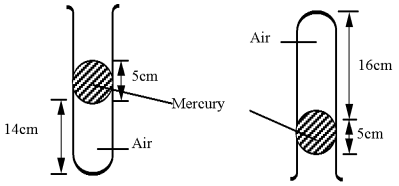


Figure 4

Use the information in figure 6 to calculate the value of the value of the atmospheric pressure in mmHg (3 marks)

7. A trolley is moving at uniform speed along a track. A piece of plasticine is dropped on the trolley and sticks on it. Explain why the trolley slows down. (1 mark)
8. State a reason why more energy is required to change ice from 0^0C to water at 1^0C, than to change equal mass of water from 0^0C to 0^0C. (1 mark)
9. State a reason why an air bubble increases in volume as it rises up the surface in a boiler. (1 mark)
10. A car of mass 800kg is initially moving at 25m/s, calculate the force needed to bring the car to rest over a distance of 20m. (2 marks)
11. An electric kettle with shiny outer surface is more efficient than one with a dull outer surface, give a reason for this. (1 mark)
12. A pipe of radius 3mm is connected to another pipe of radius 9mm. If water flows in the water pipe at a speed of $2ms^{-1}$, what is the speed in the narrower pipe (2 marks)
13. A force of 20N is used to stretch a spring through 5cm. Calculate the elastic potential energy stored in the spring. (2 marks)

SECTION B. (55 MARKS)

Answer ALL questions in this section

14. (a) Distinguish between boiling and evaporation. (2 marks)

(b) A solid of mass 1kg was heated uniformly by a 100W heating element until it melts. The graph in figure 5 shows the variation of temperature with time.

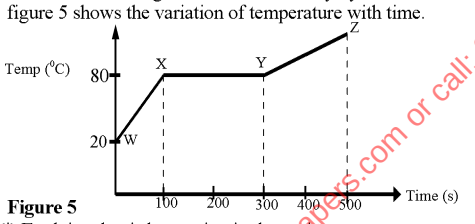


Figure 5

(i) Explain what is happening in the regions

WX:

XY:

(ii) Calculate the specific heat capacity of the solid. (3 marks)

(iii) Calculate the specific latent heat of fusion of the solid (2 marks)

(c) A substance of mass 2kg and specific heat capacity $400Jkg^{-1}k^{-1}$ initially at 80^0C is immersed in water at 19^0C. If the final temperature of the mixture is 20^0C. Calculate the mass of water. (Specific heat capacity of water = $4200Jkg^{-1}k^{-1}$) (3 marks)

15. (a) State the physical quantity represented by the gradient of a displacement – time graph (1 mark)

(b) Figure 6 shows the displacement – time graph of the motion of a particle

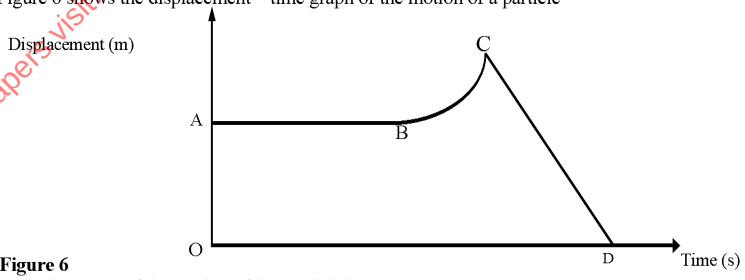


Figure 6

State the nature of the motion of the particle between? (3 marks)

(i) AB

(ii) BC

(iii CD

(c) A car decelerates uniformly from a velocity of 20m/s to rest in 4 seconds. It takes 4 seconds to reverse with uniform acceleration to its original starting point.

(i) Sketch a velocity time graph for the motion of the car. (3 marks)

(ii) Use your sketch in c (i) to determine the total displacement of the car. (3 marks)

(d) A ball slides off a horizontal table 4m high with a velocity of 12m/s, find;

(i) the time it takes to hit the floor. (g = 10ms-2) (2 marks)

(ii) the range (2 marks)

16. (a) State two factors that reduce the stability of a vehicle while going round a banked bend. (2 marks)

(b) Three insoluble powders A, B and C of densities d_A, d_B and d_C, such that $d_A > d_B > d_C$, are mixed and put into a container. The container is then whirled in a horizontal circle as shown in figure 7.

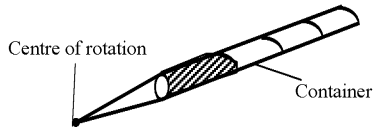


Figure 7

(i) Label on figure 7, the positions of the powders after some time. (1 mark)

(ii) Give a reason for your answer in b (i) (2 marks)

(c) Figure 8 shows two masses 0.1kg and 2kg connected by a string through a hole on a smooth horizontal surface.

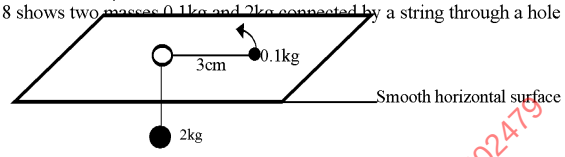


Figure 8

The 0.1kg rotates in a horizontal circle of radius 3cm. Calculate the angular velocity of the 0.1kg mass, when the system is in equilibrium. (3 marks)

(d) A bicycle wheel makes 300 revolutions per minute. Calculate the angular velocity of the wheel. (3 marks)

17. (a) State two conditions for a body to float on a fluid. (2 marks)

(b) Figure 9 shows a block with a graduated side and dimensions 4cm by 16cm, just about to be lowered into a liquid in an overflow can.

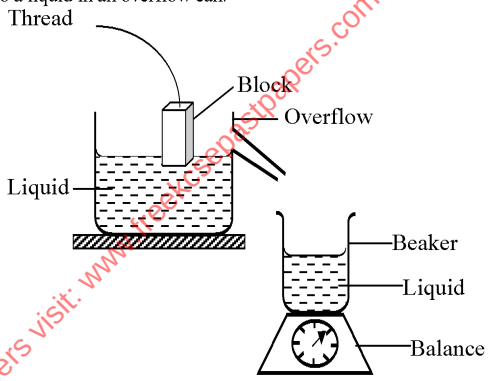


Figure 9

During an experiment with this set-up, the following was recorded:

- The block floated with ¾ of it submerged.
- Initial reading of balance = 0g
- Final reading of balance = 154g

Use the information to determine the density of

(i) the block (3 marks)

(ii) the liquid (3 marks)

(c) Figure 10 shows a buoy of capacity 40 litres and mass 10kg. It is held in position in sea water of density 1.04g/cm3 by a light cable fixed to the bottom so that ¾ of its volume is below the water surface.

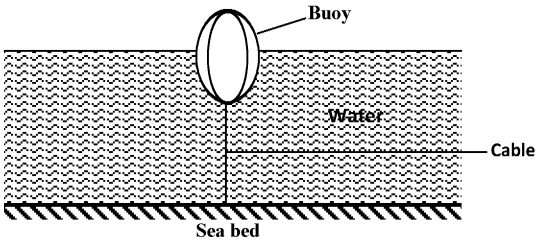


Figure.10

Determine the tension in the cable. (3 marks)

18. Figure 11 shows a load of 50N being raised by pulling it along an inclined plane of length 2.0m.

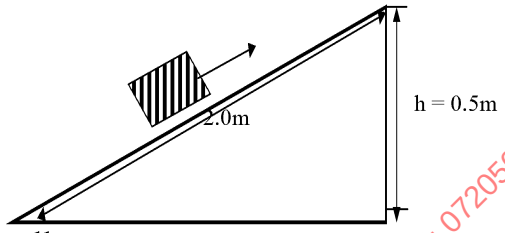


Figure 11

Determine

i. The work done by the 22N force (2 marks)
ii. The work done against the load (2 marks)
iii. The efficiency of the system (3 marks)

MAKUENI COUNTY CLUSTER PREPARATORY EXAMINATION 2016
232/2
PHYSICS
Paper 2
(THEORY)
JULY / AUGUST 2016
Time: 2 Hours

1. Figure 1 below shows a parabolic surface with focal point F. A small source of light is placed at F.

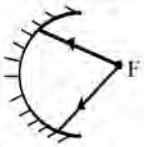


Fig. 1
Complete the ray diagram to show the incident rays are reflected by the surface.

2. Figure 2 below shows a metre rule in equilibrium balanced by the magnet and weight. The iron core fixed to the bench.

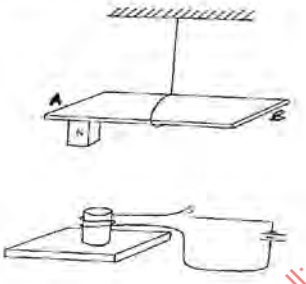


Fig. 2
State and explain the effect on the metre rule when the switch S is closed. (2 marks)

3. The figure 3 below shows a positively charged metal plate with an earthing connection. Using an arrow, show the direction of charges through the earth connection and explain the final charge of the plate. (2 marks)

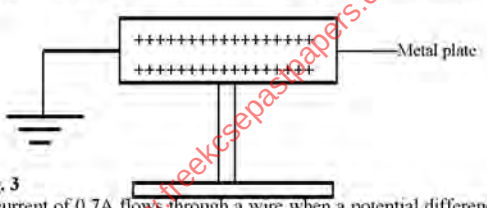


Fig. 3

4. A current of 0.7A flows through a wire when a potential difference of 0.35V is applied at the ends of the wire. If the wire is 0.5m long and has a cross-sectional area of 8.0 x 103mm2, determine its resistivity. (3 marks)
5. The control grid in a cathode ray oscilloscope (CRO) is used to control the brightness of the beam on the screen. Explain how the brightness of the beam can be increased (2 marks)
6. The following figure 4 shows the path of a ray of light through a transparent material placed in air.

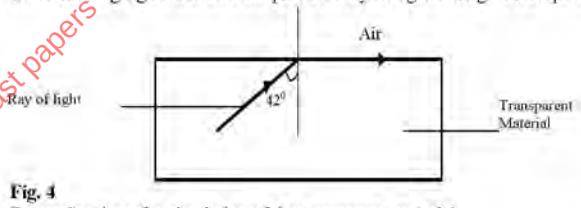


Fig. 4
Determine the refractive index of the transparent material (2 marks)

7. Give a reason why x-rays but not radio waves are used to detect fractured bones.
(1mark)
8. One of the factors that affect efficiency of a transformer is hysteresis losses. What is hyteresis losses

9. A vibrator is sending out 8 ripples per second across a ripple water tank. The ripples are observed to be 4cm apart. Calculate the velocity of the ripples (2 marks)
10. A form two student from Kimomo Secondary School found his dry cells leaking on removing from his torch. What would be the possible cause of the leakage (2 marks)
11. A sample of a radioactive substance initially has 8.0×10^{25} particles. The half life of the sample is 98 seconds. Determine the number of particles that will have decayed after 294 seconds. (3 marks)
12. Below is part of a circuit that was setup by form four students of Okok Seconday School during a physics practical lesson to demonstrate full wave rectification using two diodes. Complete the circuit by correctly placing the load R and two diodes.

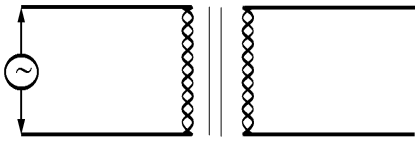


Fig. 5

13. State two factors that affects the speed of sound in gases. (2 marks)

SECTION B (55 MARKS)

Answer ALL the questions in the spaces provided

14. Some students wish to determine the focal length of a convex lens of thickness 0.6cm using an optical pin and a plane mirror. Figure 6 shows the experimental set up when there is no parallax between the pin and the image.

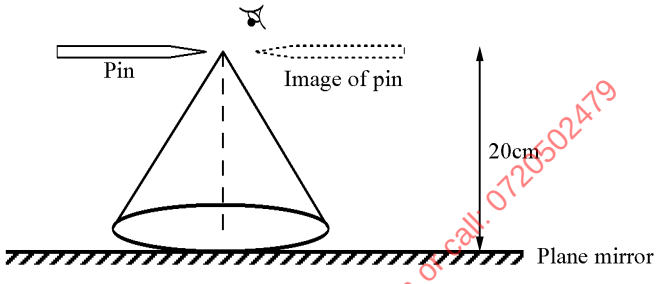


Fig. 6

Determine the focal length of the lens (2 marks)

(b) An optician in Eldoret Hospital examined an eye of a patient and made the following observations:
Eye too short and the focal length of the eye lens short
(i) State the eye defect the patient could be having. (1 mark)
(ii) Use a diagram to describe how the defect could be corrected. (2 marks)

(c) The graph below shows the variation of 1/v and 1/u in an experiment to determine the focal length of a lens.

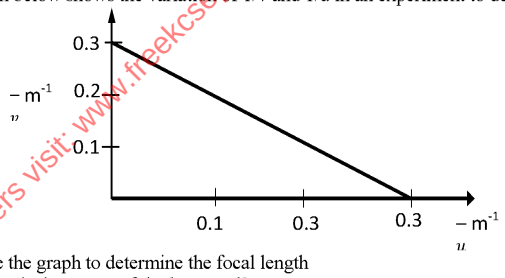


Fig. 7

(i) Use the graph to determine the focal length (3 marks)
(ii) What is the power of the lens used? (2 marks)

(d) A converging lens forms an image which is three times the object. Determine the focal length of the lens if the distance between the object and the screen is 80cm. (3 marks)

15. (a) An uncharged metal rod brought close but not touching the cap of a charged electroscope causes a decrease in the divergence of the leaf. Explain the observation.
(1mark)

(b) In experiment to investigate factors affecting capacitance of a capacitor, a student increased the area of the plates and decreased the separation of the plates. Explain the effect on the capacitance when
(i) the area of plates increased (1 mark)

(ii) the distance of the separation of the plates decreased (1 mark)

(c) Figure 8 illustrates a method of charging a metal sphere.

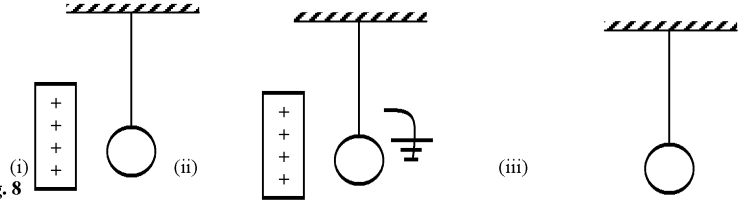


Fig. 8

(i) Name the method of charging shown in fig 8.

(ii) Indicate the final charge on the sphere in fig 8. (1 mark)

(d) Figure 9 shows an arrangement of capacitors connected to a 10V d.c supply.

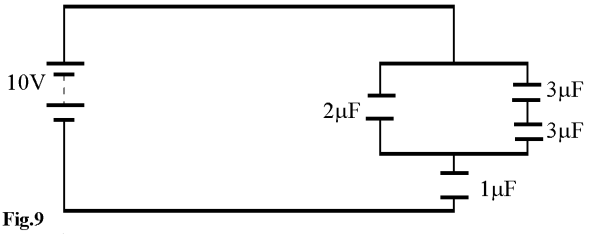


Fig.9

Determine

(i) the combined capacitance (2 marks)

(ii) the total charge in the circuit (1 mark)

(iii) the total energy stored in the circuit. (2 marks)

16. Figure 10 shows photocell used in a set-up for a burglar alarm.

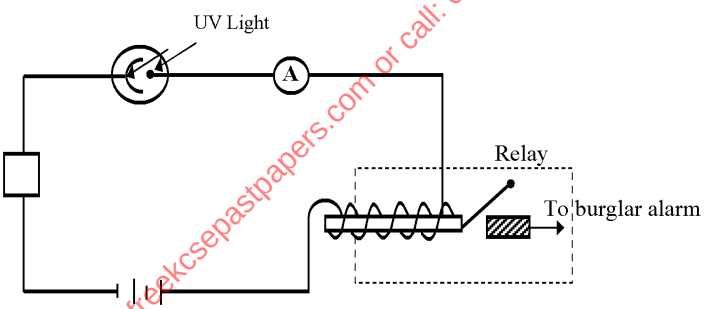


Fig. 10

(i) Give a reason why the photocell is usually evacuated. (1 mark)

(ii) State the function of the resistor R in this circuit (1 mark)

(iii) Explain why a particular radiation such as ultra-violet light is used to strike a given cathode surface. (2 marks)

(iv) Explain how the set-up in the figure can be used as a burglar alarm. (3 marks)

(b) Light of frequency 5.50×10^{14} Hz is incident on a surface whose work function is 2.5ev.

(i) Determine the energy of photons of light in eV. (Take $h = 6.63 \times 10^{-34}$ Js) and 1eV (3 marks)

(ii) Will photoelectric emission occur? Explain (2 marks)

17. (a) Define electric resistance. (1mark)

(b) Figure 11 shows three resistors as shown.

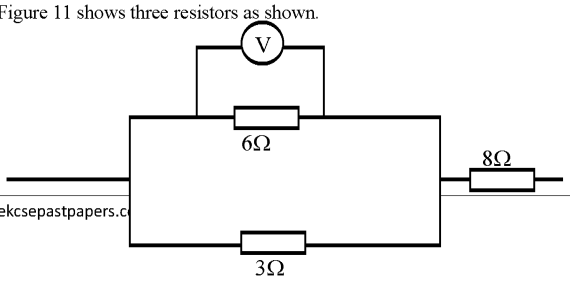


Fig. 11

If the voltmeter reads 4V, find the
(i) Effective resistance (2 marks)
(ii) Current through the 3Ω resistor (2 marks)
(iii) Potential difference across the 8Ω resistor. (2 marks)

(c) (i) What is meant by the term "lost volts"? (1 mark)
(ii) A cell supplies a current of 0.5A when connected to a 2Ω resistor and 0.25A when connected to a 5Ω resistor. Find the e.m.f and the internal resistance of the cell. (4 marks)

18. Figure 12 shows a diffusion cloud chamber for detecting radioactivity.

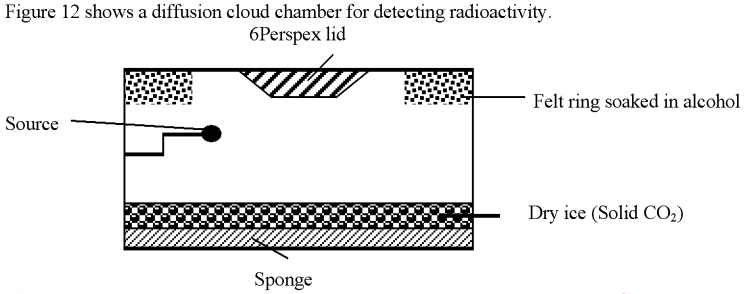
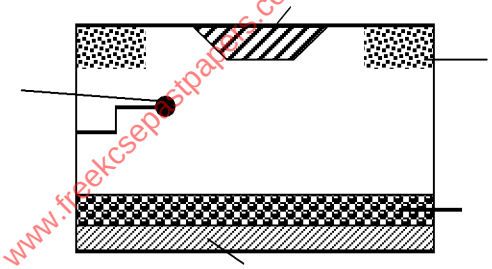


Fig. 12

(a) State the function 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.



MAKUENI COUNTY CLUSTER PREPARATORY EXAMINATION 2016
PHYSICS PAPER 232/3
PRACTICAL
CONFIDENTIAL

Q1. **Each candidate should have the following;**

- ✓ A rectangular glass of dimensions about
  l – 10cm
  w – 6.3cm
  t – 1.8cm
- ✓ Four optical pins
- ✓ 30cm transparent ruler
- ✓ Protractor
- ✓ A plain white paper fixed on the soft board

NB: The teacher to fix the sheet of paper for the candidate.
The teacher ensures the candidates removes the sheet of paper and attach it to the question paper for marking.

Q2. **Each candidate should have the following**

- ✓ Voltmeter 0 – 5V
- ✓ Ammeter 0 – 1A
- ✓ Micrometer screw gauge to be shared.
- ✓ Switch
- ✓ 2 new dry cells – Size D
- ✓ 8 connecting wires
- ✓ A wire AB – mounted on a mm scale SWG 28

NB: Teacher to mount the wire and label it as AB.

MAKUENI COUNTY CLUSTER PREPARATORY EXAMINATION 2016

232/3
PHYSICS PRACTICAL
Paper 3
JULY/ AUGUST 2016
TIME: 2 ½ HOURS

Q1. You are provided with the following:

- ✓ A plain white paper fixed on the softboard
- ✓ Four optical pins
- ✓ 30cm transparent ruler
- ✓ Protractor
- ✓ Rectangular glass block

Proceed as follows:

(a) On the white sheet of paper fixed on the softboard, draw a line XY, 25cm long at the middle of the paper. Mark its point at Q.
- ✓ At Q draw a normal, QN.
- ✓ Draw a line PQ such that the angle, i, between PQ and QN is 15^0.

(b) Place the glass block, largest face down, on the paper such that the mid-point of the edge AB of the block coincides with the mid-point Q of the line XY as shown in figure 1. Draw the outline, ABCD, of the glass block.
- ✓ Fix two pins O_1 and Q_2 on the line PQ in such a way that they are vertical and about 5cm from each other.
- ✓ Looking through the glass block through face AB, fix two pins S_1 and S_2, so that they are exactly in line with O_1 and O_2 AS shown in figure 1.
- ✓ Mark the positions of S_1 and S_2.
- ✓ Remove the block, joint points S_1 and S_2 and produce the line to meet face AB of the block at R.
- ✓ Join Q to R.
- ✓ Measure the length, QR, let its length be L = _____ cm

(c) Repeat part (b) for other values of angle i = 25^0, 35^0, 45^0 and 55^0 and complete table 1.

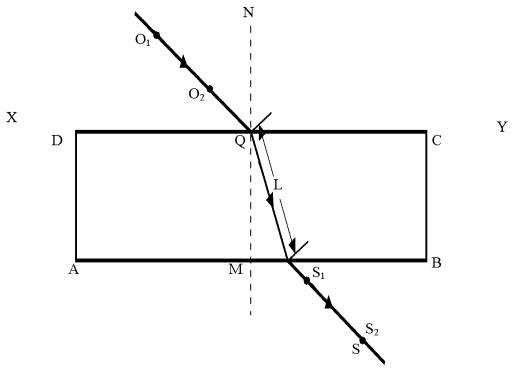


Figure 1

NB: Attach the sheet of paper to the question paper for marking. (1 mark)

Table 1

i (^{0})	L(cm)	L2 (cm2)	$\frac{1}{l^2}$ (cm^{-2})	Sin i	Sin^2i
15					
25					
35					
45					
55					

(d) On the grid provided, plot a graph of $\frac{1}{l^2}$ (vertical axis) against sin^2i (5 marks)

(e) Determine the slope of the graph (2 marks)

(f) Given that, $\frac{1}{l^2} = \frac{1}{b^2} - \frac{1}{n^2 b^2} Sin^2 i$

Use the graph for find;

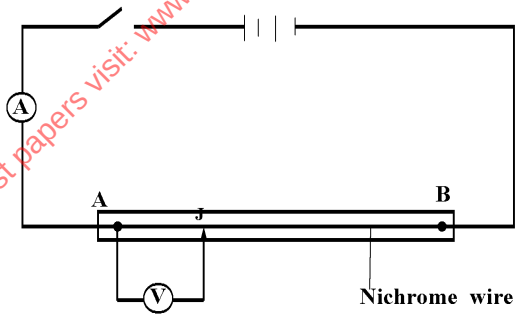
(i) b (3 marks)

(ii) n (3 marks)

Q2. You are provided with the following

- ✓ A wire AB mounted on a mm scale.
- ✓ A voltmeter screw gauge
- ✓ A switch
- ✓ 2 cells
- ✓ A cell holder
- ✓ 8 connecting wires

(a) (i) Arrange the apparatus and then connect the circuit as shown in the diagram.



(ii) Close the switch and record the value of current, I, flowing.

I = _____ A (1 mark)

(b) Place the sliding contact J at a distance of 10cm from A. Read the p.d across the wire. Increase the length AJ to the values shown each time obtain the p.d across the wire.

(c) Enter these values in the table below. (5 marks)

Length L (cm)	10	20	30	40	50	60
P.d across AJ (N)						

(d) Pot a graph of p.d (v) (y-axis) against length L (5 marks)

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

(f) Determine the diameter of the wire AB at two different points hence calculate the average. (2 marks)

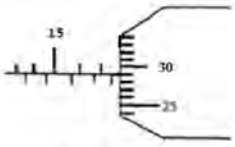
(g) Determine the cross-section area, A, of the wire in cm^2 (2 marks)

(h) Given that $V = \frac{k}{A}$, determine the value of k. (2 marks)

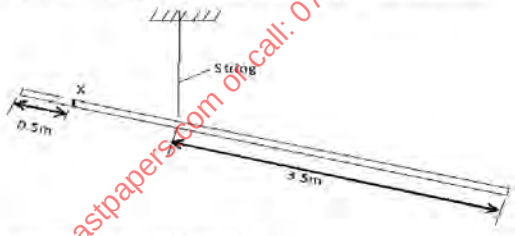
MOKASA JOINT EXAMINATION
232/1
Physics
Paper 1
March / April 2016

Section A (25Marks)

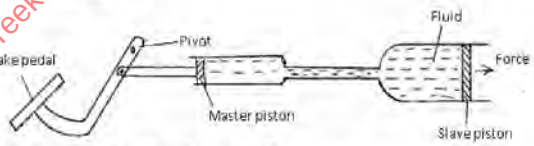
1. The diagram below shows a micrometer screw gauge. What is the reading in SI units? (2 marks)



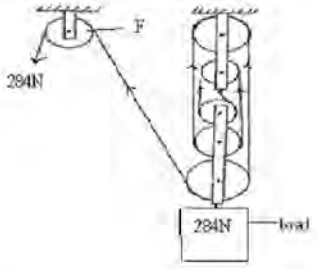
2. Apart from friction, name another factor that reduces efficiency in machines. (1 mark)
3. Diffusion in gases is faster than in liquids; state two reasons why this is so. (2 marks)
4. A tube of radius 9 mm has a constriction of diameter 10mm. Water flows in the tube at $3ms^{-1}$. Determine the velocity of water in the constriction. (3 marks)
5. (a) A student obtained ice at 0°Cfrom a refrigerator and placed it in a beaker on a bench. After 4 minutes, the temperature rose to
   4°C. State the changes that would be observed in the water in terms of;
   (i) density (1 mark)
   (ii) mass (1 mark)
   (ii) volume (1 mark)
6. The diagram below shows a uniform 5m long metal rod of mass 800g. It is suspended by a string tied at a point 3.5m from one end. Determine the load which should be hung at point X to keep the plank horizontal. (3 marks)



7. Explain why ice skaters use sharp-edged shoes to slide on ice (2 marks)
8. The diagram below shows a braking system.



   Why is the master piston, made smaller than the slave piston? (1 mark)
9. A faulty thermometer reads 2°C when dipped in ice at 0°C and 95°C when dipped in steam at 100°C. What would this thermometer read if placed in water at room temperature at 18°C? (3 marks)
10. The figure **below** shows a machine being used to raise a load. Use the information given in the figure to answer questions **below**.



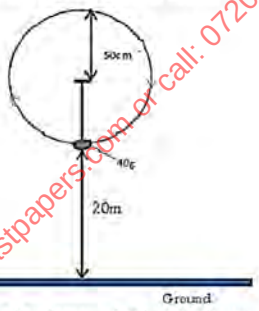
Determine the efficiency of the machine. (3 marks)

11. Using Kinetic theory of matter, explain why solids expand when heated (2 marks)

Section B (55 Marks)

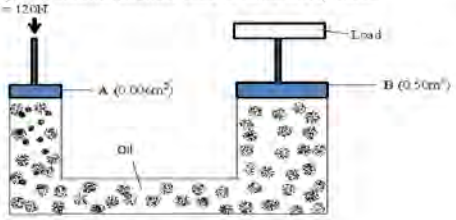
12. A bullet of mass 24g travelling in a horizontal path with a velocity of 450ms^{-1} strikes a wooden block of wood of mass 976g resting on a rough horizontal surface. After impact, the bullet and the block move together for a distance of 7.5m before coming rest.
    (a) Name the type of collision which takes place above (1 mark)
    (b) What's the velocity of the two bodies when they start sliding (2 marks)
    (c) Calculate the force which brings the two bodies to rest (3 marks)
    (d) Determine the coefficient of friction between the block and the surface during this motion. (2 marks)

13 (a) Give reason why a body moving in a circular path with constant speed is said to be accelerating. (1mark)
    (b) A stone of mass 40g is tied to the end of a string 50cm long such that it is 20m above the ground at its lowest level as shown
    in the diagram below. It is whirled in a vertical circle at 2rev/s.

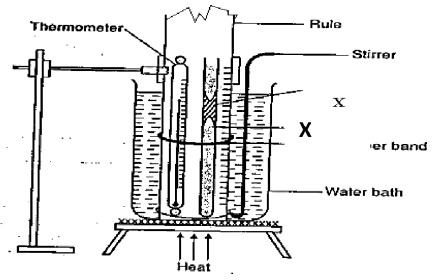


    (i) If the string breaks at its lowest levelas shown, what is the velocity with which it travels? (2 mark)
    Calculate the maximum tension in the string. (3marks)
    (ii) Calculate the maximum tension in the string. (2 marks)
    (d) Determine the maximum horizontal distance it travels from the breaking point (2 marks)

14 (a) Give reason why ink is most likely to ooze out of a pen when one is up in an airplane. (1mark)
    (b) The figure below is a simple hydraulic machine used to raise heavy loads.



    Calculate;
    (i) The pressure exerted on the oil by the force applied at A (2marks)
    (ii) The load raised at B (2marks)



(i) Give the name of part labelled X (1 mark)
(ii) What is the function of the part named in (i) above? (1 mark)
(iii) Briefly explain how the set up above is used to verify Charles Law (3 marks)

(c) A certain mass of hydrogen gas occupies a volume of $1.6m^3$ at a pressure of $1.5x10^5Pa$ and a temperature of 12^0c. Determine the volume when the temperature is 0^0c at a pressure of $1.0x10^3Pa$. (2 marks)

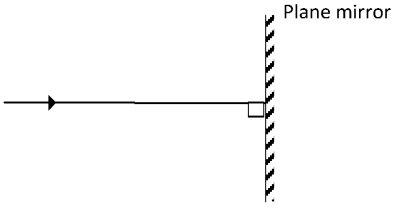
MOKASA JOINT EXAMINATIONS
Kenya Certificate of Secondary Education (KCSE
232/2
PHYSICS
Paper 2
(Theory)
March/April 2016
2 hours

Section A (25 marks)

Answer ALL the questions in the spaces provided.

1. **Figure 1** show a ray of light incident on a plane mirror.

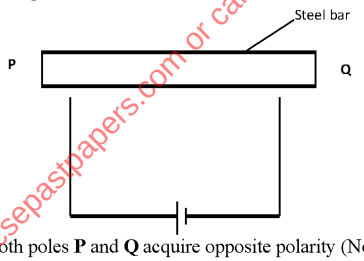
Figure1



(a) On the diagram, indicate the direction of the reflected ray. (1mark)
(b) Give reason for the path shown above. (1mark)

2. State what happens to the image when one moves closer to the object when using a pinhole camera. (1mark)
3. An object of height 2 cm is placed 25 cm in front of a concave mirror. A real image is formed 75 cm from the mirror. Calculate the height of the image. (2marks)
4. State the law of magnetism. (1mark)
5. State and explain the functions of the keeper when storing magnets. (2marks)
6. **Figure 2** shows a steel bar to be magnetized.

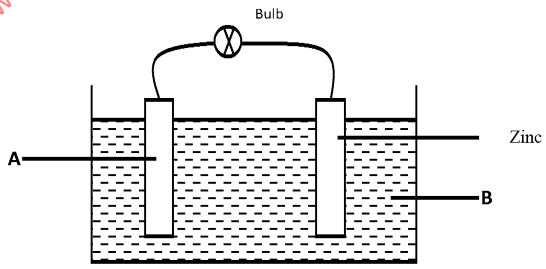
Figure 2



Complete the circuit such that both poles **P** and **Q** acquire opposite polarity (North- south respectively). (1mark)

7. **Figure 3** shows a set up of a simple cell.

Figure 3



(a) Name the electrode **A** and electrolyte **B**. (2marks)
(b) State **two** reasons why the bulb goes off a short time. (2marks)
(c) Give **one** method of minimizing the defect that occurs in plate **A**. (1mark)

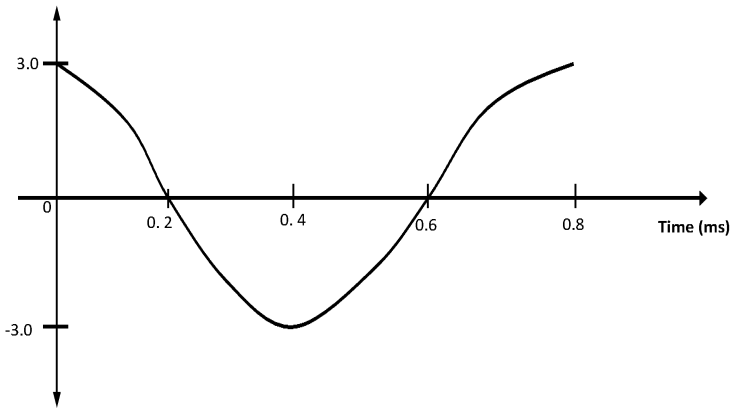
8. The chart below shows part of the electromagnetic spectrum.

A	**B**	Visible light	UV light	**C**

(a) Identify the radiation marked A and C. (1mark)
(b) Give **one** application of the radiation marked **B**. (1mark)

9. The range of audible frequencies varies from 20 Hz to 20 kHz. If the speed of sound is 340 m/s, what is the corresponding range of wavelength? (3marks)
10. Distinguish between transverse waves and longitudinal waves. (1mark)
11. **Figure 4** shows a wave form

Figure 4



Determine the wavelength given that the speed of the wave is 400 m/s. (2marks)

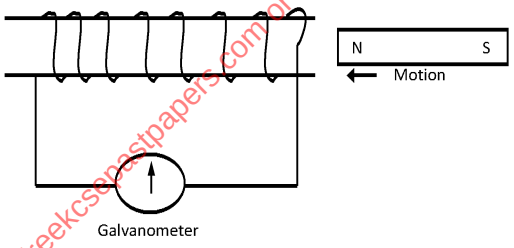
12. An electric kettle is rated at 1.8 kW, 240 V. Explain the choice of the safest fuse for the kettle. (the available fuses are 5 A, 10 A, and 20 A) (3marks)

Section B (55 marks)

*Answer **ALL** the questions in the spaces provided.*

13. (a) A bar magnet is pushed into a coil as shown in **Figure 5** below.

Figure 5

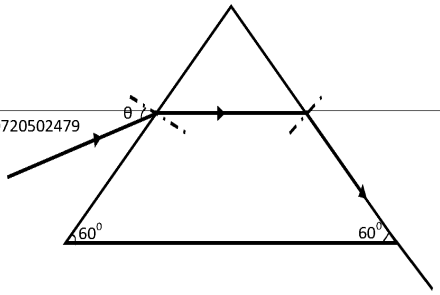


Explain what happens to the pointer of the galvanometer when the magnet is:

(i) Moved into the coil rapidly? (1mark)
(ii) Remains stationary inside the coil? (1mark)
(b) State **two** ways of increasing the magnitude of induced current in a generator. (2marks)
(c) A transformer has 200 turns in the primary coil and 1000 turns in the secondary coil. The primary coil is connected to an a.c source producing 100 V and rated 500 W. The current delivered by the secondary circuit was found to be 0.95 A.
(i) Determine the efficiency of this transformer. (3marks)
(ii) Explain why the efficiency is less than 100%. (2marks)

14. (a) A coin is placed at the bottom of a tall jar. The jar is filled with paraffin to a depth of 32.4 cm and the coin is apparently seen displaced 9.9 cm from the bottom. Determine the refractive index of air with respect to paraffin. (3marks)
(b) Define the term **critical angle**. (1mark)
(c) **Figure 6** shows a ray of light passing through a glass prism.

Figure 6



If the speed of light in prism is 2.0×10^8m/s

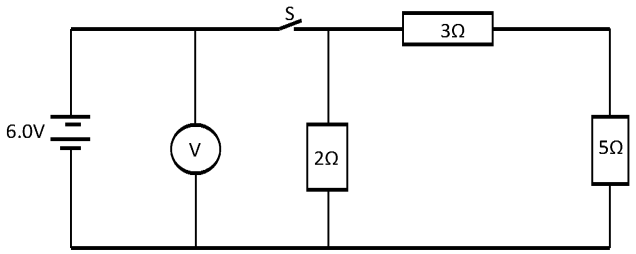
(i) Determine the refractive index of the prism material given that the speed of light in air is 3.0×10^8m/s. (2marks)

(ii) Determine the value of the critical angle c and show it on **Figure 6**. (2marks)

15. (a) Differentiate between an Ohmic and non-ohmic conductor giving **one** example in each case. (2marks)

(b) **Figure 7** shows a circuit with resistors and voltmeter connected to a battery.

Figure 7



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

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

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

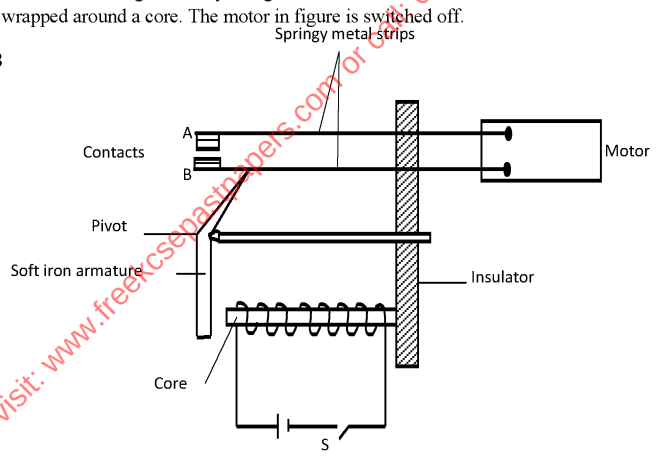
(I) Open (1mark)

(II) Closed (1mark)

(iv) Account for the difference between the answers in (I) and (II) above. (1mark)

16. **Figure 8** shows an electromagnetic relay being used to switch an electric motor on and off. The electromagnet consists of a coil of wire wrapped around a core. The motor in figure is switched off.

Figure 8



(a) Suggest suitable material for the core. (1mark)

(b) What happens to the core when switch S is closed? (2marks)

(c) Why do the contacts A and B close when the switch S is closed. (2marks)

(d) When the switch S is opened, what will happen to;

(i) The core (1mark)

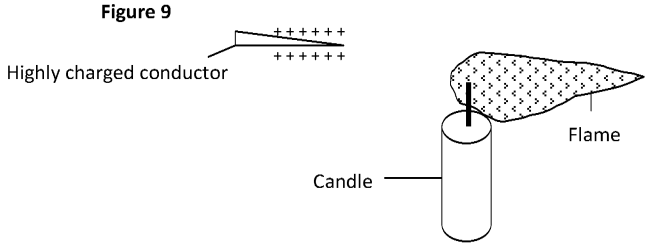
(ii) Soft iron armature. (1mark)

(e) Give **one** other application of an electromagnet. (1mark)

(f) State **two** ways in which an electromagnet could be made more powerful. (2marks)

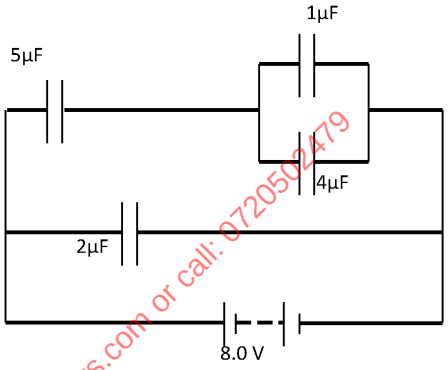
17. (a) Give a reason why a candle flame is blown when a highly charged conductor is brought close to it as shown in **Figure 9**. (2marks)

Figure 9



(b) **Figure10** shows 1μF, 2μF, 4μF and 5μF capacitors connected to a battery.

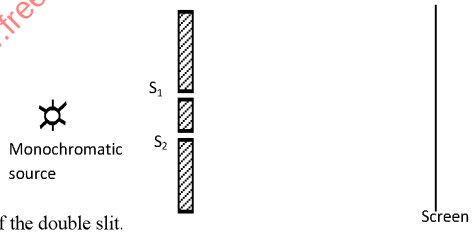
Figure 10



Determine:
(i) The total capacitance. (2marks)
(ii) The total charge. (2marks)
(iii) Voltage across the 4μF capacitor. (2marks)

18. (a) In an experiment to observe interference of light a double slit experiment was placed close to the monochromatic source as shown in **Figure 11**.

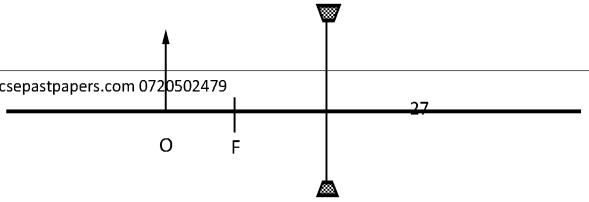
Figure 11



(i) State the function of the double slit. (1mark)
(ii) Describe what is observed on the screen. (2marks)

(b) **Figure 12** shows an object O placed in front of a diverging lens whose principal focus is F.

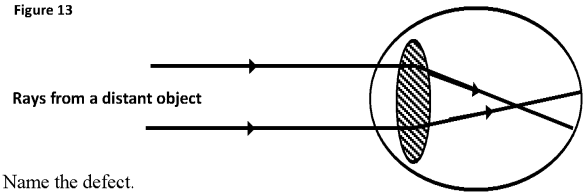
Figure 12



On the diagram, draw rays diagram to locate the image formed. (3marks)

(c) **Figure 13** shows a defective eye focusing a distant object.

Figure 13



(i) Name the defect. (1mark)

On the same diagram, sketch the appropriate lens to correct the defect and sketch the rays to show the effect of the lens. (2marks)

MOKASA JOINT EXAMINATION
232/3
PHYSICS PRACTICAL
2 ½ Hours
REQUIREMENTS

Each candidate should be provided with:

1. - A rectangular glass block
   - 4 optical pins
   - A soft board
   - A plain paper
2. (I) - A voltmeter (0 – 3V)
   - An ammeter (0 – 1A)
   - A dry cell (new)
   - A switch
   - 7 connecting wires (3 wires with crocodile clip at one end and a long one to be attached to the jockey/crocodile clip)
   - A mounted resistance wire on a metre rule (wire SWG 28)

   (II) - A half-metre rule
   - A knife edge (raised on a block of wood)
   - A thread (approx. 20cm in form of a loop)
   - A 50g mass

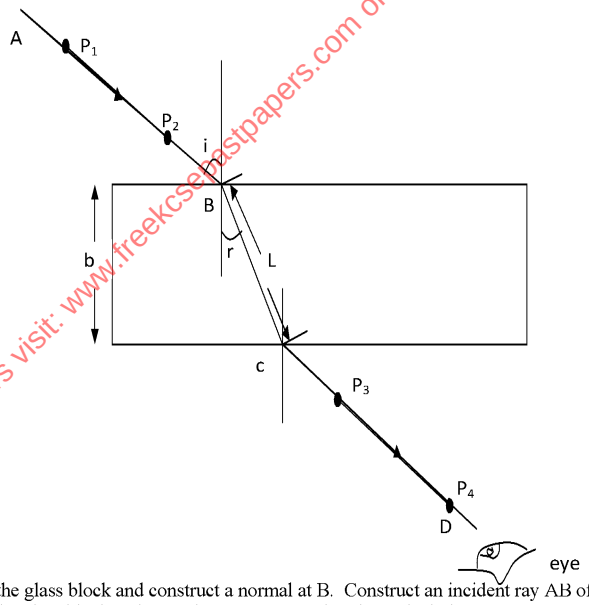
MOKASA JOINT EXAMINATION
232/3
PHYSICS
PRACTICAL
TIME: 2 ½ HRS

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 incident ray AB of angle of incidence, $i = 20^0$.
(c) Replace the glass block and trace the ray ABCD using the optical pin
(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 i^0	L (cm)	L^2 (cm^2)	$\frac{1}{L^2}$ (cm^{-2})	$Sin^2 i$
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: $\frac{1}{L^2} = -\left(\frac{1}{n^2 b^2}\right) \cdot Sin^2 i + \frac{1}{b^2}$

(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)**

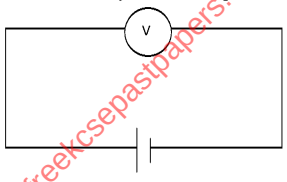
$Q = -\left(\frac{C}{S}\right) \div B$

(k) Hand in your constructions on the plain paper together with the answer script. **(2 marks)**

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

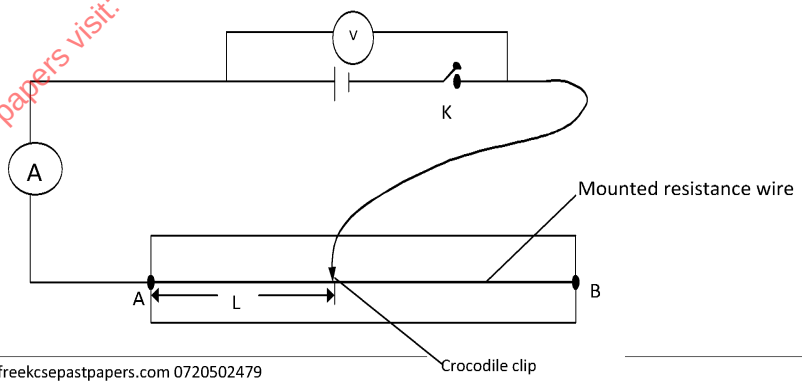
- A voltmeter
- An ammeter
- A dry cell
- A cell holder
- A switch
- 7 connecting wires (4 wires with crocodile clips at one end)
- A mounted resistance wire.

(a) Connect voltmeter across the dry cell on an open circuit. Measure its e.m.f.



E = _____ **(1 mark)**

(b) Now connect the apparatus provided as shown below.



Place the crocodile clip/jockey on the wire AB starting with L = 20 cm. Close the switch K. Record the terminal p.d. , V and corresponding current I. Repeat for other values of L shown and complete the table.

Length L (cm)	Terminal p.d. V(V)	Current I (A)	$\frac{1}{R} = \frac{1}{\Omega}$	$\frac{1}{V} = \frac{1}{V}$
20				
30				
40				
50				
60				
70				

(6 marks)

(c) Plot a graph of $\frac{1}{V}$ (y-axis) against $\frac{1}{R}$. (4 marks)

(d) Given that the equation of graph is; $\frac{1}{V} = \frac{r}{E} \cdot \frac{1}{R} + \frac{1}{E}$

Determine from the graph;

(i) the intercept C on $\frac{1}{V}$ - axis

C = _____ (1 mark)

and hence calculate the e.m.f. E of the cell. (2 marks)

(ii) the slope *S* of the graph. (2 marks

(e) (i) Use the values of *C* and *S* above to find W, given by $w = \frac{c}{s}$ (1 mark)

(ii) What is the physical meaning of *W*. (1 mark)

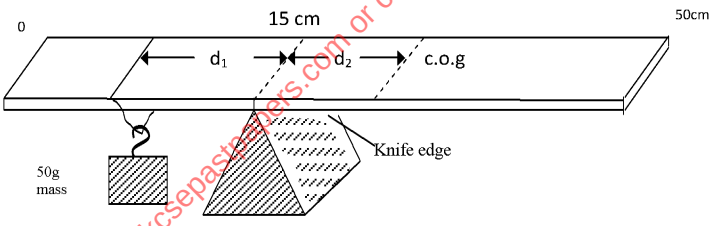
2. **II.** You are provided with the following;

- Half-metre 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 mark)**

(b)



(i) Pivot the rule at 15cm mark and balance it with the mass as shown. When it is well balanced, note and record the position of the 50g mass; (1 mark)

Position of 50g mass = _____ cm mark

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

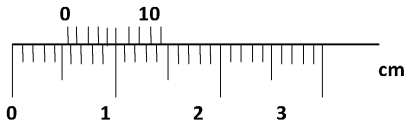
KEIYO SOUTH JOINT EXAMINATION 2016

232-1
PHYSICS 1
(THEORY)
MARCH/APRIL. 2016
2 HOURS

SECTION A (25MARKS)

1. What is the reading on the vernier caliper shown in figure 1 below? (1mark)

Figure 1

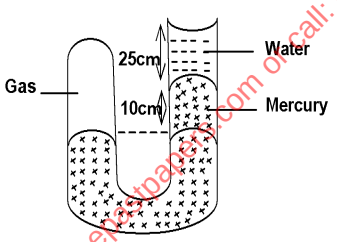


2. The figure 2 below show three wooden blocks resting on a flat surface. (They are of the same material).

Figure 2

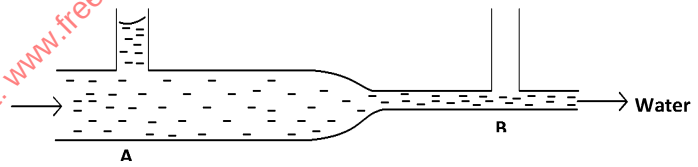
(i) Arrange them starting from the least stable. (1mark)
(ii) State the factor that you have considered in 2(i) above. (1mark)

3. The figure below shows a U-tube manometer containing a gas, mercury and water. Calculate the gas pressure acting on the mercury. (Take atmospheric pressure to be 1.05 x 10^5 pa, density of mercury and water to be 13600kg/$m^3$and 1000kg/m^3 respectively). (3mks)



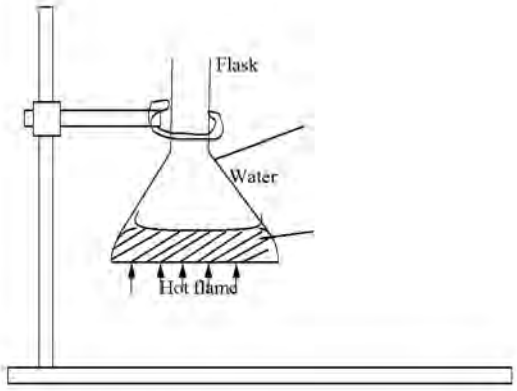
4. Figure 3 below shows water flowing through two sections A and B of a pipe having different cross-sectional area.

Figure 3



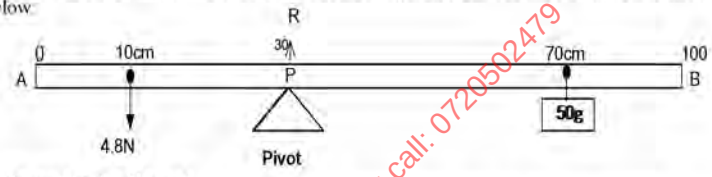
Indicate and explain the water level in manometer B. (2marks)

5. In a clinical thermometer state how the thermometer can be made. (1marks)
   a) Move sensitive
   b) Quick acting
6. A balloon is filled with a gas which is lighter than air. It is observed to rise in air up to a certain height. State a reason why the balloon stops rising. (1mark)
7. 1800cm^3 of fresh water of density 1000 kg/m^3 is mixed with 2200cm^3 of sea water of density 1025 kg/m^3. Calculate the density of the mixture. (3marks)
8. When temperature of a gas in a closed container is raised, the pressure of the gas increases. Explain how the molecules of the gas cause the increase in pressure (2marks
9 The figure below shows a flat bottomed flask containing some water. It is heated directly with a very hot flame



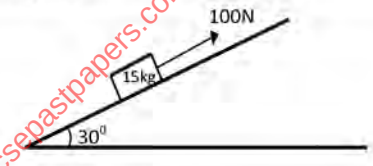
Explain why the flask is likely to crack (2marks)

10. State two factors which affect the rate of diffusion in gases (2marks)
11. The figure below show a uniform metre rule balanced when pivoted at the 30cm mark under the conditions of forces as shown below.



Calculate the weight W of the rule. (3marks)

12. The figure below shows an inclined plane and a load of mass 15kg pulled by an effort of 100N.

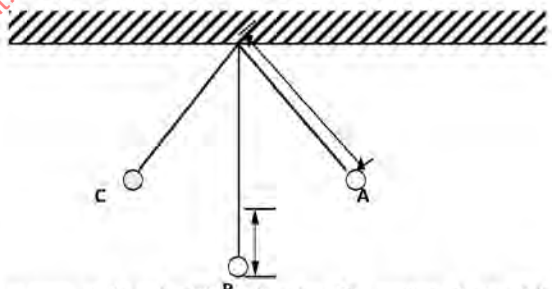


Find the efficiency of the machine (3marks)

SECTION B (55 Marks)

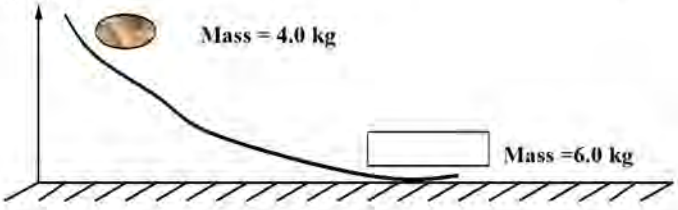
Answer all the questions in this section in the spaces provided

13. the figure below shows a simple pendulum of length 80 cm. the pendulum bob whose mass is 50 g oscillates between points A and B, through its rest position C. A and B are both 10 cm higher than C



(a) (i) indicate with an arrow, on the path ACB, the direction of the greatest velocity of the bob as it moves from A to B. (1mk)
(ii) State the form of energy possessed by the pendulum bob at point A (1 mark)

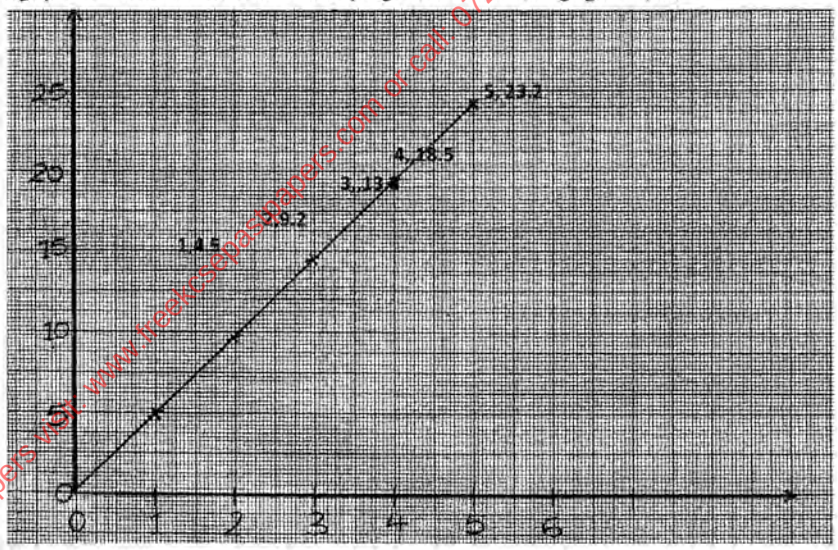
(b) Determine
(i) The velocity of the bob at point C (2 marks)
(ii) The tension in the string as the bob passes point C (2 marks)
(Take acceleration due to gravity g=10m/s²)
(c) State two characteristics of perfectly inelastic collisions (2 marks)
(d) A body of mass 4.0 kg held at a vertical height of 500cm is released to travel along a frictionless curved path as shown in the figure below.



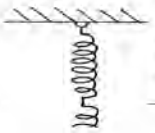
The 4.0kg mass strikes body of mass 6.0kg at rest immediately it reaches the horizontal. The bodies stick together and move in the same direction. Determine the velocity of the bodies immediately after collision. (4 marks)

14. (a) Define the term heat capacity (1mark)
(b) A block of metal of mass 150g at 100°C is dropped into a logged calorimeter of heat capacity 40Jk^{-1} containing 100g of water at 25°C. The temperature of the resulting mixture is 34°C. (Specific heat capacity of water = 4200J/KgK)
Determine;-
(i) Heat gained by calorimeter (2mks)
(ii) Heat gained by water (1mark)
(iii) Heat lost by the metal block (1mark)
(iv) Specific heat capacity of the metal block (3marks)
(b) Differentiate between boiling and evaporation (2mark)

15. a) State Hooke's law. (2marks)
b) The graph shows how extension e of a helical spring varied with load, hanging on it. (cm)



(i) Determine from the graph, the proportionality constant of the spring (3marks)
c) State three factors that affect the proportionality constant of a helical spring. (3marks)
d) Two spring Q and R have proportionality constants 20Nm^{-1} and 25Nm^{-1} respectively. Q weighs 0.2 N while the weight of R is negligible. The two springs are arranged to support a load of 3.0N as shown in the diagram that follows.



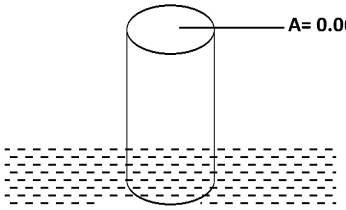
R

Q

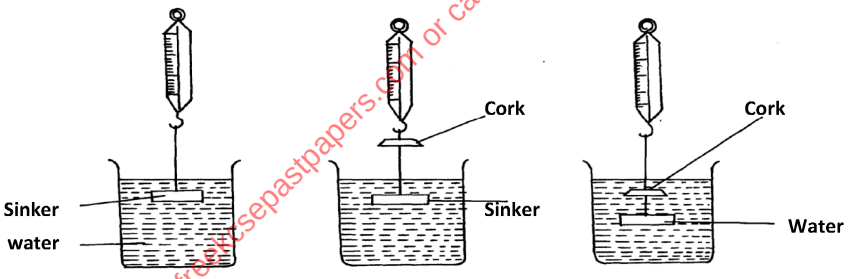
3.0N

Determine the extension in
i) Q (2marks)
ii) R (2marks)

16. (a) Define the term relative density (1mark)
(b) The diagram below shows a wooden log 12m long, density 800kg/m^3 and cross-sectional area 0.06m^{2}floating upright in sea
water of density 1.03g/cm^3, such that a third of it is covered by water.



(i) Determine the weight of the block (3marks)
(ii) The up-thrust on the block (3marks)
(iii) The minimum weight that can be placed on the block to just make it fully submerged (2marks)
(c) The following set-up was then used by a student to determine the relative density of a cork



During the experiment, the following measurements were taken:-
- Weight of sinker in water = w_1
- Weight of sinker in water and cork in air = w_2
- Weight of sinker and cork in water = w_3

(i) Write an expression for the up thrust on cork (1mark)
(ii) Write an expression for the relative density of the cork (2marks)

17. (a) Distinguish between angular velocity and linear velocity. (1marks)
(b) A pendulum bob is whirled with uniform speed in a horizontal circle of radius 20cm.The bob describes an arc of length 5cm
within 15 seconds.
Calculate
i) Angular velocity (3marks)
ii) The uniform speed of the bob along the circular path (2marks)
iii) The frequency with the bob moves along the circular path (2marks)
iv) State why the bob is accelerating yet it moves with the uniform speed along its path (1mks)

KESO JOINT EXAMINATION-2016
Kenya Certificate of Secondary Education

232/2
PHYSICS
PAPER 2
MARCH/APRIL- 2016
TIME: 2 HRS

SECTION A: (25 marks)
Answer **all** the questions in this section in the spaces provided.

1. **Figure 1** shows a ray of light XY striking the mirror CD held at an angle of 108° to mirror DE.

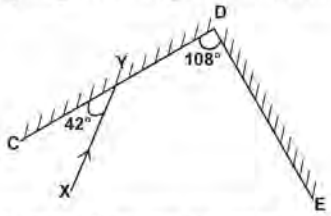


Fig 1

Complete the path of the ray XY and state the final angle of reflection. (2 marks)
Complete the path of the ray XY and state the final angle of reflection (3 marks)

2. State one advantage of a lead acid accumulator over nickel-iron accumulator. (1 mark)
3. A negatively charged polythene rod is placed on a pan of electric balance. State and explain what happens to the balance reading if a positively charged glass rod is brought closer to the polythene rod. (2 marks)
4. The **figure 2** shows a bar magnet. Point **A** and **B** are in front of the magnet.

Fig. 2

On the axis provided, sketch a graph showing how the magnetic field strength changes from A to B. (2marks)

5. Explain how an increase in temperature affects the speed of sound in air. (1 mark)
6. **Figure 3** below shows two parallel light rays incident on a concave mirror.

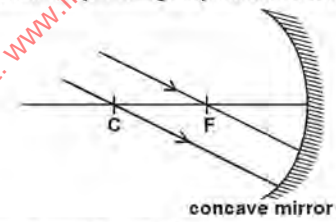


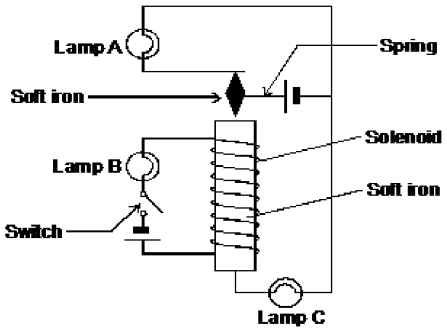
Fig 3

Sketch on the same diagram the path of the rays after striking the mirror and show the image. (2marks)

7. A wire of resistance 20Ω is connected to a battery of 12V. Determine the heat dissipated in the wire in one minute. (3 marks)

8. The **figure 4** below shows an arrangement for lighting three lamps, A, B and C only one of which is controlled directly by the switch.

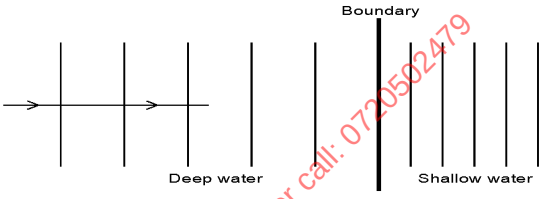
Fig 4



(a) Which of the lamp is directly controlled by the switch? (1 mark)
(b) Which lamps can be on at once? (1 mark)

9. Plane water waves produced in a ripple tank are passed from a region of deep water into a region of shallow water. **Figure 5** shows the top view of the tank.

Fig 5



State what happens at the boundary to.
(a) The frequency of the waves. (1 mark)
(b) The speed of the waves. (1 mark)
(c) The wavelength of the waves. (1 mark)

10. (i) Arrange the following waves in order of decreasing wavelength.
Infrared, X-rays, microwaves, yellow light, radio waves, red light. (1 mark)
(ii) State one application of infrared wave. (1 mark)

11. Using domain theory, explain the process of magnetization. (3 marks)

12. **Figure 6** represents a pinhole camera.

Fig 6

Sketch rays to show the formation of an enlarged image in the camera. Label both the image and the object. (2 marks)

SECTION B: (55 marks)

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

13. (a) Two coins were placed at the bottom of two jars each containing a different clear liquid as shown in **figure 7**.

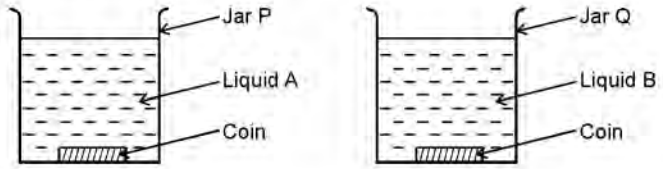


Fig 7

The liquids in the two jars are at the same level. The coin in jar Q appears shallower than that in jar P. Explain. (2 marks)

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

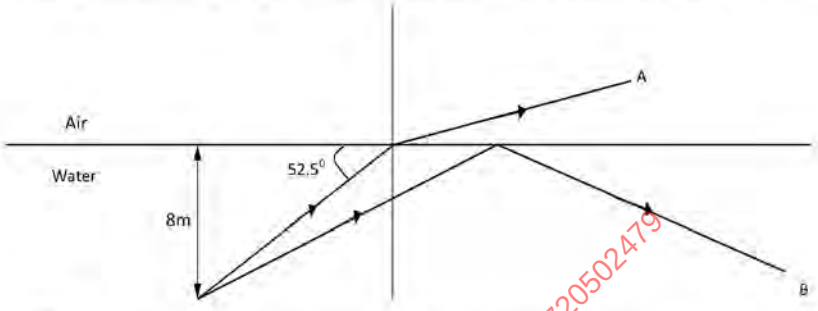


Fig 8

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

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

(iii) Find the critical angle of water. (3 marks)

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

(c) **Figure 9** below shows a ray of light incident on a triangular prism and a white screen is placed in front of the prism.

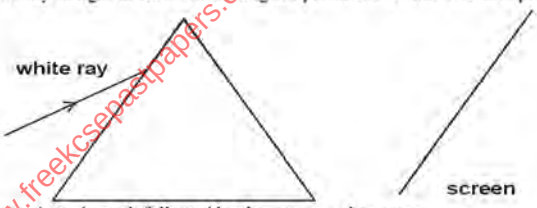
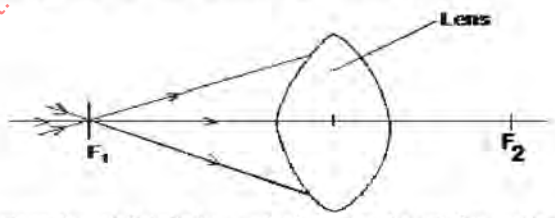


Fig 9

Complete the diagram to show the path followed by the ray up to the screen. (2 marks)

14. (a)**Figure 10** shows a glass lens in air and its two focal points F1 and F2.



Three rays of light pass through F1 to the lens, on the figure show the path followed by the three rays through the lens and into the air. (3 marks)

(b) I. State one possible cause of myopia. (1 mark)

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

(c) The **figure 11** below shows a pin 60mm long placed along the principal axis of a lens of focal length 50mm. The near end of the pin is 80mm form the lens.

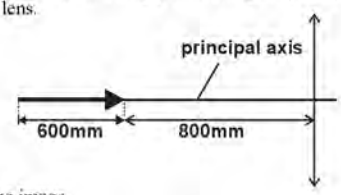
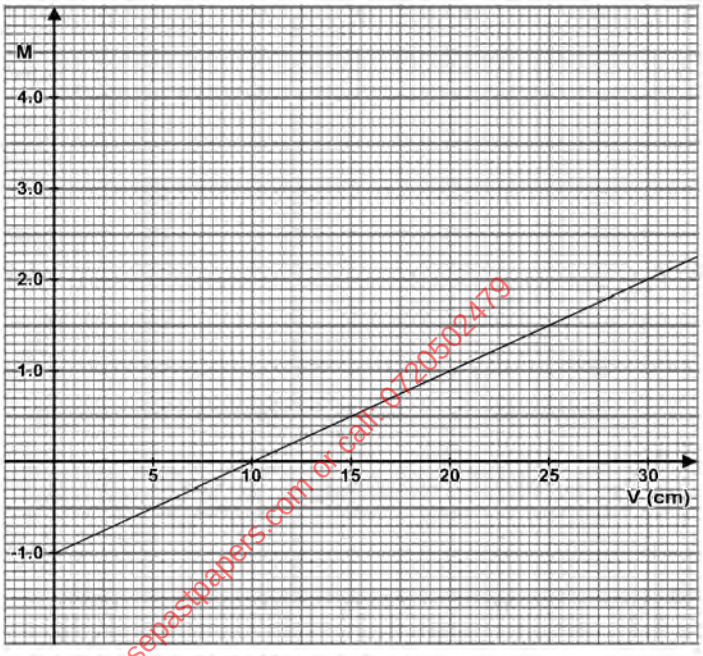


Fig 11

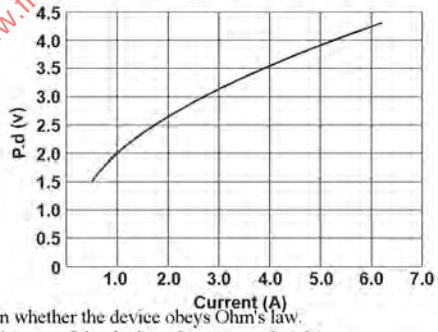
Determine the length of the image. (4 marks

(d) In an experiment to determine the focal length of a converging lens several values of image distance and the corresponding magnification were obtained. A graph of magnification m against image distance (V) was plotted as shown below.



From the graph determine the focal length of the converging lens. (4 marks)

15. (a) The following graph shows the potential difference, V against current, I for a certain device.



(i) State with a reason whether the device obeys Ohm's law. (1 mark)
(ii) Determine the resistance of the device when current is 1.0A. (1 mark)
(iii) State how resistance of the device varies as current increases from zero to 5.0A. (1 mark)

(b) When the switch S is kept open in the circuit shown in **figure 12** the voltmeter reads 1.5V. When the switch is closed, the readings drops to 1.3V and the current through the resistor is 0.5A.

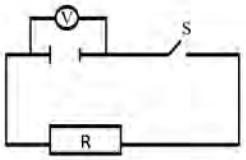


Fig 12

(i) What is the e.m.f of the cell? (1 mark)
(ii) What the terminal voltage of the cell? (1 mark)
(iii) Calculate the value of R. (2 marks)

16. (a) **Figure 13** shows a loudspeaker producing sound waves in air.

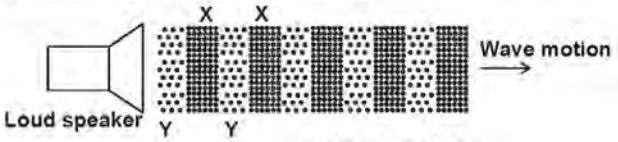


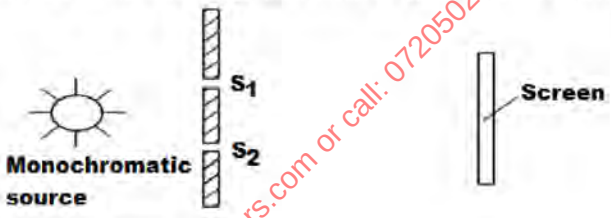
Fig 13

X compressions
Y Rarefactions

(i) Explain how compression and rarefactions are formed. (2 marks)
(ii) Show on the diagram the wavelength of the wave. (1 mark)
(iii) The wavelength of the waves produced is 0.4m. Determine the frequency of the waves if the speed of sound in air is 330m/s. (2 marks)

(b) In an experiment to observe interference of light waves a double slit placed close to the source as shown in **figure 14** below

Fig 14

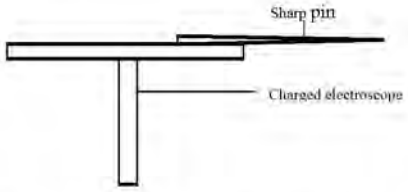


(i) **What** is monochromatic source (1 mark)
(ii) **State** the function of the double slit (1 mark)
(iii) **Briefly describe** what is observed on the screen. (1 mark)

(c) **Briefly explain** what is observed on the screen when
(i) The slit separation S_1S_2 is reduced (1 mark)
(ii) White light source is used in place of monochromatic source. (1 mark)

17. (a) In **figure 15** below, a sharp pin is fixed on a cap of a leaf of electroscope. The electroscope is highly charged and then left for some time.

Fig. 15



State and explain the observation made after sometime. (2marks)

(b) Four capacitors were connected in a circuit as shown in **figure 16**. The switch is then closed.

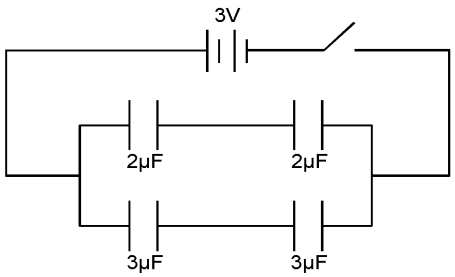


Fig 16

Determine ;

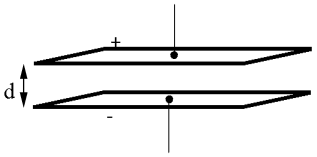
(i) The effective capacitance (3 marks)

(ii) The total charge (3 marks)

(iii) The energy stored in the combination when the switch is closed. (3 marks)

(c) **Figure 17** below shows a pair of parallel plates of capacitors connected to a battery. The upper plate is displaced slightly to the left.

Fig. 17



Suggest **two** adjustments that can be made so as to reduce the effective capacitance. (2 marks)

KEIYO SOUTH JOINT EXAMINATIONS (KESO) 2016
232/3
PHYSICS PAPER 3
CONFIDENTIAL

QUESTION 1
Each candidate requires the following:

- One complete retort stand.
- An optical pin.
- A bare copper wire, 15cm long and 1.2mm in diameter.
- A protractor.
- Two pieces of plasticine (about 10g each)
- Rubber (cork) stopper to fit a conical flask.
- A stopwatch
- A vernier caliper.
- A beam balance.

QUESTION 2
Each candidate requires the following:

- One 10 Ω carbon resistor labeled R.
- A nichrome wire, 100cm long labeled W mounted on millimeter scale (SWG 32) labeled AB.
- One new size D dry cell and a cell holder.
- One jockey.
- One centre zero galvanometer.
- Eight connecting wires, four with crocodile clips at both ends.
- A micrometer screw gauge.
- A switch.

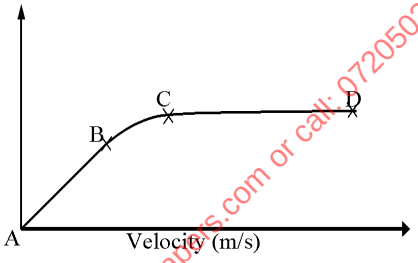
Increasing the distance d (separation distance)

KUWED JOINT EXAMINATION COUNCIL

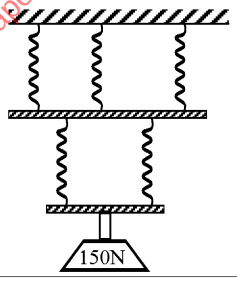
Kenya Certificate of Secondary Education
232/1
PHYSICS
PAPER 1
(THEORY)
JULY/AUGUST 2016
TIME: 2 HOURS.

SECTION A (25 MARKS)

1. State the name of the instrument used to take the following readings;
   (i) 10 kg (1 mark)
   (ii) 0.00245m (1 mark)
2. A micrometer screw gauge which had an error of +0.02mm was used to measure the diameter of a spherical marble. If the actual diameter was 3.67mm, draw a micrometer screw gauge showing its reading. (2 marks)
3. Fifty drops of oil have a volume of $1.0cm^3$. If a drop of oil forms an oil patch of diameter 20cm, determine the size of the oil molecule. (2 marks)
4. (a) A gun when fired the firer experiences equal backward recoil, explain. (1 mark)
   (b) A man whose mass is 80kg stands on weighing machine. When the lift ascends with an acceleration of $2.45m/m^2$, what is the reading on the scale? (2 marks)
5. The figure below shows a sketch graph of velocity-time graph for a body falling through a liquid. Explain the motion of the motion between.



   (a) B and C (1 mark)
   (b) A and B (1 mark)
   (c) C and D (1 mark)
6. In a faulty mercury-in-glass thermometer it was found that the mercury level stands at 2 cm mark in the tube at 0^0C and 20cm when in steam above boiling point water at normal atmospheric pressure. Calculate the temperature when the mercury stands at 13cm mark. (2 marks)
7. A balloon with argon gas of volume $199cm^3$ at the earth's surface where the temperature is 21^0C, and the pressure 760mm of mercury. If it is allowed to ascend to a height where the temperature is 2^0C and the pressure 100mm of mercury, calculate the volume of the balloon. (2 marks)
8. (a) The spiral springs shows in the figure below are identical. Each spring has a spring constant K = 200N/m. Each rod weighs 0.1N and each spring weigh 0.1N.



Determine the total extension caused by the 150N weight. (2 marks)

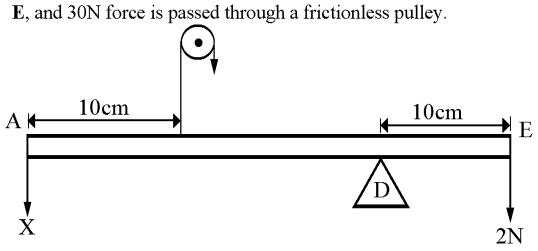
(b) Apart from length of the spring and nature of material, state one other factor affecting the spring constant. (1 mark)

9. The figure below shows a cuboid in two positions. Explain how the stability of the cuboid changes when it is changed from position 'a' to 'b'. (2 marks)

(a) (b)

10. (a) How does the area of support affect the stability of a body? (1 mark)

(b) The figure below shows a uniform rod **AE** which is 40cm long. It has a mass of 2kg and pivoted at **D**. If 2N is acting at point **E**, and 30N force is passed through a frictionless pulley.



Find the force X acting at end **A**. (3 marks)

SECTION B (55 MARKS)

Attempt all the questions in this section

11. (a) Sketch a block and tackle pulley with three movable pulleys in the lower block and two fixed pulleys in the upper block, to give a velocity ratio of 6. (3 marks)

Find:

(i) An effort of 450N is used to raise a load of 2700N. Determine:

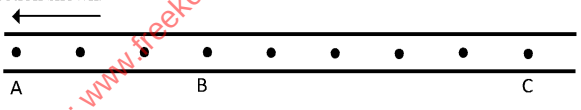
- Mechanical advantage (M.A) (2 marks)
- Efficiency of the pulley system. (2 marks)

(ii) If all the wasted energy is used to raise the lower block and the frictional force between pulleys and moving parts is 3.6N; determine the weight of the lower block. (2 marks)

(c) If the load moved through a distance of 50cm, determine the useful work done by the effort. (3 marks)

(d) James applied a force of 400N in pushing a stationery wall. If he took one hour to push the wall, calculate the power developed. (1 mark)

12. (a) The figure below shows dots which were made by a ticker timer – tape attached to a trolley. The trolley was moving in the direction shown.



If the frequency used was 60Hz, distance AB = 12cm and BC = 7.2cm, determine

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

(ii) The acceleration of the trolley. (2 marks)

(b) An object is projected horizontally with a velocity of 40m/s at the top of a cliff 100m from the ground. (Take g = 10m/s^2)

(i) Calculate the time taken for the object to hit the ground (3 marks)

(ii) What is the range of the object from the foot of the cliff (2 marks)

(b) State two assumptions that were made when deriving the equation of continuity? (2 marks)

13. (a) A ship made of steel is able to float while a steel rod sinks explain. (1 mark)

(b) A block of length 50cm, cross-sectional area of 5cm^2 and density 1.4g/cm^3 is completely immersed in a liquid of density 1.08g/cm3 find

(i) the mass of the block (2 marks)

(ii) the weight of the block in the liquid. (2 marks)

(iii) the apparent loss in weight of the block if three quarter of it is immersed in the liquid. (2 marks)

14. (a) Define specific latent heat of fusion (1 mark)

(b) Given the following. A filter funnel, a thermometer, a stop watch, ice at 0^0C, an immersion heater rated P watts, a beaker, a stand, boss and clamp and weighing machine.Describe an experiment to determine the specific latent heat of fusion of ice. Clearly state the measurements to be made. (4 marks)

(c) 200g of ice at 0^0C is added to 400g water in a well lagged calorimeter of mass 40g. The initial temperature of the water was 40^0C. If the final temperature of the mixture is X^0C, (Specific latent of fusion of ice L = 3.36×10^5JKg^{-1}, specific heat capacity of water, c = 4200Jkg^{-1}K^{-1}, specific heat capacity of copper = 400Jkg^{-1}K^{-1})

(i) Derive an expression for the amount of heat gained by ice to melt it and raise its temperature to X^0C (2 marks)

(ii) Derive an expression for the amount of heat lost by the calorimeter and its content when their temperature falls to X^0C. (2 marks)

(iii) Determine the value of X. (3 marks)

15. (a) The moon goes round the earth at constant speed. Explain why it is true to say that the moon is accelerating. (1 mark)

(b) A string of negligible mass has a bucket tied at the end. The string is 60cm long and the bucket has a mass of 45g. The bucket is swung horizontally making 6 revolutions per second. Calculate:

(i) The angular velocity. (1 mark)

(ii) The centripetal acceleration. (2 marks)

(iii) The tension on the string. (2 marks)

(iv) The linear velocity. (1 mark)

(c) Figure 6 shows of mass m = 200g attached to the centre of a rotating table with a string. The radius of the spring was varied and different values of angular velocity recorded. The mass of the body remained constant throughout the experiment.

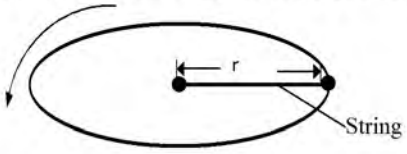
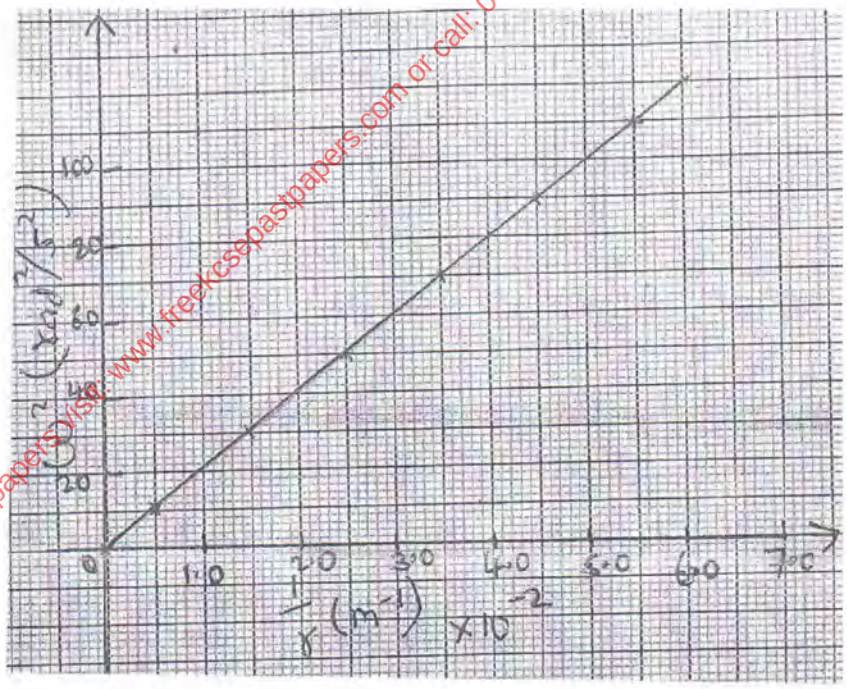


Figure 6

The results obtained for angular velocity and radius were used to plot the following graph.

From the above graph;



(i) Calculate the value of the slope. (2 marks)
(ii) If ω^2 and $\frac{1}{x}$ are related by the equation; $\omega^2 = -\frac{P}{m}\frac{1}{x}$, find the value of P. (2 marks)
(iii) State the significance of **P** (1 mark)

KUWED JOINT EXAMINATION COUNCIL
Kenya Certificate of Secondary Education
232/2
PHYSICS
PAPER 2
(THEORY)
JULY/AUGUST 2016
TIME: 2 HOURS.

SECTION A (25 MARKS)

1. State one difference between an image formed by a pinhole camera and the viewed through a magnifying glass. (1 mark)
2. Distinguish between longitudinal and transverse waves giving one example of each. (3 marks)
3. An electric immersion heater rated 240V, 3kW is to be connected to a 240V mains supply, using a 10A fuse. Showing your working, state whether the fuse is suitable or not for circuit. (3 marks)
4. Complete the following table (2 marks)

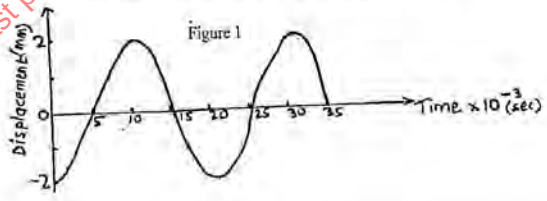
Radiation	Source	Detector	Application
Radio			Communication
	Hot body		Drying clothes

5. State one defect of a simple cell and explain how it can be minimized. (2 marks)
6. A wire of resistance 27 ohms is cut into three equal lengths. If the three wires are connected in parallel, what is the effective resistance? (2 marks)
7. A ray of light makes an angle of 35^0 with the glass surface. Calculate the total distance the ray covers through a glass of refractive index 1.45, given that the width of the glass is 6cm. (3 marks)
8. State one application of each the following mirrors. (2 marks)
   (i) Convex mirror
   (ii) Parabolic reflector
9. Below is radioactive decay

$$^{232}_{90}A \xrightarrow{K} {}^{228}_{88}B \xrightarrow{\gamma\ gamma} {}^{y}_{x}C$$

   (i) Identify radiation K (1 mark)
   (ii) Determine the values of x and y (2marks)
10. Explain briefly how a p-type semiconductor is made. (1 mark)
11. Figure 1 represents a displacement – time graph for a wave.

Figure 1



Determine the frequency of the wave. (3 marks)

SECTION B (55 MARKS)

12. (a) The two free ends of a coil are connected to a center – zero galvanometer. When the north pole of magnet is moved towards the coil, the pointer deflects in the direction shown in figure 2.

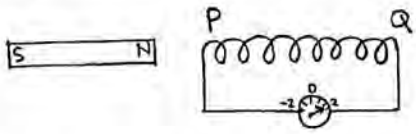


Figure 2

State with a reason the behaviour of the pointer inn the following cases:

(i) The north pole of the magnet is held stationary near P. (2 marks)

(ii) The north pole of the magnet is made to approach the coil from end Q (2 marks)

(b) State Faraday's law of electromagnetic induction. (1 mark)

(c) A transformer supplies 12V when it is connected to 240V supply of electricity. The output of the transformer is connected to 12V 36W bulb. The current drawn from the supply by the transformer is 0.5A. Calculate:

(i) the input power of the transformer. (3 marks)

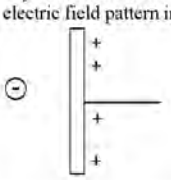
(ii) the current drawn from the transformer. (3 marks)

(iii) The output power of the transformer. (1 mark)

(iv) the efficiency of the transformer (3 marks)

13. (a) Draw the electric field pattern in figure 3 (3 marks)

Figure 3



(b) Figure 4 shows a system of capacitors connected to 100V supply.

Figure 4

Determine:

(i) the value of a capacitor for the whole circuit system. (3 marks)

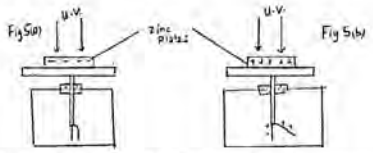
(ii) the charge through the 6μF capacitor. (3 marks)

(iii) the p.d across of the 8μF capacitor. (4 marks)

(c) State two factors that affect the capacitance of a parallel plate capacitor. (2 marks)

14. (a) Figures 5(a) and 5(b) shows ultra violet radiation striking polished zinc plates placed on negatively and positively charged

gold leaf electroscopes respectively.



Explain why the leaf collapses in fig (a) but does not collapse in fig (b) (4 marks)

(b) (i) State two factors which determine the speed of photoelectrons emitted from a metal surface. (2 marks)

(ii) In an experiment using a photocell, u.v. light of varying frequency but constant intensity was made to strike a metal surface. The maximum kinetic energy (K. E_{max}) of photoelectrons for each frequency, f, was measured.

The graph in figure 6 shows K.E_{max} varies with f.

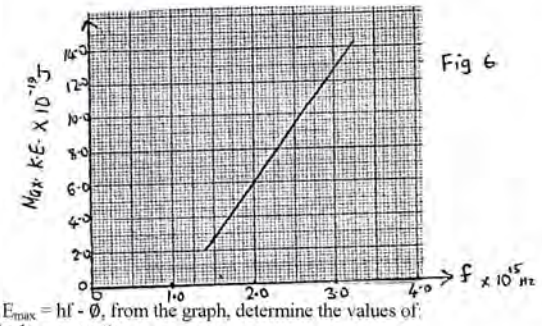


Fig 6

Given K.E_{max} = hf - Ø, from the graph, determine the values of:

(a) The h (planks constant) (3 marks)

(b) The Ø from the graph. (3 marks)

(c) Light of frequency 5.5 x 10^{14} Hz is made to strike a surface whose work function is 2.5Ev. Show that photoelectric effect will not take place. (Use the values of h from (b) above.
(Take e = 1.6 x 10^{-19}C) (3 marks)

15. (a) You are provided with a 12V a.c. source, four diodes and a resistor.
(i) Draw a circuit diagram for full wave rectifier and show the points at which the output is taken. (5 marks)
(ii) Sketch a graph of voltage against time before rectification. (1 mark)
(iii) Sketch a voltage – time graph after rectification. (1mark)
(iv) Sketch a voltage – time graph after rectification with a capacitor connected across the resistor in (i) (1 mark)

(b) A radioactive sample of half life 130 days initially has 1.0 x 10^{20} radioactive atoms. Determine the number of radioactive atoms that would have decayed after 390 days. (3 marks)

KUWED JOINT EVALUATION TEST 2016
PHYSICS PAPER 232/3
PRACTICAL
CONFIDENTIAL

Question 1

The apparatus required by each candidate are

- One jockey/ or crocodile clip
- Two new dry cells (size D)
- An ammeter 0 – 1A
- A voltimeter 0 – 5A
- One cell holder (2 cells)
- One switch
- Six connecting wires, at least three with crocodile clips at one end
- Nichrome wire of gauge SWG 32 mounted on a meter rule

Question 2

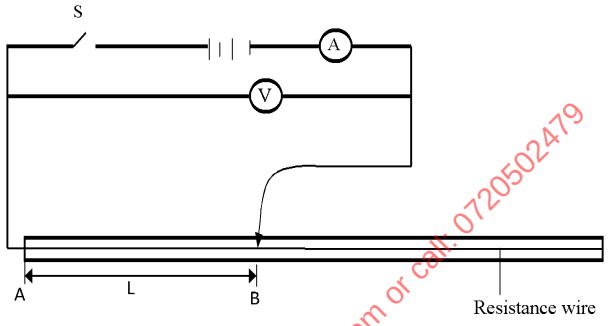
- Metre rule
- A candle
- A metre rule
- White screen
- Lens holder
- Biconvex lens of focal length 20cm
- Match box (to be shared)
- On 100g mass labelled R.
- 10g masses
- Three 15 cm long thread
- One complete retort stand
- Cellotape
- Weighing balance C to be shared

KURIA WEST SUB-COUNTY JOINT EXAMINATION COUNCIL 2016

232/3
PHYSICS
PAPER 3
PRACTICAL
JULY/AUGUST 2016
TIME: 2½ HOURS.

1. You are provided with the following
   - 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 atleast three with crocodile clips at one end.
   - A resistance wire mounted on a mm scale

   (a) Proceed as follows
   Set up the circuit as show in fig. 1 below.
   Figure 1



   (b) Close the switch and place the jockey 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 it. Record your results in table 1 below.

L (m)	0.1	0.3	0.5	0.7	0.9
p.d V					
I (A)					
R = – (Ω)					
(A^{-1})					

(7 marks)

   (c) 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.

   (d) Plot a graph of – against R. (5 marks)

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

   (f) Given that – = – + –, determine the value of
   (i) E (3 marks)
   (ii) (2 marks)

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 below fig 2.

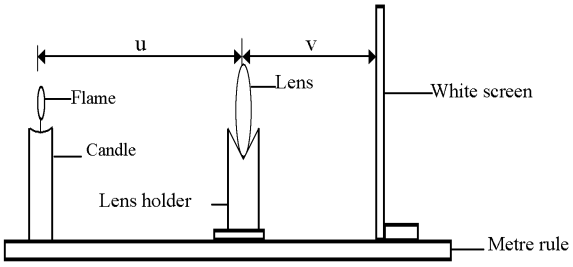


Figure 2

(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 2 and complete the table.

u (cm)	30	35	40
v (cm)			
x = –			
y = —— (cm)			

(2 marks)

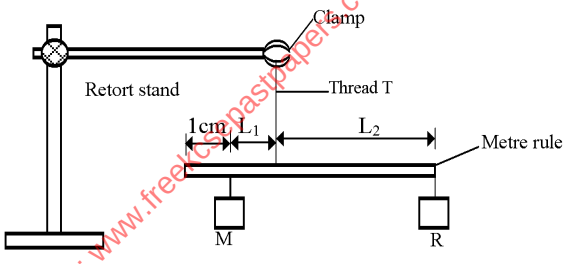
(d) Determine the mean value of y (1 mark)

PART B

You are provided with the following:

- Metre rule
- Three 15cm long thread
- Cellotape (To be shared)
- Complete retort stand.
- Weighing balance
- Masses

(e) Arrange the apparatus as shown in fig. 3



Adjust the metre rule until it balances horizontally when there is no mass hanged on it. Record the position of the centre of gravity (c.o.g)

Centre of gravity, C _____ cm mark. (1 mark)

(f) Fixed mass R at the end of the metre rule using a cellotape. This mass should remain fixed through the experiment.

(g) Hang 10g mass m on the metre by use of the thread at 1cm mark. Adjust thread T until the metre rule balances again at a new mark. Record the length L_1 and the corresponding L_2 in the table 3 below.

(h) Repeat the procedure (h) for the other masses as in the table 3 below.

Mass m (g)	10	20	30	40	50	60
Weight of m w (n)						
L_1 (cm)						
L_2 cm						
$y = (c - L_2)p$ (kgcm)						
$x = L_2 - WL_1$						

(i) Measure the mass of the metre rule.
Mass of metre rule (p) _____ kg (1 mark)

(j) Plot a graph of y against x (5 marks)

(k) Calculate the slope S of the graph. (3 marks)

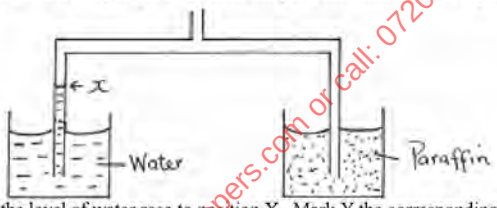
CENTRAL KENYA NATIONAL SCHOOLS JOINT MOCK - 2016
Kenya Certificate of Secondary Education
232/1
PHYSICS
PAPER 1
(THEORY)
TIME: 2 HOURS
SECTION A: (25 MARKS)

1. Figure 1 below shows a burette that was initially filled to 12ml with a liquid of density 0.8g/cm³.

Figure 1

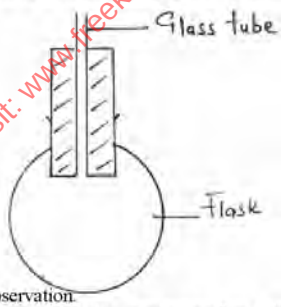
The liquid is allowed to run out for some time. If the volume of liquid removed from the burette has a mass of 14g, determine the final reading on the burette. (3mks)

2. If an umbrella is touched with a finger on inner surface when it is raining it allows the rain water to leak through. Give a reason. (1mk)
3. A vacuum pump was used to pump out air from the glass tube immersed in liquids as shown below.



After sometime the level of water rose to position X. Mark Y the corresponding position for the paraffin level. Give a reason for your answer. (2mks)

4. Explain the reason why a dropping dust particle in a still room does not trace a straight vertical path. (1mk)
5. Figure 2 shows a flask filled with water. The flask is fitted with a cork through which a tube is inserted. When the flask is cooled, the water level rises slightly, and then falls steadily.

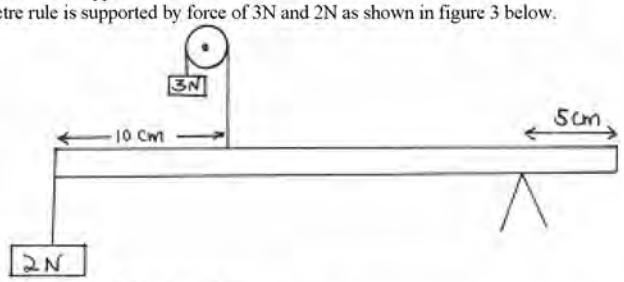


Explain this observation. (3mks)

6. Explain why copper is a better conductor of heat than iron. (1mk)
7. Two candles A and B of equal lengths and thickness are joined together and balanced horizontally as shown below. Candle A is lit.

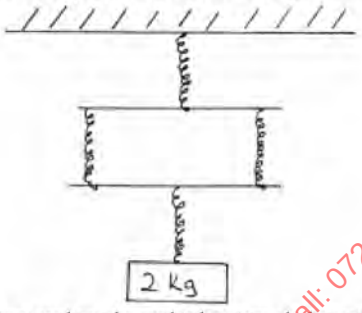
State and explain what happens after a short time. (2mks)

8. A uniform metre rule is supported by force of 3N and 2N as shown in figure 3 below.



Determine the weight of the half metre rule. (3mks)

9. When a mass of 2kg is hang from a single spring, the spring extends by a distance $\chi = 5cm$. Determine the total extension in the set up below given that the springs are identical and weightless. (2mks)



10. Trees planted along a busy road are observed to lean towards the road as they grow. Explain this observation. (2mks)
11. A particle starts from rest and accelerates uniformly in a straight line. After 3 seconds, it is at a distance of 9m from the starting point. Determine the acceleration of the particle. (3mks)
12. Bubbles of gas escaping from the bottom of a fish pond rises to the surface. It is observed that as bubbles rise, they get larger. Explain this observation. (2mks)

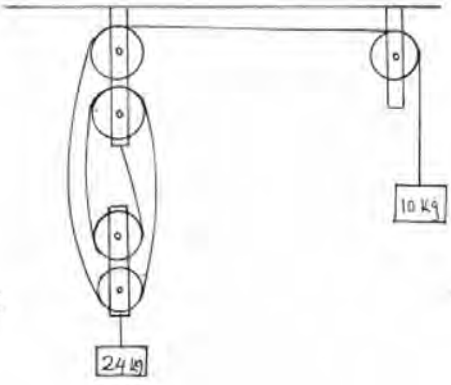
SECTION B: (55 MARKS)

13. (a) State Newton's second law of motion in terms of in momentum. (1mk)

(b) A trolley of mass 5kg travelling to the right at 2m/s collides heads on with another trolley of mass 3kg travelling at 4m/s to the left. Find their velocity after collision if the collision is perfectly inelastic. (3mks)

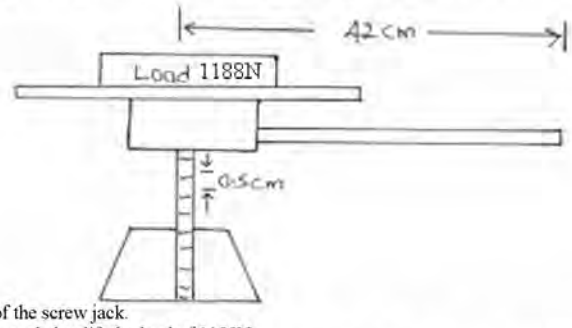
(c) A bullet of mass 2g is fired with a velocity of 300m/s into a wooden block of mass 5kg suspended from a long string. The bullet sticks into the wood and the two moves together.
(i) Find the velocity of the block and the bullet immediately after collision took place. (3mks)
(ii) Calculate the height to which both swings upwards. (3mks)

14. (a) State **two** factors that affect the efficiency of a pulley system. (2mks)
(b) Figure 5 below shows a pulley system with the load rising at uniform speed.



From the information given, calculate:
(i) The velocity ratio of the machine. (1mk)
(ii) Mechanical advantage of the machine. (2mks)
(iii) Efficiency of the machine. (3mks)

(c) The handle of the screw-jack in figure 6 below is 42cm long and the pitch of the screw is 0.5cm.



(i) Calculate the V.R of the screw jack. (2mks)
(ii) Calculate the effort needed to lift the load of 1188N. (2mks)

15. (a) Explain why a drop of methylated spirit on the back of the hand feels colder than a drop of water at the same temperature. (2mks)

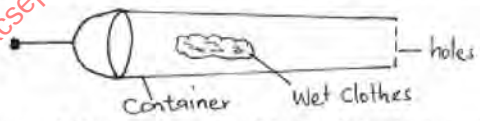
(b) A block of metal of mass 150g at 100°C is dropped into a lagged calorimeter of heat capacity 40J/k containing 100g of water at 25°C. The temperature of the mixture is 34°C. (s.h.c of water = 4200J/kgK).
Determine:
(i) Heat gained by the calorimeter. (2mks)
(ii) Heat gained by water. (2mks)
(iii) Heat lost by the metal block. (2mks)
(iv) Specific heat capacity of the metal block. (3mks)

(c) A student heated some water and noticed that it boiled at 102°C. State **one** possible reason for this observation. (1mk)

16. (a) Define angular velocity. (1mk)

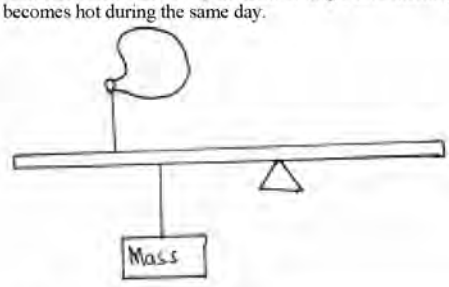
(b) A string of length 70cm is used to whirl a stone of mass 0.5kg in a circle of a vertical plane at 5 rev/s. Determine.
(i) The period. (2mks)
(ii) The angular velocity. (3mks)
(iii) The centripetal force. (3mks)

(c) (i) Explain why bodies in a circular motion undergo acceleration even when their speed is constant. (1mk)
(ii) The figure below shows a container with small holes at the bottom in which wet clothes have been put.

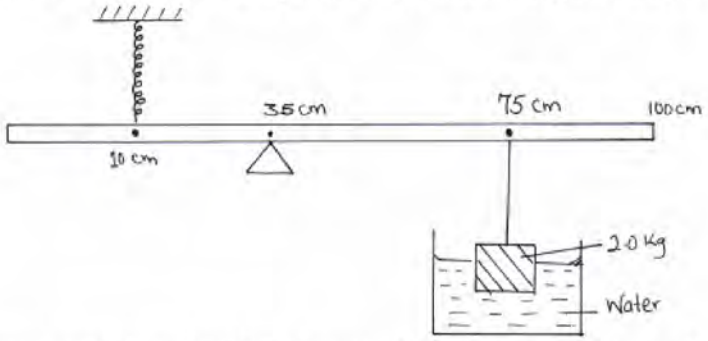


When the container is whirled in air at high speeds, it is observed that the clothes dry faster. Explain how the rotation of the container causes the clothes to dry faster. (2mks)

17. (a) The diagram below shows a uniform metre rule at equilibrium during a cold morning. State and explain the effect on the equilibrium when the weather becomes hot during the same day. (1mk)



(b) The diagram below shows a metallic metre rule at equilibrium. Study it and answer the questions that follow.



The spring had a constant of 25N/cm and stretched by 4mm at equilibrium. The 2kg mass was immersed halfway in the water. Determine the following.

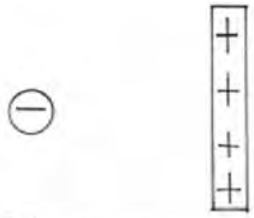
(i) Tension in the spring. (2mks)

(ii) Upthrust. (3mks)

(iii)Density of the 2kg mass. (Density of water = 1g/cm³). (3mks)

CENTRAL KENYA NATIONAL SCHOOLS JOINT MOCK - 2016
Kenya Certificate of Secondary Education
232/2
PHYSICS
PAPER 2
(THEORY)
TIME: 2 HOURS

1. State the property of light associated with formation of shadows. (1mk)
2. Figure 1 below shows a negatively charged particle close to a positively charged plate.

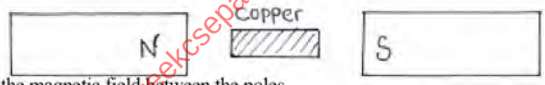


Draw the electric field pattern. (2mks)

3. Figure 2 below shows two identical bulbs connected in two circuits. The cells are of the same e.m.f.

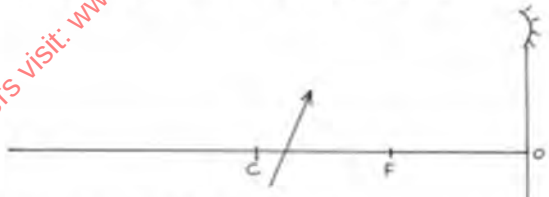
Compare the brightness of the bulbs in (a) and (b). (1mk)

4. Figure 3 below shows a block of copper placed between two poles of a magnet.



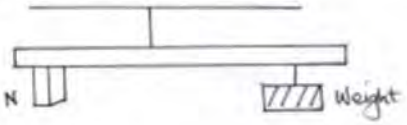
Sketch the magnetic field between the poles. (2mks)

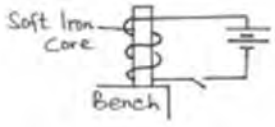
5. Figure 4 below shows an object placed infront of a concave mirror.



Use rays to locate the position of the image. (3mks)

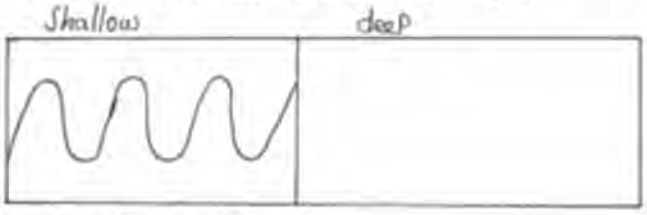
6. Figure 5 below shows a metre rule suspended by a thread such that it is in equilibrium balanced by a permanent magnet attached to the metre rule and some weight.





If the soft iron is fixed to the bench, state and explain the effect on the metre when the switch is closed. (2mks)

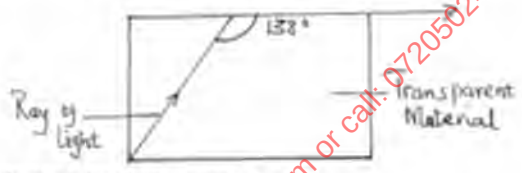
7. Figure 6 below shows a progressive wave incident from a shallow end to a deep end.



(a) Sketch the appearance of the wave in the deep region. (1mk)
(b) State the property of waves demonstrated in the figure above. (1mk)

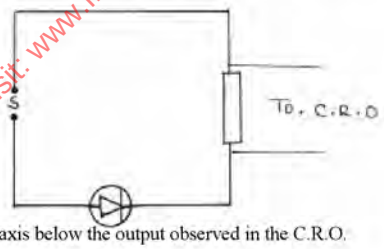
8. A fathometer produces sound in a ship and receives two echo's where there is a raised sea bed. One after 2.5 seconds and the other after 3.0 seconds. Find the height of the raised sea bank if the velocity of sound in water is 1460m/s. (4mks)

9. Figure 6 below shows the path of light through a transparent material placed in air.



Calculate the refractive index of the transparent material. (3mks)

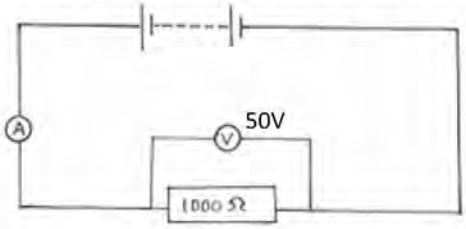
10. State the name of the eye defect corrected by convex lens. (1mk)
11. A heater of resistance R_1 is rated P watts, V volts while another of resistance R_2 is rated 2P watts, $^{V}/_{2}$ volts. Determine the ratio R_1 to R_2. (3mks)
12. State **one** use of microwaves. (1mk)
13. Figure 7 below shows a diode D connected to a source of a.c current and a resistor.



Sketch in the axis below the output observed in the C.R.O.

14. (a) State ohms law. (1mk)

(b) Figure 8 below shows a large battery connected a resistor of 1000Ω. The potential difference across the resistor is 50V.

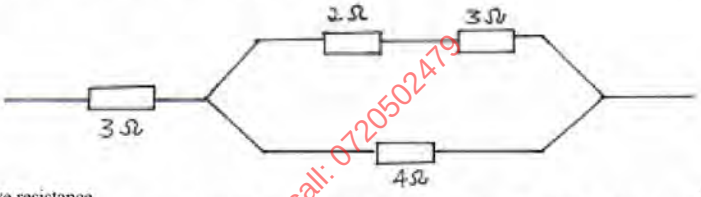


Determine:

(i) The ammeter reading (A). (3mks)

(ii) The electrical energy dissipated by the resistor in one minute. (3mks)

(c) Figure 9 below shows some resistors connected in part of a circuit.

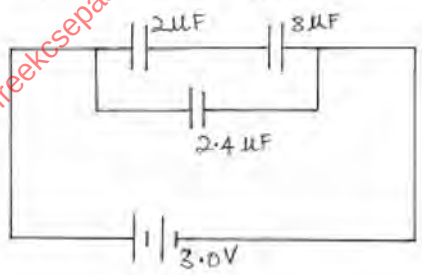


Determine the effective resistance. (3mks)

(d) Four 40w bulbs and six 100w bulbs were switched on for 2 hours in the morning and 3 hours at night each day for domestic use in a certain institution. Find the monthly bill for the consumer given that the cost of electricity in the country is at Sh.6.50 per unit. (Take one month to be of 30 days). (3mks)

15. (a) State **two** factors that affect capacitance of parallel plate capacitor. (2mks)

(b) Figure 10 below shows capacitors connected to 3v supply.



Calculate:

(i) The combined capacitance. (3mks)

(ii) The charged stored in the 2.4μF capacitor. (3mks)

(iii) The charge stored in 2μF capacitor. (2mks)

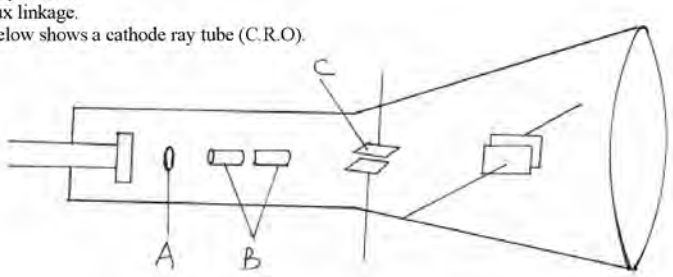
16. (a) State lenzes law of electromagnetic induction. (1mk)

(b) Figure 11 below show a magnet being pulled from a coil connected to a centre zero galvanometer.

(i)\State the observation made. (1mk)
(ii) Explain what would happen if the magnet was moved out faster. (1mk)
(iii)\Explain the observation in b(i) above. (2mks)

(c) (i) The turns ratio of primary to secondary coils in a 100% efficient transformer is 3: 1. Calculate the current through the primary coil if the current in the secondary coil is 5A. (3mks)
(ii) State how the energy losses are minimized in a transformer.
I Eddy current. (1mk)
II Flux linkage. (1mk)

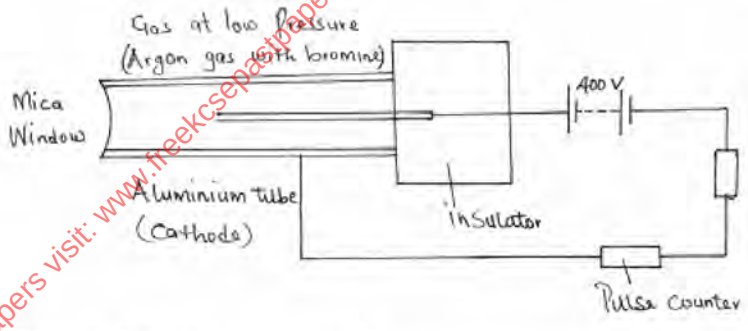
17. (a) Figure 12 below shows a cathode ray tube (C.R.O).



(i) Name the parts labelled **A** and **B**. (2mks)
(ii) What are the functions **A** and **C**? (2mks)
(iii) Explain how electrons are produced. (2mks)
(iv) Give a reason why the tube is evacuated. (1mk)

(b) State what determines the quality of X-rays in an X-rays tube. (1mk)
(c) State **one** use of X-rays in industry. (1mk)
(d) An X-ray tube operates with a p.d. of 200kv. Only 0.5% of the kinetic energy of the electrons is converted into X-rays. Calculate the frequency of the X-rays produced, take planks constant = 6.63×10^{-34}Js. (3mks)

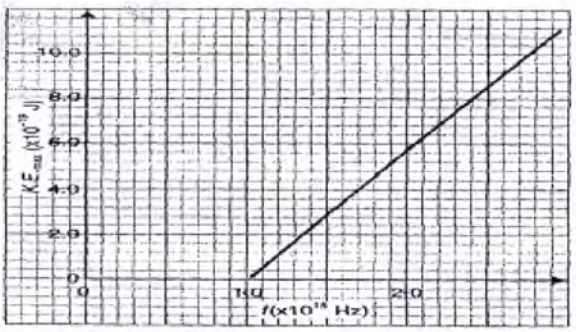
18. (a) Figure 13 below shows a diagram of a Geiger Muller tube connected to a power supply and a pulse counter.



(i) Why should the argon gas be at low pressure? (1mk)
(ii) State the purpose of the bromine gas in the tube. (1mk)
(iii) Suggest **one** way of increasing the sensitivity of the tube. (1mk)
(iv) Find the value of a and b in the following equation. (2mks)

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

(b) In an experiment using a photocell, ultraviolet light of varying frequency strikes a metal surface. The maximum kinetic energy (K.E max) of photoelectrons for each frequency, f, is measured. The graph below shows how the maximum kinetic energy varies with the frequency, f.



(a) Use the graph to determine:-
(i) Planck's constant, h. (3mks)
(ii) Work function of the metal. (3mks)

CENTRAL KENYA NATIONAL SCHOOLS JOINT MOCK – 2016
232/3
PHYSICS
PAPER 3 (PRACTICAL)
CONFIDENTIAL

Question 1A

Each candidate requires the following items.

1. Watch glass
2. Plasticine
3. Marbles.
4. Stopwatch.
5. Vernier calipers.
6. Electronic balance (to be shared).

Question 1B

1. Rectangular glass block.
2. Optical pins.
3. Soft board.
4. Protractor
5. 30cm ruler.
6. Plain paper.
7. Plane mirror

Question 2A

1. 250ml beakers.
2. Bunsen burner.
3. Thermometers.
4. Tripod stand and wire gauze.
5. Stopwatch
6. Measuring cylinder (100ml) and water.

Questions 2B

1. A boiling tube
2. Some dry sand.
3. Water in a measuring cylinder labelled L.
4. Vernier calipers.
5. Half metre rule.
6. Tissue paper.
7. Weighing machine (to be shared).

CENTRAL KENYA NATIONAL SCHOOLS JOINT MOCK - 2016
Kenya Certificate of Secondary Education
232/3
PHYSICS
PAPER 3
(PRACTICAL)
TIME: 2½ HOURS

Question 1 (PART A)

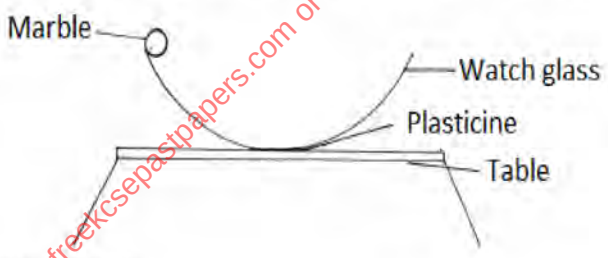
You are provided with the following:

- A watch glass.
- A small piece of plasticine.
- A marble.
- A stopwatch.
- Vernier calipers.
- An electronic balance (to be shared).

(a) Measure the mass M of the marble.
M = ……g (½mk)

(b) Place the watch glass flat on the table with a small piece of plasticine to fix it firmly to the table at the place it touches.

(c) Release the marble from one end of the watch glass and time 10 complete oscillations with a stop watch. Repeat this three times.



(d) Record your values in table 1 below
Table 1

	Time for 10 oscillations	Periodic time T(s)
1		
2		
3		

(2mks)

Find the average periodic time T.
T = …… s. (½mk)

(e) Measure the diameter of the marble with the vernier callipers and hence find its radius.
Diameter d = …… m (½mk)
Radius r = …… m (½mk)

(f) Determine the volume (V) of the marble given that:

$$V = \frac{4}{3}\pi r^3$$ (1mk)

(g) Calculate the radius of curvature of the watch glass R from the formula.

$$R - r = \frac{5gT^2}{7(2\pi)^2}$$ (2mks)

Where g = 9.8m/s² and π = 3.142.

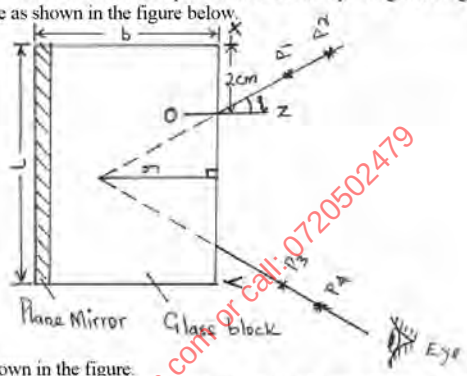
QUESTION 1 (PART B)

You are provided with the following apparatus:

- A rectangular glass block.
- Four optical pins.
- A soft board.
- A protractor.
- 30cm ruler.
- 2 white plain papers.
- A plane mirror.
- A vernier calipers (to be shared)

PROCEDURE

(a) Trace the outline of the glass block on the white paper.
(b) Draw a normal ON, 2cm from point X on side XY.
(c) Measure an angle (i) 10° from the normal.
(d) Place back the glass block on the outline and fix a plane mirror vertically along the length of the glass block on the opposite side of XY using a cello tape as shown in the figure below.



(e) Fix two pins P_1 and P_2 as shown in the figure.
(f) By observing image of P_1 and P_2, locate two pins P_3 and P_4 such that they appear to be in line with images of P_1 and P_2.
(g) Remove the pins and the block. Join P_3P_4 and produce the line to meet line P_1P_2 produced
(h) Meause the perpendicular distance y.
(i) Repeat the same for angles of 15°, 20°, 25°, 30°, 35° and 40° and record the results in table 2 below.
(NB: The paper work must be submitted together with the question paper).

Table 2

Angle i	10°	15°	20°	25°	30°	35°	40°
y(cm)							

(4mks)

(j) Plot a graph of y(cm) against angle i. (5mks)
(i) Use the graph to determine y_o the value of y when i = 0°
y_o = ... cm (1mk)
(ii) Measure and record the breadth (b) of the glass block
b = ... Cm (1mk)
(iii) Determine the value of η given that

$$\eta = \frac{b}{y_o}$$ (2mks)

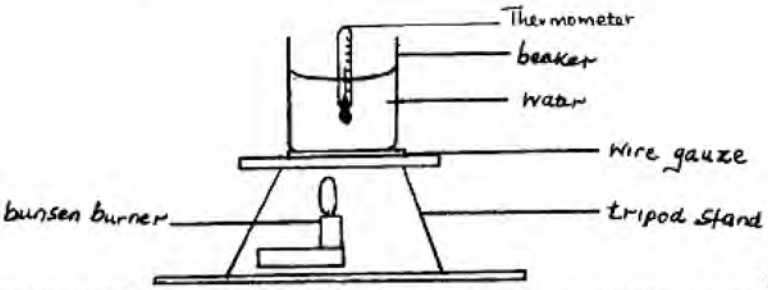
Question 2 (PART A)

You are provided with the following:-

- A 250ml glass beaker.
- A Bunsen burner.
- A thermometer.
- A stopwatch.
- A Tripod stand and a wire qauze.

- A measuring cylinder 100ml.
- Water.

Set the apparatus as shown in figure below.



(a) Measu
T_o =…
Now h
(1mk)
r and start the stopwatch when the temperature is 65°C. Take the temperature T°C of water every two minutes. Record your results in the table 3 below.

Table 3

Time, t(minutes)	2	4	6	8	10	12	14
Temperature, T(°C)							
$(T - T_o)$ (°C)							
Log $(T - T_o)$							

(5mks)

(b) Plot a graph of Log $(T - T_o)$ against Time (t). (5mks)
(c) From the graph find the value of Q given that Q = log $(T - T_o)$ when t = 0. (1mk)
(d) Determine P, where P is the antilog of Q. (1mk)
(e) Calculate the temperature of the surrounding T_S using expression
$P = 65 - T_S$. (2mks)

PART B

You are provided with the following:-

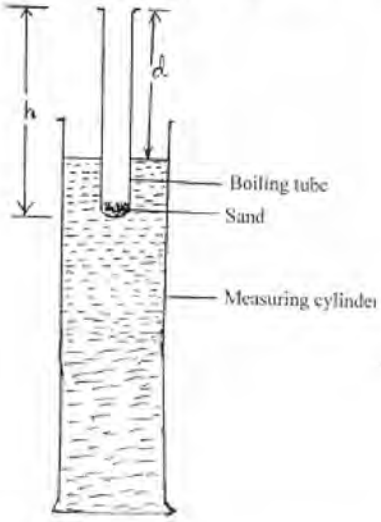
- A boiling tube.
- Some dry sand.
- A liquid in a measuring cylinder labelled L.
- Half metre rule.
- A vernier calipers (to be shared).
- A weighing machine (one per form).
- Tissue paper.
- A measuring cylinder.

Proceed as follows:

(f) Measure the length of the boiling tube.
h = ……cm (½mk)

(g) Put a little amount of sand in the boiling tube and place it in the measuring cylinder which is almost filled with liquid L. Add sand, little by little until the tube floats upright as shown in figure below.

Fig.1



Measure the length, d, of the boiling tube which is above the liquid.
d = …… cm (½mk)

(h) Determine the length, t, of the boiling tube which is immersed in the liquid.
t = …….. cm (½mk)

(i) Remove the boiling tube from the measuring cylinder, wipe it dry (on the outside) and measure its mass, m, including the sand inside.
m = …….. g (½mk)

(j) Measure the external diameter, D, of the boiling tube.
D = …….. cm (½mk)

(k) Determine the external radius, R.
R = …… cm (½mk)

(l) Using the formula $m = 12\rho\pi R^2$, determine ρ for the liquid. (2mks)

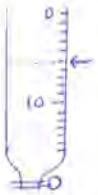
(h) t = h – d
= 15 – 2
= 13cm ✓½ [Use students substitution of h and d]
(i) M = 61.2 ± 10g ✓½ [Use students value]
(j) D = 2.53cm ± 0.1cm ✓½
(k) $R = \frac{2.53}{2} = 1.265cm$ ✓½
(l) $M = 12\rho\pi R^2$

$$\rho = \frac{M}{12\pi R^2}$$

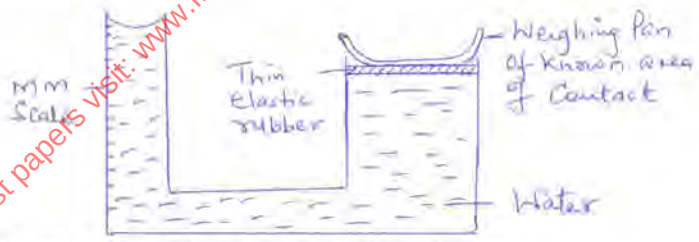
$$= \frac{61.2}{12 \times \pi \times 1.265^2}$$ ✓¹ Correct substitution
= 1.014gcm^{-3} ✓¹

KAMDARA JET - 2016
232/1
PHYSICS
SECTION A(25 MKS)

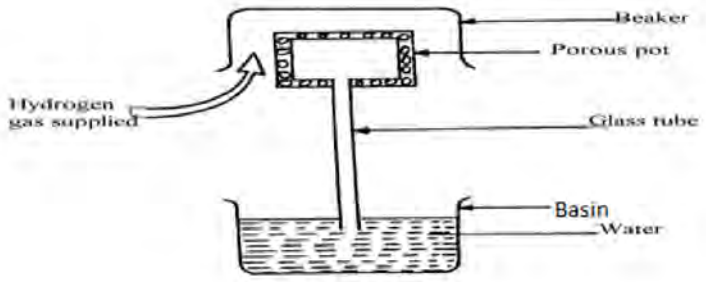
1. The figure below shows a burette partly filled with a liquid. The burette was initially full to the mark 0. If the quantity of the liquid removed has a mass of 20g, determine the density of the liquid. (2mks)



2. Water at 20^{0}C falls over a waterfall of height 40m. Calculate the temperature of water at the bottom of the waterfall if 80% of potential energy at the top is converted into heat energy (3marks)
3. A faulty thermometer reads 2^{0}C when dipped in ice a 0^{0}C and 95^{0}C when dipped in steam at 100^{0}C. what would this thermometer red if placed in water at room temperature of 18^{0}C? (3 marks)
4. Xcm^3 of substance A which has density 800 kg/m^3 is mixed with 1000cm^3 of water with a density of 1000kg/m^3. The density of the mixture is 960kg/m^3. Determine the value of X (3 marks)
5. The figure below shows a simple instrument designed by a student for weighing objects.

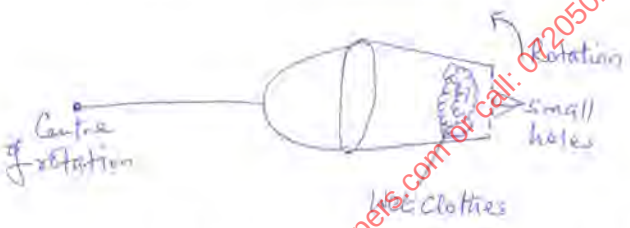


a) State what happens if one places an item on the weighing pan. (1 mark)
b) State two properties of water that make it suitable for this purpose. (2 marks)
6. The figure below shows an arrangement of demonstrate diffusion through solids.



The hydrogen gas is supplied for sometimes then stopped and the beaker removed. State and explain what is likely t be observed when the hydrogen gas supply is stopped. (3 marks)

7. A metal pin was observed to float in the surface of pure water. However, the pin sank when drops of soap solution were carefully added to water. Explain this observation. (1 mark)
8. Sauce pans have a plastic or wooden handles. It is observed that in the morning the pan feels colder than the wooden handle. Explain the difference in this observation. (2 marks)
9. A bullet moving at a velocity of 350m/s hits a tree trunk of diameter 70cm. It emerge from the opposite side with a velocity of 180m/s. Determine the average deceleration of the bullet in the trunk. (3 marks)
10. The figure below shows a container with small holes at the bottom in which wet clothes have been put. When the container is whirled in air at high speed, it is observed that the clothes dry faster.



Explain how the rotation of the container causes the clothes to dry why so fast. (2 marks)

SECTION B (55 MARKS)

11. The table below shows the value of the resultant force F and time t for a bullet raveling inside the gun barrel after the trigger is pulled.

Force F (N)	360	340	300	240	170	110
Times t (ms)	0	4	8	12	17	22

(a) On the grid provided plot a graph of force F against time t. (5 marks)

(b) Determine from the graph:

(i) The time required for the bullet to travel the length of the barrel assuming that the force becomes zero just at the end of the barrel. (1 mark)

(ii) Impulse of the force. (2 marks)

(c) Given that the bullet emerges from the muzzle of the gun with a velocity of 200m/s, Calculate the mass of the bullet. (3marks)

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

b) The pressure (P) of a fixed mass of a gas at constant temperature T=300k is varied continuously. The corresponding values of P and volume (v) of the gas are shown below.

Pressure ($x10^5$ Pa)	2.0	2.5	3.0	3.5	4.0	4.5
Volume (m^3)	0.025	0.02	0.017	0.014	0.012	0.011

(i) Plot a graph of P against $^1/_V$ using grid provided below. (5 marks)

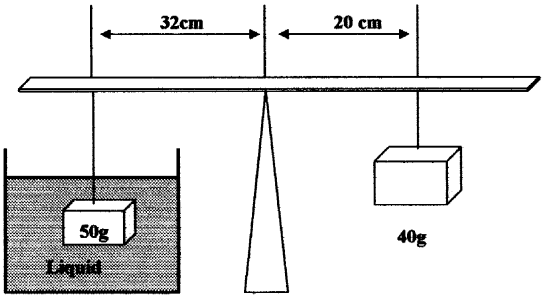
(ii) Given that P = $\frac{2RT}{}$, Find the constant R from the graph. (2marks)

V

(c) A tin with an air tight lid contains air at a pressure of 1.0×10^5 Pa and a temperature of 12^0C. The air is heated in water bath until the lid opens. If the temperature at which the lid opens is 88^0C,
Determine the pressure attained by the gas. (3marks)

13. (a) State Archimedes Principle (1 mark)

(b) The figure below shows a block of mass 50g and density 2000kg/m3 submerged in a certain liquid and suspended from uniform horizontal beam by means of a string. A mass of 40g suspended from the other end of the beam puts the system in equilibrium



(i) Determine the up-thrust force acting on the block. (3 marks)
(ii) Calculate the density of the liquid. (3 marks)
(iv) Calculate the new balance point of the 50g mass (the 40g mass remains fixed) if the liquid was replace with one whose density was 1500kg/m3. (3 marks)

14. a) A liquid at 80^o in a cup was allowed to cool for 20 minutes. State two factors that determine the final temperature. (2 marks)

b) What is meant by specific latent heat of evaporation? (1 mark)

c) In an experiment to determine the specific latent heat of vaporization L of water, steam at 100°C was passed into water contained in a well lagged copper calorimeter. The following
Measurements were made:
Mass of calorimeter = 80g
Initial mass of water = 70g
Initial temperature of water = 5°C
Final mass of calorimeter + water + condensed steam = 156g
Final temperature of mixture = 30°C
(Specific heat capacity of water = $4200JKg^{-1}k^{-1}$ and specific heat capacity for copper =390J/kg/k)
Determine:
(i) Mass of condensed steam. (2 marks)
(ii) Heat gained by the calorimeter and water. (2 marks)
(iii) Given that L. is the specific latent host of vaporization of steam.
a) Write an expression for the heat given out by steam. (1 mark)
b) Determine the value of L. (3marks)

15. (a) Distinguish between load and effort. (2 marks)

(b) A mason uses a six wheel pulley system to raise a weight of 250N through a vertical height of 2.5m using the machine. If the mason pulls using an effort of 500N. Calculate:
i) The velocity ratio of the pulley system. (2 marks)
ii) The work done by the mason. (3 marks)
iii) The useful work done by the pulley system. (2 marks)
iv) The efficiency of the system (3marks)

KAMDARA JET-2016
232/2
PHYSICS
TIME: 2 HOURS
SECTION A (25 Marks)

1. A ray of light makes an angle of 60° with a plane mirror as shown in Figure 1 below. The mirror is rotated through an angle of 20° about the point O in a clockwise direction.

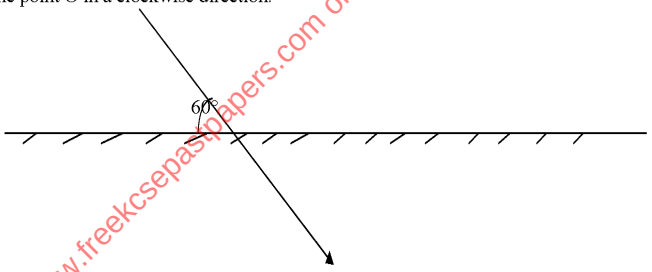


Figure 1
Determine the new angle of reflection. (2mks)

2. Describe how you would charge a gold leaf electroscope by induction method (2mks)
3. The figure 2 below shows a wire wound on a soft iron core.
Diagram.

Indicate the polarities of end A and B (2mks)

4. Describe two defects in simple cells and ways in which they can be minimized. (2mk)
5. Differentiate between Faradays law of electromagnetic induction and Lenz law. (2mks)
6. Figure 3 below shows a moving coil microphone. (2mks)
Diagram
7. An object is placed on the principal axis of a concave mirror. The image formed is upright and magnified. If the object distance is 5cm and the image distance is 10 cm, determine the focal length of the mirror. (2mks)
8. a) Differentiate between a transverse and a longitudinal wave. (1mk)
b) Kenyatta National Hospital uses x-rays of wavelength 1×10^{-11}m. Calculate the frequency of the x-rays. (Take c= 3×10^{8}m/s.) (2mks)

9. A hunter standing some distance from a cliff blows a whistle and hears its echo 2 seconds later. How far is the cliff from the hunter? (speed of sound in air=340m/s) (2mks)
10. Calculate the speed of light in a medium of refractive index 4/3 given that the speed of light in air is 3×10^8m/s. (2mks)
11. A wire of length 1.5m offers resistance of 6.5Ω to the flow of current through it. If the cross section area is 5.0×10^{-6}m^2,calculate the resistivity of the material. (2mks)
12. The Figure 4 below shows two coils used to demonstrate mutual induction.
    Diagram
    State what happens to the galvanometer when K is closed. (1mk)
13. Figure 5 below shows two parallel plate capacitors separated by a distance d units. Each plate has an area of A square units.
    Diagram
    Suggest one adjustment that can be made so as to increase the effective capacitance. (1mk)

SECTION B (55 MKS)

14. (a) What is the purpose of a fuse? (1 mark)

(b) The diagram in figure 9 below shows a ring – main circuit used by an electrician in a certain house.

(i) Identify two faults in the installation. (2 marks)

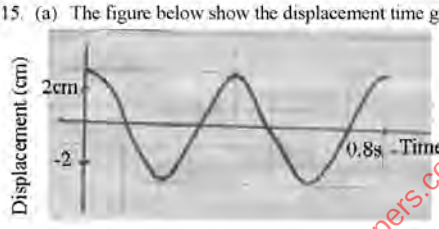
Fig 9

ii) Explain why the 3 – pin plug fuse has a longer earth pin than the live and neutral pins. (2 marks)

iii) Identify the type of transformer T used in the diagram in Fig. 9 (1 mark)

(c) A cooker rated 2.0kW was operated for 40minutes each for 30days. If the cost of each kilo – watt – hour unit is Shs. 15.50, Calculate the cost of electricity used. (4 marks)

15. (a) The figure below show the displacement time graph of a wave traveling at 400cm/s.



Determine for the wave the:

(i) Amplitude (1mk)

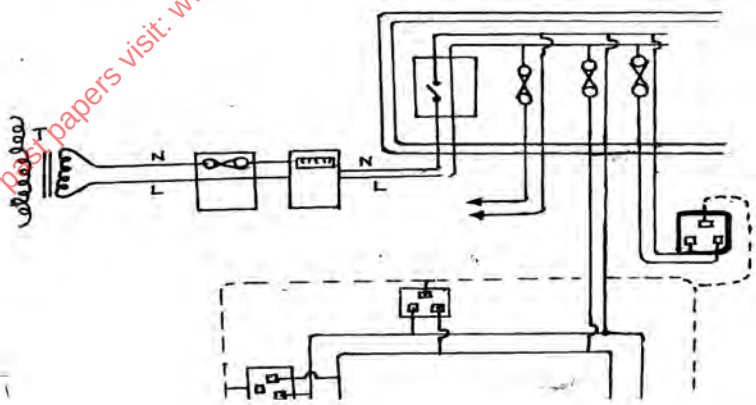
(ii) Period (1mk)

(iii) Frequency (2mks)

(iv) Wavelength (3mks)

(b) The human ear can distinguish two sounds as separate only if they reach it at least 0.1s apart. How far from a wall must an observer be in order to hear an echo when he shouts?(Speed of sound in air = 330ms^{-1}) (3mks)

16 The figure 7 below represents a cathode ray oscilloscope (C.R.O)



i) Name the parts labeled A and B (2mks)
ii) What are the functions of parts labeled C and D (2mks)
iii) Explain how electrons are produced. (2mk)
iv) Give a reason why the tube is evacuated. (1mk)

((b) i) Distinguish between cathode rays and light rays (2mks)
(ii) State the function of A (1mk)
(iii) An alternating p.d is applied across the Y-plates. State what is the effect on the position of the spot on the screen? (1 mark)
(iv) A signal with a frequency of 50Hz is applied across the Y-plates. If the time base with a period of 0.04s is applied across the X-plates, sketch a graph of p.d against time showing the number of waves that can be seen on the screen of the C.R.O (2 mks)

v) The tube of the CRO is coated with graphite. State three functions of the graphite coating (3mks)

17. (a) State one similarity and one difference between a concave lens and a convex mirror (2mks)
(b) A lens forms a focused image on a screen when the distance between the object and the lens is 100cm. the size of the image is twice that of the object.
(i) What kind of lens was used? Give a reason (2mks)
(ii) Determine the distance of the image from the lens (2mks)
(iii) Determine the power of the lens (3mks)
(c) The figure shown in figure 9 shown below is a human eye with a certain defect

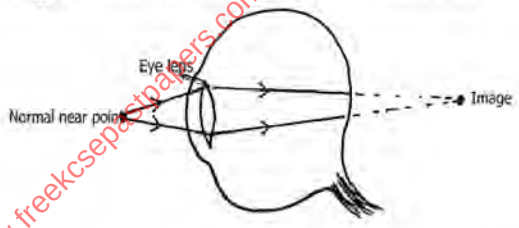
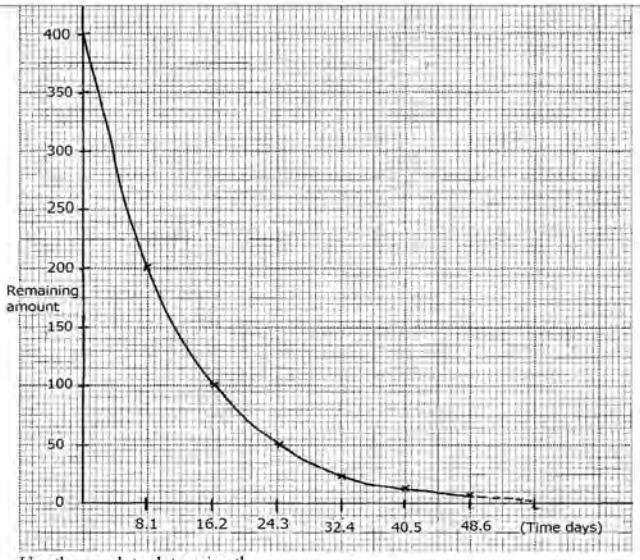


FIG 9

(i) Name the defect (1mk)
(ii) On the same diagram, sketch the appropriate lens to correct the defect and sketch rays to show the effect of the lens. (2mks)

18 a) Name any two types of radiations given out in a radioactive process. (2mks)
b) The half – life of cobalt – 60 is 5years.
How long will a sample take for the activity to decrease to $^{1}/_{16}$ of its original value. (3mks)
c) The graph below shows radioactive decay of iodine



Use the graph to determine the:-

(i) Fraction of the amount remaining after 16.2 days. (2mks)

(ii) Determine the half – life of iodine. (2mks)

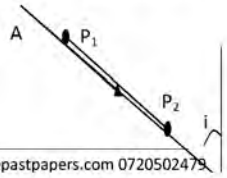
(iii) Mass remaining after 17 days. (1mk)

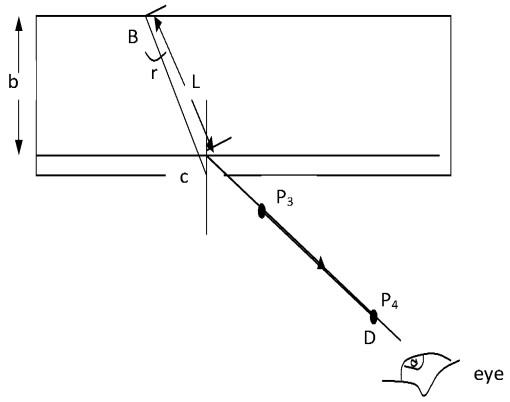
KAMDARA JOINT - 2016
232/3
PHYSICS - PRACTICAL
TIME: 2 ½ HRS

1. You are provided with the followin
- 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 incident ray AB of angle of incidence, i = 20^0.
(c) Replace the glass block and trace the ray ABCD using the optical
(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 i^0	L (cm)	L^2 (cm^2)	$\frac{1}{L^2}(cm^{-2})$	$Sin^2 i$
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: $\frac{1}{L^2} = -\frac{1}{n^2 b^2}\left(\cdot\ Sin^2 i + \frac{1}{b^2}\right)$
(i) Determine the $\frac{1}{L^2}$ – intercept C and the $Sin^2 i$ – intercept B. (2 marks)
(j) Calculate the value of Q given by; **(2 marks)**
$Q = -\left(\frac{C}{B}\right) \div B$
(k) Hand in your constructions on the plain paper together with the answer script. **(2marks)**

QUESTION 2
PART A
You are provided with the following:
- Two dry cells and a cell holder

- One voltmeter (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

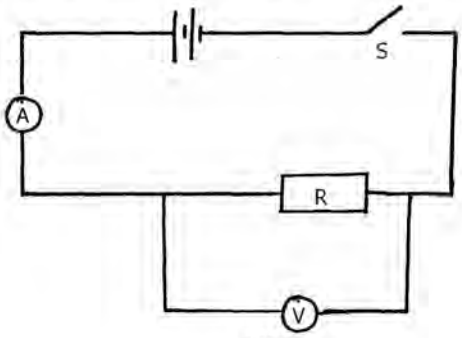


FIG 2

(i) Close the switch, s. Read and record the voltmeter and ammeter readings (1mks)

V = _____ volts

I = _____ Amperes

(ii) Determine the value of R given that $R = \frac{V}{I}$ (1mk)

(b) Set the circuit as shown in figure 3

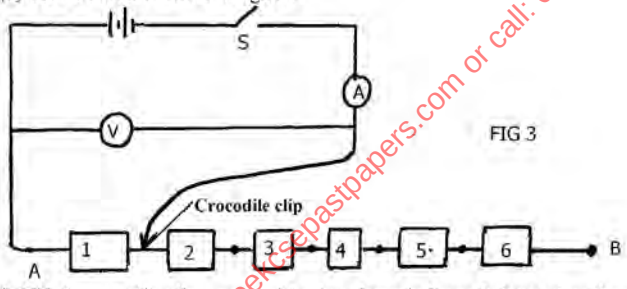


FIG 3

(i) With the crocodile clip across resistor 1 as shown 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

Table 2

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

(4mks)

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

(d) Determine the slope of the graph at:

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

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

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

PART B

You are provided with the following:

- Half-metre rule
- Knife edge (raised)

$$= \frac{3.1 - 2.8}{0.025 - 0.06}$$

$$= \frac{0.3}{0.035}$$ ✓1mk

$$= -8.57$$

(iii) Resistance of the resistor s(1mk)

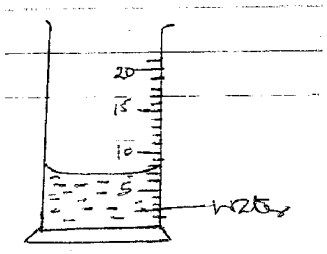
QUESTION 2 B
C.O.G 25 ± 0.5 cm
(i) position of 50 grams mass=4.7cm ± 0.1 marks
(ii) 0.05x11.3 = wx10
W = 0.565N

KASSU JET EXAMINATION - 2016
Kenya Certificate of Secondary Education
232/1
PHYSICS
PAPER 1
JUNE 2016

SECTION A (25 MARKS)

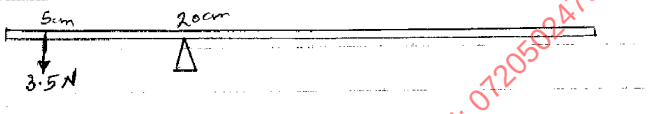
Attempt all the questions in this section.

1. The figure below shows a measuring cylinder with some water in it.



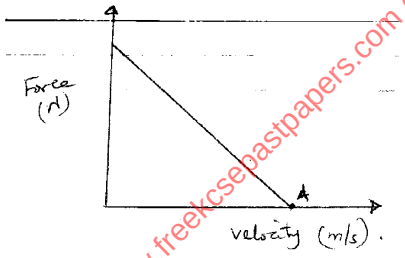
A metal cube of mass 18g is submerged in it. Given that the density of the metal is 4.167 g/cm^3, indicate the new level of the liquid. (2 mks)

2. Explain how temperature affects surface tension. (2 mks)
3. A drop of blue ink is introduced at the bottom of a beaker containing water. It is observed that after sometime, all the water in the beaker turns blue. Name the process that takes place. (1 mk)
4. The figure below shows a uniform metre rule pivoted at the 20cm mark. It is balanced by a weight of 3.5N suspended at the 5cm mark.



Determine the weight of the metre rule. (3 mks)

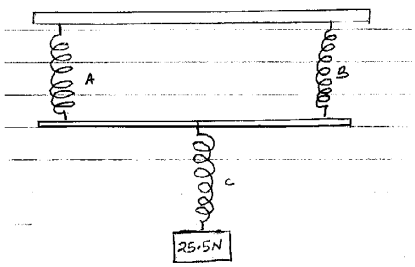
5. The diagram below shows a sketch graph of resultant force against velocity for a body falling through air.



(a) Give the name given to the velocity of the body at point a. (1 mk)
(b) Explain why the resultant force is equal to zero for the velocity given in (a) above. (2 mks)

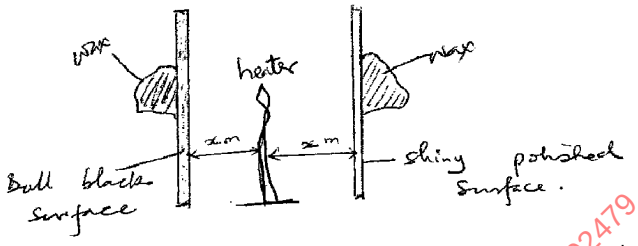
6. A student dipped a mercury thermometer into a very hot liquid.
(a) State what is observed. (1 mk)
(b) Explain observation in (a) above. (1 mk)

7. Three identical springs A, B and C are used to support 25.5N weights as shown below.



If the weight of the horizontal bar is 2.5N, determine the extension of each spring given that 6N causes an extension of 2 cm. (3 mks)

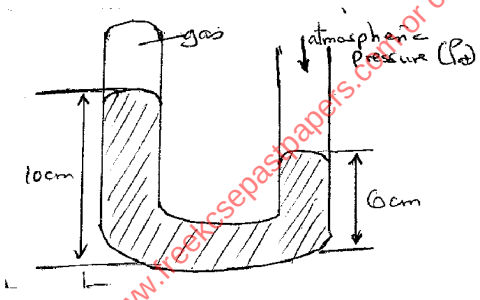
8. The diagram below shows the effect of heat from the heater on two surfaces …… surface.



(i) How does the heat from the heat reach the surface? (1 mk)
(ii) State what is observed from the set up after a few minutes. (1 mk)

9. Trees planted along or near the road seem to bend towards the road. State and explain the observation. (2 mks)

10. Figure below shows a u-tube upon which a gas has been enclosed on one end with mercury in it. Calculate the pressure of the gas.



11. State two sources of errors in an oil drop experiment. (2 mks)

SECTION B (55 MARKS)

Attempt all the questions in this section.

12. (a) (i) Define the term angular velocity (ω). (1 mk)
(ii) A body in a circular path is said to be accelerating and yet it moves in a constant speed. Explain. (1 mk)

(b) A stone of mass 500g is attached to a string of length 50cm which can break when the tension exceeds 20N. The stone is whirled by a student until the string breaks at a point 100 cm above the ground. (Take g, as 10 m/s^2).
(i) In what position does the string break. (1 mk)
(ii) Calculate the angular velocity at which the string breaks. (3 mks)
(iii) Time taken by the stone to reach the ground. (3 mks)
(iv) Distance from the feet of the student to the point the stone strokes the ground. (2 mks)

13. (a) A hydraulic lift is used to raise a load of 100 kg through a height of 2.0 m. the radius of the effort piston is 1.6cm while the load piston has a radius of 8.0cm. If the machine is 75% efficient; calculate:
    (i) The velocity ratio. (2 mks)
    (ii) mechanical advantage (1 mk)
    (iii) Effort required (1 mk)
    (iv) Energy wasted in using the machine (2 mks)

    (c) A block and tackle pulley system is used to lift a mass of 200 kg. If the machine has a velocity ratio of 5, and efficiency of 80%;
    (i) Sketch in the space provided below the possible arrangement of the system. (2 mks)
    (ii) Determine the effort required to lift the load. (2 mks)

14. (a) State Newton's first law of motion. (1 mk)

    (b) A wooden block resting on a horizontal bench is given an initial velocity, U, so that it slides on the coach surface for a distance, d, before coming to a stop. The values of, d, were measured and recorded for values of initial velocity. The figure below shows a graph of U^2 against d.

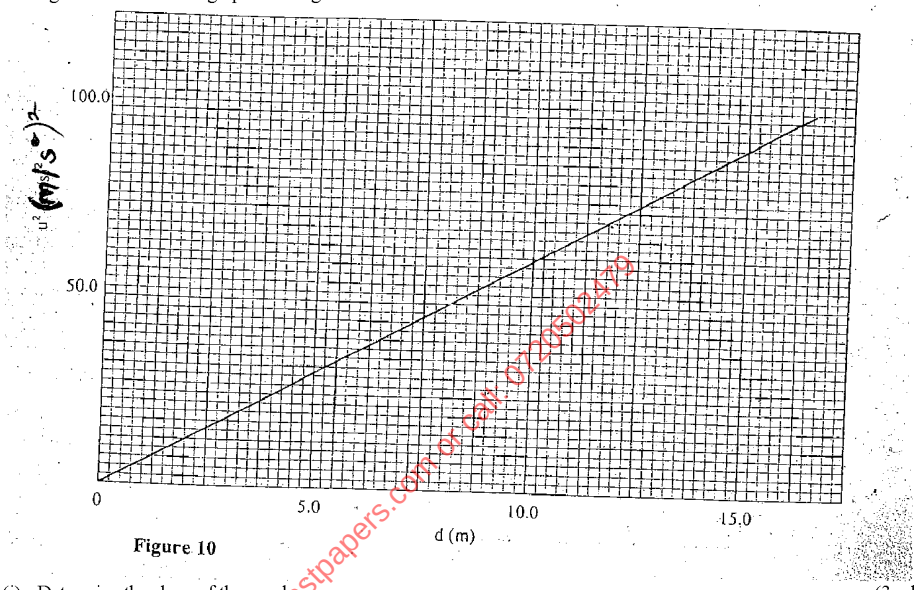


Figure 10

    (i) Determine the slope of the graph. (3 mks)
    (ii) Given that $U^2 = 20$ kd, where K is a constant for the bench surface, determine the value of K from the graph. (3 mks)
    (iii) State how the value of K would be affected by a change in the roughness of the bench surface. (2 mks)

(c) A car of mass 800 kg starts from rest and accelerates at 1.2 ms^{-2}. Determine its momentum after it has moved 400m from the starting point. (4 mks)

15. 300g of ice at 0^0c is dropped into a copper calorimeter containing warm water of mass 60g at 60^0c. it's observed that only 80% of ice melted.
    (Take: Specific heat capacity of water = 4200 $Jkg^{-1}k^{-1}$
    Heat capacity of copper = 400 JK^{-1})
    (a) Determine the final temperature of the mixture. (1 mk)
    (b) Determine the heat lost by calorimeter. (2 mks)
    (c) Determine the heat lost by warm water. (2 mks)
    (d) Determine the specific latent heat of fusion of ice. (3 mks)
    (e) It's observed that if the temperature if warm water used was 80^0c, then all the ice could have melted. What would be the final temperature of the mixture? Use the value of specific latent heat of fusion obtained in (d) above. (3 mks)

16. (a) A concrete block of value, V, is totally immersed in sea water of density, S. Write an expression for the upthrust on the block. (1 mk)
    (b) A certain solid of volume 50 cm^3 displaces 10 cm^3 of kerosene (density 800 kg/m^3). When floating. Determine the density of the solid. (4 mks)
    (c) State the condition necessary for a body to float in a fluid. (1 mk)

17. (a) A mercury thread 200 mm long traps a gas in a long glass tube. The length of the gas column is 100 cm when the tube if

held horizontally. The atmospheric pressure is 750 mmHg. Calculate the length of the gas column when the tube is held vertically with the open end facing downwards. (3 mks)

(b) State Boyle's law. (1 mk)

(c) 250 cm^3 of a gas is collected at a pressure of 900 mmHg and 27^0c temperature. Determine the volume of this gas if the pressure is reduced to 500 mmHg and temperature 19^0c. (2 mks)

KASSU J.E.T.E XAMINATION 2016
232/2
PHYSICS
Paper 2
2 Hours
SECTION A: (25 MARKS)

1. In **figure 1** two mirrors M1 and M2 are inclined at right angles to each other.
Diagram drawn to scale

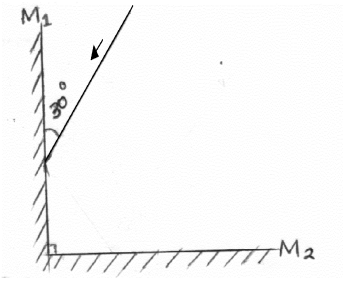


Figure 1
Trace the reflection of the ray through the two mirrors and find the angle between the incident ray and reflected ray of mirror M2. (2 marks)

2. When rod X was rubbed with material Y it was observed that the material acquired a negative charge.
a) State the charge on rod X after rubbing (1 mark)
b) Explain how rod X acquired the charge stated in (a) above. (1 mark)
3. An iron ring is placed between two magnets as shown in **figure 2.**

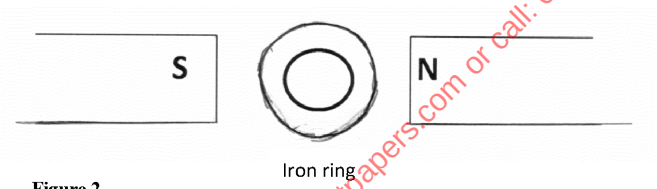


Figure 2.
(a)Sketch the magnetic field pattern between the poles and mark the neutral point, Xon the diagram . (2 marks)
(b) State one application of the concept tested above. (1mark).
4. A charge of 180 Coulombs flows through a lamp every minute. Calculate the number of electrons involved. (Take charge of an electron e, =$1.6x10^{-19}$C). (2 marks)
5. **Table 1** shows radiations and their respective frequencies.

Type of radiation	Yellow light	Gamma rays	Radio waves	Micro waves
Frequency (Hz)	1×10^{15}	1×10^{22}	1×10^{6}	1×10^{11}

Table1
a) Arrange the radiation in order of increasing energy. (1 mark)
b) State the reason why radio waves signals are easier to receive than TV signals in a place surrounded by hills. (1 mark)
6. **Figure 3**shows a metal rod PQ connected to a d.c supply and placed between two magnets.

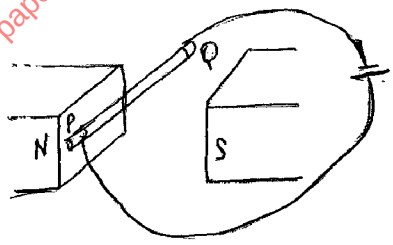


Figure 3

a) Indicate on the diagram the direction of force on rod **PQ** and magnetic field pattern between the two magnetic poles only. (2 marks)

b) State **one** way in which the direction of force can be made to change. (1mark)

7. An explosion in a quarry takes place at a distance of 70m from an observer. An echo from a cliff 50m beyond the source of the explosion is heard by the observer 0.5 seconds after he sees the flash from explosion. Calculate the velocity of sound in air. (3 marks)

8. (a) **Figure 4**below shows the path of a ray of light through a triangular prism **ABC** of refractive index 1.50. is parallel to **AC**.

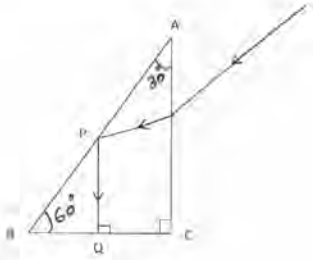


Figure 4

Determine the angle of incidence on the side **AC.** (3marks)

b) **Figure 5** shows the image formed by convex mirror

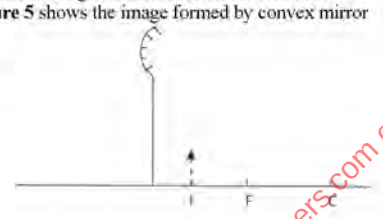


figure 5.

Sketch rays on the diagram to show the position of object (2 marks)

9. In an experiment to study interference in sound waves two identical loudspeakers are connected to an audio frequency generator so that they act as coherent sources L_1 and L_2 as shown in **figure 6.**

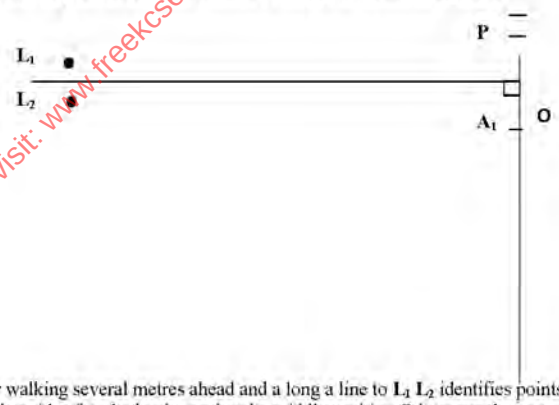


Figure 6

An observer walking several metres ahead and a long a line to L_1 L_2 identifies points**A**andA_1as the first positions of loud sound on either side after the loud sound at the middle position **O** between the two sources. (2 marks)

(a) Explain the meaning of the term coherent source. (1 mark)

(b) Name the type of interference occurring at the points **O,A,** and A_1. (1 mark)

10. Distinguish the n-type and p-type semiconductors. (1 mark)

SECTION B: 55 MARKS

11. a) **Figure 7** shows a source of α,β and r-radiation placed infront of a set of barriers A,B and C

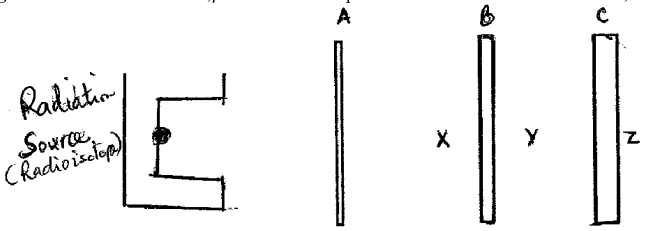


Figure 7

A is a thick sheet of paper, B is a thin sheet of aluminium foil and C is a thin sheet of lead. Name the radiation detected in the regions marked X, Y and Z. (3 marks)

b) The **figure 8** below shows the features of a diffusion cloud chamber used for detecting radiation.

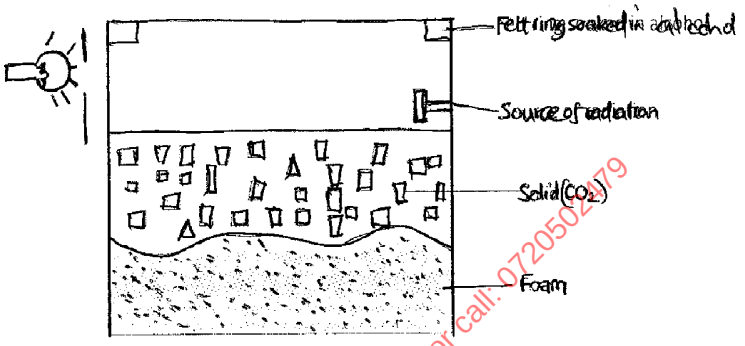


Figure 8

i) Explain how radiation from the source is detected in the chamber. (4marks)

ii) What type of radiation can the device detect? (1mark)

c) The count rate recorded for a certain source is 256 counts per second. What count rate is recorded 20 days later, if the half-life of the source is 5 days. (2marks)

12. (a) A house has five rooms each with 240V,60W bulbs.If the bulbs are switched on from 7:00pm to 10:30 pm;

(i) Calculate the power consumed in the month of April in Kilowatt-hours (2marks)

(ii) Find the cost per month for lighting these rooms at Ksh6.70 per unit. (2marks)

(b) A student designed a transformer to provide power to an electric bell marked 24W,6V from a mains supply 240V. He wound coils, 50 turns and N turns on an iron ring core. When he connected the coil of 50 turns to the bell and N turns coil to the a.c source, he found out that the transformer was only 80% efficient. Find;

(i) The value of N. (2marks)

(ii) The current in the primary coil. (2marks)

(c) The **figure 9**. shows a connection to the three- pin plug.

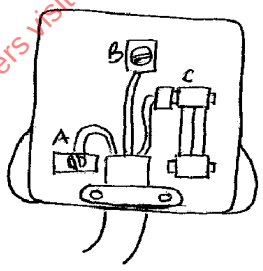


Figure 9

(i) Name the cables A, B and C and state their colours. (3marks)

(ii) Why is the fuse connected to cable C.? (1mark)
(iii) State **one** reason why in domestic wiring system appliances are connected in parallel. (1 mark)

13. **Figure 10** Shows an electric circuit with four capacitors A,B,C and D8 μF ,3μF,6 μF and 15 μF respectively connected to 12V battery.

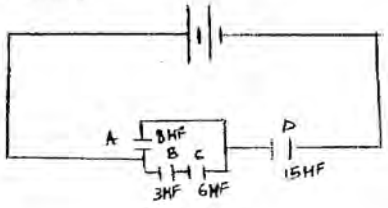


Figure 10

(a) Determine ;
(i) The effective capacitance. (3 marks)
(ii) The charge of capacitor D. (2 marks)
(iii) The total energy stored. (2 marks)
(b) Explain **one** factor that determine the capacitance of a parallel plate capacitor. (1 mark)

14. (a)**Figure 11**shows the features of a cathode ray tube.

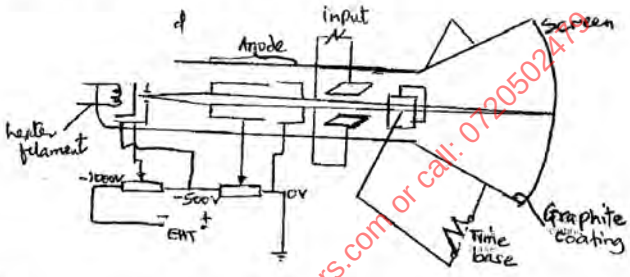


Figure 11
(i) Explain how the electrons are produced in the tube. (1 mark)
(ii) What is the purpose of the anodes? (2 marks)
(iii) Why is the tube evacuated? (1 mark)
(b) **Figure 12**shows the voltage of an a.c. generator on the screen of a C.R.O.

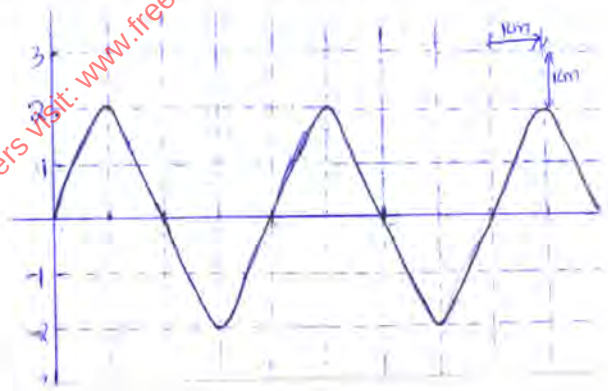


Figure 12

If the time base calibration is 20 milliseconds/cm and the y- gain is 5V/cm , calculate;

(i) The frequency of the generator. (2 marks)

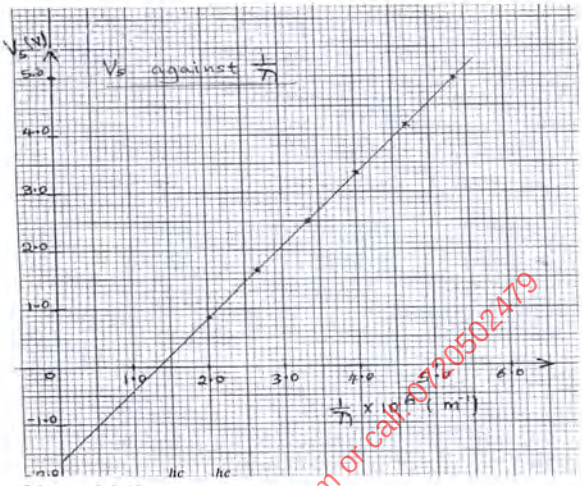
(ii) The peak voltage of the generator. (2 marks)

(c) A potential difference of 40kV is applied across an x-ray tube. Given that the charge of an electron is $1.6 \times 10^{-19} C$ and the mass of an electron is $9.1 \times 10^{-31} kg$ and Planck's constant = 6.63×10^{-34} Js;

(i) What is the effect of increasing the potential difference across the x-ray tube? (1 mark)

(ii) Calculate the velocity with which the electrons strike the target. (3 marks)

15. A Form 4 student carried out on experiment to inyestigate photoelectric effect. From the results a graph of stopping potential V_s (y-axis) against the inverse of the wavelength $\frac{1}{\lambda}$ −was plotted and was as shown below.



The equation of the graph is $V_s = \frac{}{} - \frac{}{}$

Where: c = $3.0 \times 10^{8} ms^{-1}$, speed of light in air

e= $1.6 \times 10^{-19} C$, charge of an electron

h = is the Planck's constant.

(a) From the graph, determine;

(i) The slope s of the graph. (2 marks)

(ii) The Planck's constant h. (2 marks)

(iii) The threshold wavelength λ_o (2 marks)

(iv) The threshold frequency f_o (2 marks)

(v) The work function W_o in electron volts (e.v) (2 marks)

(b) On the same graph, sketch a graph which would be obtained if the student used a metal with greater threshold frequency, explain your answer. (2 marks)

KASSU JET 2016
232/3
PHYSICS PRACTICAL
CONFIDENTIAL
Provide the following apparatus to the candidates.
Question one

- Nichrome wire SWG 28 mounted on a mm scale
- 2 new dry cell (size D)
- A cell holder
- A switch
- An ammeter (0 – 1 A)
- A voltmeter (0 – 5 V)
- Six connecting wires three with crocodile clips
- A micrometer screw gauge (to be shared)

Question 2A

- A metre rule
- Knife edge (at least 20cm high)
- One 50g mass and one 100g mass
- Some two pieces of threads (at least 30cm long)
- $100cm^3$ of water in a $250cm^3$ beaker
- $100cm^3$ of kerosene in a beaker labeled L
- Some tissue paper

Question 2B

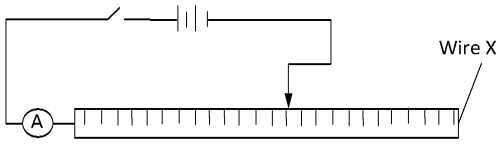
- Rectangular glass block (9.6cm x 6,0cm x 2.3cm)
- Four optical pins
- A soft board
- A plain sheet of paper
- Some cellotape
- A complete mathematical set

KASSU JET EXAMINATION JUNE 2016
Kenya Certificate of Secondary Education

232/3
PHYSICS
Paper 3
(PRACTICAL)
TIME: 2 ½ hours
Question one
You are provided with the following:

- 2 new dry cells size D
- A cell holder
- A switch
- An ammeter
- A voltmeter
- 6 connecting wires at least three with crocodile clips
- Nichrome wire mounted on the metre rule labeld X
- A micrometer screw gauge (to be shared)

Proceed as follows
a. Connect the circuit as shown in the figure below



b. Measure the voltage, E of the dry cell before closing the switch
E=…… V (1mark)

c. Adjust the length L of the wire 0.2m, close the switch S and read the value of current and record in the table below.

Length L(m)	0.2	0.3	0.4	0.5	0.6	0.7
Current , I(A)						
$\frac{1}{I}$ (A^{-1})						

d. Repeat the procedure in (c) above for the value of lengths given in the table (3mks)

e. Calculate the values of $\frac{1}{I}$ and record in the table above. (1mk)

f. On the grid provided plot a graph of $\frac{1}{I}$ (y axis) against L (5mks)

g. Determine the gradient of a graph (3mks)

h. (i) Measure the diameter dof the wire in three points used and find the average diameter.
d_1=……d_2 =……d_3……, mm (1mk)
Average d=……m (1mk)
(ii) Determine the cross section area, A of the wire (2mks)
Form the equation

$$\frac{1}{I} = \frac{kl}{AE} + \frac{Q}{E}$$: determine

i) The value of k (2mks)
ii) The value Q (2mks)

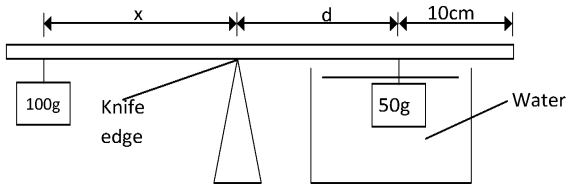
Question 2
Part A
You are provided with the following

- A metre rule
- Knife edge raising 20cm above bench
- One 50g mass and one 100g mass
- Some thread
- Some water in a beaker
- Liquid L in a beaker
- Tissue paper

Proceed as follows:

a) Balance the meter rule on the knife edge and record the reading at this point.
Balance point = ……m (1mk)
For the rest of this experiment the knife edge must be placed at this position.

b) Set up the apparatus as shown in figure below. Use the thread provided to hang the masses such that the positions of 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 from the knife edge and the 50 mass is fully submerged in the water. Record the values of x and d.

i) x_1 = ……cm (1mk)
d = ……cm (1mk)

ii) Determine W_1 (weight of the object in water) (2mks)

iii) Determine the upthrust U_w in water of the 50g in water (1mk)

c) Now balance the metre rule when the 50g mass is fully submerged in the liquid L.

x_2 =……cm (1mk)

Apply the principle of moments to determine the weight W_2 of 50g mass in the liquid L and hence determine the upthrust U_L in the liquid.

W_2 (2mks)

U_L (1mk)

d) Determine the relative density R.D of the liquid L, given that

$$R.D = \frac{U_L}{U_w}$$ (1mk)

Part B

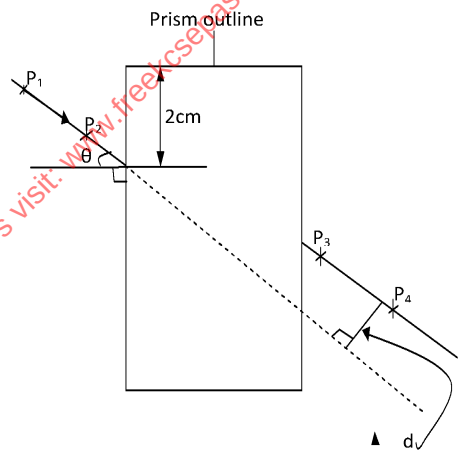
You are provided with the following

- A rectangular glass block
- Four optical pins
- A piece of soft board
- A plain sheet of paper
- Cello tape

You are also required to have your complete mathematical set.

Proceed as follows:

a) Place the plain sheet of paper on the soft board and fix it using the cellotape provided. Place the glass block at the centre of the sheet, and draw its outline. Remove the glass block. See the figure below



Draw a normal at a point 2cm from the end of the longer side of the block outline. This normal line will be used for the rest of the experiment.

b) By viewing through the glass from the opposite side stick two other pins P_3 and P_4 vertically such that they are in line with the images of the first two pins. Draw a line through the marks made by P_3 and P_4 to touch the outline.
Measure and record in the table below the perpendicular distance **d** between the extended line and the line, P_3P_4. See figure above.

c) Record this value in the table below and repeat the process for other angles shown in the table.
NB: The sheet of paper with the drawing must be handed in together with this question paper. Ensure you write your name and index on the sheet paper.

(3mks)

Θ(deg)	25	35	40	45	55	60	65
d(cm)							

d) (i) On the grid provided, plot a graph of d (y –axis) against Θ (5mks)
(ii) Using the graph, estimate the value of d when Θ = 0° (2mks)

KIRINYAGA CENTRAL SUB-COUNTY EFFECTIVE FORTY JOINT EXAMINATIONS – 2016
Kenya Certificate of Secondary Education
232/1
PHYSICS
PAPER 1
(THEORY)
JULY/AUGUST, 2016
TIME: 2 HOURS
SECTION A: (25 MARKS)

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

1. Figure 1 shows a measuring cylinder, which contains water initially at level A. A solid of mass 0.32g is immersed in the water, the level rises to B.

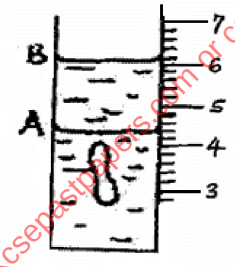


Figure 1
Determine the density of the solid. (Give your answer to 3 significant figures). (2mks)

2. The figure 2 below shows part of micrometer screw gauge with 50 divisions on the thimble scale. Complete the diagram to show a reading of 5.73mm. (1mk)

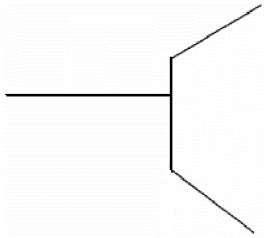
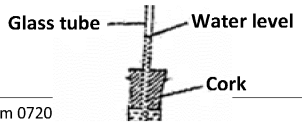


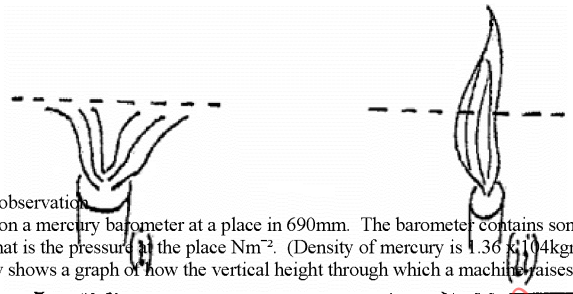
Figure 2

3. In the set up shown below, it is observed that the level of the water initially rises before starting to drop when the flask is dipped in ice cold water.



Explain this observation. (2mks)

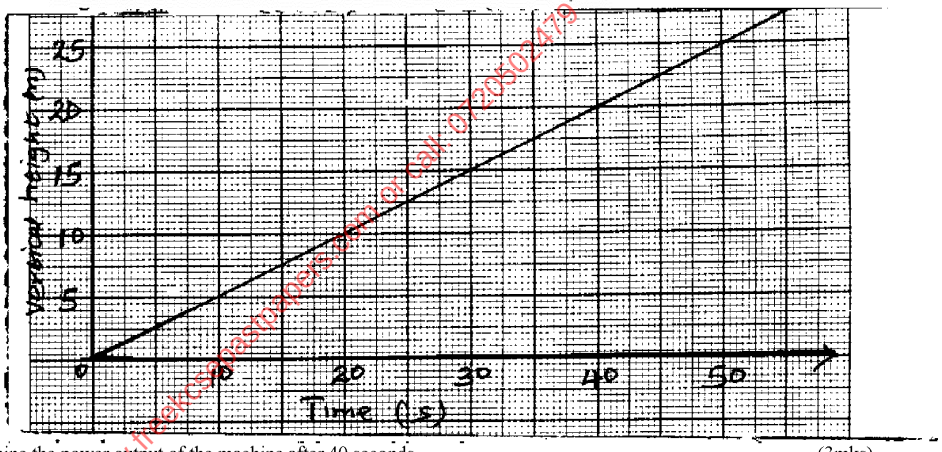
4. When a Bunsen burner is lit below wire gauze, it is noted that the flame initially burns below the gauze as shown in Figure (i). After sometime, the flame burns below as well as above the gauze as shown in Figure (ii).



Explain this observation. (2mks)

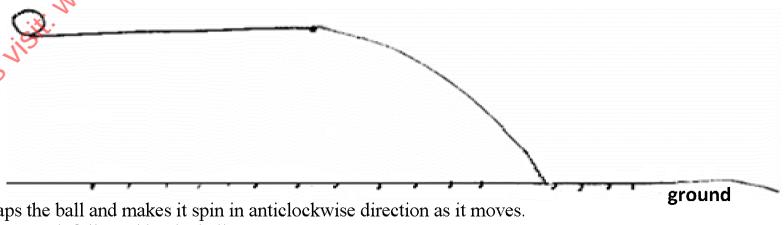
5. The reading on a mercury barometer at a place in 690mm. The barometer contains some air which exerts a pressure of $15Nm^{-2}$. What is the pressure at the place Nm^{-2}. (Density of mercury is $1.36 \times 10^{4}kgm^{-3}$). (3mks)

6. Figure below shows a graph of how the vertical height through which a machine raises a mass 30kg varies with time.



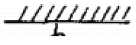
Determine the power output of the machine after 40 seconds. (3mks)

Figure below shows a ball projected horizontally. Use the diagram to answer question **7** and **8**.



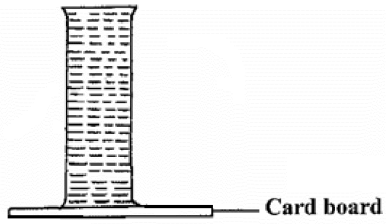
A player taps the ball and makes it spin in anticlockwise direction as it moves.

7. Show the new path followed by the ball. (1mk)
8. Explain how the ball attains the new path above. (2mks)
9. A constant force is applied to a body moving with a constant speed. State **one** observable change in the state of motion of the body likely to occur? (1mk)
10. The figure below is a uniform bar of length 2.0m pivoted near one end. The bar is balanced horizontal by a spring.



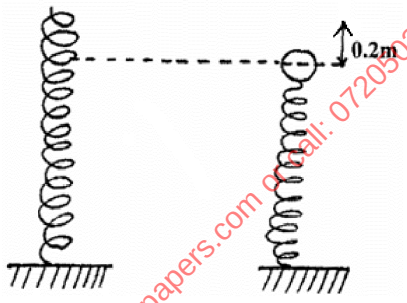
Given that the tension on the spring is 1.2N, determine the weight of the bar. (3mks)

11. The figure below shows a long tube filled with water. The open end is then covered with a cardboard and tube is inverted. It is observed that the water in the tube does not spill out.



Explain the observation. (1mk)

12. A steel ball of mass 0.05kg was placed on top of a spring on a level ground. The spring was then compressed through a distance of 0.2m.

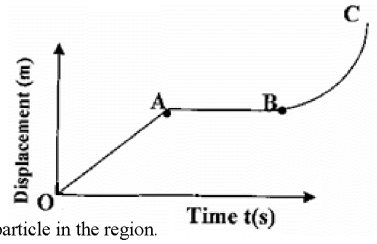


If the spring constant is 15N/m. Calculate the maximum height reached when the spring is released. (3mks)

13. The volume of inflated balloon is observed to reduce when the balloon is placed inside a refrigerator. Use the kinetic theory of gases to explain this observation. (1mk)

SECTION B: (55 MARKS)

14. (a) The figure below shows a displacement-time graph of the motion of a particle.



Describe the motion of the particle in the region. (3mks)

(i) **OA**……

(ii) **AB**……

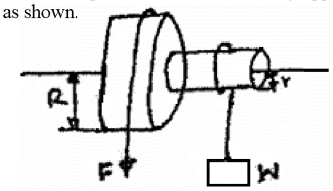
(iii) **BC**……

(b) A hot air balloon falling through the air attains terminal velocity after a short-time. State the reason why it attains terminal velocity. (1mk)

(c) State Newton's second law of motion. (1mk)

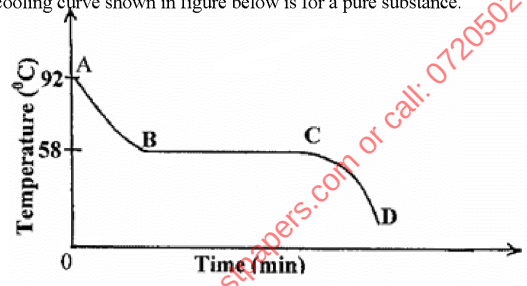
(d) A ball of mass 0.2kg is thrown vertically upwards with velocity of $8ms^{-1}$. The air resistance is 0.5N. Determine:
(i) the resultant force on the ball as it moves up;
(Take acceleration due to gravity $g = 10ms^{-2}$). (2mks)
(ii) The acceleration of the ball. (3mks)
(iii) The maximum height reached by the ball. (2mks)

15. (a) Draw a single pulley arrangement with a velocity ratio of 2. (2mks)
(b) Figure shows a wheel and axle being used to raise a load W by applying an effort F. the radius of the large wheel is R and of the small wheel r as shown.



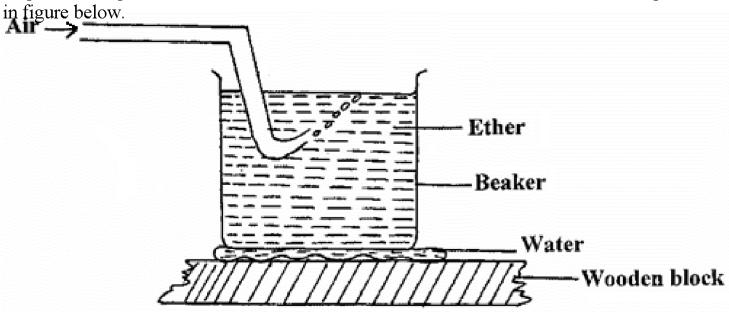
(i) Shows that the velocity ratio (V.R) of this machine is given by R/r. (3mks)
(ii) Given that r = 5cm, R = 8cm, determine effort required to raise a load of 20N if the efficiency of the machine is 80%. (4mks)
(iii) It is observed that the efficiency of the machines increases when it is used to lift large loads. Give a reason for this. (1mk)

16. (a) (i) Define the term latent heat of fusion. (1mk)
(ii) 9816J of heat energy is required to completely convert m kg of ice at 0°C to steam. Determine the value of m.
(Take latent heat of fusion of ice = $2.34 \times 10^{5}Jkg^{-1}$; specific heat capacity of water = $4200Jkg^{-1}k^{-1}$, latent heat of vaporization of steam = $22.26 \times 106Jkg^{-1}$). (4 marks)
(b) The cooling curve shown in figure below is for a pure substance.



(i) What is the melting point of the substance? (1mk)
(ii) Explain what happens in the region. (3mks)
I CD……
II AB……
III BC……

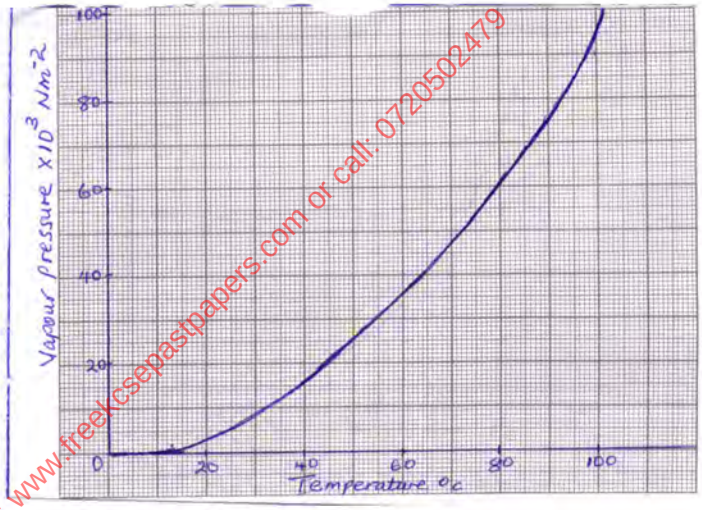
(c) A beaker containing ether was placed on some water on a wooden block. Air was then blown through the ether using a pump as shown in figure below.



State and explain what observation is made after sometime. (2mks)

17. (a) When the temperature of water reaches the boiling point, bubbles rise to the surface.
(i) State what is contained in the bubbles. (1mk)
(ii) State the reason why bubbles rise to the surface only at the boiling point. (1mk)

(b) Figure below shows a graph of vapour pressure against the temperature of water vapour at Kerugoya town where mercury barometer indicates a height of 650mm.

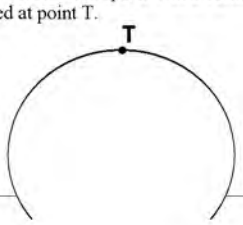


(i) Determine the atmospheric pressure of the town in Nm^{-2}.
(Take g = 10m/s² and density of mercury = 13600kg/m³). (3mks)
(ii) Use the graph to determine the boiling point of water in the town. (1mk)

(c) The pressure of helium gas of volume 10cm³ decreases to one third of its original value at constant temperature. Determine the final volume of the gas. (3mks)

18. (a) One of the factors that affect the centripetal force is the mass of the body. State **two** other factors. (2mks)

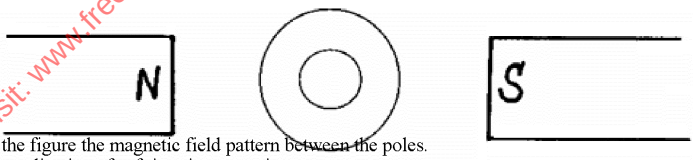
(b) A mass of 400g is rotated by a string at a constant speed V in a vertical circle of radius 100cm. The minimum tension in the string is 7.2N which is experienced at point T.



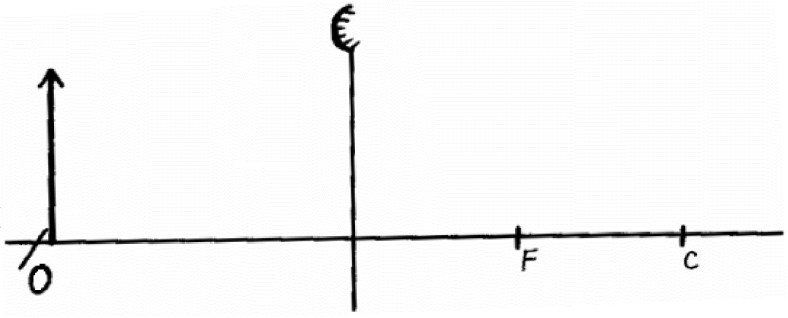
(i) Determine the velocity V of the mass at point T. (3mks)
(ii) Determine the maximum tension in the string. (2mks)
(c) The anchor of a ship is made of steel and has a weight of 3200N in air. A ship floating in water is held by the anchor submerged in water. (Density of steel is 8000kgm^{-3}).
Calculate.
(i) The volume of the anchor. (2mks)
(ii) The up thrust on the anchor. (2mks)
(iii) The apparent weight of the anchor. (2mks)

KIRINYAGA CENTRAL SUB-COUNTY EFFECTIVE FORTY
JOINT EXAMINATION – 2016
Kenya Certificate of Secondary Education
232/2
PHYSICS
PAPER 2
(THEORY)
JULY/AUGUST, 2016
TIME: 2 HOURS
SECTION A: (25 MARKS)
Answer all the questions in this section in the spaces provided.

1. State **one** property of light that a pinhole camera illustrates. (1 mark)
2. It is observed that when a rod A is brought near the cap of a negatively charged electroscope, the divergence of the leaf decreases. State **two** deductions that can be made about rod A from this observation. (2 marks)
3. State the purpose of manganese (IV) oxide in a dry cell. (1 mark)
4. A soft iron ring is placed between two poles of a magnet as shown in the figure below.

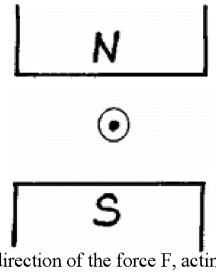


(a) Show on the figure the magnetic field pattern between the poles. (2 marks)
(b) State **one** application of soft iron in magnetism. (1 mark)
5. An object O is placed in front of convex mirror as shown in the diagram below.
(a) Complete the diagram to locate the position of the image, 1. (3 marks)



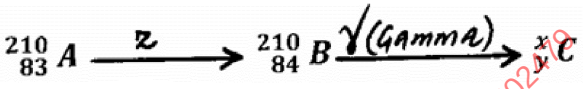
(b) State **one** practical application of a convex mirror. (1 mark)

6. The figure below shows a wire carrying current whose direction is out of the paper. The wire is placed in a magnetic field.



(a) Indicate on the figure the direction of the force F, acting on the wire. (1 mark)
(b) State what would be observed on the wire if the direction of the current is reversed (i.e. into the paper). (1 mark)

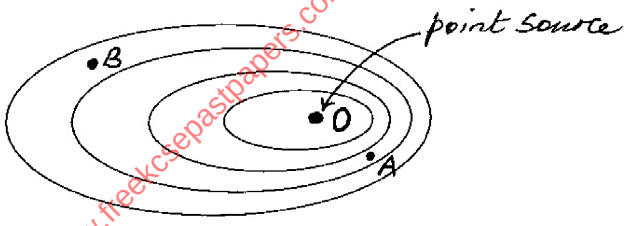
7. Explain how doping a pure semi-conductor produces on n-type semi-conductor. (3 marks)
8. State **one** example of a transverse-progressive wave. (1 mark)
9. The following reaction is part of a radioactive series.



(a) Identify the radiation **z**. (1 mark)
(b) Determine the values of χ and **y**. (2 marks)

10. State:
(a) **Two** applications of microwaves. (2 marks)
(b) **one** detector of infrared radiation. (1 mark)

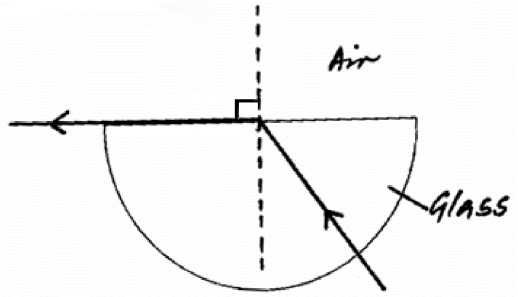
11. State **one** factor that affects the speed of sound in a solid. (1 mark)
12. The figure shown below illustrates crests of circular water wave-fronts radiating from a point source O in a pond.



State how the depth of the pond at **A** compares with that at **B**. (1 mark)

SECTION B: (55 MARKS)

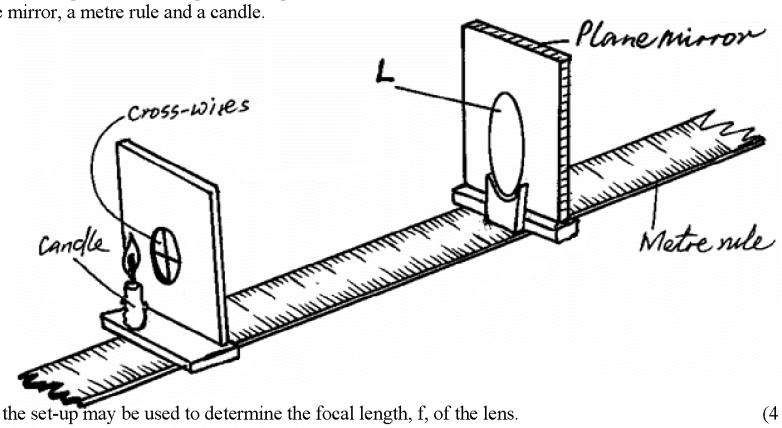
13. (a) State the meaning of the term critical angle as applied in refraction of light. (1 mark)
(b) The figure shows a ray of light incident on a glass-air interface.



(i) Show on the diagram the critical angle, **c**. (1 mark)

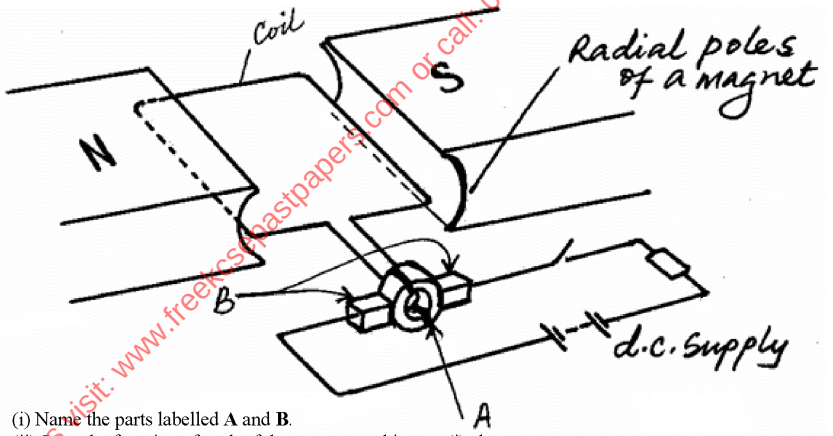
(ii) Given that the refractive index of the glass is ${}_a\eta_g$, and that the critical angle **c** = 42°, determine the value of is ${}_a\eta_g$. (3 marks)

(c) The figure shows an experimental set up consisting of a mounted convex lens **L**, cardboard screen with cross-wires at the centre, a plane mirror, a metre rule and a candle.



Describe how the set-up may be used to determine the focal length, f, of the lens. (4 marks)

14. (a) The figure below shows parts of a simple electric motor.



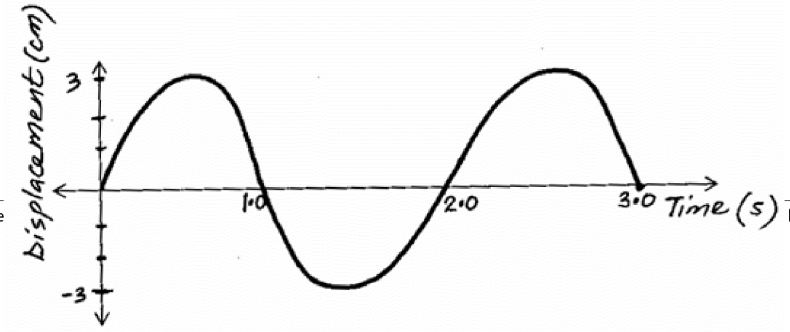
(i) Name the parts labelled **A** and **B**. (2 marks)

(ii) State the function of each of the parts named in part (i) above. (2 marks)

(iii) State the advantage of using radial (curved) poles of a magnet over plane (flat) poles. (1 mark)

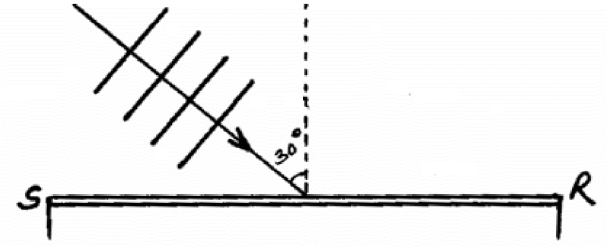
(iv) Explain the significance of copper coil as part of an electric motor. (2 marks)

(b) The graph in the figure below shows the displacement of a pendulum bob from its rest position as it varies with time.

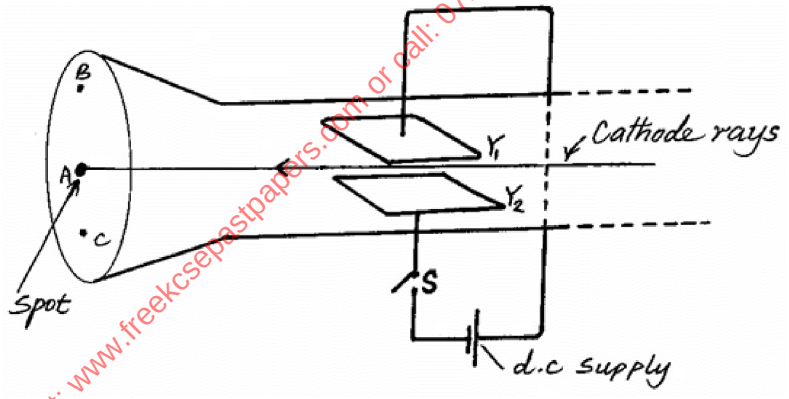


(i) Determine the amplitude of the oscillation. (1 mark)
(ii) What is the time for one complete oscillation? (1 mark)
(iii) On the same graph, draw a sketch graph which represents a pendulum swinging with half the amplitude and twice the frequency. (2 marks)

(c) Plane water wave fronts are incident onto reflector **SR** as shown in the figure below. Show on the diagram the nature and direction of the reflected wave fronts. (1 mark)



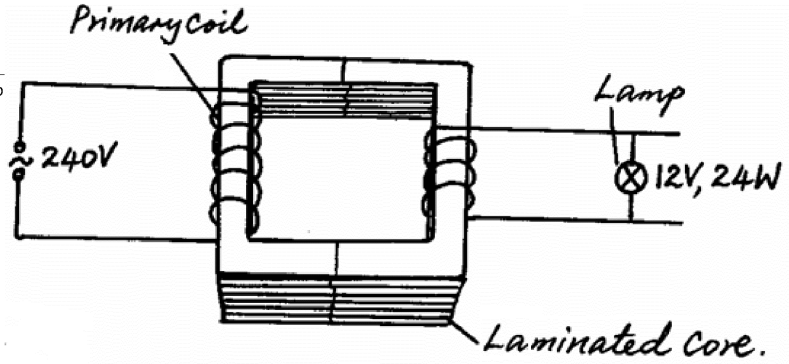
15. (a) State the property of lead that makes it a suitable material for shielding an x-ray tube. (1 mark)
(b) State how an increase in temperature of the filament in an x-ray tube affects the nature of x-rays produced. (1 mark)
(c) The figure below shows the vertical deflection system of a Cathode Ray Oscilloscope (C.R.O).



(i) State how cathode rays are produced in Cathode Ray Oscilloscope. (1 mark)
(ii) Show on the diagram the path of the cathode rays when the switch **S** is closed. (1 mark)
(iii) State what is observed on the screen if the d.c. supply is replaced with a high frequency a.c. supply. (1 mark)

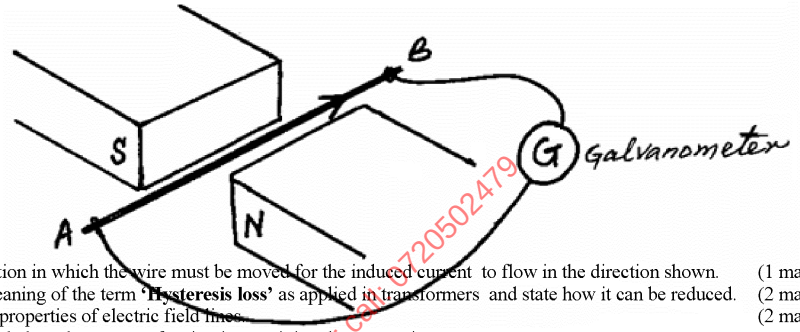
(d) An electric filament bulb is rated 24V, 0.5A.
Calculate:
(i) The power of the bulb. (2 marks)
(ii) The energy dissipated by the bulb in 80 minutes. (2 marks)

16. (a) State Faraday's law of electromagnetic induction. (1 mark)
(b) The figure below shows a 12V, 24W lamp operated by a step-down transformer that is connected to a 240V mains supply.



(i) Explain what is meant by the term '**laminated core**' and state its significance in a transformer. (2 marks)
(ii) Calculate the efficiency of the transformer if the current through the primary coil is 0.12A. (3 marks)

(c) The figure below shows a conductor AB placed in a magnetic field.

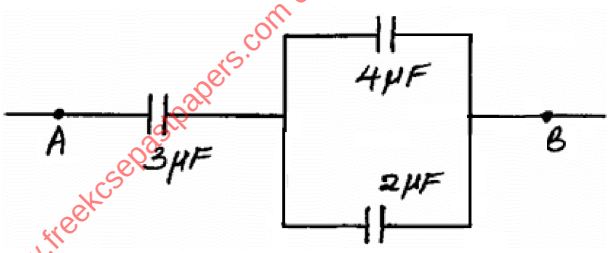


State the direction in which the wire must be moved for the induced current to flow in the direction shown. (1 mark)

(d) Explain the meaning of the term '**Hysteresis loss**' as applied in transformers and state how it can be reduced. (2 marks)

17. (a) State **two** properties of electric field lines. (2 marks)

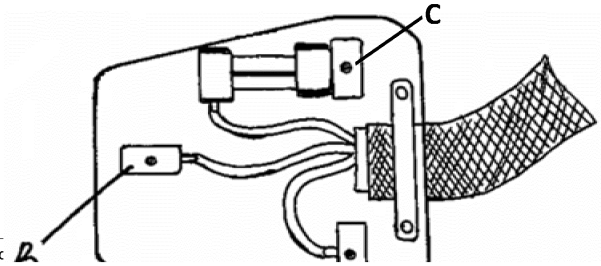
(b) The figure below shows part of a circuit containing three capacitors.



(i) Calculate the effective capacitance between **A** and **B**. (3 marks)
(ii) Given that the potential difference (p.d.) across AB is 10V, what is the total charge flowing through the circuit? (1 mark)

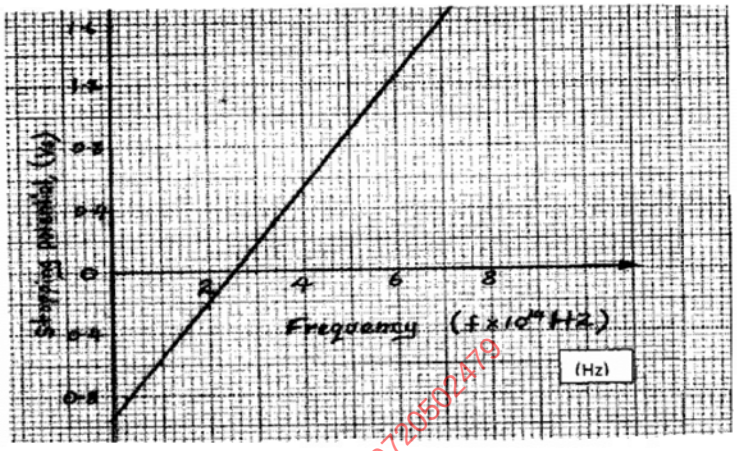
(c) State how an increase in thickness affects electrical resistance of a conductor. (1 mark)

18. (a) The figure below shows the inner parts of a three-pin plug.



(i) Identify the pins **A** and **B**. (2 marks)
(ii) State the reason why the pin **B** is normally longer than the other two pins **A** and **C**. (1 mark)

(b) In an experiment to find the relationship between frequency of radiation and kinetic energy of photoelectrons in a photoelectric device, the following graph was obtained.



Use the graph to answer the following questions.
(i) Determine the threshold frequency. (1 mark)
(ii) Find the plank's constant h. (Take the charge of an electron to be 1.6×10^{-19}C). (3 marks)
(iii)Calculate the work function of the metal in joules. (2 marks)

KIRINYAGA CENTRAL SUB-COUNTY EFFECTIVE FORTY JOINT EXAMINATION – 2016
232/3
PHYSICS
PAPER 3
(PRACTICAL)
JULY/AUGUST 2016
TIME: 2½ HOURS
CONFIDENTIAL

Question 1:

- A resistance wire PQ mounted on mm scale. (SWG 30, diameter = 0.32mm)
- Ammeter (0 – 1A).
- A voltmeter 0 – 3V or 0 – 5V.
- 2 new size D dry cells and a cell holder.
- A switch labelled K.
- Seven connecting wires at least two with crocodile clips.
- A convex lens of focal length 20cm and a lens holder.
- A metre rule.
- A white screen.
- A candle.

Question 2:

- A metre rule.
- A knife edge raised 20cm above the bench.
- One 50g mass and a 100g mass.
- Some thread (2) 20cm each.
- Some water in a beaker.
- Some liquid L in a beaker (paraffin).
- Tissue paper.
- A rectangular glass block.
- 4 optical pins.
- A plain sheet of paper.
- Cello tape.

- A piece of softboard.

KIRINYAGA CENTRAL SUB-COUNTY EFFECTIVE FORTY JOINT EXAMINATION – 2016
Kenya Certificate of Secondary Education
232/3
PHYSICS
PAPER 3
(PRACTICAL)
JULY/AUGUST, 2016
TIME: 2½ HOURS

Question 1

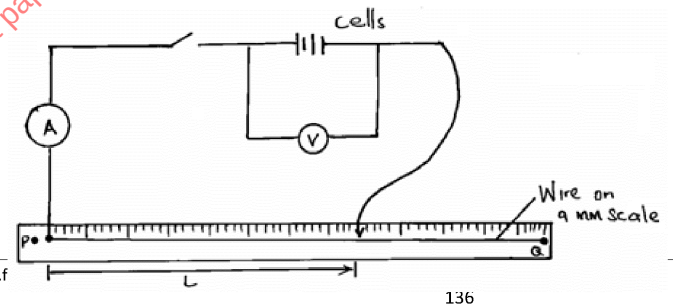
PART A

You are provided with the following.

- A resistance wire PQ mounted on a mm scale.
- An ammeter.
- A voltmeter.
- A switch K.
- Two new dry cells and cell holder.
- Seven connecting wires at least two with crocodile clips.

Proceed as follows:

(a) Set up the circuit as shown in figure 1 below.



(b) Open the switch and record the voltmeter readings.
E = …… volts. (1 mark)

(c) (i) Starting with L = 70cm, read and record the readings of voltmeter and ammeter in table 1 provided.
Table 1

Length L(cm)	70	50	40	30	20	10
Current I(A)						
P.d, V (Volts)						

(ii) Repeat step c(i) above for other values of L given in the table, 1 above. (5 marks)

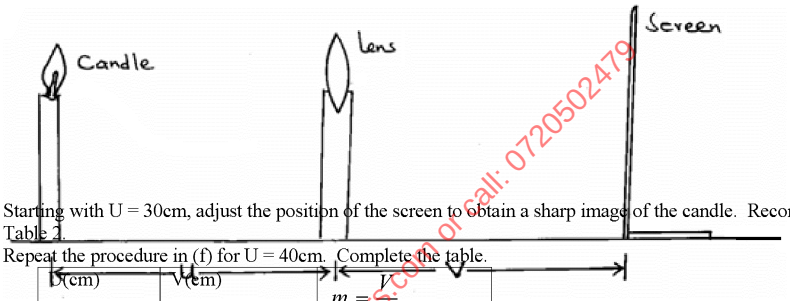
(d) Plot a graph of p.d (y-axis) against I. (5 marks)

(e) Given that the graph is governed by the equation E = V + Ir, determine.
(i) the e.m.f of the two cells in series. (2 marks)
(ii) the internal resistance of the two cells. (2 marks)

PART B

You are provided with the following.
- A lens and lens holder.
- A candle.
- A screen.
- A metre rule.

Proceed as follows:
Set up the apparatus as shown in figure 2.



(f) Starting with U = 30cm, adjust the position of the screen to obtain a sharp image of the candle. Record the value of V in Table 2.

(g) Repeat the procedure in (f) for U = 40cm. Complete the table.

U(cm)	V(cm)	$m = \frac{V}{U}$
30		
40		

(2 marks)

Table 2

(h) Given that the focal length of the lens satisfies the equation $f = \frac{V}{1+m}$ determine the average value of focal length f.

(3 marks)

Question 2

PART A

You are provided with the following:
- A metre rule.
- A knife edge.
- One 50g mass and a 100g mass.
- Some thread.
- Some water in a beaker.
- Liquid L in a beaker.
- Tissue paper.

Proceed as follows:

(a) Balance the metre rule on the knife edge and record the reading at this point.
Balance point …… cm (1 mark)
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 1. Use the thread provided to hang the masses such that the positions of the support can be adjusted.

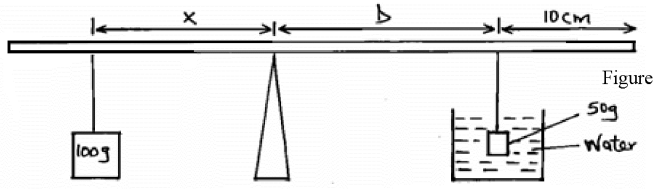


Figure 1

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

X = ... cm (1 mark)

D = ... cm (1 mark)

Apply the principle of moments to determine the weight W_1 of the 50g mass in water and hence determine the upthrust U_w in water. (2 marks)

$\mathbf{W_1}$ = ...

$\mathbf{U_w}$ = ... (1 mark)

N

Remove the 50g mass from the water and dry it using tissue paper.

(c) (i) Now balance the metre rule when the 50g mass is fully immersed in the liquid L. Record the value of the distance χ.

χ = ...cm (1 mark)

(ii) Apply the principle of moments to determine the weight W_2 of the 50g mass in the liquid L and hence determine the up thrust U_L in the liquid.

$\mathbf{W_2}$ = ... (1 mark)

$\mathbf{U_L}$ = ... (1 mark)

(d) Determine the relative density R.D of the liquid L, given that: (1 mark)

$$R.D = \frac{U_L}{U_w}$$

(e) Find the density of liquid χ in kg/m³. (Given that density of water in 1000kg/m³). (1 mark)

PART B

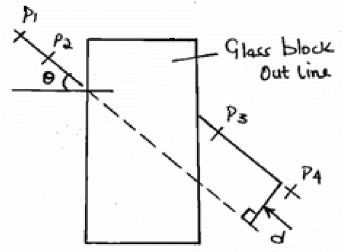
You are provided with the following:

- A rectangular glass block.
- Four optical pins.
- A piece of soft board.
- A plain sheet of paper.
- Cello tape.

You are required to have your own Mathematical set.

Proceed as follows.

(f) Place the plain sheet of paper on the soft board and fix it using the cello tape provided.
Place the glass block at the centre of the sheet, draw its outline. Remove the glass block.



(g) Draw a normal at a point 2cm from the end of one of the longer side of the block outline. This normal line will be used for the rest of the experiment. Draw a line at an angle θ = 25° from the normal. Stick two pins P_1 and P_2 vertically on this line.

(h) By viewing through the glass from the opposite side, stick two other pins P_3 and P_4 vertically such that they are in line with the images of the first two pins. Draw a line through the marks made by P_3 and P_4 to touch the outline. Extend the line

$W_1 = \frac{1 \times 17.8}{40.5}$ ✓ = 0.4395 ✓2 marks

$U_w = 0.5 - 0.4395 = 0.0605N$ ✓1 mark

(c) (i) $\chi = 18.4cm$ ✓

(ii) $W_2 = \frac{1 \times 18.4}{40.5} = 0.4543N$ ✓1 mark

$U_L = 0.5 - 0.4543$ ✓1 mark

$= 0.0457N$

(d) R.D = 0.755 ✓

(e) Density = 0.755 x 1000

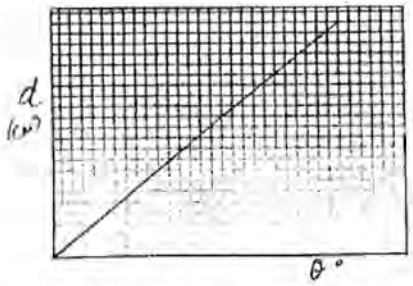
= 755kg/m³ ✓

PART B (i)

θ(deg)	25	35	40	45	55	60	65
d(cm)	1.2	1.8	2.1	2.15	3.1	3.6	4.2

Each value ½ mark – maximum 3 marks

j(i)



Axis – Labelled with units ✓1 mark
Scale – Simple and uniform ✓1 mark
Plotting – 4 points - ½ mark each maximum 2 marks
Line through the origin ✓1 mark

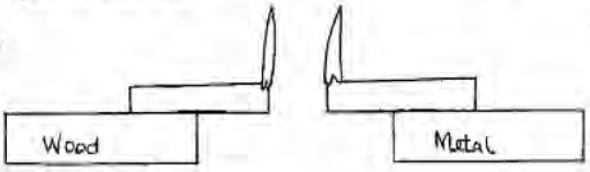
j(ii) d = 0cm.

KAHURO/MURANG'A EAST JOINT EXAMINATION – 2016
Kenya Certificate of Secondary Education
232/1
PHYSICS
PAPER 1
(THEORY)
TIME: 2 HOURS

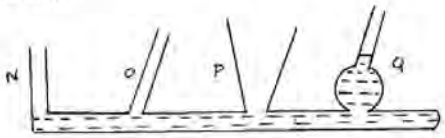
SECTION A: (25 MARKS)

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

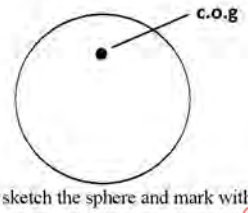
1. χcm of substance A of density 800kg/m³ is mixed with 1000cm³ of water of density 1000kg/m³. The density of the mixture is then 0.96/cm³. Determine the value of χ (3mks)
2. When washing clothes, it is easier to remove the dirt using some warm water containing soap than cold water. Explain this observation. (1mk)
3. Explain why a thick glass is more likely to break when hot water is poured on it than thin glass. (2mks)
4. The figure below shows two identical burning splints. Placed on wood and metal blocks respectively it was observed that when the flame reached the edge of the metal block the splint was extinguished while the other on the wooden block continued to burn. Explain this observation. (1mk)



5. The figure below shows water level in limb Q of a glass tube. Indicate the corresponding water levels in limb N, O and P. Explain your answer. (2mks)

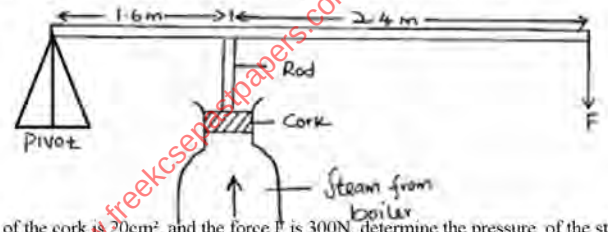


6. A spring has a spring constant 4N/m. Two identical springs are connected end to end. Find their effective spring constant. (2mks)
7. The figure below shows a solid sphere with its centre of gravity marked with a dot. The sphere is rolled on a horizontal ground and comes to rest after. Some time.



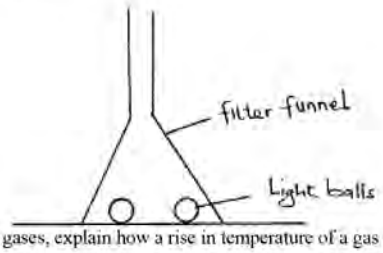
On the space provided below sketch the sphere and mark with a dot the most likely position of the c.o.g after it comes to rest. (1mk)

8. Seen through a hand lens pollen grains particles in water move about randomly. Explain this observation. (1mk)
9. A cork enclosing steam in a boiler is held down by the system shown below.



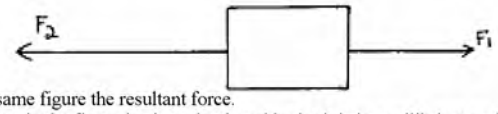
If the area of the cork is 20cm², and the force F is 300N, determine the pressure of the steam in the boiler. (3mks)

10. The figure below shows light balls resting on a flat surface. A filter funnel is then inverted over them. State what is observed when air is blown through the funnel. (1mk)



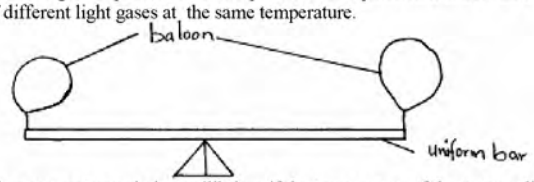
11. Using the kinetic theory for gases, explain how a rise in temperature of a gas causes a rise in the pressure of the gas if the volume is kept constant. (2mks)
12. An aircraft 320m from the ground travelling horizontally at 50m/s releases a bomb. Calculate the horizontal distance covered by the bomb from the point of release (ignore air resistance and g = 10m/s²). (2mks)

13. The figure below shows two forces F_1 and F_2 acting on an object.



Show on the same figure the resultant force. (1mk)

14. The uniform bar in the figure is pivoted at its midpoint it is in equilibrium under the action of two identical balloons with equal volumes of different light gases at the same temperature.



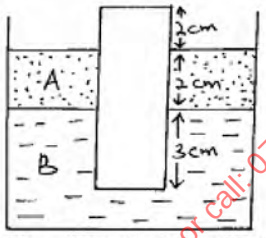
Explain why the bar may not remain in equilibrium if the temperature of the surrounding changes. (2mks)

15. In a vacuum flask, the double glass walls that enclose the vacuum are shiny. State the reason. (1mk)

SECTION B: (55 MARKS)

16. (a) State **two** conditions necessary for a body to float in water. (2mks)

(b) The figure below represents a block of uniform cross-sectional area 6.0cm² floating on two liquids A and B. The length of the block in each liquid is shown.



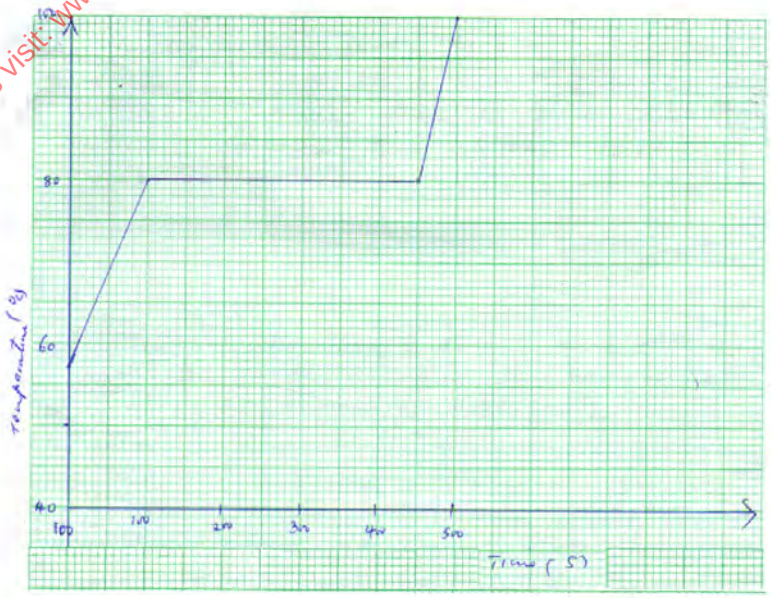
Given that the density of liquid A is 800kg/m³ and that of liquid B is 1000kg/m³ determine.

(i) Weight of liquid A displaced. (3mks)

(ii) Weight of liquid B displaced. (3mks)

(iii) Density of the block. (4mks)

17. (a) A certain powder of mass 100g was heated in a container by an electric heater rated 100w for some time. The graph below shows the variation of the temperature of the powder with time.



Use the graph to:

(i) Determine the melting point of the powder …… (1mk)

(ii) Determine the quantity of heat supplied by the heater from the time the powder starts to melt to the time it has melted. (3mks)

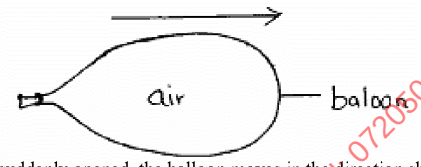
(iii) Determine the specific latent heat of fusion of the powder assuming the container absorbs negligible amount of heat. (3mks)

(b) State **one** application of cooling caused by evaporation. (1mk)

(c) Water of mass 2kg at 100°C is allowed to cool for 20 minutes. State **two** factors that determine the final temperature. (2mks)

18. (a) Give a reason why the inside of a helmet is lined with sponge. (1mk)

(b) The figure below shows a balloon filled with air.



When the mouth is suddenly opened, the balloon moves in the direction shown above by the arrow. Explain that observation. (2mks)

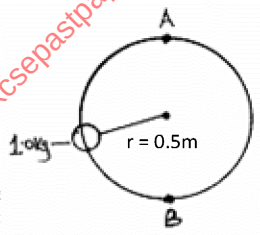
(c) A rock of mass 150kg moving at 10m/s collides with a stationary rock of mass100kg. They fuse after collision. Determine the

(i) Total momentum before collision. (2mks)

(ii) Total momentum after collision. (1mk)

(iii) Their common velocity after collision. (2mks)

(d) The figure below shows an object of mass 1kg whirled in a vertical circle of radius 0.5m at a uniform speed of 5m/s.



(i) Determine:

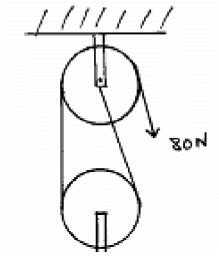
I the centripetal force on the (3mks)

II the tension in the string wl (2mks)

III the tension in the string when the object is at B. (2mks)

(ii) The speed of rotation is gradually increased until the string snaps. At what point is the string likely to snap. Explain. (2mks)

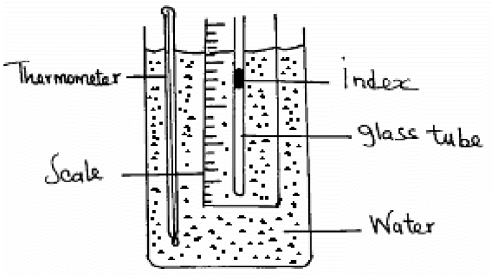
19. (a) Using the pulley system shown a mass of 10kg is raised 2M by effort of 80N.



(i) Calculate the distance the effort moves. (2mks)
(ii) How much potential energy does the load gain. (1mk)
(iii) How much work is done by the effort? (1mk)
(iv) What is the efficiency of these pulleys? (2mks)

(b) A small pump develops an average power of 100w it raises water from a borehole to a point 10M above the water level. Calculate the mass of water delivered in 30 minutes. (3mks)

20. The figure below shows a set-up used to investigate Charles Law.



(i) State **one** missing item in the set-up. (1mk)
(ii) Name **two** measurements to be taken in this experiment. (2mks)
(iii) Explain how the measurements stated above may be used to investigate Charles Law. (4mks)

KAHURO/MURANG'A EAST JOINT EXAMINATION – 2016
Kenya Certificate of Secondary Education
232/2
PHYSICS
PAPER 2
(THEORY)
TIME: 2 HOURS

SECTION A: (25 MARKS)

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

1. Figure 1 shows a circuit contains a battery of cells V, a 3A fuse, F, a switch S, and two identical lamps L_1 and L_2. A current of 2A flows through lamp L_2 when the switch is open.

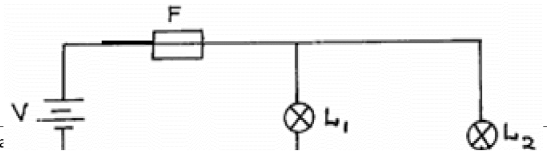


Figure 1

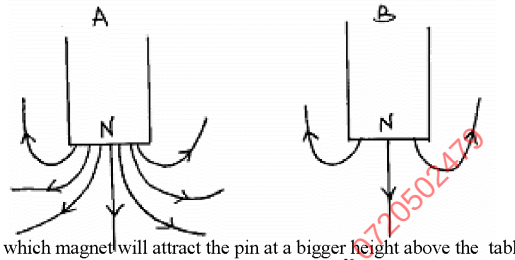
Explain why the fuse may blow when the switch is closed. (2mks)

2. What property of light is suggested by the formation of shadows? (1mk)
3. A student holds a large concave mirror of focal length 1M, 80cm from her face. State **two** characteristics of her image in the mirror. (2mks)
4. A positively charged rod is brought close to the cap of a gold leaf electroscope, it is observed that the gold leaf diverged further. Explain this observation. (2mks)
5. The chart below shows an arrangement of different parts of the electromagnetic spectrum.

Radio wave	Infrared rays	B	Ultra-violet	χ-Rays	Gamma-Rays

Name the radiation represented by **B**. (1mk)

6. In a cathode ray oscilloscope the time base is set at 25ms/mm. Given that crest to crest of a signal covers a length of 6cm, determine the frequency of the signal. (3mks)
7. Two magnets **A** and **B** in figure 2 were brought from a point high above a table towards a steel pin.



State with a reason which magnet will attract the pin at a bigger height above the table. (2mks)

8. A radioactive sample of half-life 260 days initially has 2.0×10^{20} radioactive atoms. Calculate the number of atoms that would decay after 780 days. (3mks)
9. Explain how a P-type semiconductor is made from a pure semiconductor. (2mks)
10. Distinguish between transverse and longitudinal waves. (2mks)
11. A policeman standing between two high walls fires a gun. He hears the first echo after 3 seconds and the next 2 seconds later. What is the distance between the wall. (Take velocity of sound = 330m/s). (2mks)
12. Figure 3 shows two parallel current carrying conductors Y and Z placed close to each other. The direction of the current is into the place of the paper.

Figure 3

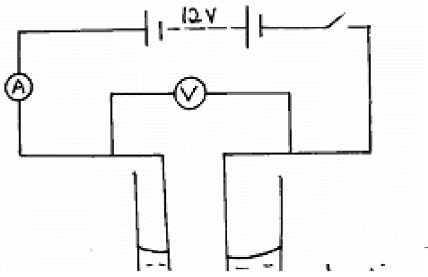
(i) Sketch the magnetic field patterns. (1mk)

(ii) Indicate the force F due to the current. (1mk)

SECTION B: (55 MARKS)

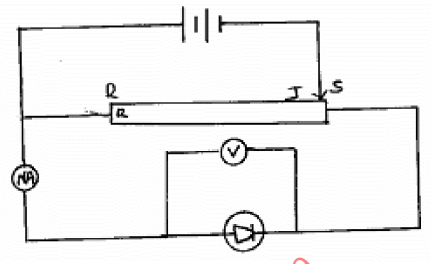
13. The figure 4 shows a circuit with a coil used to warm oil in a beaker.

Figure 4



(a) State the Ohm's Law. (1mk)
(b) (i) Explain how heat is produced in the coil. (2mks)
(ii) Given that the reading of the ammeter is 2.5A, determine the resistance of the coil. (3mks)
(iii) How much heat is produced in the coil in a minute? (3mks)
(iv) Give **two** changes that can be made in the set-up in order to produce more heat per minute. (2mks)
(c) Figure 5 below shows a circuit used to study behaviour of diode.

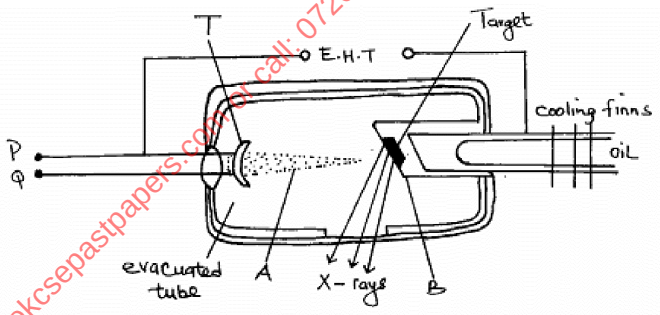
Figure 5



State the behaviour of voltmeter reading as Jockey J is moved from **S** to **R**. Explain. (2mks)

14. (a) State **two** properties of χ-rays. (2mks)
(b) Figure 6 below shows an χ-ray tube. Use it to answer questions that follow.

Figure 6

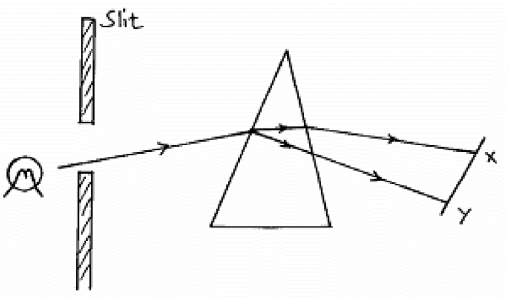


(i) Name parts labelled **A** and **B**. (2mks)
(ii) Explain how a change in the potential across P changes the intensity of the χ-rays produced in the tube. (2mks)

(iii) During the operation of the tube, the target becomes very hot. Explain how this heat is caused. (2mks)
(iv) Name a suitable material for the target. (1mk)
(v) Name the part labelled **T**. (1mk)
(vi) Why is the tube evacuated? (1mk)
(c) In a certain χ-ray tube, the electrons are accelerated by a p.d. of 24000V. Assuming all the energy goes to produce χ-rays, determine the frequency of the χ-rays produced. (Plank's constant h = 6.62 x 10^{-34}Js and charge on an electron, e = 1.6 x 10^{-19}C). (3mks)

15. Figure 7 below shows a narrow beam of white light onto a glass prism.

Figure 8



(i) What is the name of the phenomenon represented in the diagram? (1mk)
(ii) Name the colour at **X** and **Y**. Give a reason. (3mks)
(iii) What is the purpose of the slit? (1mk)

(b) Figure 8 below shows the path of ray of yellow light through a glass prism.The speed of yellow light in the prism is 1.8 x 10^8m/s.

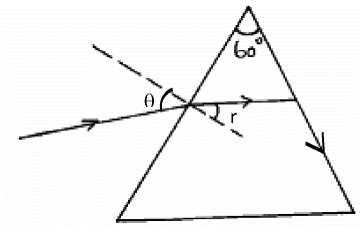


Figure 8

(i) Determine the refractive index of the prism material (speed of light in vacuum C = 3.0 x 10^8m/s). (3mks)
(ii) Show on the same diagram, the critical angle, c, and hence determine its value. (3mks)
(iii) Given that r = 31.2°, determine the angle θ. (3mks)

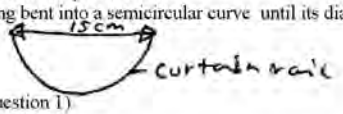
16. (a) State **one** difference between a transformer and an induction coil. (1mk)
(b) State **two** energy losses in a transformer. (2mks)
(c) A transformer has 1000 turns in its secondary coil and 10 turns on its primary coil. An alternating current of 2.5A flows in the primary circuit when it is connected to a 12V a.c. supply.
(i) State the type of transformer. (1mk)
(ii) Calculate the power input to the transformer. (3mks)
(iii) Calculate the e.m.f. across the secondary coil. (3mks)
(iv) Determine the maximum current that could flow in a circuit connected to the secondary coil if the transformer is 80% efficient. (Use the e.m.f in secondary as calculated in (iii) above). (3mks)
(v) In transmitting power why is it necessary to step up before transmission. Explain. (2mks)

KAHURO/MURANG'A EAST JOINT EXAMINATION – 2016
232/3
PHYSICS
PAPER 3 (PRACTICAL)
CONFIDENTIAL
Each candidate will require the following:
Q1.
- Vernier calipers (to be shared)
- A source of boiling water.
- A glass beaker (200 – 250ml)
- A thermometer (0 - 110°C)
- A stop watch.
- A magnifying glass.

- A plastic measuring cylinder (100ml).
- A circular cardboard plate with a hole to fit a thermometer (Diameter about 8cm).

Q2.

- Two new dry cells.
- A cell holder.
- A variable resistor (50Ω) labelled K.
- A carbon fixed resistor labelled R whose value is 10Ω.
- A voltmeter (0 – 3 or 0 – 5V).
- An ammeter (0 – 1A).
- A switch.
- 8 connecting wires, 2 with a crocodile clip at one end.
- A piece of curtain rail, 20cm long bent into a semicircular curve until its diameter is 15cm.



- A glass marble.
- A stopwatch (the one used in question 1).
- A half metre rule.
- Some plasticine (about 30g).

NB: To make the curves curtain rails the teacher in charge of Physics may cut 20cm long pieces of the rail from the rails available in hard waves.

KAHURO/MURANG'A EAST JOINT EXAMINATION – 2016
232/3
Kenya Certificate of Secondary Education
PHYSICS
PAPER 3
(PRACTICAL)
TIME: 2½ HOURS

Question 1

You are provided with the following:

- A vernier calipers (to be shared).
- A source of boiling water.

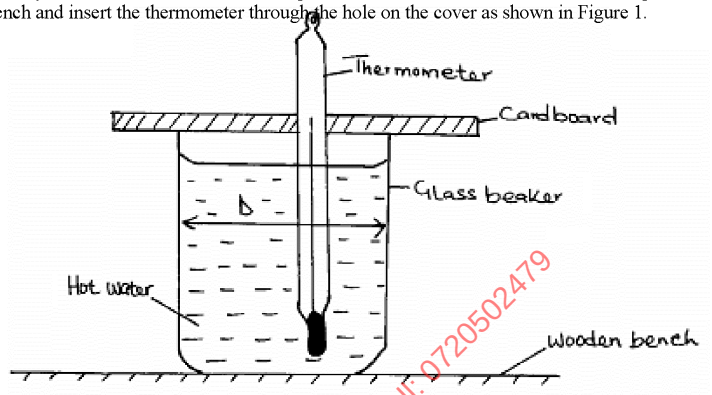
- A glass beaker (250ml).
- A thermometer (0 - 110°C).
- A stopwatch.
- A magnifying glass.
- A plastic measuring cylinder (100ml).
- A cardboard circular plate with a hole.

Proceed as follows:

(a) Measures and record the room temperature θ_R.
θ_R = …… °C. (1mk)

(b) Using the vernier calipers provided, measure the internal diameter D of the glass beaker at its centre. (Position shown in figure 1).
D = …… m. (1mk)

(c) Measure exactly 150ml of the hot water into the glass beaker and cover it with the cardboard plate. Place the beaker on a wooden bench and insert the thermometer through the hole on the cover as shown in Figure 1.



(d) Measure and record the temperature θ of the cooling water after every two minutes for at least 12 minutes (use the magnifying glass provided to read the scale move accurately). Record the values of the temperature θ in table 1 below. (3mks)

Table 1

Time (min)	2	4	6	8	10	12
Temperature θ (°C)						

(e) Plot a graph of θ (°C) against time t (min) on the grid provided. (3mks)

(f) On the graph construct, as accurately as possible, five tangents at temperatures of 75°C, 70°C, 65°C, 60°C and 55°C. Find the slope of each and record the value in table 2 below. (5mks)

Table 2

Temperature θ (°C)	75	70	65	60	55
$(\theta - \theta_R)$ (°C)					
Slope of tangent $\frac{\theta}{t}$ (°C min^{-1})					

(g) Plot a graph of slope $\frac{\theta}{t}$ of tangents against temperature difference $(\theta - \theta_R)$. (4mks)

(h) Find the gradient of the graph. (2mks)

(i) Determine the value of constant K from the graph given that $K = \frac{SMC}{A}$ where M is mass of water in kilograms, C is specific heat capacity of water = 4200$jkg^{-1}K^{-1}$ and A the surface area of the beaker walls in contact with the hot water $A = 2\pi\frac{D}{2L}$, and S is the slope of the graph. (1mk)

Question 2

You are provided with the following:

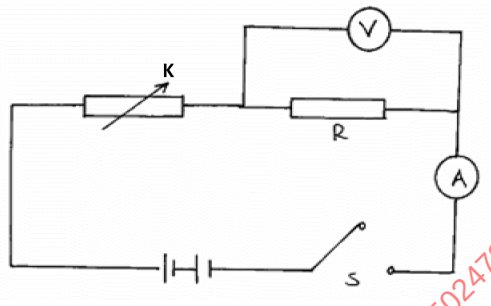
- Two dry cells.
- A cell holder.

- A variable resistor labeled K.
- A carbon fixed resistor labeled R.
- A voltmeter.
- An ammeter.
- A switch.
- 8 connecting wires at least two with a crocodile clip at one end.
- A curved curtain rail.
- A glass marble.
- A stopwatch.
- A half metre rule.
- Some plasticine.

PART A

Proceed as follows:

(a) Starting with the switch's open connect the circuit as shown in figure 2 below.



(b) Close the switch S and adjust the variable resistor K until the ammeter reading is 20mA. Record the corresponding voltmeter reading in table 3.

(c) Repeat step (b) above for other values of ammeter readings and complete Table 3. (6mks)

Table 3

I (mA)	20	40	60	80	100	120
I (A)						
P.d (V)						

(d) Plot a graph of I (A) against p.d (V) on the grid provided below. (5mks)

(e) From the graph, determine

(i) the slope S. (2mks)

(ii) State the quantity represented by the slope S and state its S.I units. (2mks)

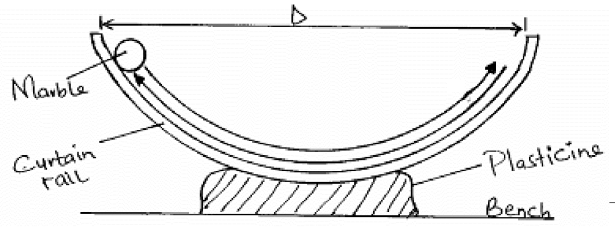
(iii) Value of resistor R. (1mk)

PART B

Process as follows:

(f) Measure the diameter D of the semicircular curtain rail provided using the half metre rule (Figure 3 below).

D = …… m (1mk)



(g) Fix the lower end of the curtain rail on the bench using some plasticine as in Figure 3 above. Place the marble on one end of the curtain rail and let it oscillate freely. Record the time t_1 taken by the marble to make 5 complete oscillations. Repeat this 3 times and calculate the average time for 5 oscillations.
Complete table 4 below. (1mk)

t_1	t_2	t_3	$t_{AVR} = \frac{t_1 + t_2 + t_3}{3}$

(h) Determine the periodic time T(S).
T = …… (s). (1mk)

(I) Given that

$T = 2\pi\sqrt{\frac{D}{2g}}$ Determine the value of constant g. (1mk)

KAHURO/MURANG'A EAST JOINT EXAMINATION – 2016
232/1 – PHYSICS PAPER 1 MARKING SCHEME

1. Mass of A = 0.8χ
Mass of B = 1 x 1000 = 1000g

$= \frac{Total\ mass}{Total\ volume}$ ✓

NANDI NORTH AND NANDI CENTRAL SUB-COUNTIES JOINT EXAMINATIONS 2016

Kenya Certificate of Secondary Education (KCSE)
232 / 1
PHYSICS
PAPER 1
TIME: 2 HOURS
SECTION A (25 MARKS)
Answer ALL questions in this section in the spaces provided

1. The micrometer screw gauge represented by figure 1 has a thimble scale of 50 divisions.
   What is the reading shown? (1mk)
2. The bar AB represented in figure 2 has negligible weight and is pivoted at A.
   Find the weight W when the bar is equilibrium. (3mks)
3. Explain why a glass container with thick walls is more likely to crack, than one with a thin wall when a very hot liquid is poured into them. (1mk)
4. Two identical alluminium rods are placed as shown in figure 3. One rests on a metal block and the other on a wooden block. The protruding ends are heated on a Bunsen burner as shown.
   State with a reason on which bar of the wax is likely to melt sooner. (2mks)
5. A spring stretches by 5cm when 40N force is applied to it. If the 40N force is replaced by 125N, how much further would the spring stretch? (3mks)
6. (a) A body in circular motion moving at constant speed is said to be accelerating. Explain this. (1mk)
   (b) A stone of mass 450g is rotated in a vertical circle at 3 revolutions per second. If the string has a length of 1.5m, determine its linear velocity. (2mks)
7. State the variable force acting on a ball bearing released to fall freely on a surface of glycerin. (1mk)
8. Figure 4 shows a manometer used to measure the pressure of gas.
   The force exerted by gas on A is 20,000N. Calculate the density of the liquid given that the cross-sectional area of A is $0.1m^2$ and the atmospheric pressure is 100,000 Pascals. (3mks)
9. State the Newton's second law of motion. (1mk)
10. A trolley of mass 4kg is moving with a velocity of 3m/s and collides head on with another trolley of mass 2kg travelling in the opposite direction a velocity of 4m/s. After collision both trolleys fuse and move with a common velocity V. Determine V. (2mks)
11. Water flows through a horizontal pipe of varying cross-sectional area as shown in figure 5.
    The volume flux is $30m^3/s$. calculate the change in speeds of the fluid. (3mks)
12. In an experiment to determine the density of ground stones a form one student obtained the following results
- Mass of empty density bottle – Xg
- Mass of density bottle filled with water – Yg
- Mass of density bottle + ground stones – Vg
- Mass of density bottle + ground stones + top up water – Zg

Use the information to calculate the density p of the ground stones. (3mks)

SECTION B: 55 MARKS
ANSWER ALL QUESTIONS IN THIS SECTION.

13. (a)Using the kinetic theory of gases, explain how rise in the temperature of a gas causes a rise in the pressure of the gas if the volume is kept constant. (2mks)
    (b) Figure 6 below shows a set up that may be used to verify Charles' law.
    (i) State the measurements that should be taken in the experiment. 2mks
    (ii) Explain how the measurement taken in (i) above, may be used to verify Charles Law. (4mks
    (c) A certain mass of hydrogen gas occupies a volume of $1.6m^3$ at a pressure of $1.5x10^5$ pa and temperature 12°C. Determine its volume when the temperature is O° at a pressure of $1.0x10^5$pa. (3mks)
14. (a)State the law of floatation. (1mk)
    (b)The figure 7 below shows a simple hydrometer.
    (i) State the purpose of the lead shots in the glass bulb. 1mk
    (ii) How would the hydrometer be made more sensitive? 1mk
    (iii) Describe how the hydrometer is calibrated to measure relative density. 2mks
    (c) Figure below shows a cork floating on water and held to the bottom of the beaker by a thin thread.
    (i) Name the forces acting on the cork. (3mks)
    (ii) Describe how each of the forces mentioned in (i)above changes when water is added into the beaker until it fills p. (3mks)
15. An engineer uses a pulley with a velocity ratio of 6 to raise an engine out of a vehicle. The engine which has a weight of 3200N is raised through a vertical distance of 1.5m by the machine. If the machine pulls within an effort of 600N, calculate:-
    (i) The work done by the machine. (3mks)
    (ii) The work done by effort. (2mks)

(iii) The efficiency of the machine. (3mks)

(iv) State **two** reasons why the efficiency in (a) (iii) above is not 100%. (2mks)

(c) (i) State the law of conservation of energy. (1mk)

(ii) The graph shown below shows how potential energy of a stone thrown vertically upwards varies with height. Sketch on the same axes the graph of kinetic energy against height. (1mk)

16. (a) Differentiate between specific heat capacity of ice and specific latent heat of ice. (1mk)

(b) Figure 9 shows an incomplete circuit set-up by a student to determine the specific capacity of an Alluminium block of mass 1.4kg.

(i) Complete the diagram showing missing components in their correct symbols. (2mks)

(ii) During the experiment, the heater was switched on for 15 minutes. The ammeter and voltmeter were found to be steady at 3A and 48V respectively. The temperature rose by 250C. Calculate the specific heat capacity of the Aluminum block. (4mks)

(iii) Give **two** precautions which should be taken in when carrying out the experiment so as to obtain accurate results. (2mks)

17. (a) A body in motion is uniformly retarded from a certain velocity to a final velocity V in a time of t seconds.

(i) Sketch a velocity time graph to show the motion. (1mk)

(ii) Using the drawn graph show how to get the final velocity V. (2mks)

(iii) By finding the area under the graph, show that the total displacement for the motion is given by $s = ut + \frac{1}{2} at^2$. (3mks)

(b) A stone of mass 0.5kg is whirled in a vertical circle by a cord of length 1.5m at a velocity of 30m/s. Find the maximum tension on the cord. (3mks)

(c) Speed governor is one of the applications of circular motion. Explain how it works. (3mks)

NANDI NORTH AND NANDI CENTRAL SUB-COUNTIES JOINT EXAMINATIONS 2016

Kenya Certificate of Secondary Education (KCSE)
232 / 2
PHYSICS
PAPER 2
TIME: 2 HOURS
SECTION A (25 MARKS)
Answer ALL questions in this section in the spaces provided

1. Name **two** measurements you would need to determine whether a lead accumulator is fully charged. (2mks)
2. Fig. 1 shows a ray of light striking a mirror at an angle of incidence of 45^0. Complete the diagram to show the path of the ray and the angle of reflection at which it leaves the second mirror. (2mks)
3. Figure 2 shows a straight electrode placed near a point charge. Draw the electric field map between them.
4. Figure 3 shows an electric circuit operated by four dry cells each of e.m.f 1.5V and internal resistance of 0.2Ω. When the switch is closed, the ammeter reads 0.2A. (3mks)
5. The graphs in figure 4 represents the same wave.

   Determine the velocity of the wave. (3mks)
6. Arrange the following waves in order of increasing frequency; X-rays, visible light, infrared, T.V waves, microwaves, ultraviolet, y-rays. (1mk)
7. Two heaters A and B are connected in parallel across a 240V mains supply. Heater A is rated 1000W and B 2500W. Calculate the ratio of their resistances. (3mks)
8. Draw a circuit showing a junction diode in a reverse bias connection to a cell. (2mks)
9. Find the cost of using a 3000W electric heater for 24 hours. The cost of a unit is sh. 2.00. (2mks)
10. Figure 5 below represents a soft iron bar being magnetized.

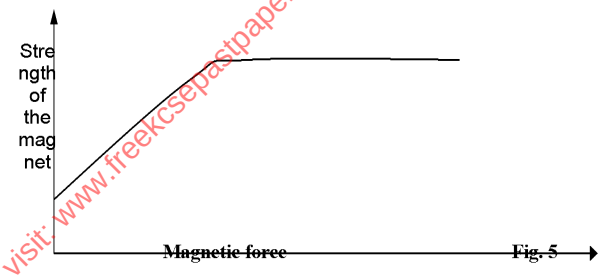
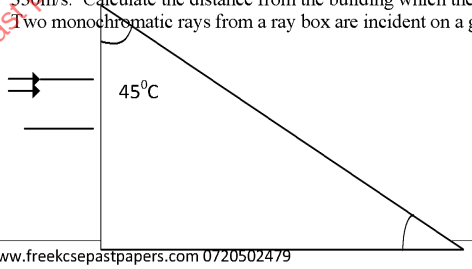


Fig. 5

   Explain the shape of the graph. (1mk)
11. A gun is fired in front of a high building. It takes 2 seconds for the soldier to hear the echo. If the speed of sound in air is 330m/s. Calculate the distance from the building which the soldier stands. (2mks)
12. Two monochromatic rays from a ray box are incident on a glass prism of refractive index 1.56 as shown in the figure below.



Draw on the diagram how the rays are refracted until they leave the prism. (2mks)

13. What is the purpose of a commutator in an electric current? (1mk)

SECTION B (55 MARKS)

14. (a) A Television tube uses a voltage of 4.55k.V to accelerate electrons released from its cathode by thermionic emission.
    (i) What is meant by thermionic emission? (1mk)
    (ii) If the electron has a charge of -1.6×10^{-19}C and the mass of an electron is 9.1×10^{-31}kg, find:-
    I. The energy of an electron striking the television screen. (3mks)
    II The speed of the electron as it strikes the screen. (3mks)
    (b) Figure 7 shows a cathode ray oscilloscope.
    (i) State the function of the components labeled A, B, C and D. (4mks)
    (ii) Sketch what will be observed on the screen when an A.C voltage is connected to the Y-plates. (1mk)
15. (a) Figure 8 below represents an eye defect.
    (i) State **two** possible causes of the defect. (2mks)
    (ii) Draw a ray diagram to show how the defect can be corrected. (1mk)
    (b) An object O placed in front of a converging lens Lo forms an image I on the other side of the lens. Another Converging lens Le 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. (3mks)
    (ii) State the reason why the focal length of Lo must be greater than that of Le. (1mk)
    (c) An object is placed 20cm from a converging lens. A focused image is formed on a screen placed 30cm from the lens on the other side. If the screen is moved 6cm towards the lens, work out the distance the object must be moved for the image to be formed on the screen. (3mks)
16. (a) What is radioactivity? (1mk)
    (b) The graph below shows radioactive decay of iodine.
    Graph
    Use the graph to determine the half-life of iodine. (2mks)
    (c) Figure 9 below shows a G.M tube.
    Diagram
    (i) Give the reason why the mica window is made thin. (1mk)
    (ii) Explain how the radiation entering the tube is detected by the tube. (3mks)
    (iii) What is the purpose of the halogen vapour? (1mk)
    (d) A sample of a radioactive substance of half life 1500 years has an activity of 32000 counts per hour. Find the time it will take for the activity to decrease to 2000 counts per hour. (3mks)
17. Figure 10 shows UV light shone on a zinc plate placed on a negatively charged leaf electroscope. It was observed that the leaf collapses.
    Diagram
    (a) State and explain the above observation. (2mks)
    (b) Figure 11 below shows a photocell.
    (i) State the reason of using an evacuated photocell. (1mk)
    (ii) Explain the role of resistor P in the circuit. (1mk)
    (iii) What is the effect on the reading of the millimeter if the frequency of the radiation falling on the cathode is increased? (2mks)
    (iv) Briefly explain how the set up can be used as an automatic switching device alarm.(2mks)
    (c) A surface whose work function is 1.82×10^{-19}J is illuminated with light of frequency 4.0×10^{14}HZ. Work out the minimum kinetic energy of the emitted photoelectrons. ($h = 6.6 \times 10^{-34}$Js) (3mks)
18. (a) State **one** cause of energy losses in a transformer and explain how it can be minimized. (2mks)
    (b) A transformer is designed to supply a current of 7.5A at a potential difference of 100V to a motor from an A.C supply of 240V. If the efficiency of the transformer is 85%, calculate;-
    (i) The power supplied to the transformer. (3mks)
    (ii) The current in the primary coil. (3mks)
    (c) Fig. 12 below shows a cross-section of a bicycle dynamo. The wheel is connected by an axle to a permanent cylindrical magnet and is rotated by the bicycle tyre.
    (i) Explain why the bulb lights. (2mks)
    (ii) How can the bulb be made brighter? (1mk)

NANDI NORTH DISTRICT JOINT MOCK 2013

232/3 – PHYSICS PAPER 3
CONFIDENTIAL
QUESTION 1

1. Two dry cells (Size D, each 1.5V)
2. Nichrome Wire (SWG 28 – 100cm long mounted on a mm scale).
3. An ammeter.
4. Cell holder.
5. 6 connecting wires with crocodile clips.
6. Switch.
7. A Voltmeter
8. A Jockey (Crocodile clip)

QUESTION 2

1. A metre rule.
2. One Stop watch.
3. One complete stand.
4. One spring, (spring constant 0.1N/cm) Range 0.07 – 0.12Ncm^{-1}
5. 2 pieces of wood.
6. Beam balance or electronic balance (to be shared).
7. One 100g mass labeled M.

NANDI NORTH AND NANDI CENTRAL JOINT EXAMINATIONS 2016

Kenya Certificate of Secondary Education (KCSE)
232 / 3
PHYSICS
PAPER 3
(PRACTICAL)
JULY / AUGUST 2016
TIME: 2 ½ hours

1. You are provided with the following:-

- Nichrome wire (SWG 28) mounted on a mm scale.
- Micrometer screw gauge (to be shared).
- Voltmeter (0 – 3V or 0-5V)
- Ammeter (0-1A)
- Switch
- Jockey / long wire with crocodile clip attached.
- One new dry cell and a cell holder.
- 6 connecting wires with crocodile clips attached to one end.

Proceed as follows:

i. Set up the circuit below and ensure that when the switch is open, both meters read zero, keep the switch open when readings are not being taken.
Diagram
(i) Measure and record the diameter d of the nichrome wire AB mounted on a mm scale using the micrometer screw gauge. (1mk)
d = ……mm = ……m
(ii) Disconnect the jockey from wire AB and close the switch. Record the value E of the voltmeter reading.
E = …… V (1mk)

ii. Now, connect the jockey on AB at a distance L = 2.5cm. Close the switch and record the voltmeter and ammeter readings, V and I respectively in table 1 below.
Table 1

L(cm)	2.5	7.5	10.0	20.0	30.0	40.0
P.d(V)						
Current I (A)						
IV (watts) 4d.p						

(i) Complete the table (6mks)
(ii) Plot a graph of IV (Vertical axis) against L. (5mks)
(iii) Using your graph, find the value Lo where the line intersects the horizontal axis. (1mk)
Lo = ……cm

iii. Now, place the jockey on AB such that the length l is 63cm. Close the switch and record both the voltmeter reading, V and the ammeter reading, I. (2mks)
V= _____ V
I= _____ A

iv. Determine the value r from the relation. (2mks)

$$r = \frac{E - V}{I}$$

v. Determine the value of X from the relation: (2mks)

$$r = \frac{\pi r d^2}{2.52}$$ where π= 3.142

Question 2

2. **PART A**
You are provided with the following:-

- Vernier calipers

- Micrometer screw gauge
- Masses: one 10g, two 20g and one 100g.
- A helical spring.
- Metre rule or half metre rule.

Proceed as follows:

a. Determine the number of complete turns of the helical spring.
N = _____ (1mk)

b. Measure the external diameter of the spring using the vernier calipers.
D = _____m. (1mk)

c. Use the micrometer screw gauge to determine the diameter of the wire of the spring.
d = _____ m (1mk)

d. Determine the value of m.

$$N = \frac{0.4D}{dm}$$

e. Suspend the helical spring vertically alongside the clamped half metre rule as shown in figure 3 below. Determine the length Lo of the spring before loading it.
Lo = _____ cm

f. Load the spring with a mass of 20g and determine the new reading on metre rule, (L). Record this in the table below. Determine the extension e = L – Lo due to the mass of 20g and record the value in the table given below. Repeat step (f) for other masses and complete the table. (6mks)

Mass(g)	0	20	30	40	50	60	70	80	90	100
Weight (N)										
Reading (L) (cm)										
Extension e (cm)										
$\frac{1}{e}\left(cm^{-1}\right)$										

g. Plot a graph of weight (N) against $\frac{1}{e}\left(cm^{-1}\right)$ (5mks)

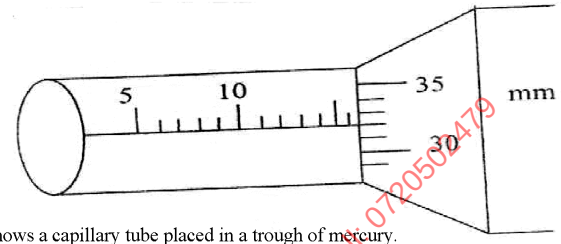
h. Determine the slope S of the graph at a mass of 55g. (2mks)

i. Given that $m = \frac{255T}{S^2}$, determine the value of T. (2mks)

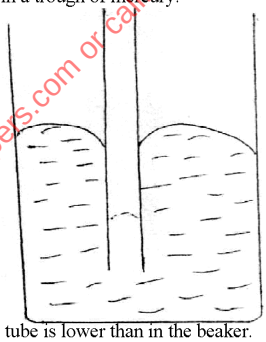
NANDI EAST, NANDI SOUTH & TINDERET SUB-COUNTIES JOINT EVALUATION 2016

Kenya Certificate of Secondary Education (KCSE
232 / 1
PHYSICS
PAPER 1
THEORY
JULY / AUGUST 2016
TIME: 2 HOURS
SECTION A (25 MARKS)
Answer ALL questions in this section in the spaces provided

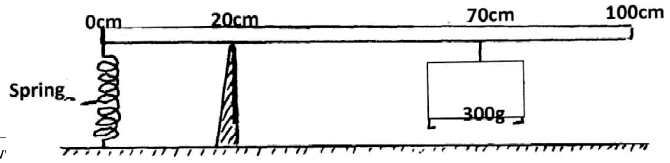
1. Figure 1 below shows a section of a micrometer screw gauge used by a student to measure the diameter of a wire. Determine the cross-sectional area of the wire. (2mks)



2. Figure 2 below shows a capillary tube placed in a trough of mercury.

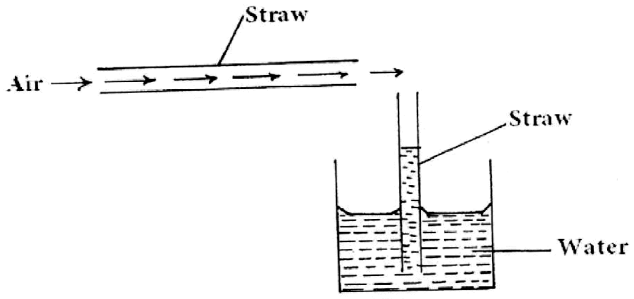


Give a reason why the level of mercury in the tube is lower than in the beaker. (1mk)
3. Body scanners and lasers are applications of physics in medicine. State **one** other application. (1mk)
4. A piece of sealing wax, weighs 3N in air and 0.22N when immersed in water. Calculate the density of the wax. (2mks)
5. The barometric height in a town is 65cmHg. 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) (2mks)
6. When the temperature of a gas in a closed container is raised, the pressure of the gas increases. Explain in terms of kinetic energy how the molecules of the gas cause an increase in pressure. (2mks)
7. A certain mass of hydrogen gas occupies a volume of 1.8m^3 at pressure of 2.5 x 10^5 N/M^2 and a temperature of 270C. Determine the volume when the temperature 0^0C at a pressure of 7.5 x 10^4 N/M^2. (3mks)
8. The figure below shows a uniform metal rod of mass 100g balanced over a pivot using a spring balance and a mass of 300g.



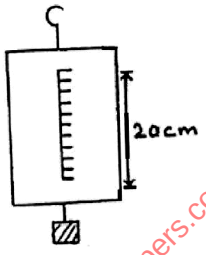
Calculate the tension in the spring. (3mks)

9. A student below air into a horizontal straw in the direction shown in the diagram below.



State what was observed in the vertical straw. (1mk)

10. The figure below shows a spring balance, its spring constant is 225N/m. The scale spreads a distance of 20cm.

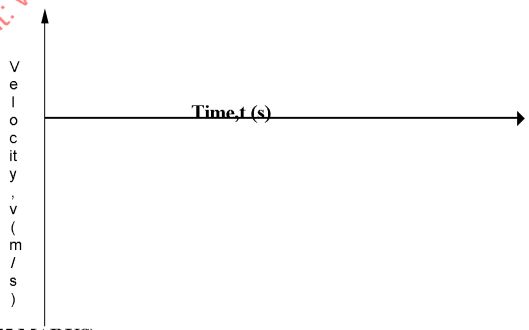


Determine the maximum weight that can be measured using the spring balance. (2mks)

11. Give a reason why water is not a suitable liquid for use in a barometer. (2mks)
12. An oil drop of radius 0.42mm when placed in water spreads out to form a circular patch of radius 42cm. using this information:

a. Estimate the size of the oil molecule. (2mks)
b. State any **one** assumption you made in your calculation. (1mk)

13. An object is fired vertically upwards from the ground level with a velocity of 50m/s and reaches a maximum height h. It falls back to the ground. Sketch velocity time graph to represent the motion of the object from the time it is fired till it hits the ground.



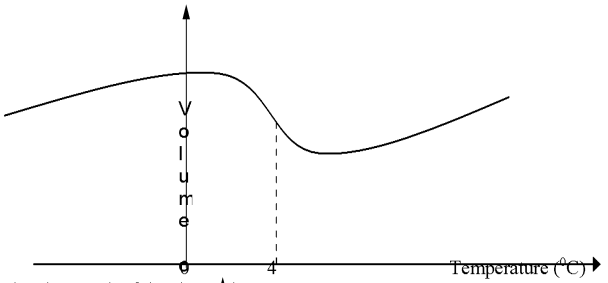
SECTION B (55 MARKS)

Answer ALL questions in this section on the spaces provided.

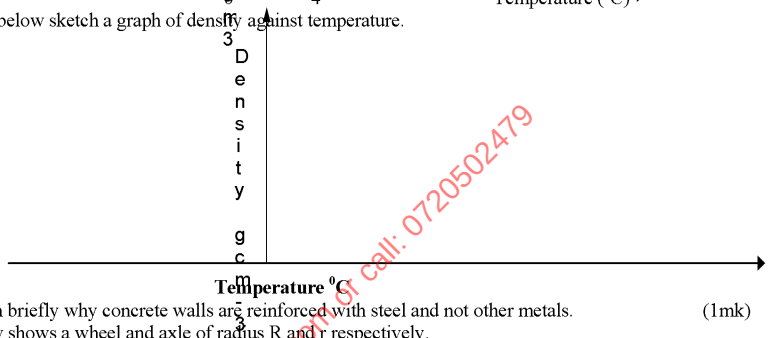
14. (a) State **two** factors that affects conductivity in metals. (2mks)

(b) You are provided with a metallic ball, a metallic ring and a source of heat. Describe how you would show that solids expand. (3mks)

(c) Figure below shows how water expands from lower temperatures.

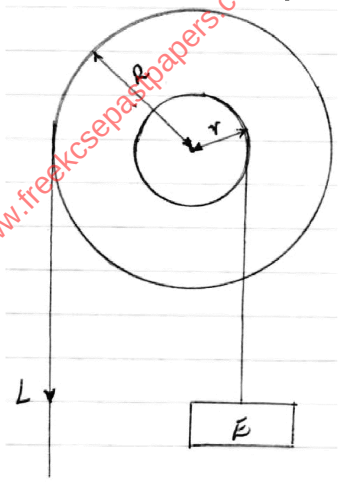


On the axes below sketch a graph of density against temperature.



(d) Explain briefly why concrete walls are reinforced with steel and not other metals. (1mk)

15. Figure below shows a wheel and axle of radius R and r respectively.



(a) Show that the velocity ratio of the system is given by $\left(\frac{R}{r}\right)$. (2mks)

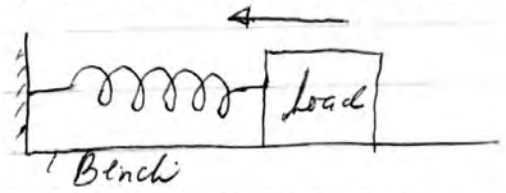
(b) Given that r = 5cm, R = 20cm and an effort of 1200N is used to lift a load of 3000N. Determine:

i. The work done by effort to raise the load through a distance of 2m. (3mks)

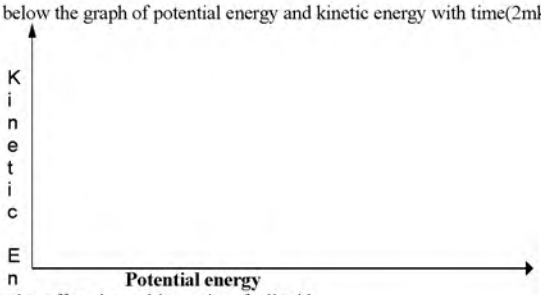
ii. The efficiency of the system. (3mks)

iii. State **two** ways in which the efficiency in (ii) above can be increased. (2mks)

(c) A stretched spring with a load attached to one end and fixed at the other is released as shown below.



Sketch on the same axis below the graph of potential energy and kinetic energy with time(2mks)



16. (a) State any **two** factors that affect the melting point of a liquid. (2mks)

(b) 600g of a solid X was heated by an electric heater rated 500W until it melted, temperature readings taken as it heats from room temperature. The graph shown below shows variation of temperature against time.

Graph of Temperature ^{0}C against time (minutes)

1. From the graph, determine the melting point of the solid X. (1mk)
2. I. Determine the heat supplied by the heater for solid X to melt. (2mks)
   II. Hence determine the specific latent heat of fusion for solid X. (2mks)
3. I. State the room temperature. (1mk)
   II. From the graph, determine the temperature change between the time t = 0 minutes and t = 4.0 minutes. (2mks)
   III. Hence determine the specific heat capacity of the solid X. (3mks)

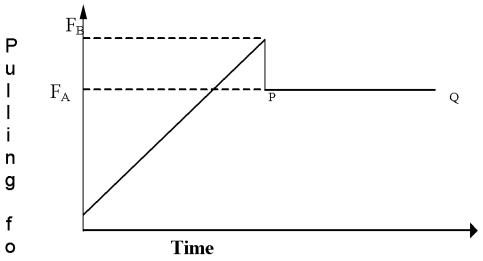
17. (a) State **two** factors that influence fractional force between two surfaces.

(b) Figure below shows a rectangular block of wood attached o a spring balance being pulled gently by a pulling force P at a steady velocity.

Block of wood

Spring balance

i. A graph of pulling force against time was drawn as shown below.

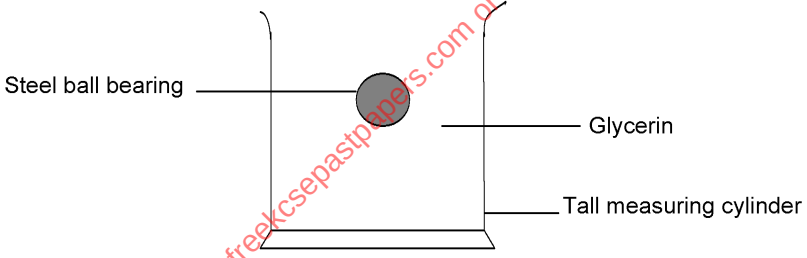


I. State the forces F_A and F_B.
F_A :.....(1mk)
F_B :.....(1mk)

II. From the graph, state what happens to the block of wood between point P and Q. (1mk)

ii. Given that the wooden box has a mass of 2.0kg and requires force of 5N to pull it with uniform speed along a horizontal surface, calculate the coefficient of friction between the surface and the block. Take (g = 10N/kg). (3mks)

(c) Figure below shows a steel bearing moving through glycerine at a steady velocity.



Indicate on the diagram the forces with directions acting on the ball bearing. (2mks)

18. (a) A body moving in a circular path with constant speed is said to be accelerating. Explain. (1mk)

(b) A stone of mass 40g is tied to the end of a string 50cm long such that it is 10m above the ground at its lowest as shown in the diagram.

The stone is whirled in a vertical circle at 2 rev/s.

I. (i) If the string breaks at point B, what is the velocity at this level? (2mks)
(ii) Determine the maximum horizontal distance it travels after breaking. (3mks)

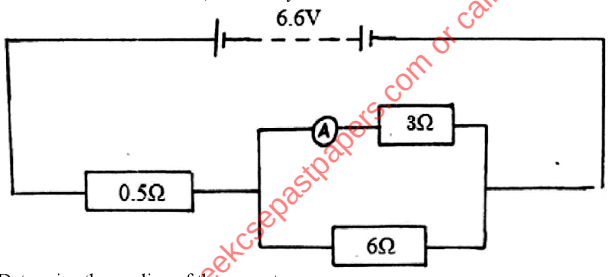
II. Calculate
i. The tension in the string at point B. (3mks)
ii. The tension in the string at point A. (2mks)

(c) State **one** application of Uniform Circular motion. (1mk)

NANDI EAST, NANDI SOUTH & TINDERET
SUB-COUNTIES JOINT EVALUATION 2016

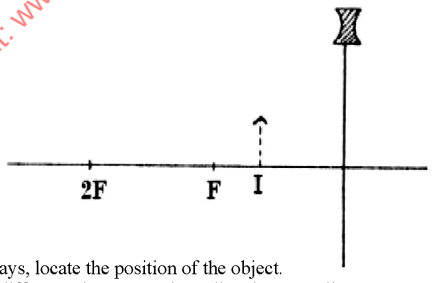
Kenya Certificate of Secondary Education (KCSE)
232 / 2
PHYSICS
PAPER 2
THEORY
JULY / AUGUST 2016
TIME: 2 HOURS
SECTION A: 25 MARKS
Answer all questions from this section.

1. A plain sheet of paper and a plane mirror both reflect light yet only the plane mirror forms images. Explain why the paper cannot form images. (2mks)
2. The element of an electric hot plate has a resistance of 120Ω. What is the energy dissipated when element is kept on for 10 minutes on a 240V supply? (2mks)
3. Arrange the following in order of increasing wavelength: Visible light, X-Ray, Ultra Violet Radiation and Radio Waves. (1mk)
4. In the circuit shown below, the battery has an e.m.f. of 6.6V and internal resistance of 0.3Ω.



Determine the reading of the ammeter. (3mks)

5. The figure below shows the image formed when an object is placed in front of a concave lens.

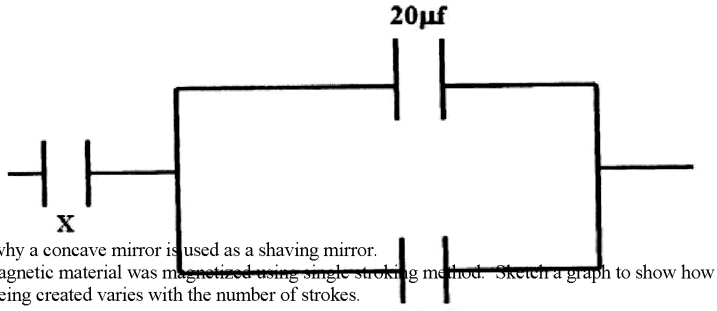


Using suitable rays, locate the position of the object. (3mks)

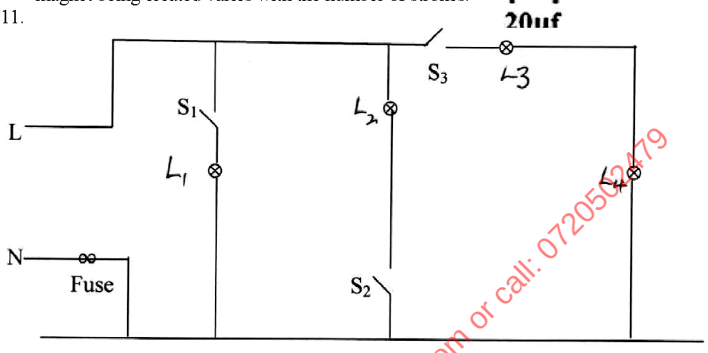
6. State the major difference between a dry cell and a wet cell. (1mk)

7. Radium $^{226}_{88}Ra$ disintegrates into a new stable element lead $^{206}_{82}Pb$. How many Alpha and Beta particles are emitted? (2mks)

8. The figure below shows an arrangement of three components. If the total capacitance of the capacitors is **5µf**, determine the value of X. (3mks)

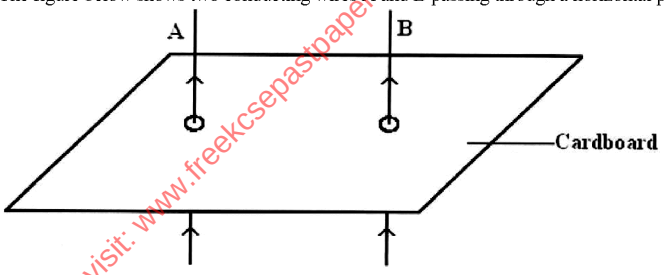


9. Explain why a concave mirror is used as a shaving mirror. (1mk)
10. A ferromagnetic material was magnetized using single stroking method. Sketch a graph to show how the strength of the magnet being created varies with the number of strokes. (2mks)
11.



Identify and explain **two** faults in the light circuit shown in the figure above. (2mks)

12. The figure below shows two conducting wires A and B passing through a horizontal piece of cardboard.



(a) Sketch the resultant magnetic field patterns when the currents of the high magnitude are flowing in both wires as shown. (1mk)

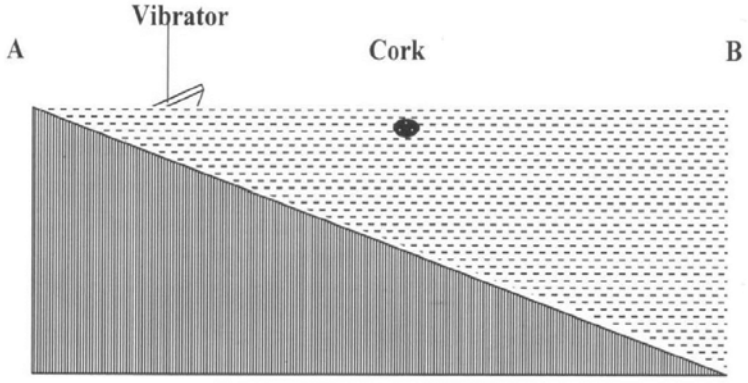
(b) What is the resulting effect of the field on the wires at the loose ends? (1mk)

13. State **one** property of high quality X-rays. (1mk)

SECTION B: 55 MARKS

Answer all the questions from this section.

14. (a) The figure below shows the cross-section of a ripple tank full of water. a piece of cork floats on the surface of water and a straight edge vibrator placed at shallow end A to generate waves that travel to deep end B.

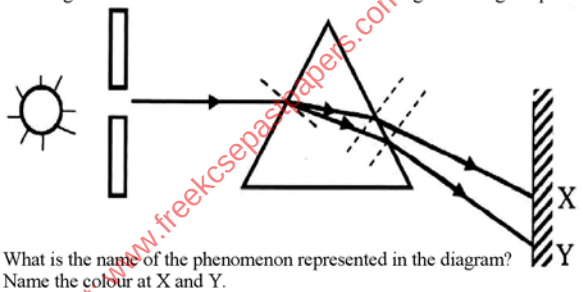


1. Name the type of wave generated on the water surface. (1mk)
2. The cork is observed to stay put despite passing water waves. Explain this observation. (2mks)
3. It was estimated that successive waves pass the cork every 0.25 seconds. If the speed of the waves is 0.28m/s, determine the frequency and wave length of the waves at that point. (4mks)
4. In the space provided, sketch the wavelength as viewed from a point above the ripple tank. (1mk)

A

(c) A ship sends out an ultrasound whose echo is received after 10 seconds. If the wavelength of the ultrasound in water is 0.05m and the frequency of the transmitter is 50KHz, determine the depth of the ocean.

15. (a) The diagram below shows a narrow beam of white light onto a glass prism.

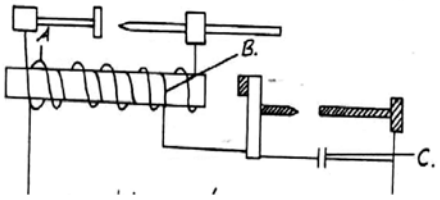


1. What is the name of the phenomenon represented in the diagram? (1mk)
2. Name the colour at X and Y. (2mks)
3. Give a reason for your answer in part (ii) above. (1mk)
4. What is the purpose of the slit? (1mk)

(d) The figure below shows the path of a ray of light passing through a rectangular glass block placed in air.

1. Determine the refractive index of glass. (2mks)
2. Given that speed of light in air 3.0×10^8m/s, find the speed of light in the glass. (2mks)

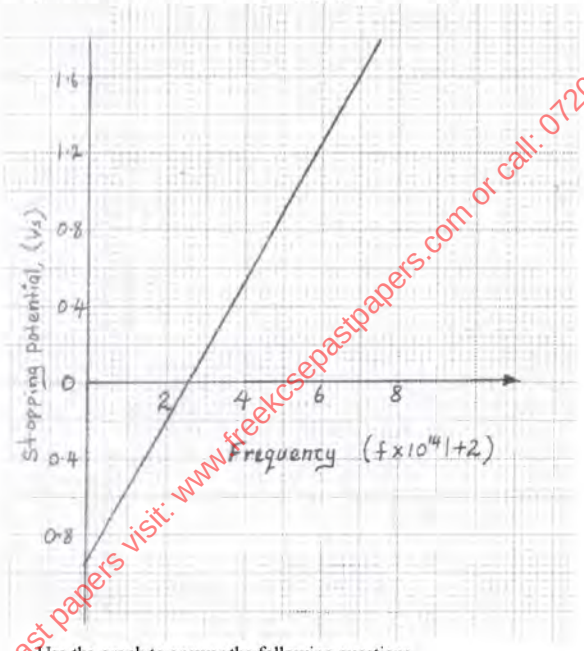
16. (a) What do you understand by the term mutual induction? (1mk)
(b) State **two** factors that determine the magnitude of e.m.f. induced in a coil. (2mks)
(c) The diagram below shows an induction coil used to produce sparks.



1. Name the parts labeled A, B and C. (3mks)
2. Explain the purpose of device C. (1mk)

(d) A transformer is used on a 240V A.C. supply to deliver 12A at 120A to a hating coil. If 20% of energy taken from the supply is dissipated in the transformer.
(i) What is the current in the primary coil? (3mks)
(ii) Give **two** causes of 20% energy dissipation in the transformation above. (2mks)

17. In an experiment to find the relationship between frequency of radiation and kinetic energy of photoelectrons in a photoelectric device, the following graph was obtained.

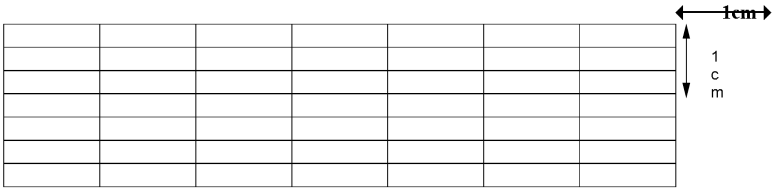


Use the graph to answer the following questions.

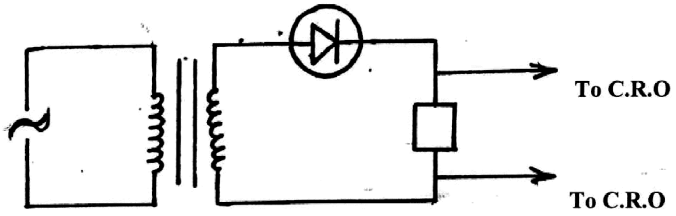
(e) (i) Determine the threshold frequency. (1mk)
(ii) Find the plank's constant h. (3mks)
(Take the charge of an electron to be .6 x 10^{-19}C)
(iii) Determine the work function of the metal in joules. (2mks)

(f) Determine the threshold wavelength of a metal whose work function is 2.4 x 10^{-18}J. (3mks)
(Take the plank's constant to be 6.63 x 10^{-34}Js)

(g) An alternating voltage of peak value 15V and frequency 25Hz is applied to the terminals of a cathode ray oscilloscope. The Y-gain is set at 5v/cm and the time base at 10ms/cm. Draw the trace observed on the screen. (3mks)



18. (a) What is an extrinsic semi conductor? (1mk)
(b) The figure below shows a PN junction diode used in a rectifier.



1. What type of rectification is shown? (1mk)
2. Describe how the rectification is achieved. (3mks)
3. State **two** disadvantages of this rectification. (2mks)
4. In the space provided below, sketch the output signal displayed on the CRO during the rectification process. (2mks)

NANDI EAST, NANDI SOUTH & TINDERET SUB-COUNTIES JOINT EVALUATION 2016

232/3
PHYSICS PRACTICAL
JULY / AUGUST 2016
CONFIDENTIAL INSTRUCTIONS TO SCHOOLS
Each student should be provided with the following apparatus:-
Question 1

- Two dry cells (size D)
- One bulb (1 – 3V)
- Voltmetr (0 – 3V or 0 – 5V)
- Ammeter (0 – 2.5A)
- A mounted nichrome wire (swg) on millimeter scale and labeled X and Y.
- Switch
- Seven connecting wires at least two with crocodile clips.
- Micrometer screw gauge (to be shared)

Question 2

- One metre rule
- Two knife edges each of height 20cm
- One piece of thread of length about 30cm
- An optical pin to act as a pointer
- Some cellotape
- One half metre rule
- One 400g mass or 100g x 4
- One complete stand and clamp
- Vernier calipers (to be shared)

- One concave mirror of focal length 10cm
- One mirror holder
- One white screen

NANDI EAST, NANDI SOUTH & TINDERET
SUB-COUNTIES JOINT EVALUATION 2016

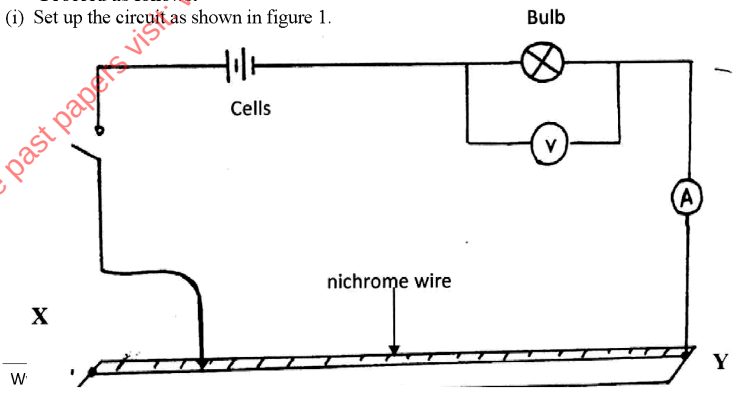
Kenya Certificate of Secondary Education (KCSE)
232 / 3
PHYSICS
PAPER 3
(PRACTICAL)
JULY / AUGUST 2016
TIME: 2 ½ hours

1. You are provided with the following:-

- Two dry cells (size D)
- One bulb
- Voltmeter (0 – 3V or 0 – 5V)
- Ammeter (0 – 2.5A)
- A Nichrome wire mounted on a millimeter scale
- Switch
- Seven connecting wire at least two with crocodile clips
- Micrometer screw gauge

Proceed as follows:

(i) Set up the circuit as shown in figure 1.



ii) With the crocodile clip at X read and record the voltmeter reading, V and the ammeter reading I in table 1 below. Repeat this procedure for the lengths, L = 80, 60, 40, 20 and 0 respectively.

Table 1

Length, L(cm)	100	80	60	30	40	20	0
Voltage V(v)							
Current, I(A)							
Resistance, $R = \frac{V}{I}(\Omega)$							

(iv) Plot a graph of the ammeter reading (y = axis) against voltmeter reading. (5mks)

(v) Determine the slope of your graph at V = 0.45 volts. (2mks)

(vi) What physical quantity is represented by the slope of the graph at any given point? (1mk)

i. (i) Given the apparatus in a (i) above, draw a diagram of a circuit you would use to determine the current through the resistance wire and the potential difference across it. (2mks)

i. Set up the circuit you have drawn. Record the ammeter reading, I and the voltmeter reading V, when L = 100cm.
V = ……..v (1mk)
I = ……A (1mk)

ii. Using a micrometer screw gauge, measure the diameter, d, of the nichrome wire. (1mk)
d = ……m

iii. Calculate the quantity, $p = 0.785\left(\frac{V}{I}\right)\left(\frac{d^2}{L}\right)$ where L = 100cm. (2mks)

2. A. You are provided with the following:-

- A metre rule
- Two knife edges
- Thread
- An optical pin to act as pointer
- Some cellotape
- One half metre rule
- 400g mass or 4 x 100g masses
- Thread 30cm long
- Complete retort stand
- Vernier calipers

Proceed as follows:

a. (i) Measure the width d and the thickness, t of the metre rule provided using the vernier calipers.
d = ……m (1mk)
t = ……m (1mk)

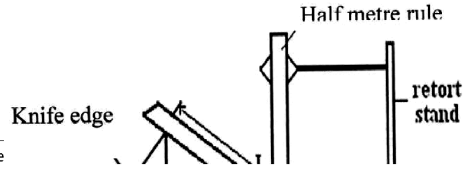
(ii) Given that $M = \frac{td^3}{12}$ Calculate the value of M.

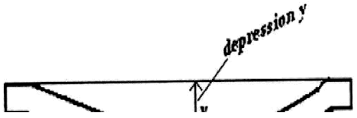
b. (i) Attach a pointer (optical pin) at the 50cm mark of the metre rule provided using the cellotape

i. Place the metre rule so that it lies horizontal on the two knife edges (wedges) provided.

ii. Clamp the half metre rule vertically and place it near the 50cm mark of the metre rule, and adjacent to the pointer as shown in the diagram 2(a) below.

iii. Place the metre rule on the knife edges such that the distance, L, between them is equal to 90cm and is equidistant from the 50cm mark of the metre rule as shown in figure 2(a).





iv. Read and record the initial position of the pointer on the half metre rule.
Note: *The 0cm mark on the half metre rule should be on top, at the clamped end of the half metre rule and the 50cm mark is below.*

c. Suspend a mass of 400g at the 50cm mark of the meter rule using a thread.

d. Read and record the final position of the pointer, L_1, on the half metre rule. Hence find depression, $y = L_1 - L_0$, of the metre rule as shown in figure 2(b). record the results in table.

e. Remove the mass from the meter rule. Repeat the procedure b(iv) to d above for values of L equal to 80cm, 70cm, 60cm, 50cm and 40cm.

f. Enter your results in table 2 below.

L(cm	90	80	300	70	60	50	40
Initial pointer reading, L_0(cm)							
Final pointer position, L_1(cm)							
Depression, $y = L_1 - L_0$(cm)							
Log L							
Log y							

(6mks)

g. Plot a graph of log y (y-axis) against log L. (4mks)

h. Find the slope S of the graph. (2mks)

i. Given that $E = \frac{1}{4.5S}$ determine the value of E. (2mks)

2. B

You are provided with the following:-

- A concave mirror
- A mirror holder
- White screen
- A metre rule.

Proceed as follows:-

j. Arrange the concave mirror, mirror holder and the white screen as shown in figure 2(c) below.

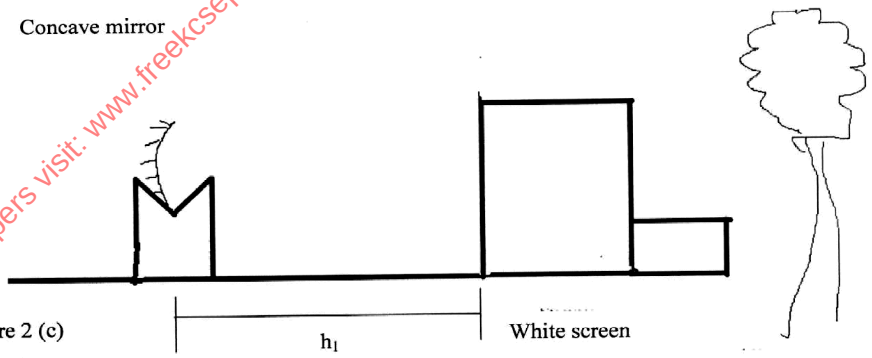


Figure 2 (c)

k. Move the concave mirror towards the white screen …… clear image of the tree or any far object is seen on the screen.

l. Measure the distance, h_1, between the mirror and the white screen.
h_1 = ……m (½mk)

m. Repeat procedure (b) and (c) to get another value of h_1 and record it as h_2.

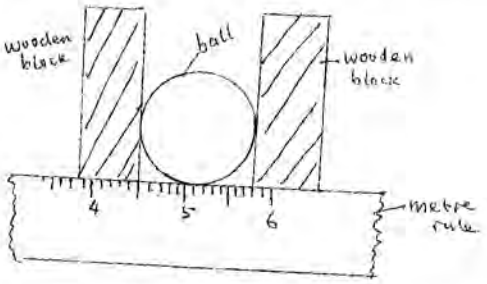
√1/2 √1/2

n) $h = \frac{0.10+0.12}{2} = 0.11\ m$ (1 mark)

GATUNDU SOUTH FORM FOUR JOINED EVALUATION EXAM
Kenya Certificate Of Secondary Education

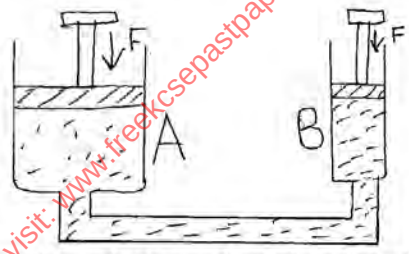
232/1
PHYSICS
PAPER 1
JULY/AUGUST 2016
TIME: 2 HOURS
SECTION A (25 MARKS)

1. The figure below shows a spherical ball placed between 2 wooden blocks and a metre rule.



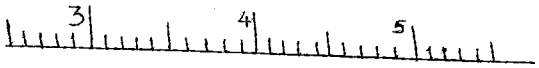
What is the volume of the ball? (3 Mks)

2. A solid weighs 16.5N on the surface of the moon. The force of gravity on the moon is 1.7N/kg. Determine the mass of the solid. (2 Mks)
3. The figure below shows two cylinders containing a liquid and connected with a tight – fitting flexible tube. The cylinders are fitted with air – tight pistons A and B as shown.



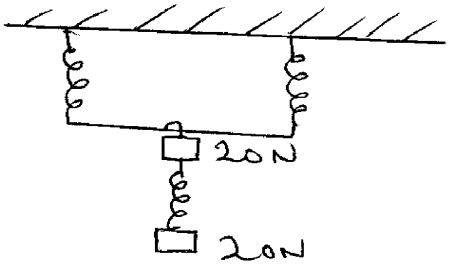
When equal forces, F are on the pistons as shown, what is observed. Explain the observation. (3 Mks)

4. A bottle of soda stands on a bench. As the temperature of the surrounding rises the temperature of the bottle also rises. State and explain the effect of this on the stability of the bottle. (3 Mks)
5. Explain how heat loss by ;
   (i) Radiation is minimized in a vacuum flask. (1 Mk
   (ii) Conduction is minimized in a vacuum flask. (1 Mk)
6. The figure below shows part of the main scale of vernier valipers.



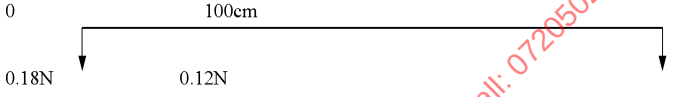
Insert the vernier scale to the main scale, to show a reading of 3.62 C.M (1 Mk)

7. A liquid flows into a pipe of varying cross sectional area. The inlet cross section is 10cm in diameter. If the liquid leaves the pipe at $0.5m^3/_s$ find the inlet velocity of the liquid. (3 Mks)
8. The three springs shown below are identical and have negligible weight. The extension produced on the system of springs is 20cm.



Determine the constant of each spring. (2 Mks)

9. The figure below shows a uniform metre rule of weight 1N with two weights 0.18N and 0.12N suspended from its ends.

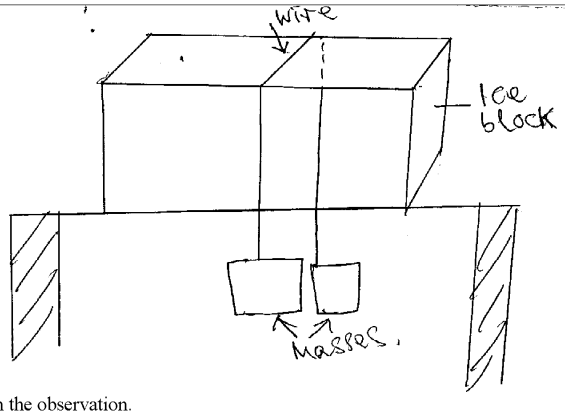


Determine how far from the 0.18N weight a pivot should be placed in order to balance the metre rule. (3 Mks)

10. An athlete runs at 4m/s from point A to point B and immediately turns and runs back from B to A with a speed of 8m/s. Calculate the average speed of the athlete. (3 Mks)

SECTION B: 55 MARKS.

11. (a) In a car, the engine drives an alternator which produces electricity that lights the headlights. List the energy changes involved. (3 Mks)
(b) What is the power output of a pump which can raise 60kg of water to a height of 10m every minute. (3 Mks)
(c) If the efficiency of the pump in 11(b) is 80%, how much power must be supplied (2 Mks)
12. (a) A mass, 5kg moving with a velocity of 10m/s collides with a 10kg mass moving with a velocity of 4m/s in the same direction along the same line. After collision, the 5kg mass moves with a velocity of 7.0m/s. Calculate the velocity of the 10kg mass. (3 Mks)
(b) Explain why a steel ball falling through oil, will first accelerate after which the acceleration falls to zero. (3 Mks)
13. (a) State one factor that affects the rate of evaporation. (1 Mk)
(b) A thin wire is passed round a large block of ice and two heavy weights are attached to the ends. It is observed that the wire passes through and the ice remains as a single block.



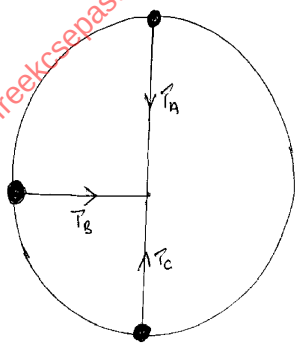
Explain the observation. (2 Mks)

(c) The graph below shows the cooling curve of naphthalene.
State what is happening at points;
(i) A – B. (1 Mk)
(ii) B –C. (1 Mk)

(d) A copper calorimeter of mass 50g contains 80g of oil at 25°C.A piece of ice of mass 25g at 10°C is added to the oil. What mass of ice will be left when the temperature of the calorimeter and its contents will be 0°C. (6 Mks)

14. (a) An air bubble of volume 0.5cm^3 when released from the bottom of a lake rises to the surface of the lake.
(i) Explain why the bubble rises up. (2 Mks)
(ii) Calculate the volume of the bubble at the surface of the lake given that the lake is 92.7m deep and the atmospheric pressure is equivalent to 10.3m of water pressure. (4 Mks)
(iii) What assumption have you made in arriving at your answer? (1 Mk)
(b) A fixed mass of gas at constant pressure has a volume of 600cm^3 at 0°C. At what temperature will its volume be 1099 cm^3. (3 Mks)

15. (a) (i) Define centripetal force. (1 Mk)
(ii) Explain why no work is done by a centripetal force acting on a body moving in a horizontal plane. (1 Mk)
(iii) A body of mass m is tied to a string in a vertical plane with a constant speed V. Tensions in the string at positions A, B and C marked T_A, T_B and T_C respectively.Arrange the tensions T_A, T_B and T_C in ascending order. (1 Mk)

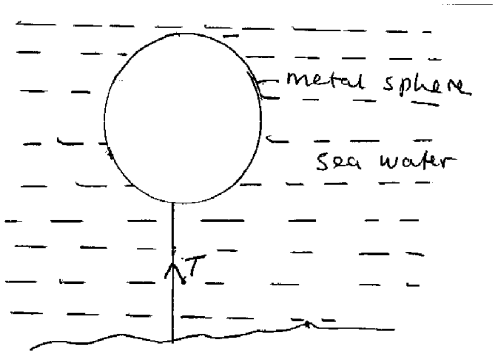


(iv) Explain why wet clothes put in a spin dryer, drys faster when the spin drum is rotated at a higher speed. (2 Mks)

(b) A particle revolves at a frequency of 5 H3 in a horizontal circle of radius 2m.
Determine its;
(i) angular velocity. (2 Mks)
(ii) Linear velocity. (2 Mks)

(iii) Centripetal acceleration. (2 Mks)

16. The figure below shows a metal sphere of mass 400kg and volume 0.6m^3 fully submerged in sea water of density 1030kg/m^3



Determine;

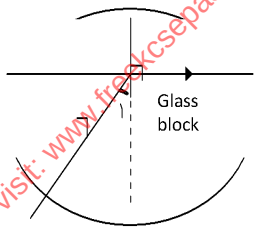
(a) The tension in the cable holding the sphere. (4 Mks)
(b) The radius of the sphere. (2 Mks)
(c) The weight of a solid in air is 5N. When it is fully immersed in a liquid of density 800kg/m^3 its weight is 4.04N.
Determine;
(i) The upthrust of the liquid. (1 Mk)
(ii) The volume of the solid. (2 Mks)

GATUNDU EVALUATION EXAMS 2016

Kenya Certificate Of Secondary Education
PHYSICS PAPER 2 (232/2)
TIME 2 HOURS
SECTION A: 25 MARKS.

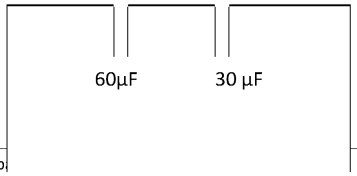
Answer all questions in this section in the spaces provided.

1. Give a reason why it is necessary to leave the caps of the cells open when charging an accumulator. (1 Mk)
2. The figure shows a ray of light incident on a face of semi-circular glass block.

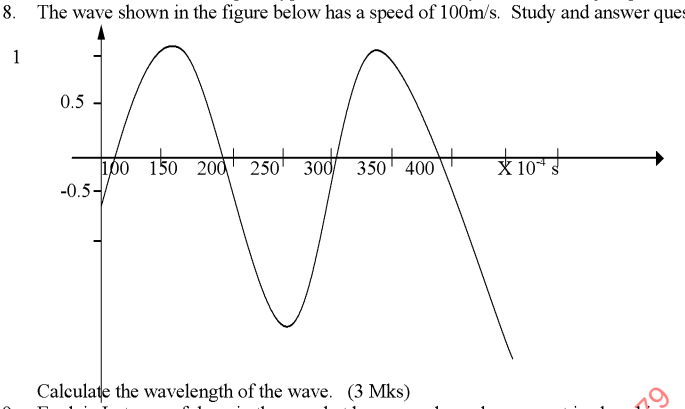


Determine the angle of incidence (refractive index of glass = 1.5) (2 Mks)

3. Explain how doping produces a p-type semiconductor from a pure – semi conductor material. (2 Mks)
4. When a highly positively charged rod is gradually brought towards a negatively charged electroscope. It is observed that the leaf divergence first decreases and then increases when the rod moves near to the cap. Explain (2 Mks)
5. Calculate the effective capacitance of the capacitors shown in the figure below. (2 Mks)



6. State how the deflection system of a television differs from that of a C.R.O (2 Mks)
7. State two factors affecting the type of shadow formed by a fixed size object placed in front of a source of light. (2 Mks)
8. The wave shown in the figure below has a speed of 100m/s. Study and answer question below.



Calculate the wavelength of the wave. (3 Mks)

9. Explain In terms of domain theory what happens when a bar magnet is placed in a solenoid in which an alternating current flows. (2 Mks)
10. If the half life of a radio active gas is 2 minutes, then after 8 minutes the activity will have fallen to afraction of its initial value. Determine this fraction. (2 Mks)
11. In each case, the pattern of the waves is incident on the slit and the emergent pattern is shown.

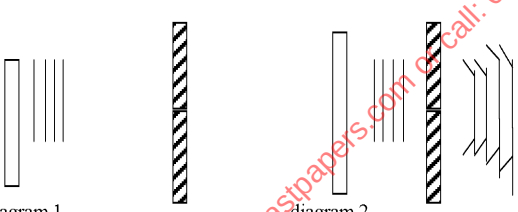
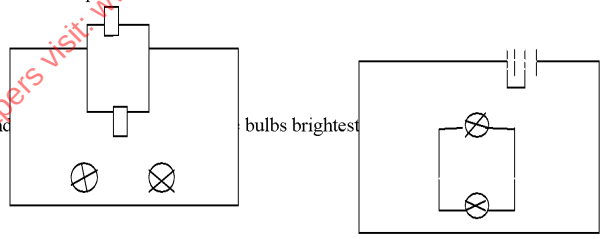


Diagram 1 diagram 2

Which action would cause the waves in diagram 1 to be diffracted less and so produce an emergent pattern closer to that shown in diagram 2. (1 Mk)

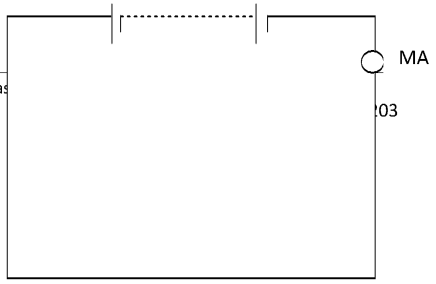
12. Explain why the cathode of a cathode ray tube is coated with oxides of metals such as strontium and barium. (1 Mk)
13. State why optical fibers are preferred in communication to ordinary cables. (1 Mk)
14. A student was investigating the brightness of bulbs with set up in circuits. He used identical bulbs and cells. The circuits A and R were set up as shown.

State and bulbs brightest

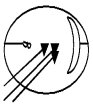


SECTION B - 55 MARKS.

15. (a) The figure below shows a photocell P in action



R

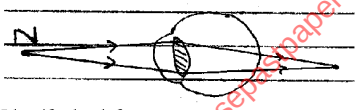


Ultraviolet light. photocell

(i) Give a reason why the photocell is evacuated. (1 Mk)
(ii) What is the function of the resistor R in the circuit? (1 Mk)
(b) The following graph was plotted for the results obtained from an experiment on photoelectric effect. Given that $eV_s = hf_o - W_o$ where h is planks Constant and W_o is the work function of the metal used. Use the graph to:
(i) Determine the threshold frequency. (1 Mk)
(ii) The plank's constant. (4 Mks)
(iii) The work function for the metal. (take charge of an electron e = 1.6 x 10^{-19} J) (2 Mks)
(c) (i) Sodium has a work function of 2.0eV.
Calculate the least frequency of radiation by which electrons are emitted.Use the value of h obtained from the graph above. (3 Mks)

16. (a) State the Lenz's law of electromagnetic induction. (1 Mk)
(b) List three features in a transformer which improves its efficiency. (3 Mks)
(c) A step down transformer has 800 turns in the primary coil and 40 turns in the secondary coil.
A 100Ω resistor is connected to the secondary output. If the primary voltage is 240V, calculate;
(i) The output voltage. (3 Mks)
(iii) The secondary current. (3 Mks)

17. (a) An object is placed 30cm in front of a thin converging lens of focal length 20cm. The set up is represented in the figure.
lens
(i) On the same figure construct a ray diagram to locate the position of the image. (3 Mks)
(ii) Determine the magnification produced. (2 Mks)
(b) An object 6cm tall is placed 40cm from a convex lens of focal length 50cm.
Find the position of the image. (2Mks)
(c) State two differences between the human eye and the camera. (2 Mks)
(d) The figure below shows an eye defect.

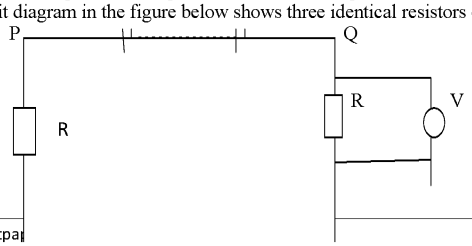


(i) Identify the defect. (1 Mk)
(ii) State the cause of the defect. (1 Mk)

18. (a) (i) Define background radiation. (1 Mk)
(ii) State two sources of background radiation. (2 Mks)
(b) State two differences between alpha and beta particles. (2 Mks)
(c) State one use of radioactivity in each of the following areas.
(i) Agriculture. (1 Mk)
(ii) Medicine (1 Mk)

(d) Uranium $\left[{}^{238}_{92}U\right]$ **undergoes both alpha and beta radioactive decay to become lead** $\left[{}^{206}_{82}Pb\right]$
Find the number of alpha and beta particles emitted in the process. (3 Mks)

19. (a) The circuit diagram in the figure below shows three identical resistors connected to a cell of e.m.f 12V



(i) Determine the reading of the voltmeter. (2 Mks)
(ii) If another identical resistor R is connected parallel to PT, determine the potential difference across Qs. (3 Mks)
(b) Explain why the earth pin in the mains plug is longer than the neutral and live pins. (1 Mk)
(c) Give one example of a semi conductor and one example of a conductor. (2 Mks)
(d) A hair dryer rated 1000W, 240V runs for 3 hours per day for 7 days. Calculate;
(i)The number of KWh used. (2 Mks)
(ii)The cost of electricity paid at the rate of Ksh 5.50 per unit. (2 Mks)

GATUNDU DISTRICT JOINT EXAMINATION JULY/AUGUST 2016

PHYSICS PRACTICAL 232/3

CONFIDENTIAL

QUESTION 1

Each candidate should have the following

- A voltmeter
- An ammeter
- A nichrome resistor wire mounted on wooded bar A-B
- Fixed Resistor of 10 Ohms labelled R
- A conductor X-Y labelled (P) which is 20.0 cm long nichrome wire of SWG 32 and about 0.25 mm in diameter
- 9- pieces connecting wires at least4 with
- 4 crocodile clips
- Two dry cells and cell holders
- A Jockey (J)
- A switch (K)
- A micrometer screw gauge * (to be shared)

Question 2

- Water in a beaker
- Complete retort stand
- Glass marble
- 100ml measuring cylinder
- Boiling tube
- Cotton thread, 50cm
- Meter rule
- Beam balance
- Rubber band (one piece)
- A piece of plasticine

GATUNDU DISTRICT JOINT EXAMINATION

JULY/AUGUST 2016

PHYSICS PRACTICAL

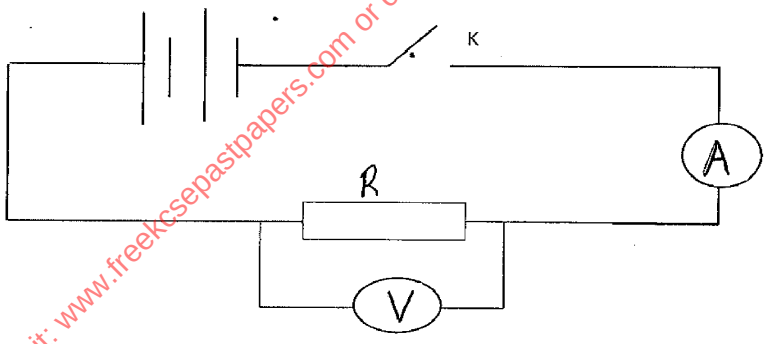
232/3

QUESTION 1

Each candidate is provided with the following

- A voltmeter
- An ammeter
- A nichrome resistor wire mounted on a wooded bar A-B
- A fixed resistor labelled (R)
- A conductor X-Y labelled (P)
- 9- pieces connecting wires
- Two dry cells and cell holders
- Jockey
- A micrometer screw gauge *(to be shared)

(a) Set up the apparatus as shown below in fig 1.0



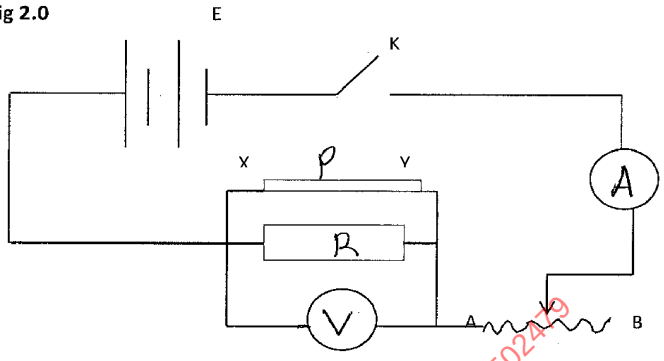
b) Close the switch k and record the ammeter and the corresponding readings

I (A) =.....A (1mk)

Pd (V) =.....V (1mk)

(c)set the apparatus again as shown in fig 2.0 below. With the conductor XY length set at L = 0.2m

fig 2.0



(d) switch on the current and adjust the rheostat ab so that the voltmeter read 0.5v Read the ammeter readings and record in the table below.

Pd (V)	0.1	0.2	0.3	0.4	0.5	0.6
I(A)						

(e)Plot a graph of p.d (V) against I (A) (5mks)

(f) Determine the slope (S)of your graph (2mks)

2

(g) Given that S = $\frac{10P}{P+10}$ determine the value of P (2mks)

(h) Measure the diameter (d) of the conductor P.

d = ...m (1mk)

(g) Find the cross section area (A) of the conductor P (1mk)

(h) Find the quantity (α) given by

$\alpha = \frac{A \times P}{L}$ (2mks)

Question 2

You are provided with the following:

- Water in a beaker
- Complete retort stand
- Marble
- 100ml measuring cylinder
- Boiling tube
- Cotton thread, 50cm
- Meter rule
- *Beam balance (to be shared)
- Rubber band (one piece)

Proceed as follows

a)i) measure the mass of the marble using the electronic beam balance and record the value as m_0

m_0 =.....g (1/2 mk)

(ii) Now half fill the boiling tube with water and using the meter rule, measure the height, h_1 of the water column.

h_1 = ...cm (1/2mk)

b) i) carefully drop the marble into the water in the tube and measure, h_2, of the water column.

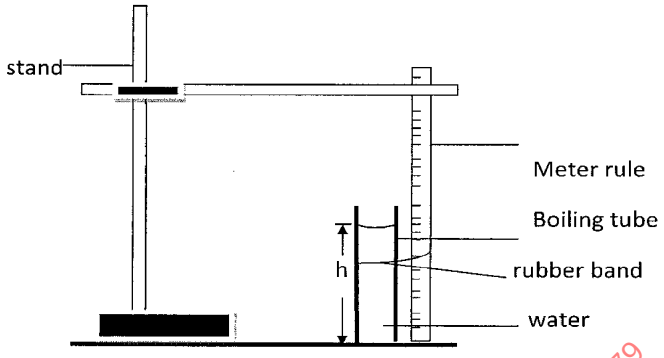
h_2 =.....cm (1/2mk)

(ii) Record the mass m, of the boiling tube.

m = ...g (1/2mk)

c) Fill a measuring cylinder with water up to 100ml mark: clamp the boiling tube vertically with its base resting on a flat surface as shown in figure 2.0

figure 2.0



The meter rule should be clamped beside the boiling tube.

d) Pour 10ml (cm^3) of the water from the measuring cylinder into the boiling tube. Measure the height h, of the water column and record in the table below.

Keep adding water in small amounts of 10cm^3 into the boiling tube until you obtain six sets of reading as given in the table below to complete the table:

TABLE 2.0

V (cm^3)	Height (h)(cm)
10	
20	
35	
45	
50	
65	

5

e) On the grid provided, plot a graph of volume V(cm^3) of water (y-axis) against height h (cm) of the water column. (5 marks)

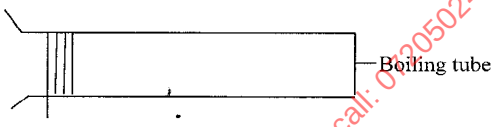
f) From the graph determine the slope s (3mks)

g) Measure the length (H) of the boiling tube,

H=.....cm (1mk)

h) Wind the cotton thread ten times round the boiling tube, pushing the windings very close together, the turns should touch one another but not overlap as shown in figure 3.0.

figure 3.0.



Unwind the thread and measure the length, L, of the thread

L =.....cm (1mk)

I)i) calculate the volume v, of the glass material which the boiling tube is made of.

Given that v = $H\left[\frac{2L^2}{2500}e/s\right]$

(ii) Calculate the density, ũ, of the glass material of the boiling tube (1mk)

(iii) using the graph determine the volume of the marble (V_o)

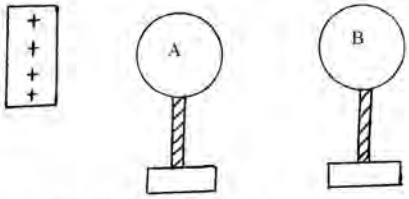
$V_o = s(h_2 - h_1)$ (2mks)

(iv) Hence calculate the density d_o, of the marble (1mk)

RAISMARADE JOINT EXAMINATIONS COUNCIL

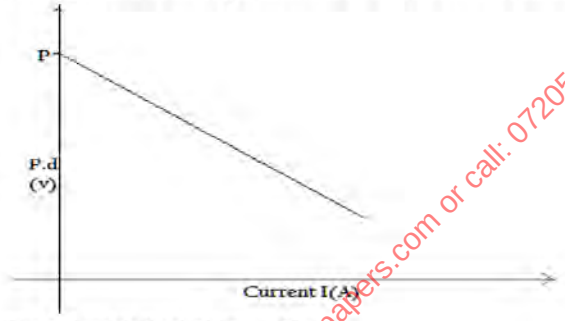
Kenya Certificate of Secondary Education
232/2
PHYSICS
Paper 2
March/April, 2016
2 hours
SECTION A (25MARKS)
Answer all questions from this section.

1. A positively charged rod is brought close to two spheres A and B, held by insulating handles as shown below.



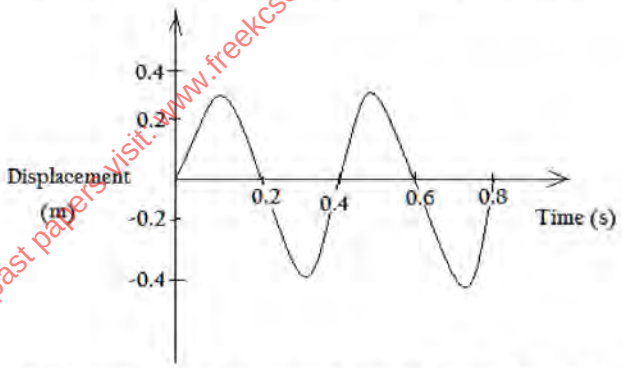
Indicate the charge on A and B (2 marks)

2. The sketch below shows the p.d across a cell for various values of current through a resistance wire.



State and explain the significance of P. (2 marks)

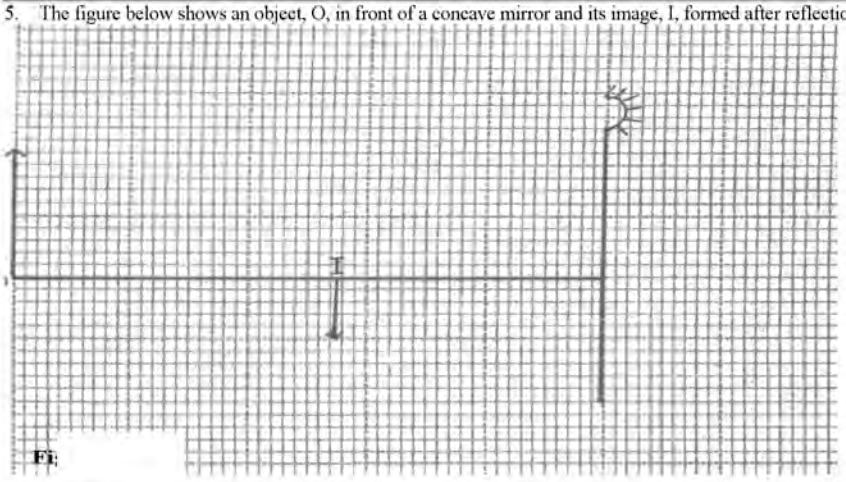
3. The figure below how the displacement of a point varies with time as α waves passes it.



On the same diagram, draw a wave which passes the point with twice the frequency and half the amplitude of the one shown. (2 marks)

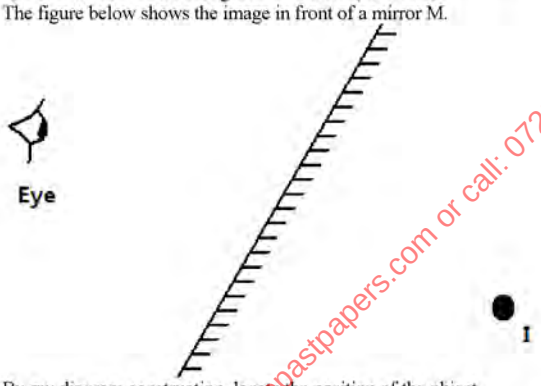
4. A boy standing in front of a cliff blows a whistle and hears the echo after 0.5s. He then moves 17 meters away from the cliff and blows the whistle again. He now hears the echo after 0.6s. Determine the speed of the sound. (2 marks)

5. The figure below shows an object, O, in front of a concave mirror and its image, I, formed after reflection.



a) On the same diagram draw an appropriate ray(s) to locate the principal focus, F, of the mirror. (2 marks)
b) Determine the focal length of the mirror (Scale 1:5) (1 mark)

6. The figure below shows the image in front of a mirror M.



By ray diagram construction, locate the position of the object. (2marks)

7. A negatively charged rod is brought rear the cap of a leaf electroscope. The cap is then earthed momentarily by touching with the finger. Finally the rod is withdrawn. The electroscope is found to be positively charged. Explain how this is acquired (2marks)

8. Explain why the e.m.f of a dry cell drops if a large current is drawn for a short time and then recovers if allowed to rest. (2marks)

9. A heating element rated 2.5 KW is used to raise the temperature of 3.0 kg of water through 50°C. Calculate the time required to effect this. (Specific heat capacity of water is 4200 J/kgK) (3 marks)

10. Other than a photographic film state one other detectors of
    i) X-rays (1 mark)
    ii) UV, (1mark)
    iii) Visible spectrum (1 mark)

11. Give two conditions necessary for formation of annular eclipse. (2 marks)

SECTION B (55 MKS)

Instruction:answer all questions in this section.

12. (a) Define capacitance of a capacitor (1 mark)
    b) The figure below shows a pair of parallel plates of a capacitor connected to a battery. The upper plate is displaced slightly to the left.

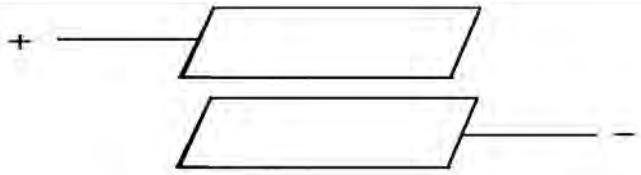
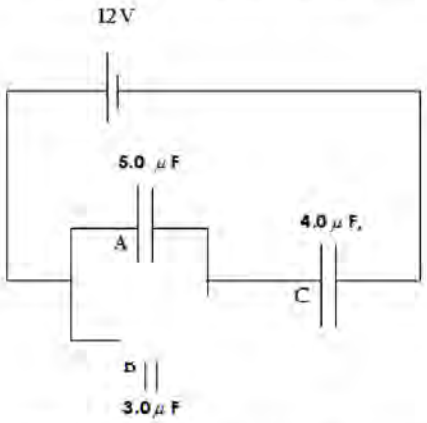


Figure 9

State with reason the effect of this movement on the capacitance. (2 marks)

c) The figure below shows an electrical circuit with three capacitors A, B and C of capacitance **4.0 μ F, 5.0 μ F and 3.0 μ F** respectively connected to a 12V battery.



Determine:

i) The combined capacitance of the three capacitors. (3 marks)

ii) The charge on the capacitor C (2 marks)

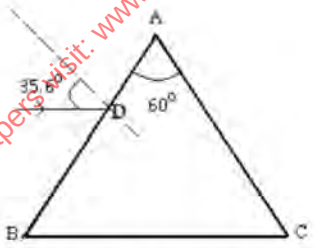
iii) The potential difference across the capacitor A (2 marks)

13. a)Define refraction of light. (2 marks)

b) Give one reason for the cause of refraction of light. (1 mark)

c) The refractive index of glass is $^3/_2$ and that of water is $^4/_3$. Calculate the refractive index of glass with respect to water. (3 marks)

d) The figure below shows a ray of light incident at an angle of 35.6^0 at point D on the first face of a glass prism ABC. The refractive index of the prism is 1.6



i. Determine the angle of refraction at point D. (3marks)

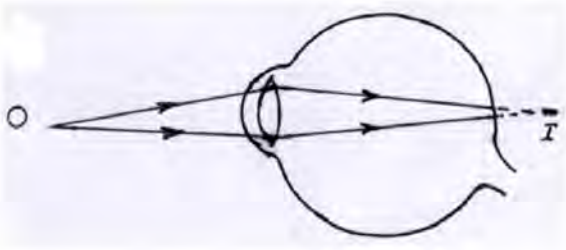
Find the angle of incidence of the refracted ray on the face AC. (2marks)

Complete the diagram to show the emergent ray from the face AC. (2marks)

14. a) Distinguish between a real and virtual image. (1marks)

b) An object is placed 15cm from a converging lens of focal length 20cm. calculate the image position. (2marks)

c) i) Name the eye defect shown in the figure below. (1mark)

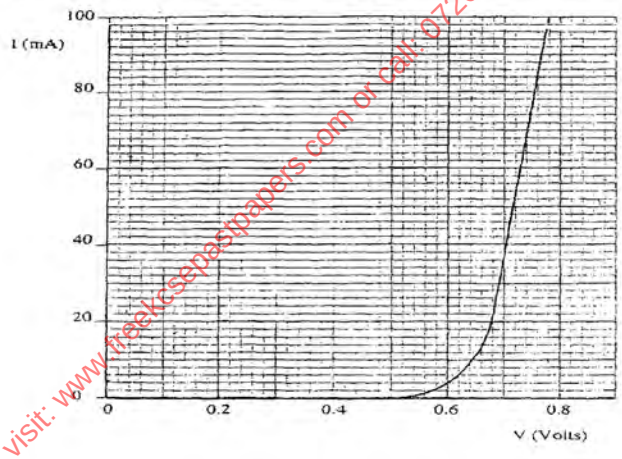


Draw another diagram to show how a suitable lens can be used to correct the defect. (2marks)

15. (a) State Ohm's Law (1 mark)

(b) The graph in figure below shows the current – voltage characteristics of a certain device, X

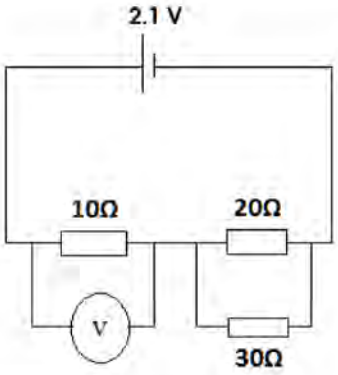
(i)



State with a reason whether the device, X obeys Ohm's law. (2 marks)

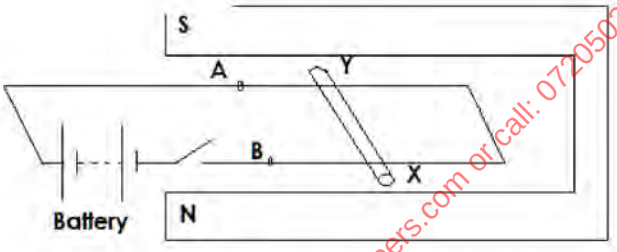
(ii) Determine the resistance of the device, X, when the current through it is 60mA. (2 marks)

(c) The cell figure has an e.m.f of **2.1 V** and negligible internal resistance.



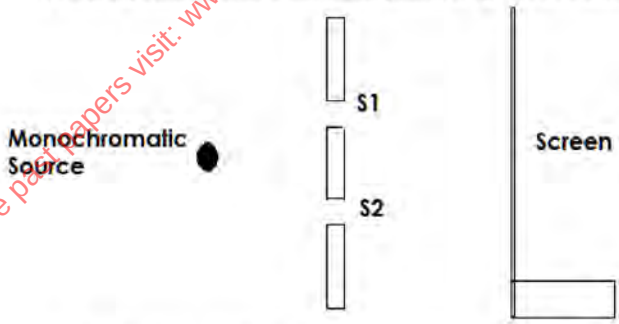
Determine the
(i) Total resistance in the circuit (2 marks)
(ii) Current in the circuit (1 mark)
(iii) Reading of the voltmeter (2 marks)

16. An un insulated copper wire XY lies over the fixed wire A and B connected to a battery when the key in the circuit is closed, the wire XY experiences a force.



(i) In which direction does the wire XY experience the force? (1 mark)
(j) (ii) When is the force on the wire XY greatest? (1 mark)
(k) (iii) What is the effect of reversing both the magnetic field and direction of flow of current? (1 mark)
(iv) State TWO factors by which the force on XY can be decreased (1 mark)
(vi) Name an instrument which uses this effect (1 mark)

17. (a) Define diffraction. (2 marks)
b) In an experiment to observe interference patterns of light waves, a double slit is placed close to the source as shown below.



i) State the function of the double slit. (1mark)

Briefly describe what is observed on the screen. (3 marks)

ii) State and explain what is observed on the screen when the slit separation S_1 S_2 is reduced (2 marks)

iii) State and explain what is observed on the screen when white light is used in place of the monochromatic light. (3 marks)

RAISMARADE JOINT EXAMINATION 2016

233/3

PHYSICS

PAPER 3 - CONFIDENTIAL

INSTRUCTIONS TO SCHOOLS

Question 1

Each student should be provided with the following:-

1. Two 100g masses with a hook.
2. Two strings 30cm long.
3. A metre rule.
4. 25cm high knife edge.
5. 250ml beaker with salt solution (50g salt dissolved in 200ml of water)

Question 2A

Each student should be provided with the following:-

- Ammeter (0 – 1A)
- Voltmeter (0 – 3V)
- 2 dry cells
- A nichrome wire SWG 24 fixed on a metre rule, labelled Y.
- A nichrome wire SWG 32 of length 50cm fixed on a piece of wood labeled X.
- A switch.
- Seven connecting wires 4 with crocodile clips.
- A cell holder to accommodate 2 dry cells.
- A micrometer screw gauge (To be shared)

Question 2B

Each student should be provided with the following:-

- A crosswire fixed on a screen, labelled screen B.
- A candle.
- A screen labeled screen A.
- A convex lens of focal length, f = 20cm.
- A convex mirror of focal length f = 10cm.
- Lens holder.
- A metre rule.
- Mirror holder.

RAISMARADE JOINT EXAMINATIONS COUNCIL

Kenya Certificate of Secondary Education
232/3
PHYSICS
Paper 3
(Practical)
March/April, 2016
2 ½ hours

1.[2] Question one

You are provided with the following:

- Salt solution in a 250ml container
- Two identical cylindrical 100g masses
- A string
- A metre rule
- Knife edge
- Two pieces of thread.

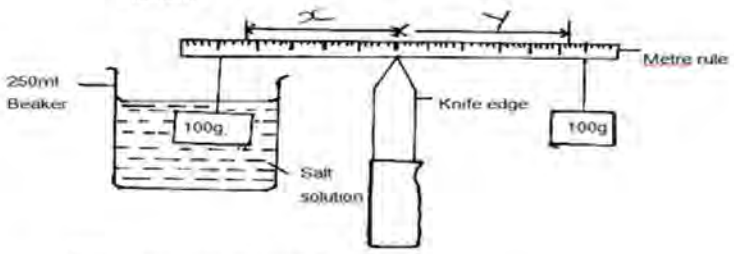
Procedure

(a) Determine the volume V, of one of the masses by using the apparatus provided. Record the volume, V.
V = _____ (1mark)
Explain how you have determined the volume, V. (1mark)

(i) Determine the centre of gravity of the metre rule
Centre of gravity = _____ (1mark)

(ii) Arrange the apparatus as shown in diagram 1 below. Show that the metre rule is at equilibrium, starting with X = 100mm.

Diagram 1



Measure and record the length, Y. (1mark)

Y:_____

(b) Repeat procedure a (ii) with the following values of X and fill table 1 below.

Table 1

X (mm)	100	150	200	250	300	350
Y(mm)						

(i) On the grid provided, plot a graph of Y (y-axis) against X. (5marks)

(ii) Determine the gradient, N, of the graph. (3marks)

(iii) The gradient, N, given by the equations N = F/W, where F is the apparent weight of the mass in the salt solution and W is the actual weight of the mass. Calculate the value F and the up thrust, U.

F = _____ (1mark)

U = _____ (2marks)

(iv) Hence determine the density, p of the salt solution.(2marks)

2. Question 2

Part A

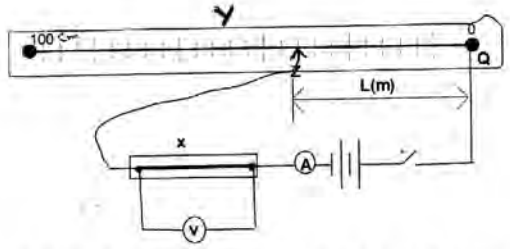
You are provided with the following apparatus:-

- Ammeter (0 – 1A)
- Voltmeter (0 – 3V)
- 2 dry cells.
- A resistance wire fixed on a metre rule, labeled Y.
- A resistance wire fixed on piece of wood, labeled X.
- A switch.
- Seven connecting wires, 4 with crocodile clips.
- A cell holder, to accommodate two dry cells.
- A micrometer screw gauge (To be shared).

Proceed as follows:

i. Set up the circuit as shown in the diagram 2 below.

Diagram 2



ii. Keeping both crocodile clip attached on the resistance wire QZ for a length L = 0.2m from Q, record the corresponding values of current, I (A) and Voltage, (V) in table 2 below.

iii. Repeat procedure (ii) for other lengths, L = 0.4m, 0.6m, 0.8m and 1.0m.

Table 2

Length (L) (m)	0.2	0.4	0.6	0.8	1.0
Current (I) (A)					

Voltage (V) (V)					

iv. Plot a graph of V (y-axis) against I on the grid provided below (5marks)

v. Calculate the slope, S of the graph. (3marks)

vi. Using the micrometer screw gauge provided, measure the diameter, d of the resistance wire labeled X

d = _____ m (1mark)

v. Calculate the quantity, K of the wire from the equation: (2marks)

$K = \frac{S \times d}{S \times \pi}$, giving its units. Where **S** is the gradient in (v) above

PART B

You are provided with the following:-

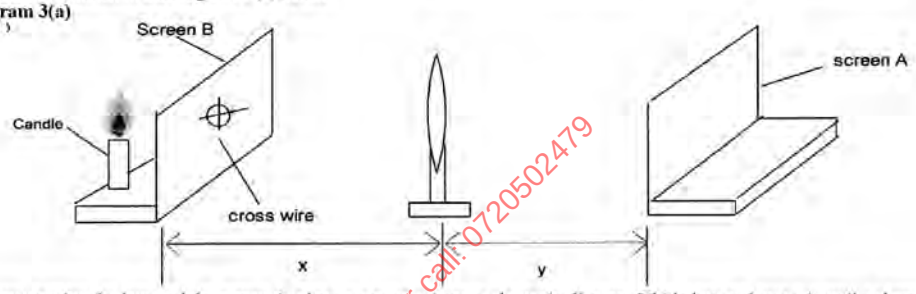
- A cross wire fixed on a screen
- A candle.
- A screen.
- A convex lens.
- A convex mirror.
- A metre rule

(i) Determine the focal length f_1 of the lens by locating the image of a distant object.

f_1 = _____ (1mk)

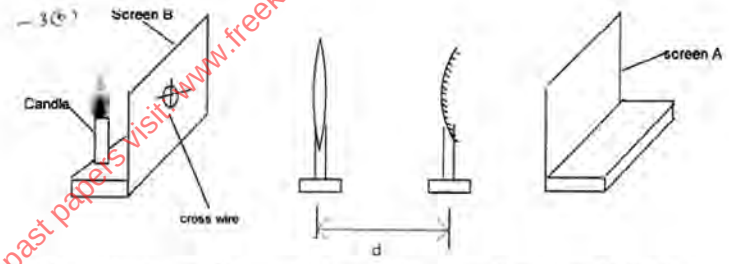
(ii) Place the lens at a distance of x = 35cm from the crosswire and move the screen A until a sharp image of the crosswire is focus on it as shown in the diagram 3 (a) below.

Diagram 3(a)



(iii) Without moving the lens and the screen A, place a convex mirror as shown in diagram 3(b) below and move it until a sharp image of the cross wire is formed on the screen B next to the crosswire.

Diagram 3(b)



(iv) Measure the distance, d between the lens and the mirror and record on table 3 below.

Table 3

Distance, x of lens from crosswire (cm)	Distance, y(cm)	Distance, d(cm)	y – d (cm)
35			
40			

(3marks)

(v) Repeat procedure (ii) to (iv) for the value of x = 40cm.

(vi) Calculate the mean value of (y – d) (1mark)

(vii)Calculate the quantity, f_2 of the convex mirror from the equation below. (1mark)

$$f_2 = \frac{mean\ of\ (y-d)}{4}$$

RAISMARADE JOINT EXAMINATION 2016
PHYSICS - MARKING SCHEME
PHYSICS PAPER 2 MARKING SCHEME.

1.

✓1 ✓1

2. R is the emf of the cell ✓1
   Emf is this pd across a voltage source when it is not producing current

3.	