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NAME..... INDEX NO.....

GATUNDU SOUTH FORM FOUR 2015 EVALUATION EXAM

232/1
PHYSICS
PAPER 1
JULY/AUGUST 2015
TIME: 2 HOURS

KENYA CERTIFICATE OF SECONDARY EDUCATION
GATUNDU SOUTH DISTRICT EVALUATION EXAM

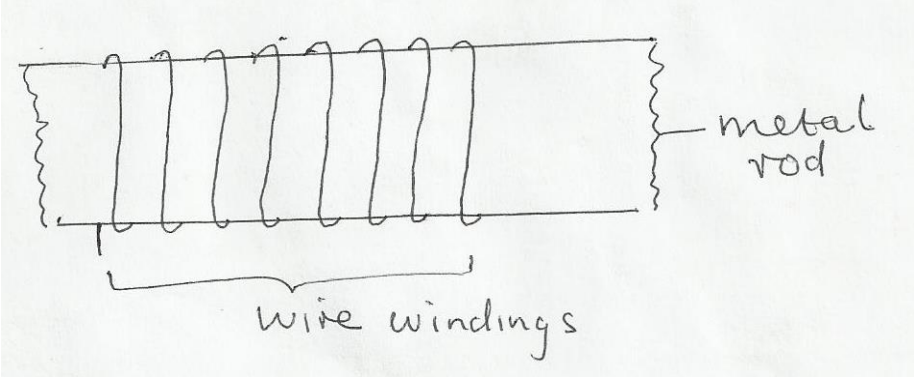
INSTRUCTIONS TO CANDIDATES

- Write your name and index number in the spaces provided above.
- Answer ALL questions in section A and B in the spaces provided.
- All working must be clearly shown.
- Non programmable silent electronic calculators and KNEC mathematical tables may be used.

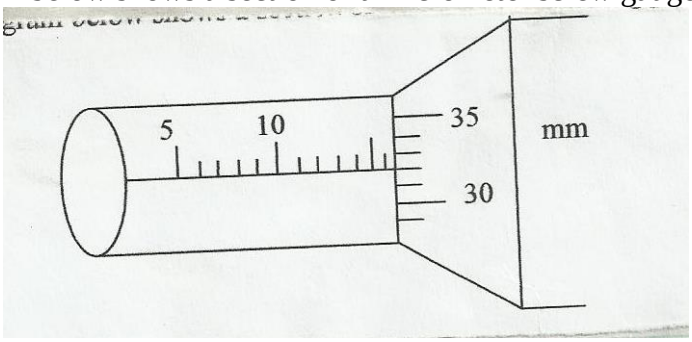
- Take $g = 10m/s^2$
  Specific heat capacity of water is $4200Jkg^{-1}K^{-1}$
  Density of water = $1000kgm^{-3}$
  Density of mercury = $1.36 \times 10^4 kgm^3$

SECTION A (25 MARKS)

1. The figure below shows a wire wound on a metal rod. The windings just touch each other. If the total number of complete loops was found to be 25 and the distance covered by the windings on the rod is 0.6cm, find the radius of the wire giving your answer in standard form. (2 marks)



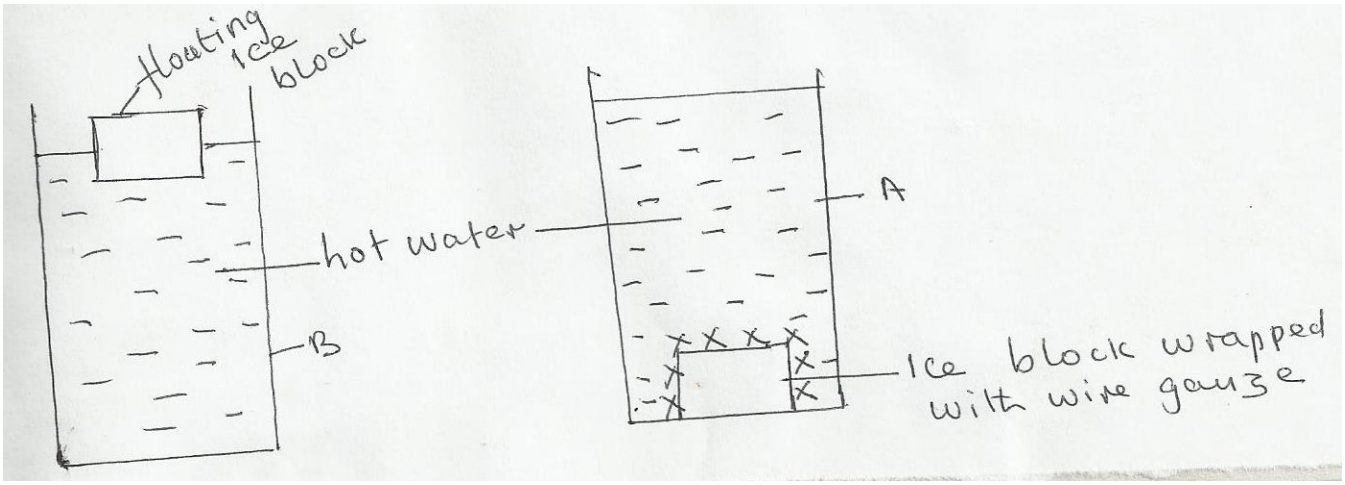
2. The diagram below shows a section of a micrometer screw gauge.



a) State the smallest measurement that can be made by the measurement that can be made by the micrometer screw gauge. (1 mark)

b) The thimble of the micrometer screw gauge is rotated through 2 ½ revolutions in the clockwise direction in order to measure the diameter of a marble. State the diameter of the marble. (1 mark)

3. The figure below shows two identical containers A and B containing hot water and ice block.



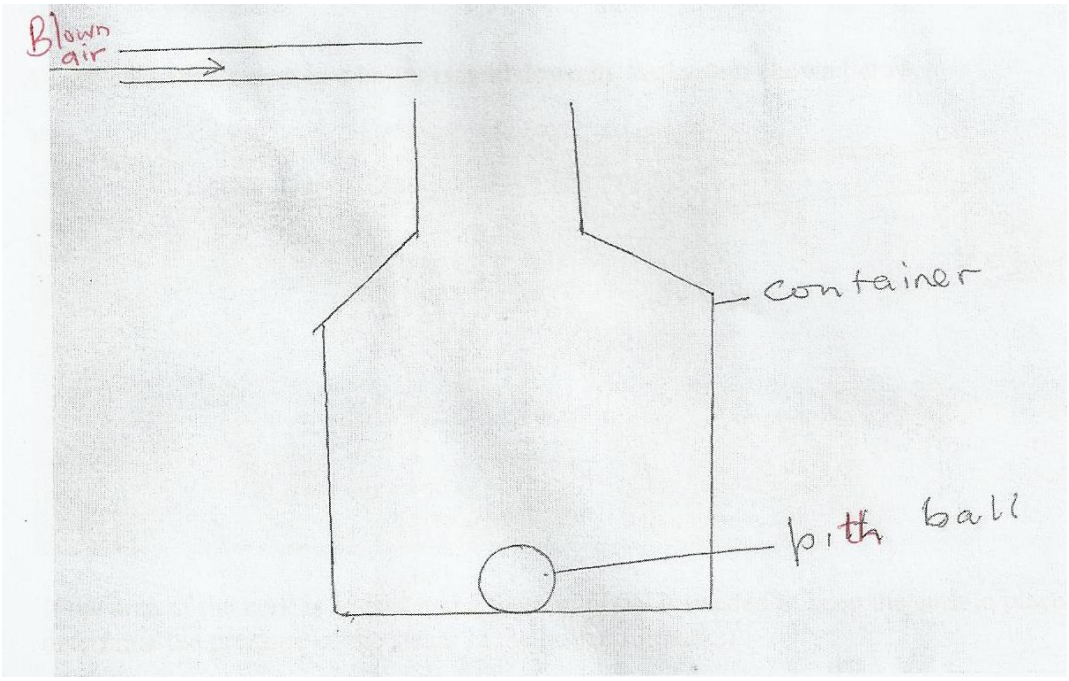
State with reason which water cools faster assuming that the wire gauge absorbs negligible heat. (2 marks)

4. A bus that carries goods in the under seats carrier is more stable than one that carries goods in the carrier at the top. Explain why this is so. (1 mark)

5. A turntable of radius 16cm is rotating at 960 revolutions per minute. Determine the angular speed of the turntable. (2 marks)

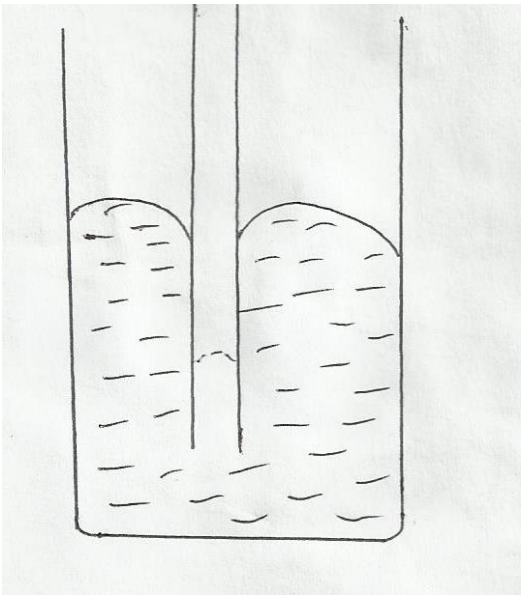
6. Sketch a velocity – time graph for a body initially moving at a velocity u before a force F is applied to it for 5 seconds and there after the force F is withdrawn. (2 marks)

7. The figure below shows a pith ball in a container. (2 marks)



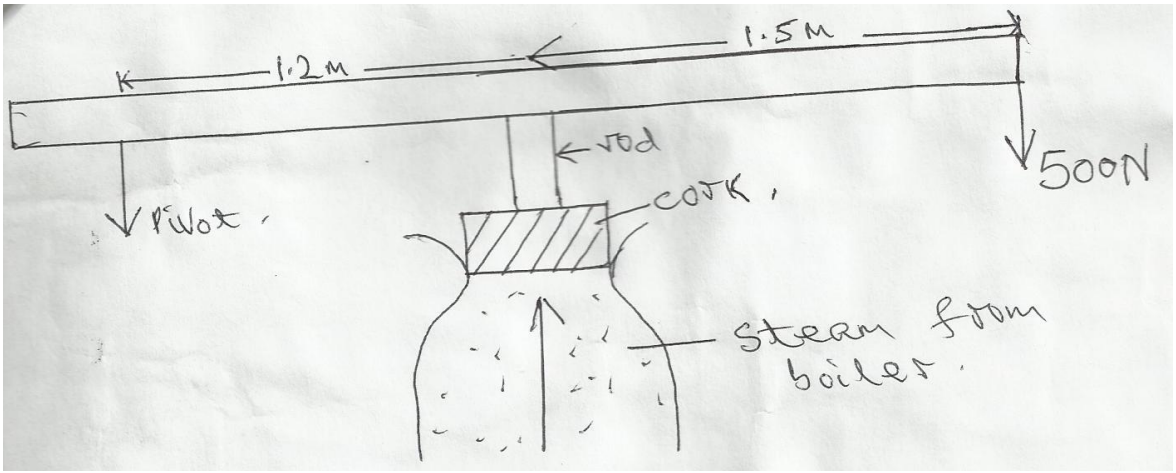
State and explain what would happen if air is blown over the mouth of the container. (2 marks)

8. The figure below shows a capillary tube placed in a trough of mercury.



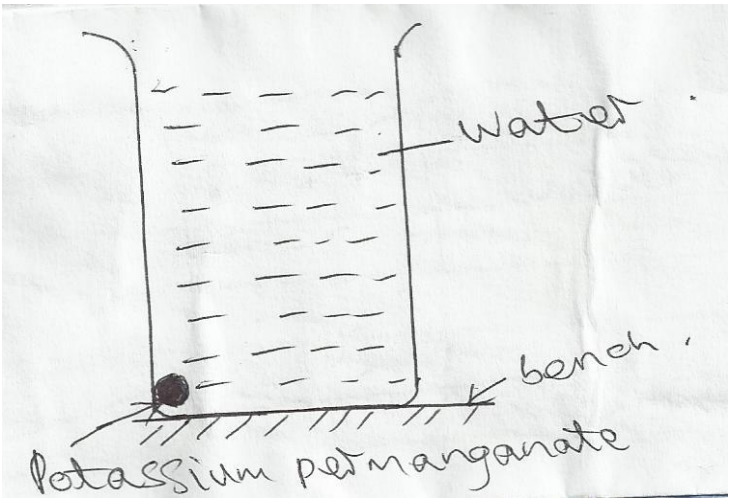
Give a reason why the level of mercury in a capillary is lower than in the beaker. (1 mark).

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



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

10. In an experiment a crystal of potassium permanganate was placed in water as shown below.

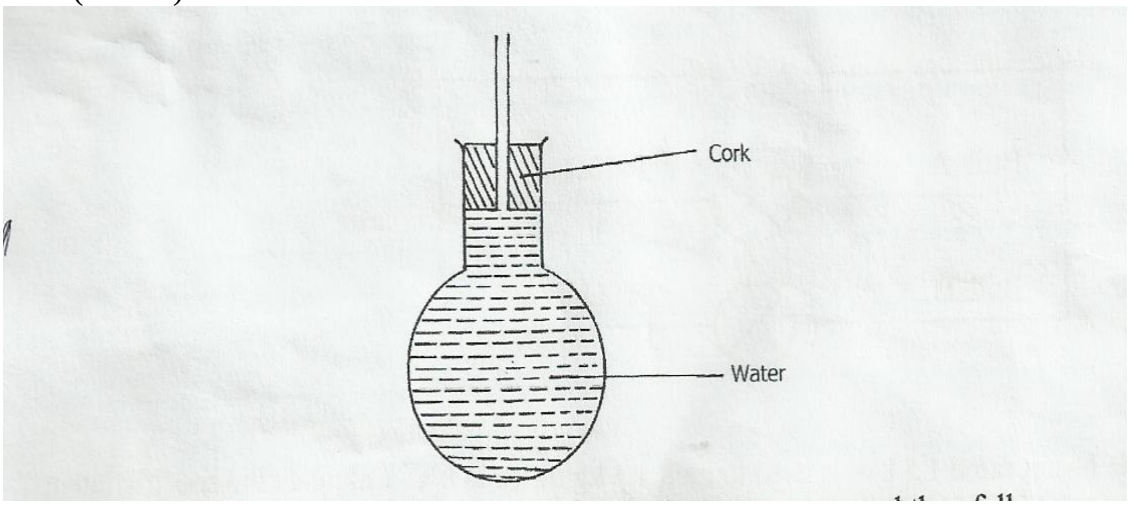


After sometime, it was observed that the water turned purple. Explain this observation. (1 mark)

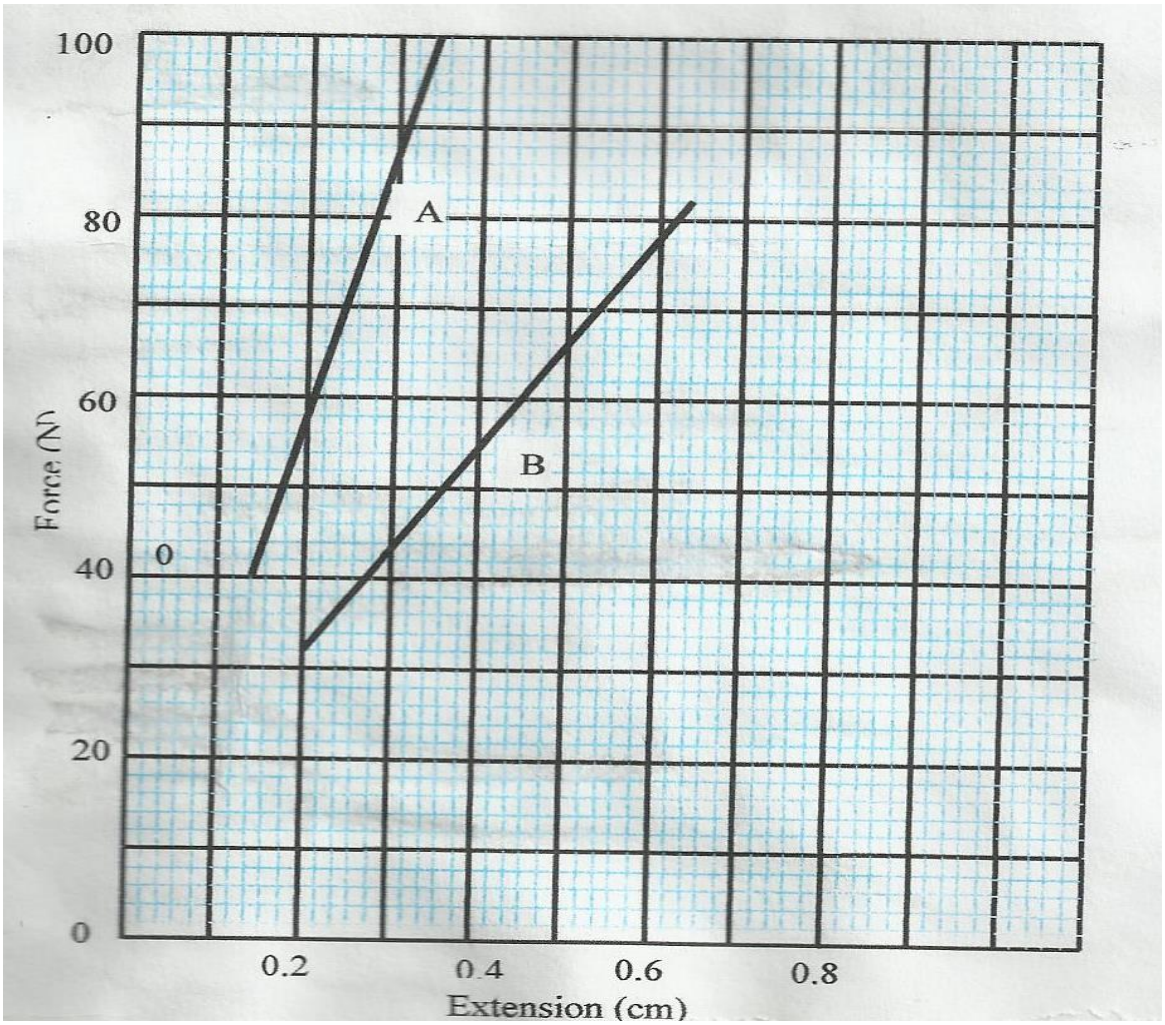
11. An aircraft 300m from the ground traveling horizontally at 400m/s releases a parcel. Calculate the horizontal distance covered by the parcel from the point of release.
(Ignore air resistance). (2 marks)

12. A 20kw immersion water heater is used to heat $5.0 \times 10^{-3} m^3$ of water from 23°C to 100°C. Given that 30% of heat is lost to the surroundings, determine the time used in heating the water.
(2 marks)

13. When the flask is placed in iced water the level on water rose and then fell. Explain this observation. (1 mark)



14. The graph (curve) below show the variation of force against extension (cm) of two spiral springs of same material, same wire thickness length but of different diameters (one large and the other small). Identify which graph (A or B) represents which spring. (2 marks)

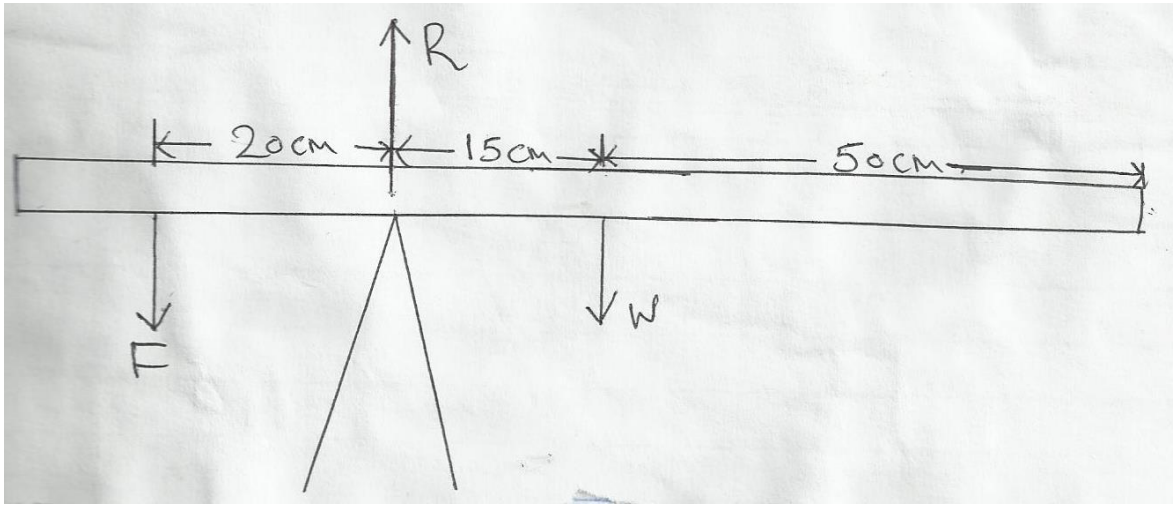


15. a)State the principle of moments. (1 mark)

b)A uniform metal strip is 3.0cm wides 0.6cm thick and 100cm long. The density of the metal is 2.7g/cm^3.

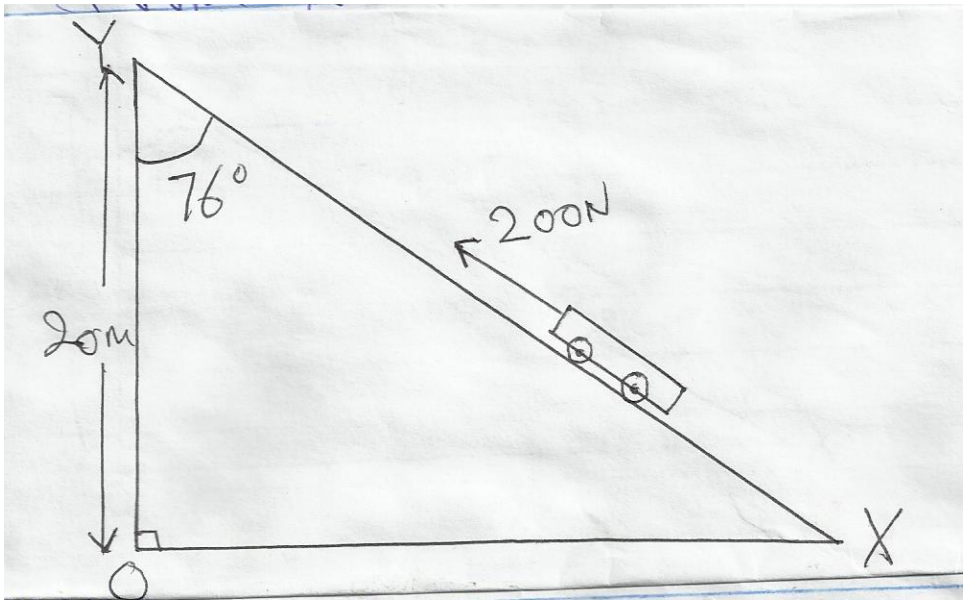
(i) Determine the weight of the metal strip. (3 marks)

(ii) The strip is placed on a pivot and kept in equilibrium by forces as shown.



Determine the value of F and R. (3 marks)

16. The figure below shows an inclined plane, a trolley of mass 60kg being pulled up the slope by a force of 200N parallel to the slope. The trolley is moved from X to Y.



Determine the

(i) Work output of the system. (2 marks)

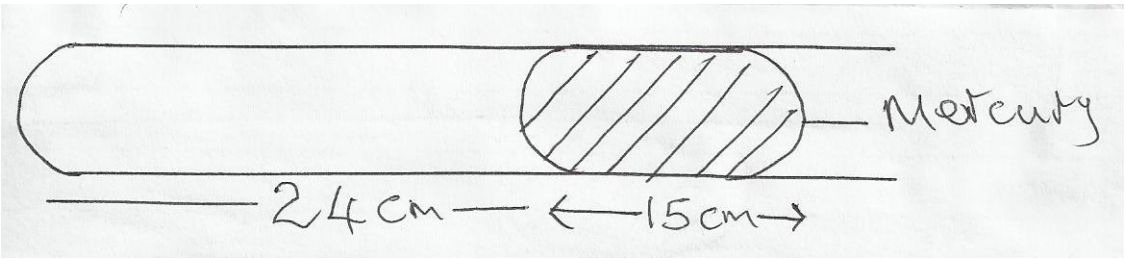
(ii) Work input of the system. (2 marks)

(iii) The frictional force between the wheels of the trolley and the inclined plane. (2 marks)

(iv) The efficiency of the system. (2 marks)

(v) The velocity ratio of the system. (2 marks)

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



(i) What is the length of the enclosed air column when the tube is vertical with the open end uppermost if the atmospheric pressure is 750mmHg? (2 marks)

(ii) What is the length of the enclosed air column when the tube is vertical with the closed end upper most if the atmospheric pressure is 750mmHg. (2 marks)

(iii) Explain why the mercury does not run out when the tube is vertical with the closed end uppermost. (1 mark)

b) Explain why an air bubble increase in volume as it rises from the bottom of a lake to the surface. (2 marks)

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

d) A certain mass of hydrogen gas occupies a volume of $1.6m^3$ at a pressure of 1.5×10^5 N/M^2 and a temperature of 27^o C. Determine the volume when the temperature is 0^o C at a pressure of $8.0\ 10^4$ N/M^2. (3 marks)

e) State the pressure law. (1 mark)

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

b) A block of wood measuring 0.8m by 0.5m by 2m floats in water. 1.2m of the block is submerged.

(i) Determine the weight of the water displaced. (2 marks)

(ii) Find the force required to just make the block fully submerged. (3 marks)

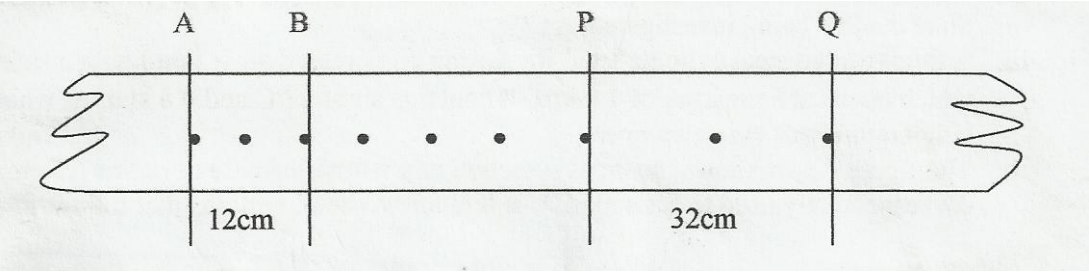
c) A block of glass of mass 250g floats in mercury. What volume of the glass lies under the surface of mercury. (3 marks)

d) A piece of sealing wax, weight 3N in air and 0.22N when immersed in water, calculate the density of the wax. (3 marks)

e) A balloon weighs 10N and has a gas capacity of $2m^3$. The gas in the balloon has a density of $0.1kg/m^3$. If density of air is $1.3kgm^{-3}$, calculate the resultant force of the balloon when it is floating in air. (3 marks)

19. a) Distinguish between speed and velocity. (1 mark)

b) The figure below shows the motion of a ticker tape through a ticker timer whose frequency is 100Hz.



Determine

(i) Velocity at AB and PQ. (5 marks)

(ii) Constant acceleration of the tape. (3 marks)

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

NAME:……INDEX…….……..…..DATE

SCHOOL:……..……SIGNATURE……

GATUNDU EVALUATION 2015 EXAMINATION

232/2
PHYSICS
PAPER 2
JULY / AUGUST, 2015
2 HOURS

INSTRUCTIONS TO CANDIDATES

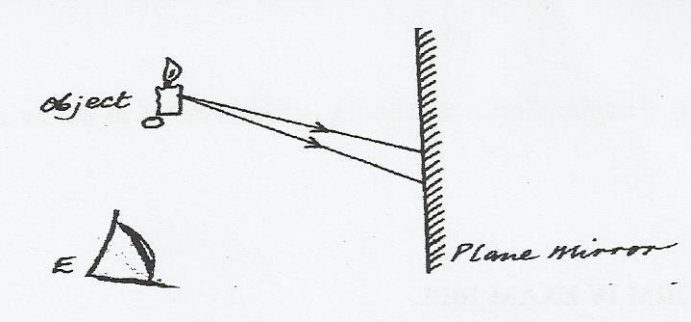
- *Write your name and index number in the spaces provided above*
- *Sign and write the date of the examination in the spaces provided*
- *Mathematical tables and electronic calculators may be used.*

For Examiner's Use Only

Section	Question	Maximum Score	Candidates' Score
A	Q1 – Q14	25	
B	Q15 Q16 Q17 Q18 Q19 Q20	10 6 8 10 12 9	
		80	

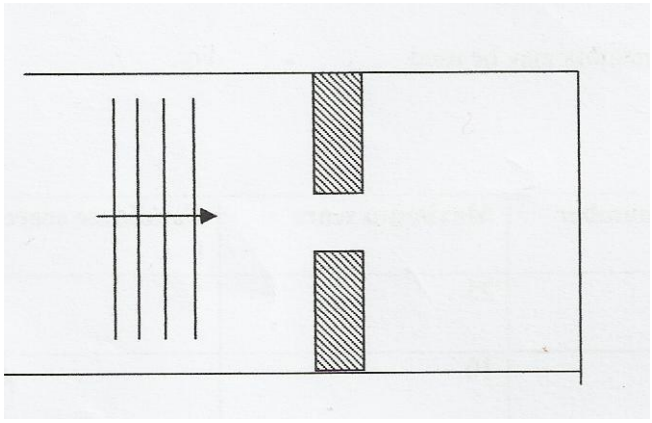
SECTION A (25 MARKS)

1. Figure 1 below shows an object O placed in front of a plane mirror.



On the diagram, draw rays to locate the position of the image I, as seen from the eye, E. (2 marks)

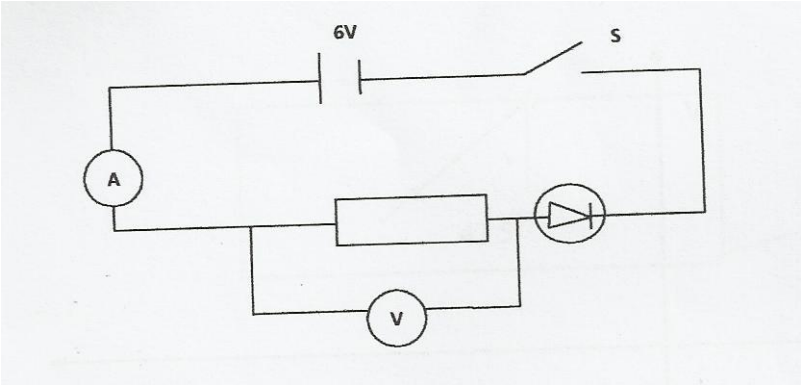
2. The figure 2 below water waves of different wave length incident on aperture which is greater than the wave length of the wave.



Complete the diagram to show the pattern of the wave beyond the aperture. (1 mark)

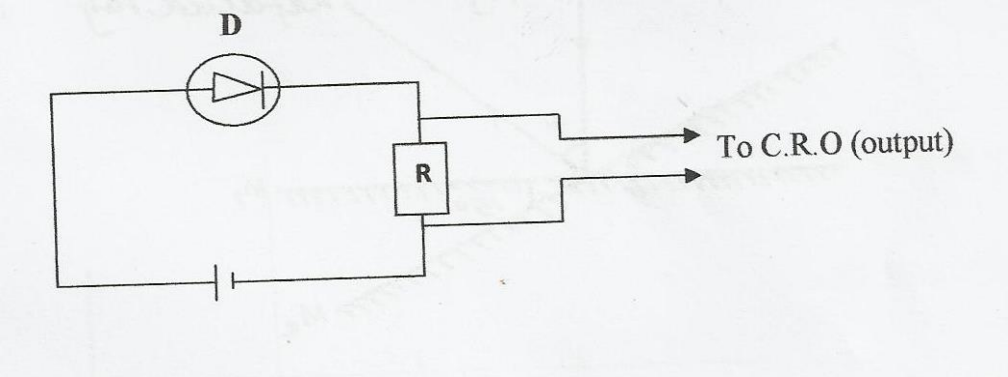
3. State one difference between X-rays and gamma rays based on their production. (1 mark)

4. In the circuit diagram in figure 3 below, the voltmeter and ammeter read 4v and 40mA respectively.



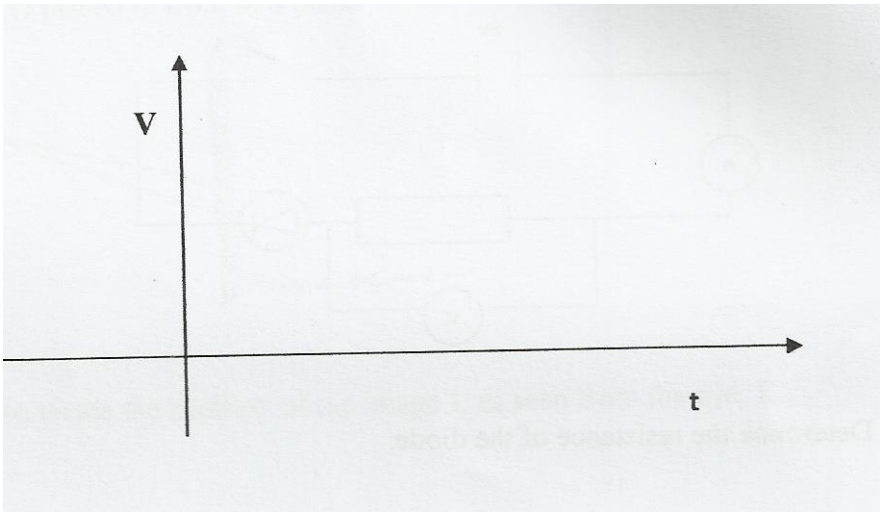
Determine the resistance of the diode. (2 marks)

5. Figure 4 below shows the supply of d.c. to a resistor, R through a diode, D.

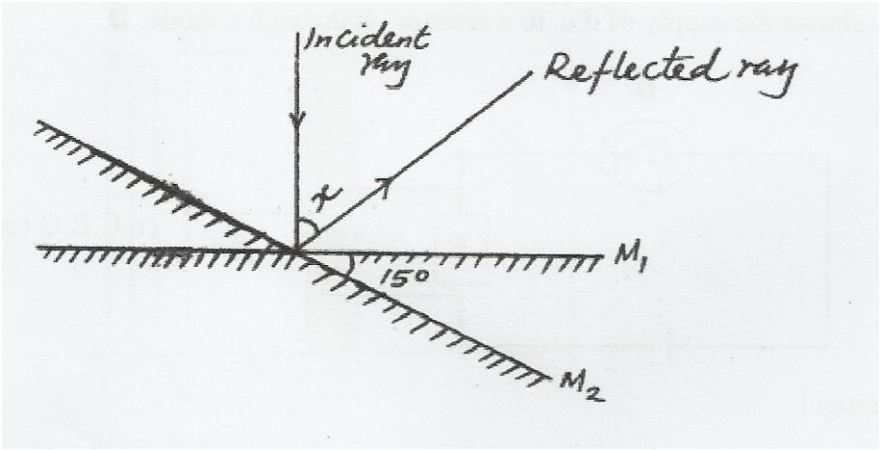


a) Give the bias of the diode. (1 mark)

b) An a.c supply is now supplied to the resistor R. On the axes provided below, sketch the output observed in the C.R.O connected across R. (1 mark)



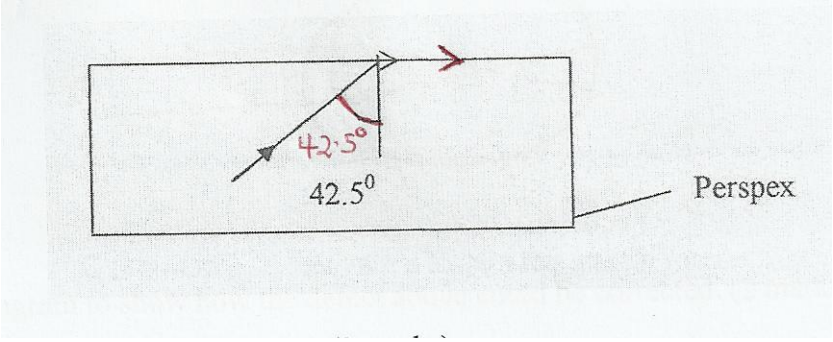
6. Figure 5 shows a ray of light incident along the normal. The mirror is rotated at an angle of 15^{o} in a clockwise direction without changing the position of the incident ray,



Determine the angle between the reflected ray and the incident ray. (2 marks)

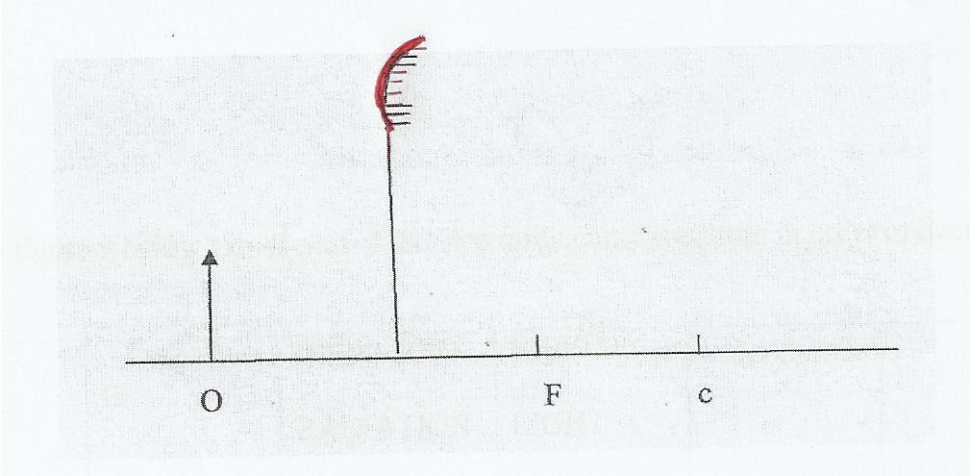
7. An electric heater is found to have a resistance of 950Ω when operating normally on a 240V mains. Find the power rating of the heater. (2 marks)

8. Figure 6 below shows a path of a ray of light through a rectangular block of Perspex placed in air.



Calculate the refractive index of Perpex. (2 marks)

9. Figure 7 below represent an object O placed 5cm infront of a convex mirro. F is the focal point of the mirror.

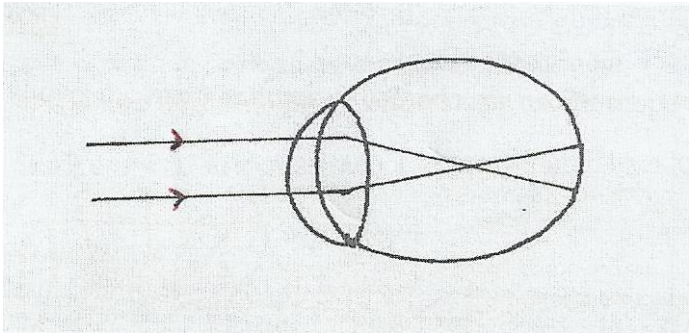


Draw rays to locate the position of the image. (2 marks)

10. A boy watching fireworks display sees the light from an explosion and hears the sound 2.5 seconds later. Determine how far is the explosion. (Speed of sound in air 330m/s). (2 marks)

11. Why is repulsion a sure way of testing polarity of a magnet?(1 mark)

12. Figure 8 below shows an eye defect



Use a ray diagram to show how the defect above could be corrected. (2 marks)

13. State two properties of X-rays similar to those of visible light. (2 marks)

14. The table in figure 9 below shows part of the electromagnetic spectrum in order of decreasing wavelength.

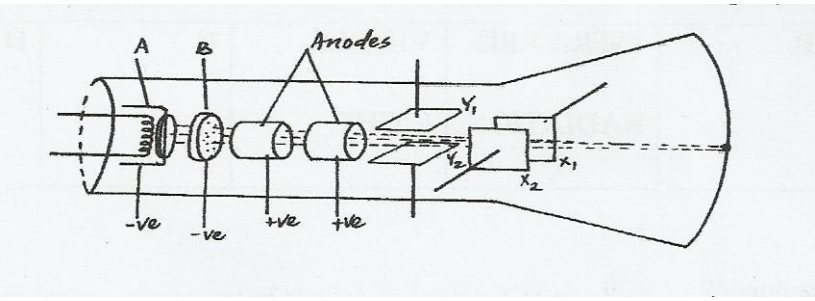
A	B	INFRA RED RADIATION	VISIBLE LIGHT	C	D

a) How are waves C produced? (1 mark)

b) State one use of the wave D. (1 mark)

SECTION B (55 MARKS)

15. Figure 10 below shows the main features of cathode ray oscilloscope (C.R.O)

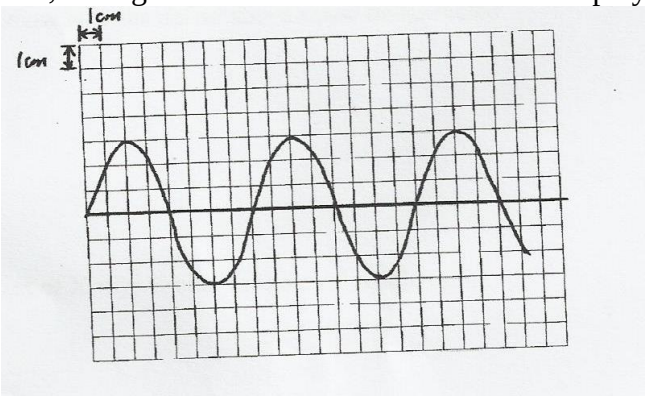


a) (i) Name the parts labeled A and B. (2 marks)

(ii)State the function of B and briefly outline how it works. (2 marks)

(iii) State two function of the anodes. (2 marks)

b) The output of an a.c generator was connected to the input of the cathode ray oscilloscope whose time base settling was 5 milliseconds per centimetre and the y-gain at 10 volts per centimetre, the figure below shows the waveform displayed on the screen of the C.R.O.



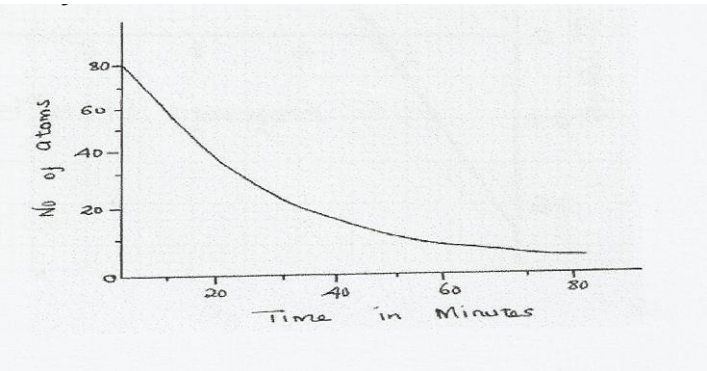
Determine

(i) The park voltage of the generator. (2 marks)

(ii) The frequency of the voltage (2 marks)

16. a) Define the term half-life of a radioactive material. (1 mark)

b)Figure 11 below shows a decay of a certain element. The diagram is drawn to scale.



From the graph find.

i) Half-life of the element (1 mark)

ii) Number of half-lives undergone when the count rate is 10 atoms. (2 marks)

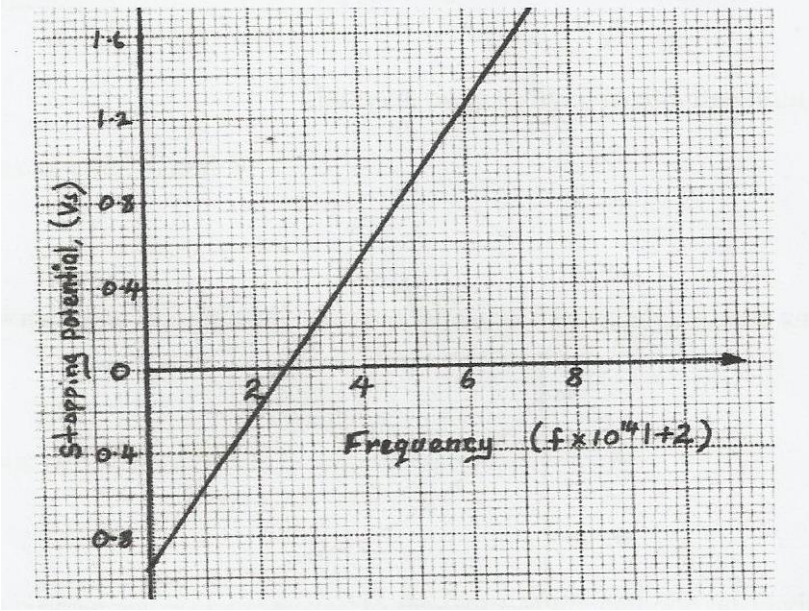
iii) The following is part of a radioactive decay series.

$$^{232}_{90}Th \xrightarrow{\beta} {}^{a}_{91}X \xrightarrow{\alpha} {}^{228}_{b}Y$$

Determine the value of 'a' and 'b'. (2 marks)

17. a) Define the term photoelectric effect. (1 mark)

b) In an experiment to find 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)

iii) Calculate the work function of the metal in joules. (2 marks)

c) The threshold frequency of sodium is 4.8×10^{14}Hz. Calculate the work function of sodium. (*Take the plank's constant to be 6.6×10^{-34}JS*) (2 marks)

18. a) State Lenz's law of electromagnetic induction. (1 mark)

b) A transformer with 2000 turns in the primary circuit and 150 turns in the secondary circuit has its primary circuit connected to a 800V a.c source. It is found that when a heater is connected to the secondary circuit, it produced heat at the rate of 1000W. Assuming 100% efficiency, determine the;

i) Voltage in the secondary circuit. (2 marks)

ii) Current in the primary circuit. (2 marks)

iii) Current in the secondary circuit. (1 mark)

iv) State the type of transformer represented above. (1 mark)

b) (i) State the reason why long distance power transmission is done at a very high voltage and using thick cables. (1 mark)

(iii) Calculate the cost of using the following appliances in one month (30 days) if the company rate is ksh. 9.50 per unit. (2 marks)

I A 2000W water heater for 2 hours per day.
II A 75W bulb for 10 hour per day.
III A 1500W electric iron for 1 hour per day.

19. a) Define capacitance. (1 mark)

b) Figure 12 shows three capacitors of capacitance 3μF, 2μF, 6μF and 12V supply connected in a circuit.

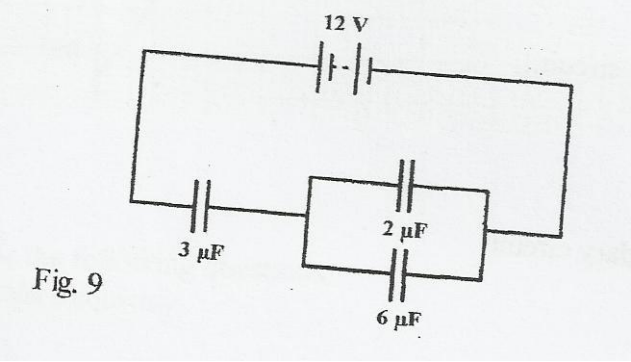


Fig. 9

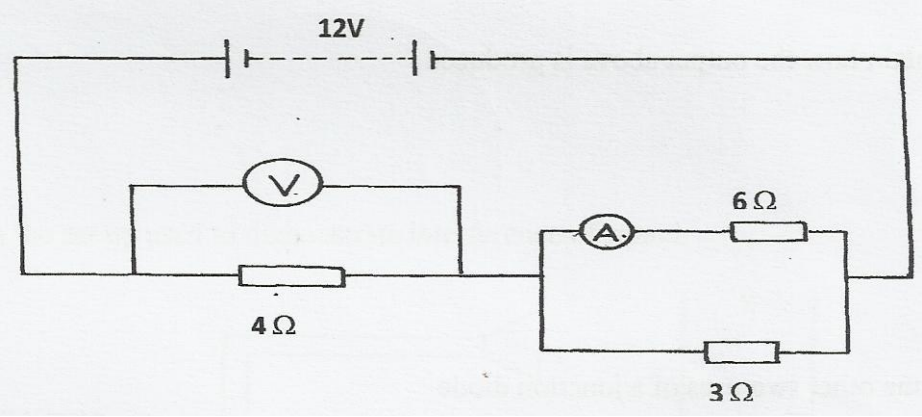
Calculate
i) The total capacitance of the circuit. (2 marks)

ii) The charge stored in the circuit. (2 marks)

iii) The potential difference across the 2 μF capacitor. (2 marks)

C i) State Ohm's law. (1 mark)

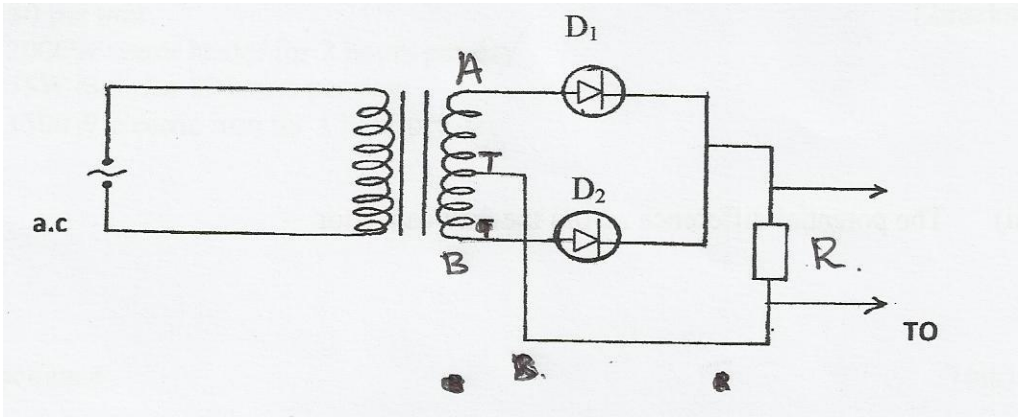
Study the circuit diagram shown below.



(ii) Determine the reading of the voltmeter V. (2 marks)

(iii) Determine the reading of the ammeter A. (2 marks)

20a) A student connected a circuit as shown in figure 13 below hoping to produce a rectified output.



i) Sketch the graph of the output on the **CRO** screen. (1 mark)

ii) Explain how the output above is produced. (2 marks)

iii) Name other two uses of a junction diode. (2 marks)

b) Figure 14 shows circular waves approaching a concave reflector.

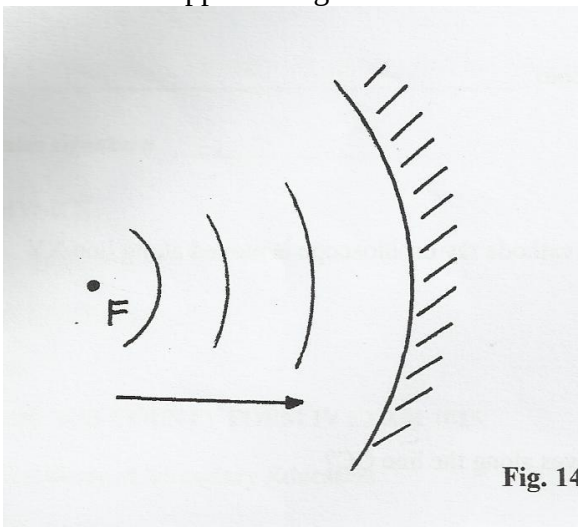


Fig. 14

Show the reflected waves. (2 marks)

c) Figure 15 shows the set up used to demonstrate interference of sound

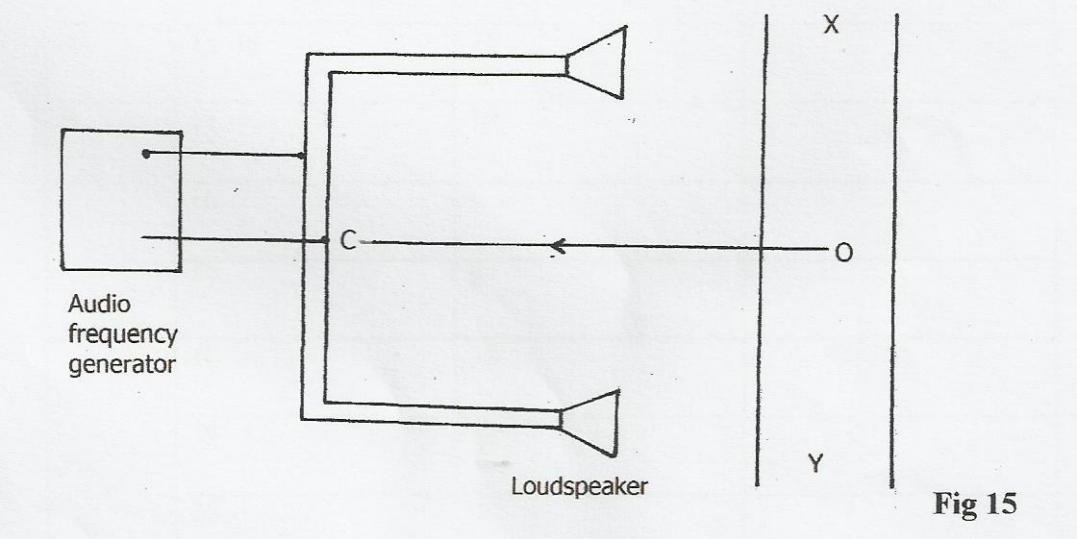


Fig 15

i) An observer O, moves along XY.

State the observation(s) made. (1 mark)

(ii) State what would be observed if a cathode ray oscilloscope is moved along line XY. (1 mark)

(iii) What will a student hear if he moves along the line OC? (1 mark)

232/3
PHYSICS
PAPER 3
JULY /AUGUST 2015

GATUNDU JOINT EXAMINATION - 2015
Kenya Certificate of Education
Physics Paper 3

Instructions to candidates

- **This paper consists of two Questions 1 and 2.**
- **Answer all the questions in the spaces provided.**
- **Electronic calculators, mathematical tables may be used.**
- **All numerical answers should be expressed in the decimal notations.**

QUESTION	MAX MARKS	CANDIDATE'S SCORE
1	20	
2	20	
TOTAL	40	

QUESTION 1

You are provided with the following:

- Wooden plank 100cm long or a metre rule
- two knife edges
- Retort stand, boss and clamp
- Half metre rule
- An optical pin and a piece of cello tape
- Five 100g masses or (two 200g masses and one 100g mass)

Proceed as follows

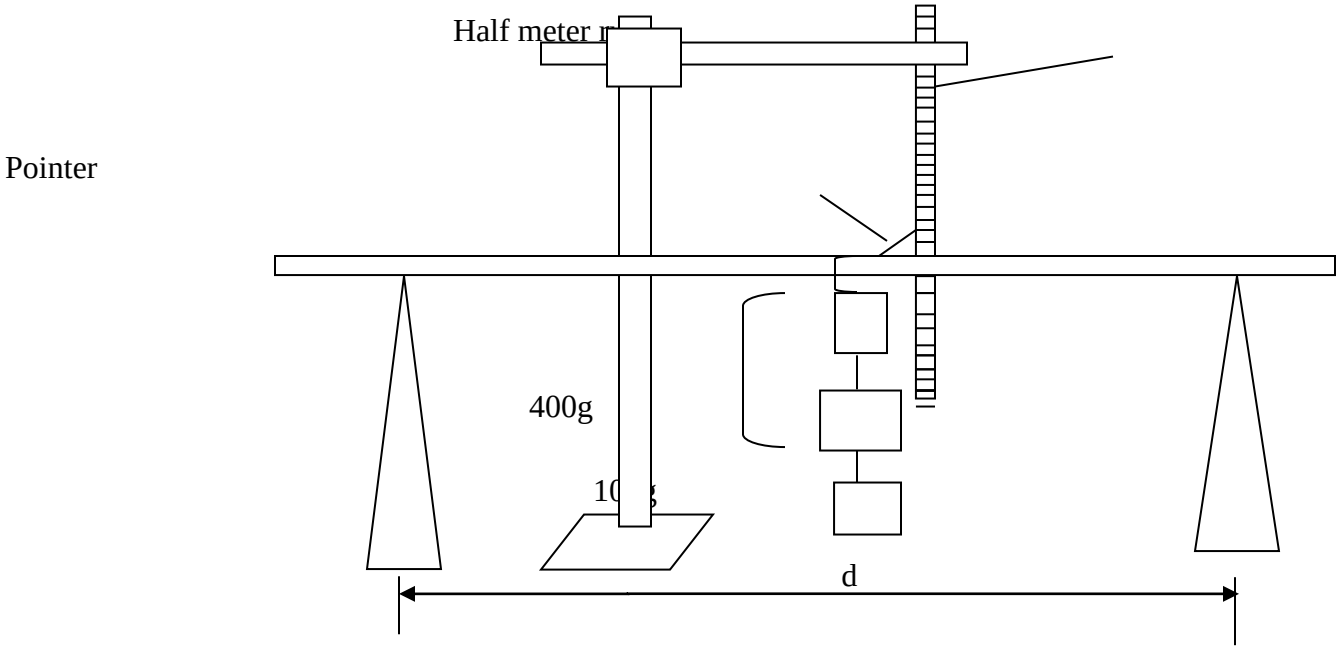
a) Balance the wooden plank (metre rule) on a knife edge and record the point of balance.

----------cm (2marks)

Fix a pointer on the plank at this point

b) Put the wooden plank so that it lies horizontally on the two knife edges provided.

c) Clamp the half metre rule vertically and place it near the pointer on the wooden plank as shown in the figure



d) Adjust the knife edges such that the distance d, between them is equal to 90cm and they are equidistant from the position of the pointer.

e) Read and record the position of the pointer on the vertical scale

X_0 .....cm (1mark)

f) Suspend a mass of 500g at the center of the wooden plank (where the optical pin is fixed as a pointer). Read and record the position of the pointer on the scale.

X_1 =.....cm (1mark)

g) Hence find the depression, X of the metre rule at its mid-point and fill the table

h) Remove the mass from the metre rule.

h) Repeat procedures (c) to (g) for values of d equal to 80 70 60 50 and 40cm
(8 marks)

d(cm)	90	80	70	60	50	40
X_0(cm)						
X_1cm)						
X (cm)						
Log_{10} d						
$Log_{10}X$						

Question 2

You are provided with the following

-A stop watch

A milliameter

-A capacitor

-Two switches **S_1**and **S_2**

-Six 1000 Ohms Resistors

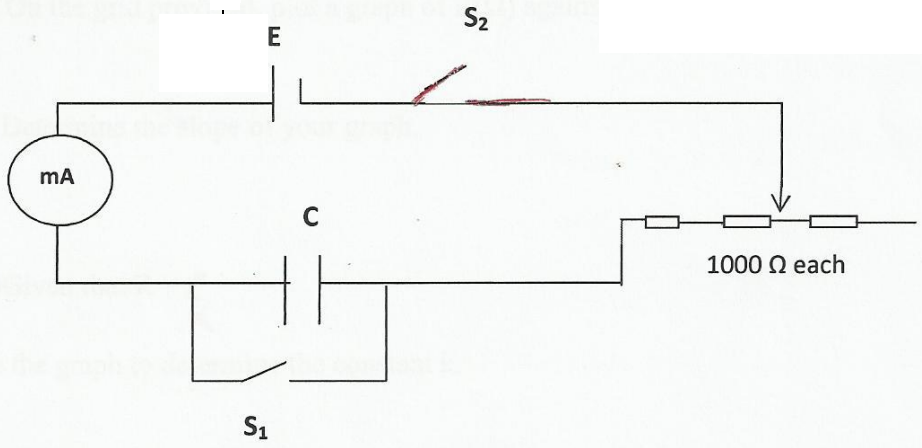
-a dry cell and a cell holder

Seven pieces connecting.

At least six crocodiles clips.

Proceed as follows

a) Connect the circuit as shown in figure 1.0 bellow



(Make sure the positive terminal of the Capacitor connects to the positive terminal of the cell and negative to negative)

4

b) Close switch S_1first and then switch $S_2$and record the maximum reading of the milliameter in the Table 1.0 below.

c) Open switch S_1 and at the same instant, start the stop clock.Record the time taken for the value of current to fall to a half of its original value.

d) Repeat step (b) and (c) with other values of R(Ω).

Table 1.0 (6 mks)

Resistance,R (Ω)	2000	3000	4000	5000	6000	7000
Maximum Current I(mA)						
Time t(s)						

e(i) On the grid provided, plot a graph of R(Ω) against t (s) (5mks)

(ii) Determine the slope of your graph. (3mks)

(iii)Given that $R = \frac{t}{k}$

Use the graph to determine the constant k. (2mks)

f) Why should the switch S_1 be closedfirst and S_2 later?. (2mks)

f) What is happening to the capacitor when the milliammeter reading is decreasing? (2mks)