watch
- A metre rule
- 1 stand + clamp + Boss

Proceed as follows.

(a) (i) Clamp the metre rule vertically with the 0 cm mark at the top. Hang the spring on the clamp such that the pointer slides on the metre rule.



(ii) Record the position of the pointer for the unloaded spring. **(½ mark)**
Unloaded spring position lo = …………………….. cm mark.

(b) Load the spring with 200g mass and determine its extension e ……….. **(1 mark)**
e = …………….. m

(c) Displace the mass on the spring by pulling it slightly downwards and release it to oscillate freely. Record the time for 10 complete oscillations.
Time for 10 oscillations = ……………………… seconds **(½ mark)**
Find the periodic time T. **(1 mark)**
T = ……………………………..s

(d) From the formula.
$g = \frac{4\pi^2 e}{T^2}$. Determine the value of g. **(2 marks)**
g = ……………………………

QUESTION 2

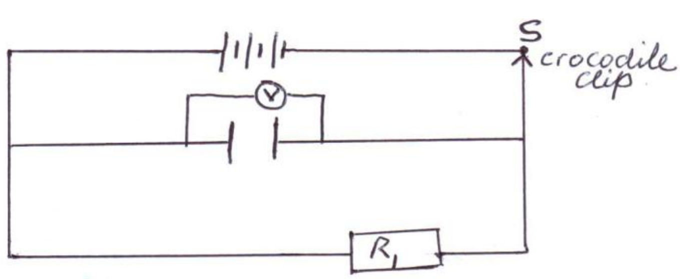
<u>PART A</u>

You are provided with the following;

- A voltmeter 0 – 5V
- A capacitor C
- A switch
- A stop watch
- 9 connecting wires
- 3 cells and 3 cell holder to hold 1 – 3 cells
- A resistor R_1
- Ammeter (O – 1)A
- A resistor R_2

Proceed as follows:

(a) Set up the circuit as shown in the figure.



(i) Charge the capacitor C by connecting the crocodile clip to S. Record the reading of the voltmeter, V_0. **(1 mark)**
V_0 = ……………………………………

(ii) Calculate the value of the current I_0 given that $I_0 = \frac{V_0}{R1}$ (where $R_1 = 4.7 \times 10^3 \Omega$) **(3 marks)**

(iii) While the voltmeter shows maximum voltage V_0 open the crocodile clip from S and start the stop watch simultaneously. Stop the stop watch when the voltage has dropped from V_0 to 4.0V. Read the record in the table the time taken. **(4 marks)**

Voltage $V = V_0$ when $t = O_{(s)}$

Voltage V		4.0	3.5	3.0	2.5	2.0	1.5	1.0	0.5
Time, t (s)	0								

(iv) Reset the stop watch and close the switch. Repeat the procedure in (i) - (iii) to measure and record the time taken for the voltage to drop from V_0 to each of the other values on the table.

(b) On the grid provided, plot a graph of voltage V (y-axis) against time (s).

(ii) Use the graph to determine the time t at which $V = \frac{V_0}{2}$

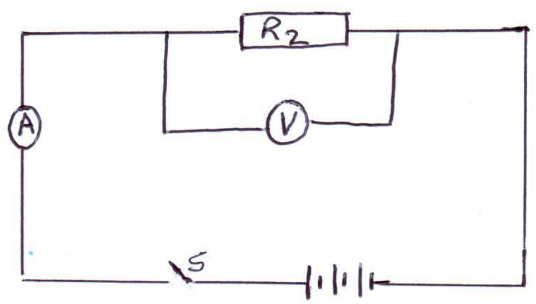
t = ………………………….. Seconds **(1 mark)**

(c) Determine the resistance of the voltmeter R_v given that;

$t = 0.693\ CR_v$ where C is the capacitance of the capacitor. **(3 marks)**

PART B

(a) Connect the circuit as shown below.



Close the switch and record the ammeter and voltmeter reading. **(1 mark)**

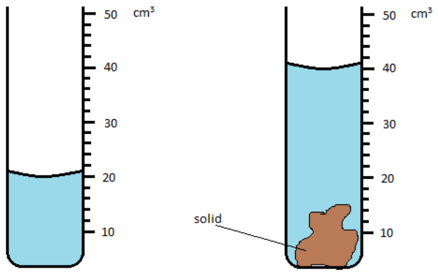
P.d V(v) = v

Current I(A) = A

Hence determine the value of resistance R_2. **(2 marks)**

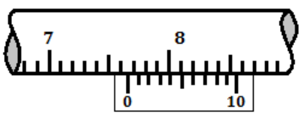
SUKEMO JOINT MOCK 2017
232/1
PHYSICS
PAPER 1
TIME: 2 HOURS.

1. The figure below shows the change in volume of a liquid in a measuring cylinder when an irregular solid is immersed in it.



Given that the mass of the solid is 75.0 g, determine the density of the solid in SI units. **(2 marks)**

2. The figure below shows a vernier caliper scale.

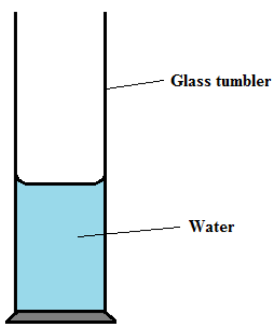


State the correct reading of scale if the instrument has a zero error of -0.02cm. **(2 marks)**

3. The air pressure at sea level is 75cm of mercury. Given the density of mercury is 13600 kg/m^3 and the average density of air is 1.25 kg/m^3. Calculate the air pressure in cm of mercury at the top of a mountain of height 1600m. **(3 marks)**

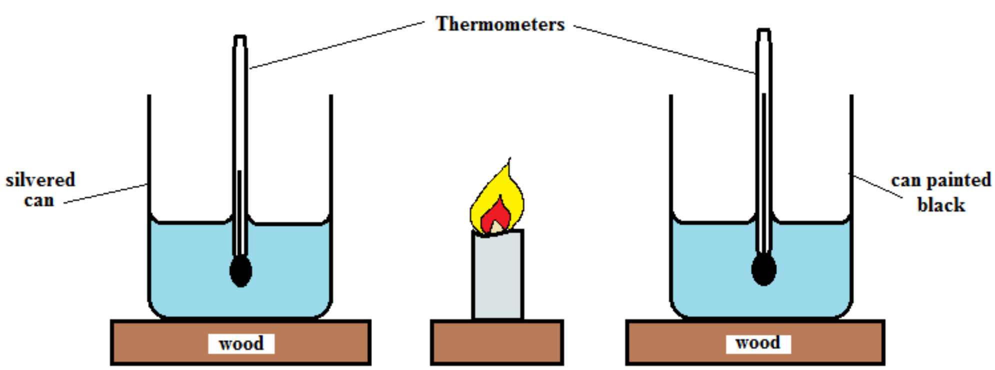
4. A student observed the smoke particles in a smoke cell and noted that they moved in a random way. Explain this observation. **(2 marks)**

5. The figure below shows a glass tumbler partly filled with water at room temperature



Briefly explain what happens to the stability of the tumbler when water is cooled to a temperature of 0^0C from 5^0C **(2 marks)**

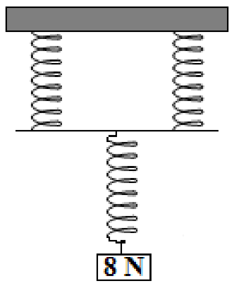
6. Two similar cans are partly filled with equal quantities of water. Each holds a thermometer and are placed at equal distances from a radiant heater as shown in the figure below.



State with reason, the container in which the temperature is likely to be higher after a few minutes. **(2 marks)**

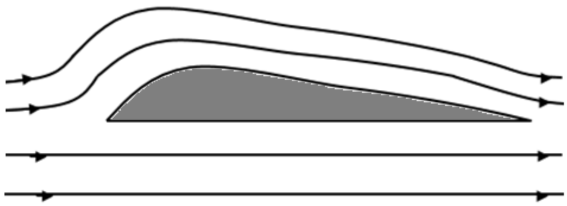
7. After a piece is cut off from a uniform metre rule, the remainder of it was found to balance at 46 cm mark. To make it, balance at 50cm, a 20g mass was suspended at the 75-cm mark. Find the mass of the shortened rule. **(3 marks)**

8. Calculate the total extension for the system below



Given that the spring constant for each spring is 40 N/m. **(2 marks)**

9. The figure below represents an aerofoil plate moving through air. The speed of the plate is initially very high in the horizontal direction.

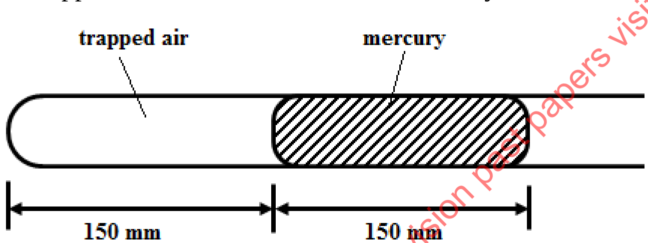


(a) Indicate on the diagram region experiencing high pressure **(1 mark)**

(b) Explain your answer above **(1 mark)**

10. A body is dropped from a height of 90 m from the ground. At the same time another body is projected vertically upwards from the ground with a velocity of 30m/s. After how long will the two bodies pass each other. **(3 marks)**

11. The figure below shows a glass tube containing enclosed air in the closed end of a horizontal tube of mercury. The length of the trapped air is 150mm while that of mercury is also 150mm.



The other end of the tube is open and the atmospheric pressure is 750 mmHg. Calculate the length of the enclosed air if the tube is turned until it is vertical with open end up. **(2 marks)**

SECTION B 55 (MARKS)

Answer all the questions in this section in the spaces provided

12. a) Distinguish between perfect elastic and inelastic collision **(1 mark)**

b) A car of mass 1000kg moving with a speed of 10m/s crushes into a wall and comes to rest in 0.4 s. Find

i) the impulse **(2 marks)**

ii) the average force exerted by the wall. **(2 marks)**

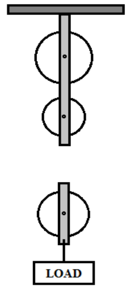
(c) A bullet of mass 30 g is fired at a speed of 600m/s from a gun of mass 5.0 kg at rest. Calculate the recoil velocity of the gun when the bullet is fired. **(3 marks)**

(d) A mass of 100g falls 5 m from rest and stops after penetrating 0.5 m in the sand, show that the force exerted on it by the sand is 11N. **(3 marks)**

13. (a) Name a device used to convert light energy directly into electrical energy. **(1 mark)**

(b) A girl whose mass is 60 kg runs up a flight of 20 steps each 15 cm in 40 seconds. Calculate the power developed by the girl. **(2 marks)**

(c) (i) The figure below shows an incomplete arrangement of the pulley. Draw on the diagram the string arrangement that would give a velocity ratio of 3. **(1 mark)**

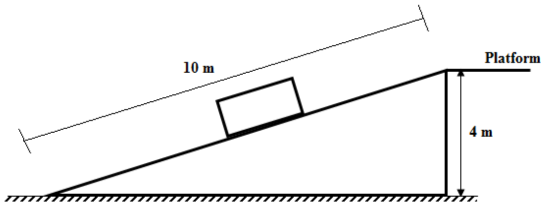


(ii) The pulley system is used to raise a load of 160 N through a distance of 40m. If the effort applied is 80N, determine

a) Mechanical advantage **(2 marks)**

b) Efficiency of the pulley system **(3 marks)**

(d) A wooden plank 10m long was used to raise a load to a platform 4 m high as shown in the diagram.



i) Indicate on the diagram with an arrow the direction of effort **(1 mark)**

ii) Determine the velocity ratio of the arrangement **(2 marks)**

14. (a) Define the term heat capacity **(1 mark)**

(b) In an experiment to determine the specific latent heat of vaporization L_V of water, steam was passed into cold water in a copper calorimeter. The following data was obtained.

Mass of the calorimeter = 105.2 g

Mass of the calorimeter + water =228g

Mass of the calorimeter + water + steam = 231.2 g

Temperature of the cold water =18.0^0C

Final temperature of the water =29.0^0C

Temperature of the steam = 100^0C

i) Determine the mass of steam that condensed **(1 mark)**

ii) Calculate the amount of heat lost by the condensed steam *(specific heat capacity of water 4200J/kgK)* **(3 marks)**

iii) Calculate the amount of heat absorbed by water and the calorimeter *(specific heat capacity of copper =390 J/kgK)* **(3 marks)**

iv) Calculate the specific latent heat of vaporization L_V of water **(2 marks)**

15. (a) Define angular velocity of a body moving in a circular path **(1 mark)**

(b) An object of mass 500g tied to the end of a rope is rotated in a horizontal circle of radius 2.0 m at a frequency of 2 Hz. Determine;

(i) the uniform speed of the mass. **(3 marks)**

(ii) the tension developed in the rope **(2 marks)**

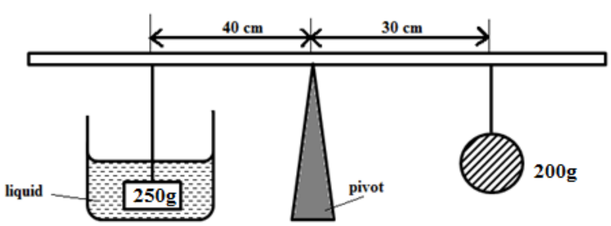
(c) If the same object is now rotated in a vertical circle of the same radius with the same speed, determine the

(i) maximum tension **(2 marks)**

(ii) minimum tension in the rope **(1 mark)**

16. (a) State the law of floatation **(1 mark)**

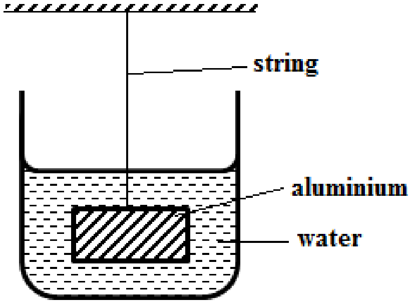
(b) The figure below shows a block of mass 250g and density 200 kg/m^3 submerged in a certain liquid and suspended from a homogenous horizontal beam by means of a thread. A mass of 200g is suspended from the beam as shown in the figure below.



(i) Determine the upthrust force acting on the block **(3 marks)**

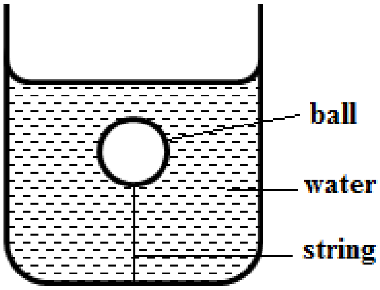
(ii) Calculate the density of the liquid **(3 marks)**

(c) The figure below shows a piece of alluminium suspended from a string and completely immersed in a container of water. The mass of the alluminium is 1kg and its density is 2.7×10^3 kg/m^3. *Take density of water 1000kg/m^3*



Calculate the tension in the string. **(3 marks)**

(d) The figure below shows a ball fully immersed in water and held with a string attached at the bottom.



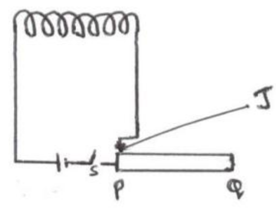
(a) Indicate on the diagram two forces acting on the ball **(2 marks)**

(b) If the mass of the ball is 0.5 kg, calculate the upthrust on the ball given that the tension on the string is 2 N. **(1 mark)**

Calculate the refractive index of the glass prism. (2mks)

9. State the adjustment on the x-ray tube to produce a more intense beam of x-rays. (1mk)

10. A coil wire is connected in series with a battery, a switch in figure 6 below.

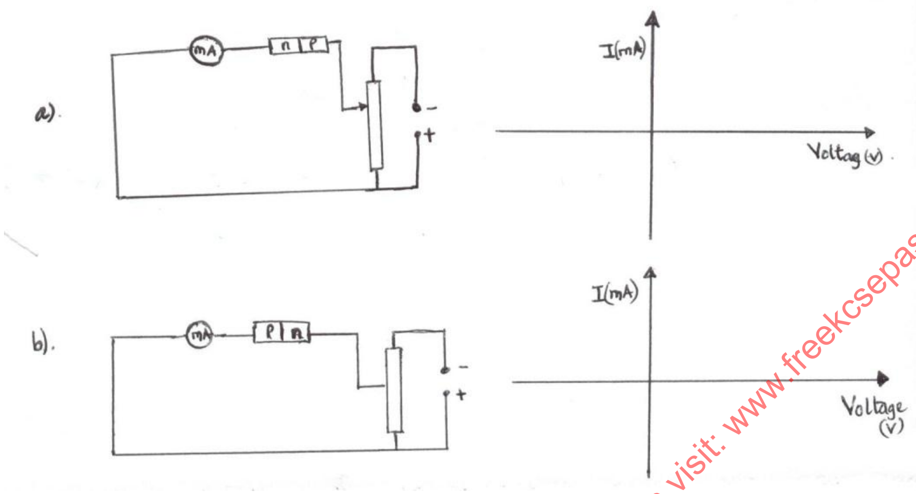


If the jockey J on the rheostat is moved towards Q what is the effect on: -

i) The resistance of the circuit (1mk)

ii) The current through the coil (1mk)

11. A form four student made a circuit (a) and (b) below and used them to investigate diode characteristics.



Sketch how the current varied with voltage in both (a) and (b) on the axes provided. (2mks)

12. Arrange the following in order of increasing energy.
Visible light, infra-red, radiation, x-rays, u.v radiation, radio waves (1mk)

SECTION B (55 MARKS)

Answer ALL the questions in this section in the spaces provided.

13. a) An electric bulb is rated 210w, 240v what does it mean. (1mk)

b) Two light bulbs x and y are rated 60w, 220v and 80w, 220v respectively.

i) Which of the bulbs draws more current. (1mk)

ii) Calculate the cost of using the two bulbs, if the bulbs above are used for 10 hours daily for 10 days. (1kwhr = ksh.7.20). (2mks)

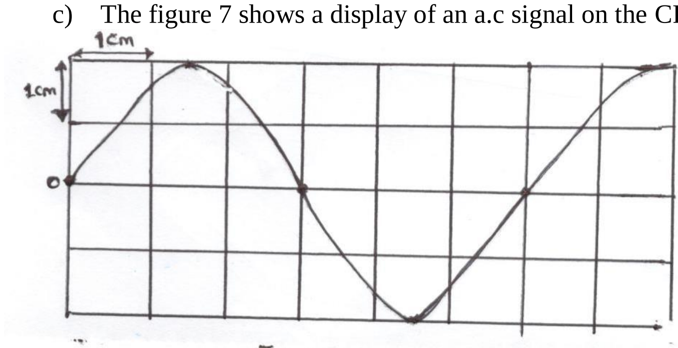
c) A cell supplies a current of 2.4 A through a 2.4Ω resistor and a current of 4A through a 1.4 Ω resistor. Calculate the e.m.f (E) and the internal resistance ,r, of the cell. (3mks)

d) State reasons why in modern domestic wiring circuit breakers are preferred to fuses. (1mk)

14. a) Define cathode rays (1mk)

b) Explain clearly the function of the grid in the cathode ray oscilloscope. (2mks)

c) The figure 7 shows a display of an a.c signal on the CRO screen.



Given that the time-base setting is 100mS per division and y-gain (sensitivity) is 25v/division. Determine:

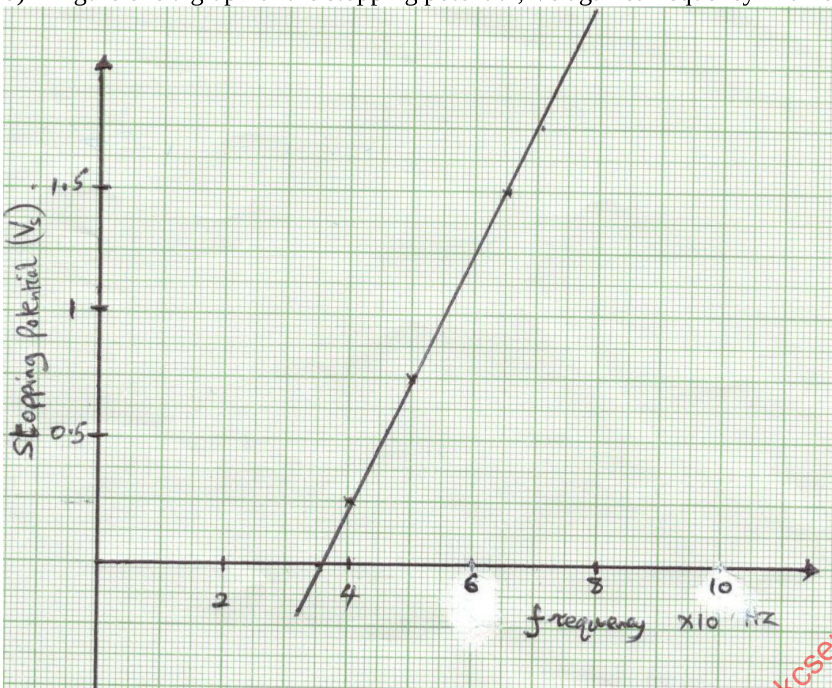
i) the frequency of the wave (3mks)

ii) the peak-voltage (3mks)

d) State reason why magnetic fields are preferred to electric fields in deflecting the beam of electrons in CRT television set. (1mk)

15. a) State how intensity of an incident radiation affects the number of photoelectrons emitted from a metal surface. (1mk)

b) Figure 8 is a graph of the stopping potential, Vs against frequency in an experiment on photoelectric effect.



i) Define the term stopping potential (Vs) (1mk)

ii) Given that the stopping potential, Vs is related to the frequency by the equation Vs = $\frac{h}{e}f - \frac{\emptyset}{e}$ where e = 1.602 x 10^{-19}C. Calculate

I. Plank's constant, h (4mks)

II. The work function, $\emptyset$, of the metal in ev. (2mks)

16. a) Define half-life of an element. (1mk)

b) Figure a shows a Guiger uller (G.M) tube use it to answer the questions that follow.

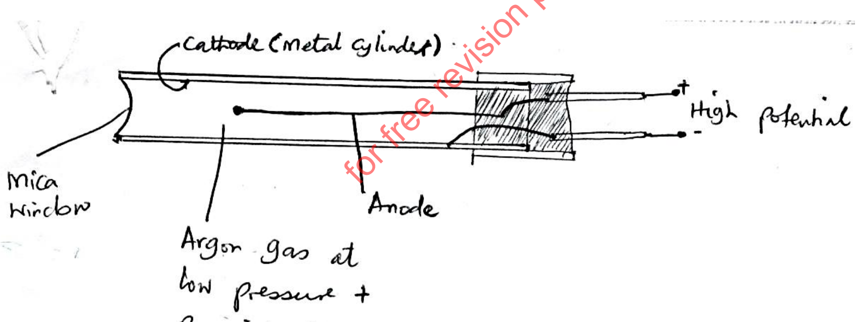


Fig. 9

i) Give a reason why the mica window is made thin. (1mk)

ii) Explain how the radiation entering the tube through the mica window is detected by the tube. (3mks)

iii) What is the purpose of bromine gas. (1mk)

c) The initial mass of a radioactive substance is 40g, the substance has a half-life of 5 years. Determine the mass that would have decayed after 15 years. (3mks)

d) i) Define the term principal focus for a convex lens. (1mk)

SUKEMO 2017, PHYSICS PAPER 3

Question 1

You are provided with the following:

- Vernier calipers (to be shared).
- A source of boiling water.
- A glass beaker (250ml).
- Magnifying glass (hand lens)
- A thermometer (0 - 110°C).
- A stopwatch.
- A plastic measuring cylinder (100ml).
- A square carton plate of side 10cm with circular hole through which a thermometer can be fixed tightly. **Carton to be used in place of cardboard in figure 1**

Question 2

You are provided with the following:

- Three new dry cells.
- A cell holder.
- A wire mounted on a metre rule labeled **G**. Diameter 0.35mm

(was used in K.C.S.E 2016 on a scale labelled FH)

- A nichrome wire labeled **R**. Diameter 0.35mm, length 60cm.

(was used in K.C.S.E 2016 on a scale labelled FH)

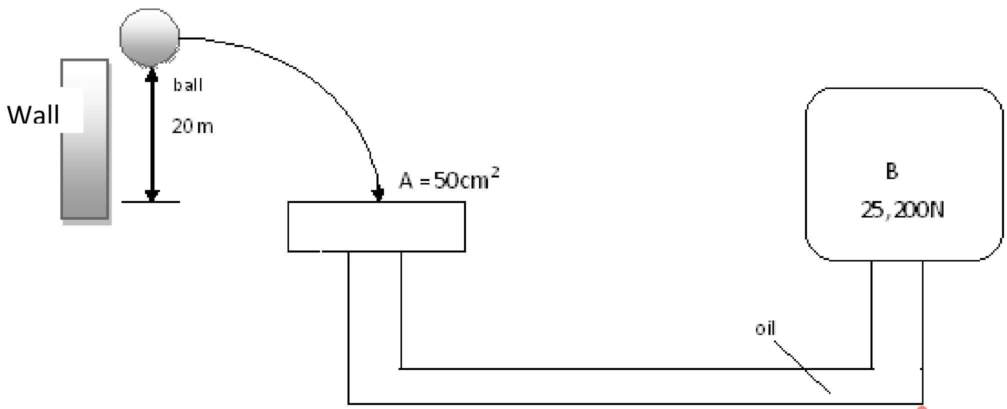
- A voltmeter **(0-3V**).
- An ammeter (**0-1A**).
- A switch.
- 7 connecting wires with a crocodile clip at one end.
- Glass rod (**K.C.S.E 2016**)
- A curved curtain rail**. (Length 50cm, internal width 1.5cm-2cm, diameter of the semicircle formed 35cm)**
- A glass marble.
- A stopwatch.
- A half metre rule.
- Some plasticine.

Section B (55 Marks)

9. (a) During the construction of dams, the base of the dam is ***widened*** and ***curved***. Explain. (2 marks)

(b) A block of density 1.58 g/cm^3 and measures 3cm by 5cm by 7cm was placed on the ground. Determined the difference between the maximum and minimum pressure that would be exerted on the ground by the block. (3 marks)

10. (a) The figure below shows ball of mass 50Kg thrown from the top of a wall 20m high with a horizontal velocity of 20m/s. The ball strikes the smaller piston A of the hydraulic lift and compresses a cotton bale B with a 25,200N force.



Determine;

(i) The time taken by the ball to hit the piston A. (2 marks)

(ii) The horizontal distance covered by the ball from the foot of the wall to the piston. (2marks)

(iii) The vertical velocity with which the ball hits the piston A (2 marks)

(iv) The force with which the ball strikes piston A (2 marks)

(v) The area of the load piston B assuming that the two pistons were initially at the same level (2marks)

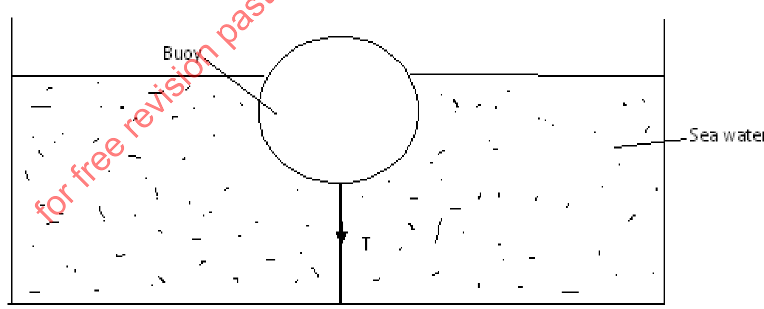
(b) i) State Hooke's law (2marks)

ii) A string extends by 5cm when supporting a load of 10N
Determine the spring constant of three such springs when placed side by side (2 marks)

iii) What is the extension of the three springs when supporting a load of 50N (2marks)

11. (a) Give reason why a steel rod sinks in water while a ship made of steel floats on water (1mark)

(b) The figure below shows a buoy B of volume 40 litres and mass 10Kg. It is held in the position shown below in sea water of density 1.04g/cm^3 by a light inextensible cable at the bottom so that three quarters of its volume is submerged below the surface of the sea water.

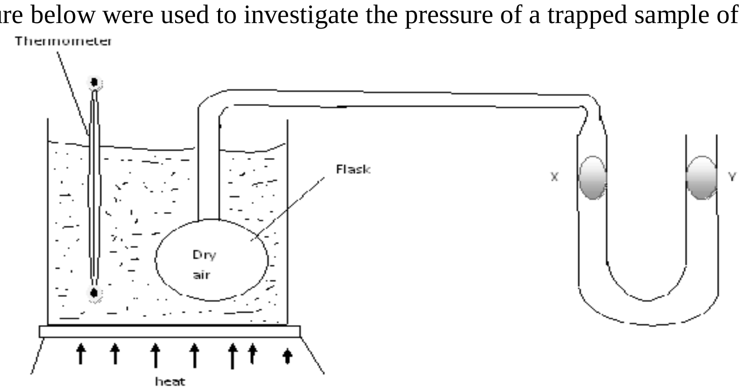


Determine the tension in the cable (3marks)

(c) State a factor which determines the depth to which a body sinks in a liquid (1 mark)

(d) A student constructed a hydrometer for use in the milk industry. What is the name given to this type of hydrometer? (1 mark)

12. The apparatus in the figure below were used to investigate the pressure of a trapped sample of air varies with temperature.



(a) Why must the heat be supplied slowly during the experiment? (1 mark)

(b) How would you ensure that that the air trapped in the flask was at the temperature recorded by the thermometer? (2marks)

(c) Why is the U tube always adjusted so that the level of mercury in the tube X and Y stays the same? (1 mark)

(d) What measurements would be recorded in the above experiment? (2 marks)

13. During an experiment, a 30g metal block was heated in a blast furnace to a temperature of 850^oc. Then quickly transferred to a copper calorimeter of mass 200g containing 60g of water at 80^oc. it was observed that 20g of water vapourized. Given that the specific heat capacity of water and that of copper are 4.2kJ/KgK and 390J/KgK respectively, and the specific latent heat of vapourization of steam is 2.26 X 10^6J/Kg.

(i) Write an expression for the heat lost by the metal bock given that its specific heat capacity is $C_{m.}$ (2marks)

(ii) Determine the heat gained by the water and the calorimeter (3 marks)

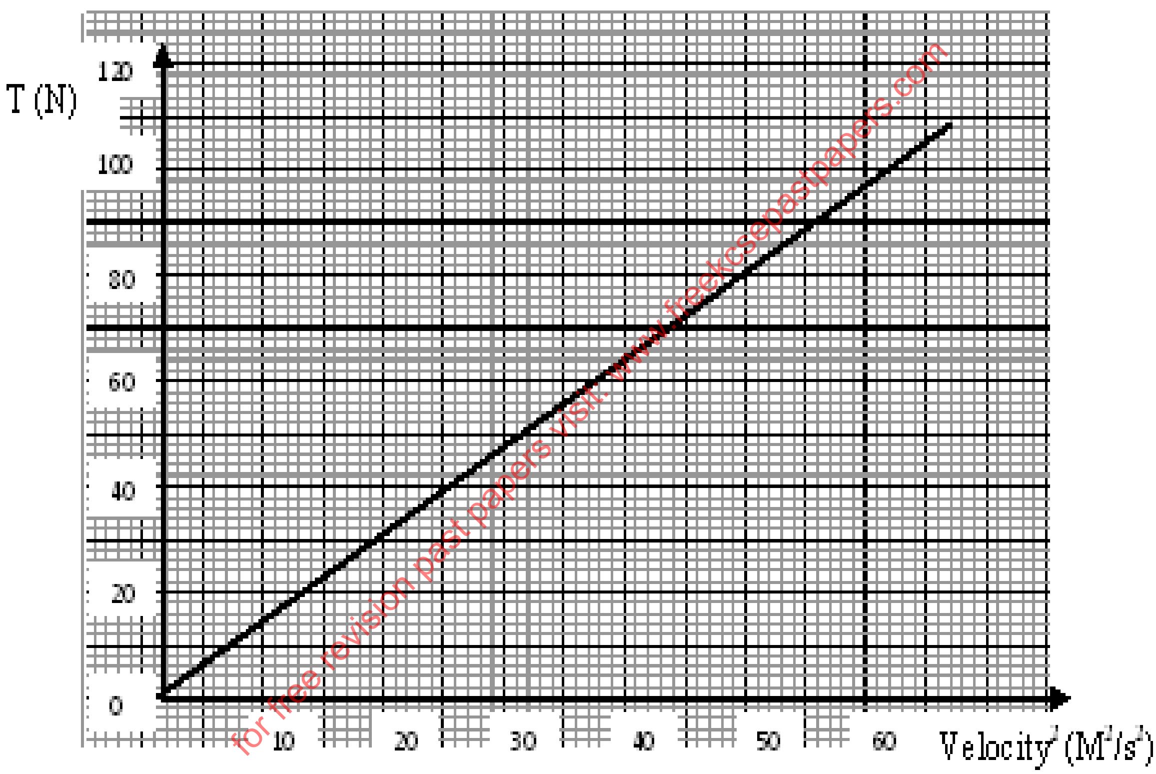
(iii) Calculate the specific heat capacity of the metal (3 marks)

(iv) State one possible error in this experiment (1 mark)

14. (a) Explain why a motorcycle rider leans towards the centre of the curve while negotiating a bend. (1 mark)

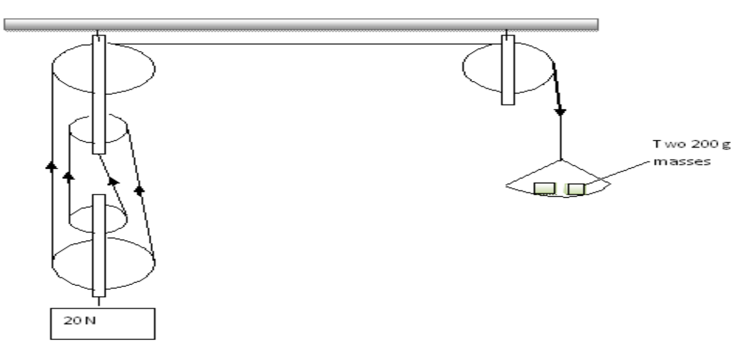
(b) In an experiment to determine tension in a string, a solid ball was rotated round a turn table of diameter 80cm at different velocities.

The tension T at different values of velocity squared was obtained and the results represented on a graph shown below.



From the graph, determine the mass of the ball (3 marks)

15. The diagram below shows a pulley system with a load of 20N hung at the lower block. The effort consists of a pan on which weights are added one at a time.



;

(a) the velocity ratio of the machine (1 mark)

(b) the mechanical advantage if the two 200g masses could cause the 20N load to raise steadily (2 marks)

(c) the efficiency of the system (2 marks)

EMBU
232/1
PHYSICS
PAPER 1
(THEORY)
JULY/AUGUST 2017
TIME: 2 HOURS.

SECTION A (25 MKS)

1. The figure 1 below shows Perspex container with a square base of side 5cm carrying water to a height of 7cm.

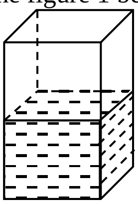


Fig. 1

When pebble is immersed into the water, the level rises to 10cm. What is the volume of the pebble? (2 mks)

2. Explain why fish can survive under water when the surface is already frozen. (1 mk)

3. The graph below represents Hooke's law.

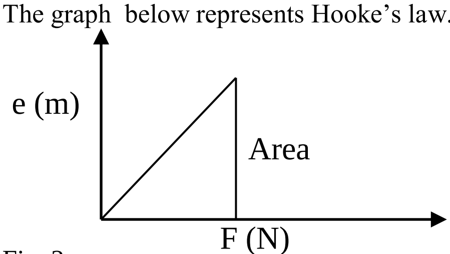


Fig. 2

Show that the area under graph is given by A = ½ke2 where k is the spring constant. (2 mks)

4. Air is tapped in a tube of uniform cross-section using mercury as shown below.

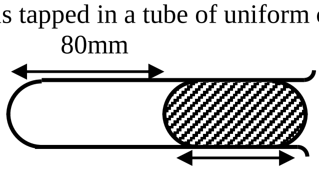


Fig. 3

Determine the length of the air column when the tube is kept vertical with the open end facing down.
(Atmospheric pressure is 750mmHg) (3 mks)

5. A horse rider bends forward when the horse is on speed. Explain. (2 mks)

6. Find the moment of the force below. (2 mks)

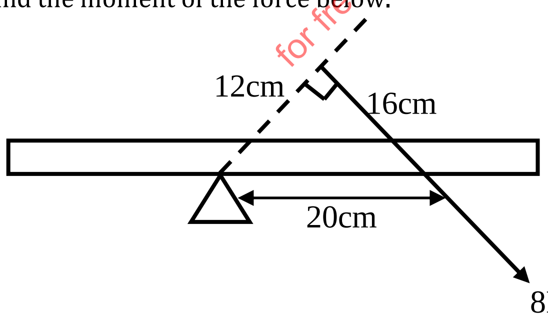


Fig. 4

7. What basic physical quantity can be measured using a simple pendulum? (1 mk)

8. A string supports a solid copper block of mass 20kg (density 9.0 x 103 kg/m^3, g = 10N/kg). Calculate the tension in the string. (2 mks)

9. The figure below shows an open-ended manometer connected to a gas supply.

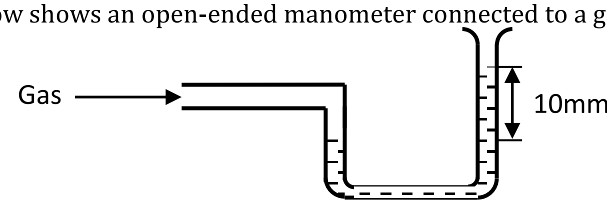
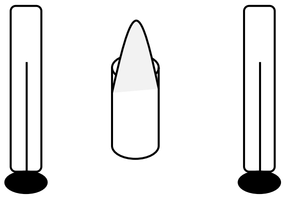


Fig. 5

If the mercury reads 760mm, calculate the pressure of the gas in the cylinder. (Density of water = 1g/cm^3, density of mercury = 13.6g/cm^3) (3 mks)

10. In an experiment to demonstrate Brownian motion, smoke was place in air cell and observed under a microscope. Smoke particles were observed to move randomly in the cell. Explain the observation. (1 mk)
11. The figure 6 below shows two identical thermometers. A has a blackened bulb while thermometer B has a silvery bulb. A candle is placed equidistant between the two thermometers.



A Candle B

Fig. 6

State with a reason the observations made after sometime. (2 mks)
12. State two factors that determine the stability of a body. (2 mks)
13. An object accelerates uniformly at $3m/s^2$. It attains a velocity of 19m/s in 5 seconds. What was its velocity? (2 mks)

SECTION B. (55 mks)

14. (a) Define angular velocity (1 mk)
    (b) A student tied a 0.06kg mass to the end of a string 0.03m long and whirled it around a horizontal circle of radius 0.015m with a speed if 2m/s. Determine the force keeping the body moving in the circle. (2 mks)
    (c) A centrifuge is used to separate blood cells from blood. Plasma rotating at 55 revolutions per second. What is the acceleration towards the centre of a centrifuge tube 8.0cm from the centre of rotation. (2 mks)
    (d) A bullet is fired horizontally from a platform 15m high. If the initial speed is 30m/s, determine the maximum horizontal distance covered by the bullet. (2 mks)
    (e) Explain why a body moving with uniform circular motion is said to be accelerating. (2 mks)
15. The figure 7 below shows a uniform plank one metre long balanced by suspending it at the centre of gravity from a string. The 4N weight on one side balances the solid M of value 80cm3 which lies immersed in a beaker of water on the opposite side.

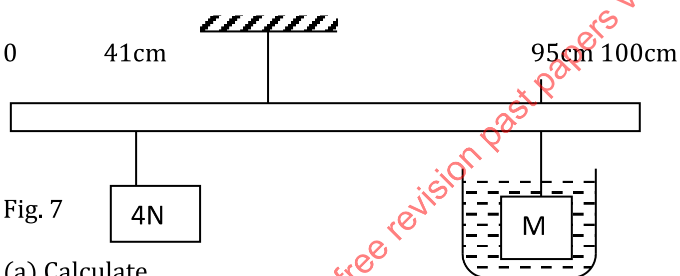
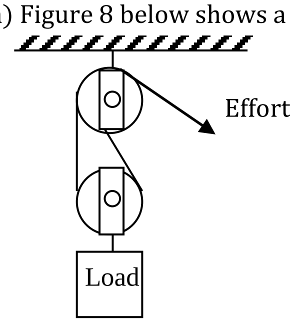


Fig. 7

(a) Calculate
    (i) the apparent weight of M (2 mks)
    (ii) the upthrust (4 mks)
(b) The beaker of water is then removed ad while keeping the weight of 4N at 41cm, the position of solid M is adjusted to obtain balance condition again. Determine the new position of M. (4 mks)
16. (a) Define the specific latent heat of fusion of a solid. (1 mk)
    (b) An electric kettle is switched on and it is found that 13 minutes later the mass of water in it is 0.5kg. Ignoring heat losses, calculate
    (i) Total heat supplied. (2 mks)
    (ii) Heat used for the kettle (2 mks)
    (iii) Heat used to raise temperature of 1kg of water from 20^0C to 100^0C. (2 mks)
    (iv) Heat needed to change water at 1000C to steam at 100C. (2 mks)
    (v) The specific latent heat of vaporization of water. (2 mks)
17. (a) Figure 8 below shows a pulley system used to lift a load.



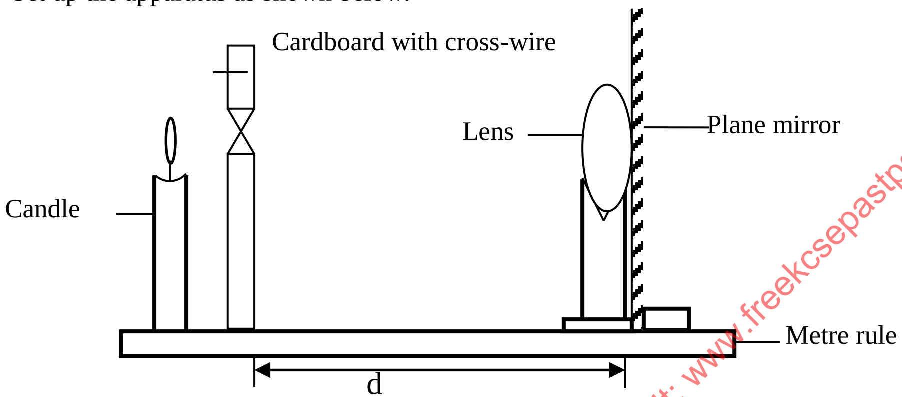
EMBU
232/3
PHYSICS
PAPER 3
PRACTICAL
JULY/AUGUST 2017
TIME: 2½ HOURS.

1. A You are provided with the following:-
- Candle
- Plane mirror
- Metre rule
- Lens
- Lens holder
- A cardboard with cross-wire at its centre
- Screen

Proceed as follows.

(a) Attach the plane mirror to the lens using cellotape.

(b) Set up the apparatus as shown below.

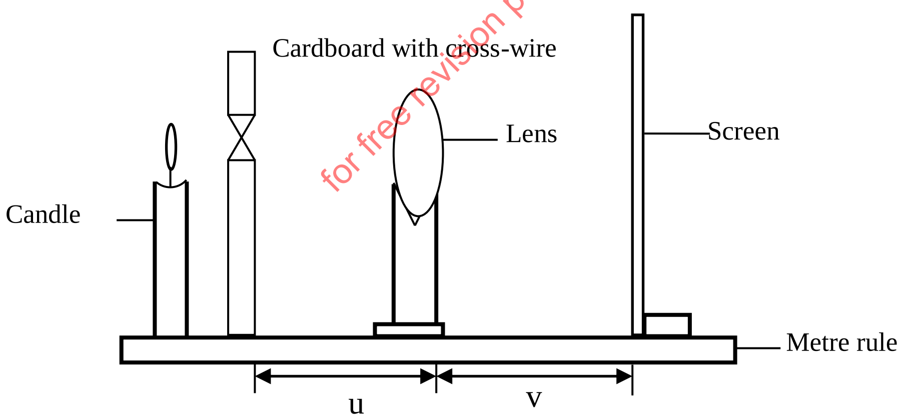


Ensure that the candle flame is at the same level as the cross wire.

(c) Place the cardboard with cross wires at the 0cm mark.

(d) Move the lens along the metre rule until a sharp image of the cross-wire is formed alongside the object cross-wire. Measure the length d. d = ____________ cm. (1 mk)

Now set up the apparatus as shown below.



Set u = 25cm and adjust the screen until a clear image of the cross-wire appears on the screen. Measure the value of v and record in the table.

(f) Repeat the procedure (c) above for the other values of u and complete the table. (4 mks)

u (cm)	25	30	35	40	45
v (cm)					
m = $\frac{v}{u}$					

(g) Plot a graph of m against v.

(h) Determine the slope of the graph. (3 mks)

(i) Given that the equation of the graph is given by $m = \frac{v}{n} - 1$ where n is a constant, determine the value of n. (2 mks)

B. You are provided with the following.
- ✓ A 250ml glass beaker
- ✓ A Bunsen burner

- ✓ A thermometer
- ✓ A stop watch
- ✓ A tripod stand and a wire gauze
- ✓ A measuring cylinder 100ml
- ✓ Water

Set the apparatus as shown below.

a) Measure 100cm^3 of water and pour it into the beaker.
Take the initial temperature of the water.
T_o = _______________^{0}C
Now heat the water to a temperature of 80^{0}C. Switch off the gas tap and place a thermometer into the beaker and start the stopwatch when the temperature is 65^{0}C. Take the temperature T^{0}C of water every two minutes.

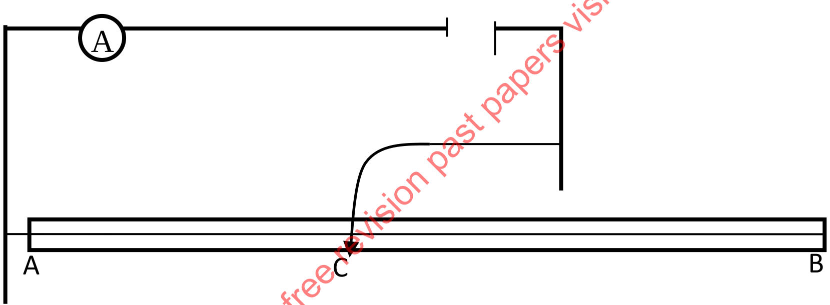
b) Record the results in the table below. (5 mks)

Time, t (min)	2	4	6	8	10	12	14
Temperature T (^{0}C)							
$(T - T_0)$							
Log $(T - T_0)$							

c) Plot a graph of log $(T\text{-}T_0)$ against Time t. (5 mks)
d) Find the value of P of log $(T - T_0)$ when T = 0. (1 mk)
e) Determine N, where N is the antilog of P. (1 mk)
f) Calculate the temperature of the surrounding T_R using expression. $N = 65 - T_R$. (2 mks)

2. You are provided with the following.
g) One cell and a cell holder.
h) One ammeter (0 1A)
i) One voltmeter
j) 9 connecting wires
k) 4 crocodile clips
l) One metre long nichrome wire mounted on a scale.

Procedure.
(a) (i) Connect the apparatus as shown in the circuit diagram.



AB → Nichrome wire mounted on 100cm scale.
NB: Leave the crocodile clip next to the cell unconnected. This clip should be disconnected when no reading are being taken.
(ii) Adjust the length AC of the wire to 80cm using the crocodile clip at C.
(iii) Connect the crocodile clip next to the cell and record the voltmeter and ammeter reading.
(iv) Repeat the procedure for other lengths AC as shown on the table of value below.

Length AC (cm)	80	70	60	50	40	30
p.d (V)						
Current (A)						

(b) (i) Using the grid provided plot graph of p.d across the cell against the current. (5 mks)
(ii) I. Calculate the slope of the graph. (2 mks)
II. What is the significance of the slope in I above. (1 mk)