KCSE 2023 PREDICTION CYCLES

PHYSICS PAPER 1

KCSE 2023 TOP PREREDICTION CYCLE 1-10

CLASS OF KCSE 2023 NOVEMBER

The set Comprises of 10 Prediction Cycles prepared by a panel of Top Writers from KNEC Nairobi HQ

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NAME …… ADM NO. ……..CLASS ……..

SCHOOL ……DATE……SIGN ……...

232/1
PHYSICS
PAPER 1
FORM FOUR
TIME: 2 HOURS

KCSE TOP PREDICTION MASTER CYCLE 1

INSTRUCTIONS TO CANDIDATES

- Write your name, school and index number in the spaces provided above.
- Write the date of examination and sign in the spaces provided above.
- This paper consists of two sections, Section **A** and **B**.
- Answer **ALL** the questions in section **A** and **B** in the spaces provided.
- **ALL** answers and working **MUST** be clearly shown.
- Mathematical tables and electronic calculators **may be** used.
- Take acceleration due to gravity, g = 10m/s^2

FOR EXAMINER'S USE ONLY:

Section	Question	Maximum score	Candidate's score
A	1–12	25	
B	13	12	
	14	11	
	15	10	
	16	12	
	17	10	
	TOTAL	80	

1. Figure 1 below shows a micrometer screw gauge being used to measure the diameter of a metal rod. The thimble scale has 50 divisions.

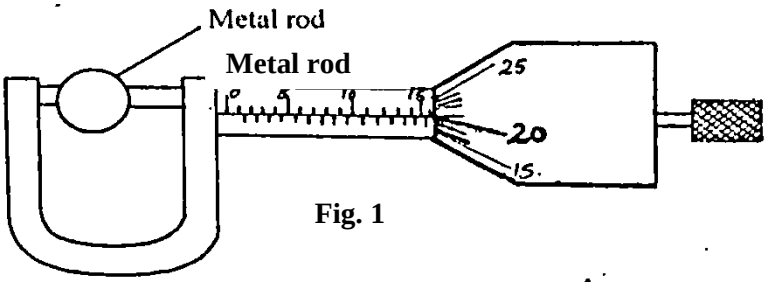

Fig. 1

Find the diameter of the metal rod. ***(1 mark)***

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2. A man of mass 72kg jumps from a small boat on to the lake shore with a forward velocity of $9.0ms^{-1}$. If the mass of the boat is 216kg, calculate the initial backward velocity of the boat. ***(3 marks)***

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Explain briefly how the temperature in a green house is kept higher than outside. ***(2 marks)***

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3.

The diagram shown in figure 2 below is an arrangement of three pulley wheels used to help in lifting loads. Use it to answer questions 4 and 5.

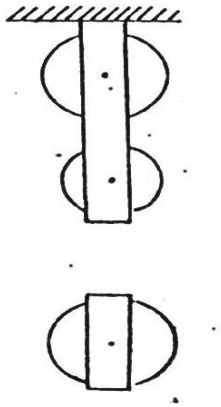

Fig. 2

4. Complete the diagram to show how the rope goes round the wheels, position of the load and the effort.
(2 marks)

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5. Write down the velocity ratio (VR) of the system. ***(1 mark)***

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6. State how temperature affects the speed of sound in air. (***1 mark)***

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7. State **two** facts which show that heat from the sun does not reach the earth surface by convection.
(2 marks)

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8. The diagram in figure 3 below shows water with negligible viscosity flowing steadily in a tube of different cross-section area. If at a point A, the cross section area is $120cm^2$ and the velocity of water is $0.40ms^{-1}$, calculate the velocity at B where cross section area is $4.0cm^2$? ***(3 marks)***

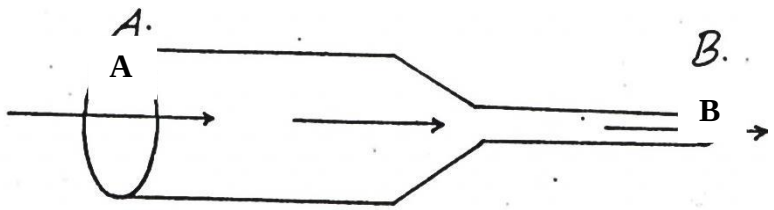

Fig. 3

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9. A motor uses an electrical energy at a rate of 200W and raises a mass of 25kg through a vertical distance of 20m in 0.5 minutes. Determine the efficiency of the motor. ***(3 marks)***

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How long will it take 240V, 3000W electric immersion heater to raise the temperature of 150 litres of water in a well-lagged calorimeter made of copper of mass 20kg from 15^0 to 70^0C? ***(3 marks)***

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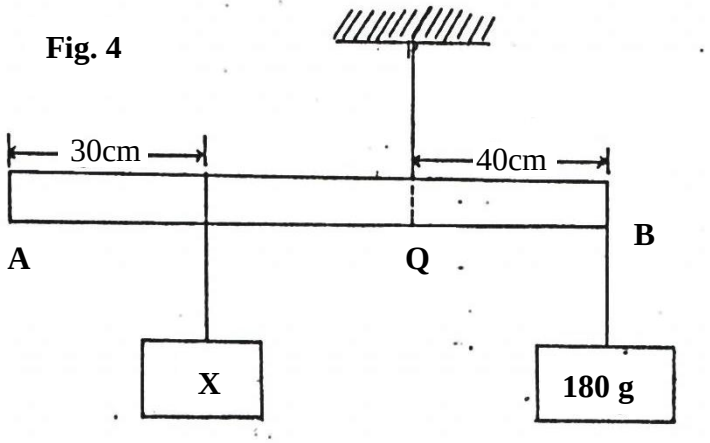
10. The diagram shown in the Figure 4 below shows a system in equilibrium with the rule horizontal. AB is a uniform rule of length 1.0m and weight 1.8N. Calculate the weight of the block X. ***(3 marks)***

Fig. 4



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11. State the reason why a trailer carrying heavy loads has many wheels. ***(1 mark)***

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SECTION B (*55 MARKS*)

Answer ALL the questions

12. A student in Anestar Girls set up an experiment to study the acceleration of a trolley using ticker tape timer. The timer made 50 dots per second on the tape. Dots A to E measured 2.5cm apart and dots E to I measured 4.5cm apart.

a) Using a scale drawing show the dots A, B C, D, E, F, G and I as they appeared on the tape. ***(3 marks)***

b) Determine the velocity of the trolley from:

i) A to E. ***(2 marks)***

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ii) E to I. ***(2 marks)***

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c) Calculate the acceleration of the trolley. ***(2 marks)***

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d) What end of the tape was fixed onto the trolley? ***(1 mark)***

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e) State **two** precautions that the student should take before she takes her final samples of the dots.
(2 marks)

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13. a) i) What is Brownian motion? ***(1 mark)***

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ii) Describe with the aid of a diagram, the apparatus you could set up in order to demonstrate Brownian motion of smoke particles suspended in air. ***(5 marks)***

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b) An oil drop has a volume of $0.01mm^3$ when it is placed on the surface of some water, it spreadsout to form a circular patch of area $500cm^2$

i) Calculate the thickness of the oil film. ***(3 marks)***

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ii) What **two** assumptions have you made in the answer b(i) above. ***(2 marks)***

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14. a) i) Distinguish between inelastic and elastic collisions. ***(2 marks)***

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ii) A particle A of mass M moving with an initial velocity, u, makes a head-on collision with another particle B of mass 2M, B being initially at rest. In terms of u, calculate the final velocity of A if the collision is perfectly inelastic. ***(3 marks)***

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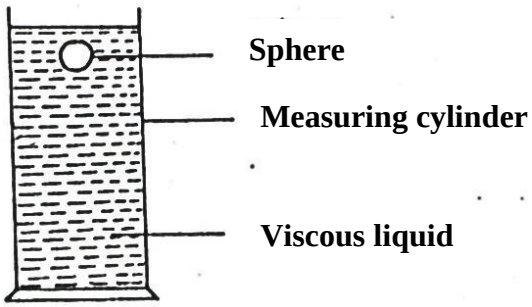
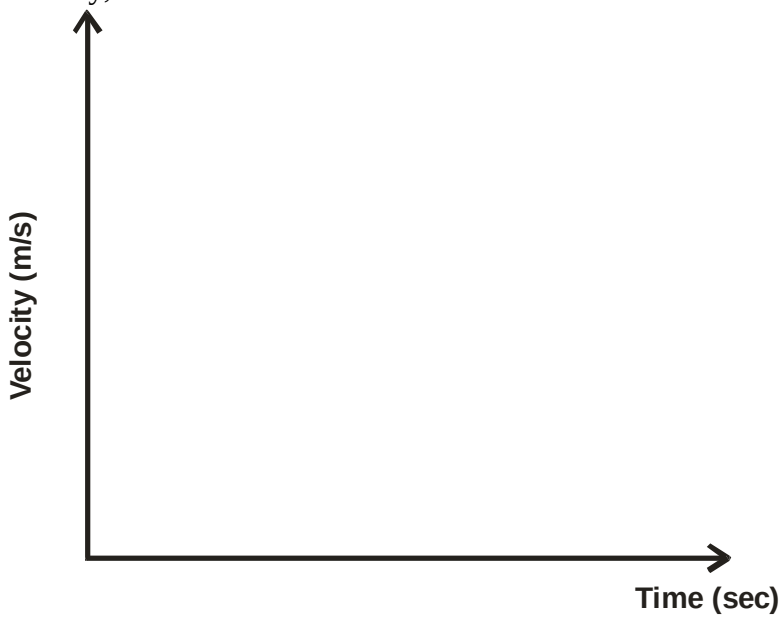
b) The diagram in Figure 5 below shows a sphere moving in a viscous liquid in a tall measuring cylinder.

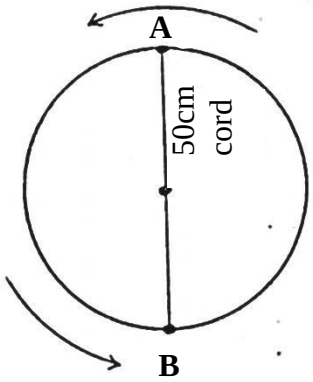


i) Show on the diagram the forces acting on the sphere. ***(3 marks)***

ii) Sketch a graph showing the variation of velocity with time in figure 6 below. Show on the graph the terminal velocity, V_T. ***(2 marks)***



15. A mass of 1kg is attached to a cord of length 50cm. It is whirled in a circle in a vertical plane at 10 revolutions per second as shown in the figure below.



a) Find the tensions in the cord when the mass is at:

i) Highest point of the circle A. ***(2 marks)***

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ii) Lowest point of the circle B. ***(2 marks)***

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b) i) Describe an experiment to determine specific heat capacity of aluminium block with two holes drilled in it to accommodate a thermometer and an electric heater. ***(5 marks)***

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ii) An immersion heater rated 90W is placed in a liquid of mass 2kg. When the heater is switched on for 15minutes, the temperature of the liquid rises from 20^0C to 30^0C. Determine the specific heat capacity of the liquid. ***(3 marks)***

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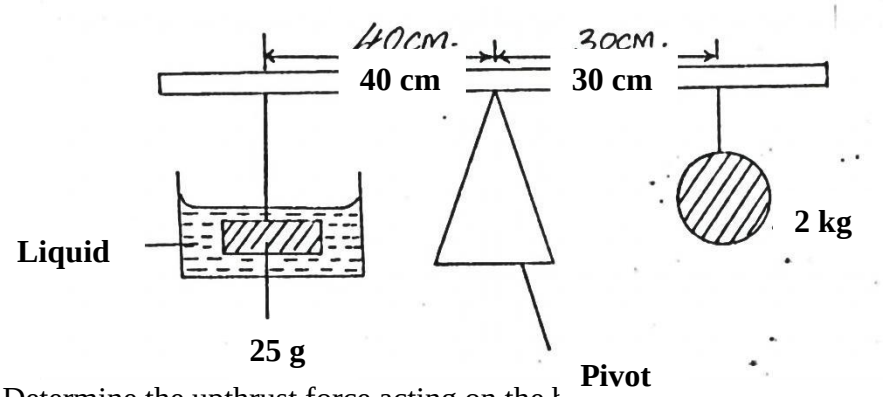
16. a) The figure below shows a block of mass 25g and density 200kg/m^3 submerged in a certain liquid and suspended from a homogenous horizontal beam by means of a thread. A mass of 2kg issuspended from the beam as shown in the figure below.



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

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

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

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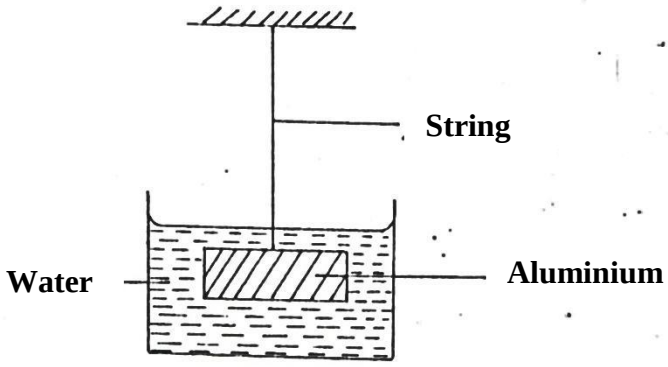
ii) The figure below shows a piece of aluminum suspended from a string and completely immersed in a container of water. The mass of the aluminium is 1kg and its density is $2.7 \times 10^3 kg/m^3$



Calculate the tension in the string. (3 marks)

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NAME: ……..…CLASS:…..…ADM NO:……

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PHYSICS
PAPER 1

KCSE TOP PREDICTION MASTER CYCLE 2

Instructions to candidates

- ***This paper consists of two sections A and B.***
- ***Answer all the questions in the two sections in the spaces provided after each question***
- ***All working must be clearly shown.***
- ***Electronic calculators, mathematical tables may be used.***
- ***All numerical answers should be expressed in the decimal notations.***

SECTION	QUESTION	MAX MARKS	CANDIDATE'S SCORE
I	1 – 12	25	
II	12	12	
	13	12	
	14	11	
	15	09	
	16	11	
TOTAL		80	

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SECTION A (*25 MARKS)*

1. A spherical ball bearing of mass 0.0024 kg is held between the anvil and spindle of a micrometer screw gauge. The reading on the gauge when the jaws are closed without anything in between is 0.11mm. Use this information and the position of the scale in the **figure 1** below to answer the questions **(a)** and **(b)** below:

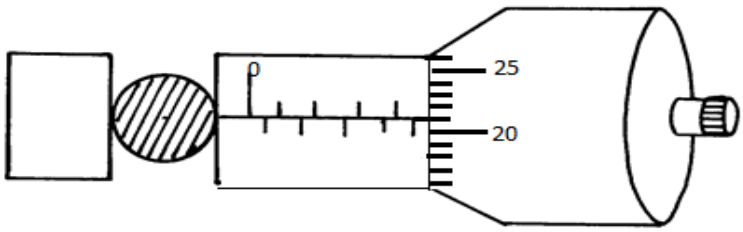

fig 1

a) What is the diameter of the ball bearing? ***(1 mk)***

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b) Find the density of the ball bearing correct to 3 significant figures ***(2 mks)***

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2. The diagram below shows a wire loop with two threads tied across it. The loop is dipped into a soap solution such that the soap film covers it as shown in **fig 2**

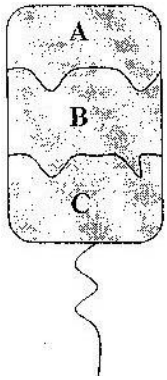

Fig 2

Region B is punctured such that the soap film in that section is broken. On the space alongside the diagram sketch the resulting shape of the wire loop. Give a reason for the shape. ***(2 mks)***

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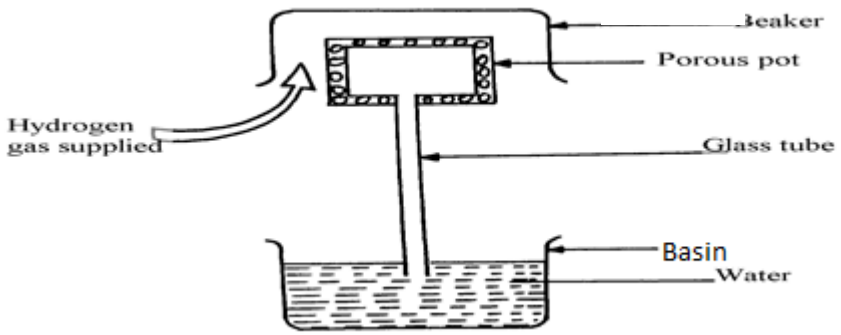
3. The **figure 3** below shows an arrangement to demonstrate diffusion through solids:-



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

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4. Figure 4 shows two identical thermometers. Thermometer **A** has a blackened bulb while thermometer **B** has a silvery bulb. A candle is placed equidistant between the two thermometers

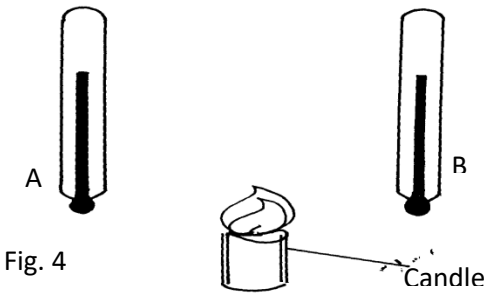

Fig. 4

State with a reason the observations made after some time***(2 mks)***

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5. A car being driven on a horizontal straight road accelerates uniformly from O to 20m/s. In the first 10s. It continues at that speed for the next 40s and then decelerates to a stop in 5s. Sketch the velocity time graph for its motion. ***(2 marks)***

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6. A uniform metre rule is balanced at its centre. It is balanced by the 30N, 5N and the magnetic force between **P** and **Q**. **P** is fixed and **Q** has a weight of 5N

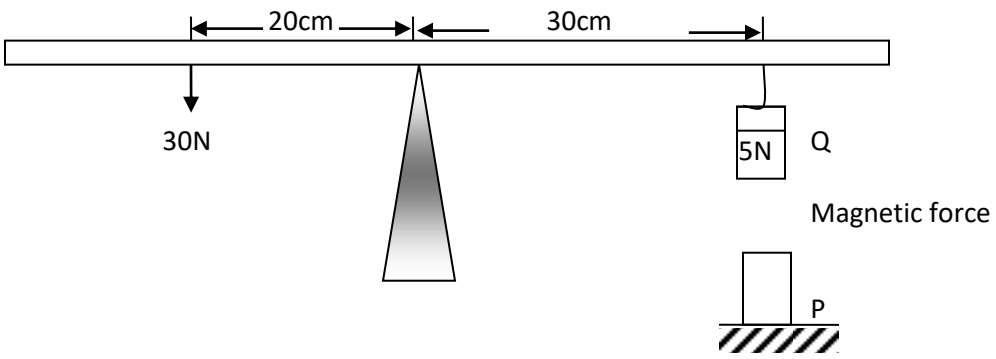

Fig 5

a) Ignoring the weight of the metre rule, calculate the value of the magnetic force between Q and P ***(2 mks)***

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b) Given that the lower end of Q is North pole, state polarity of the end of P facing Q.

(1 mk)

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7. (a) Give a reason why water is not suitable as a barometric liquid. ***(1 mk)***

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(b)Explain why a lift pump is unable to raise water from a borehole where the level of water is 20m below the ground level. ***(1 mks)***

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8. The diagram below shows a mass of 12g hanged on a set of 6 identical springs. When a mass of 12g was hanged on spring A alone, its extension was 5cm. Find the extension of the combination shown if each spring and each rod has negligible mass ***(2 mks)***

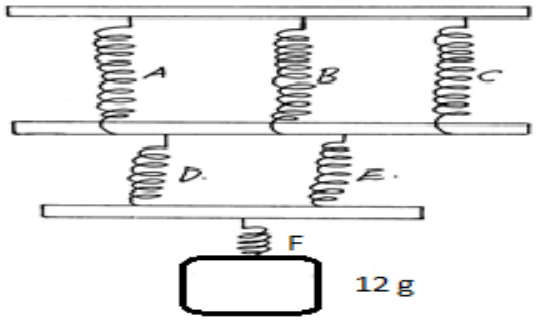

fig 6

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9. Sea water of density **1.04g/cm^3** is being pumped into a tank through a pipe of uniform cross-sectional area of 3.142cm^2. If the speed of water in the pipe is 5m/s, determine the mass flux in S.I unit. ***(2 mks)***

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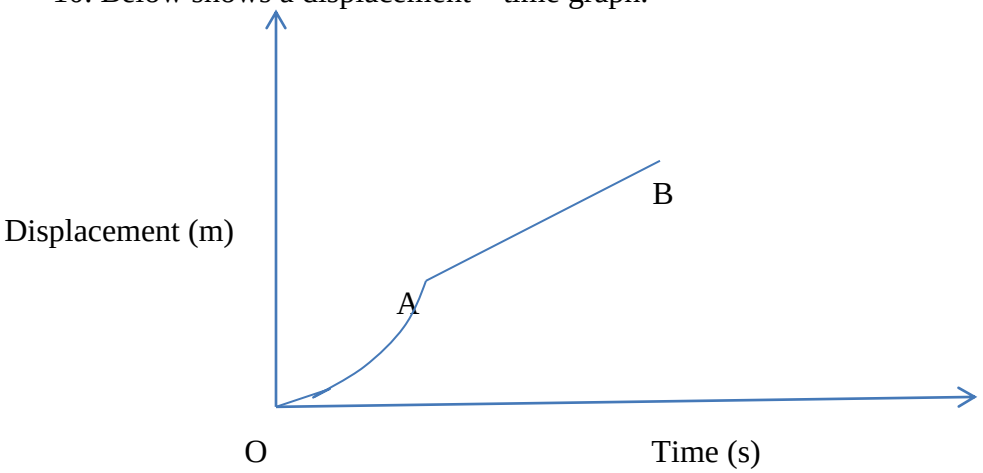
10. Below shows a displacement – time graph.



Describe the motion of the body between points:

OA…… ***(1 mk)***

AB……..(***1 mk)***

11. A quantity of air occupied 500cm^3 at 15^{0}C when the pressure was 76 cmHg. At what temperature would it occupy 460cm^3 if the pressure was 85cmHg? ***(2 mks)***

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SECTION B (55 MARKS)

12.a) State the pressure law for an ideal gas.(***1 mark)***

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c) The set up shows an arrangement to determine the relationship between temperature and pressure of a gas at constant volume.

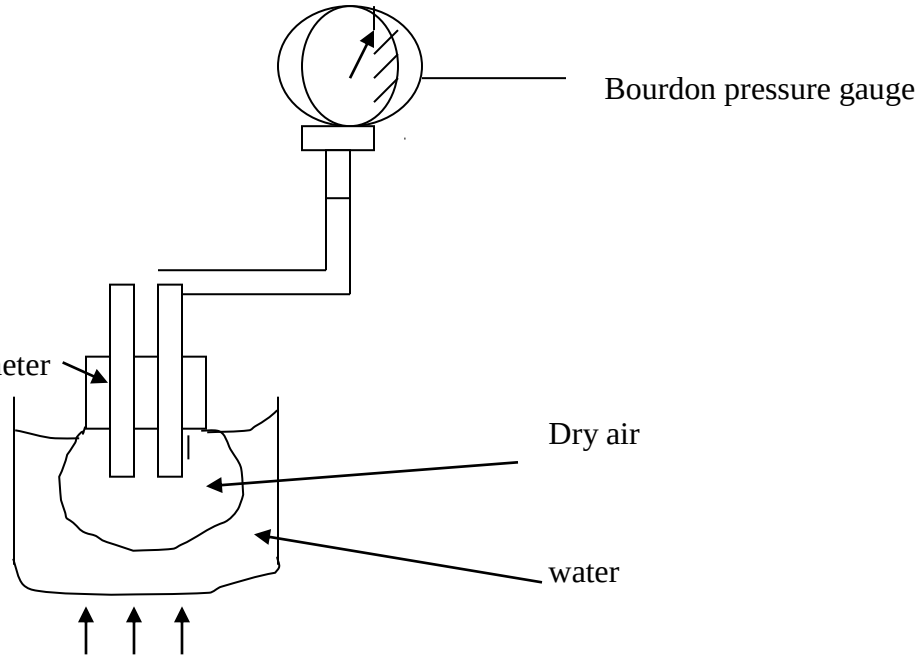

Fig 7

i) Describe how the measurements are obtained in the experiment ***(3 marks)***

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ii) Explain how the results from the experiment can be used to determine the relationship between temperature and pressure ***(2 marks)***

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c) A bicycle tyre is pumped to a pressure of 2.2×10^5 pa at 23°c. After a race the pressure is found to be 2.6×10^5 pa. Assuming the volume of the tyre did not change, what is the temperature of the air in the tyre. ***(3 marks)***

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d) Air is trapped inside a glass tube by a thread of mercury 240mm long. When the tube is held horizontally the length of the air column is 240mm.

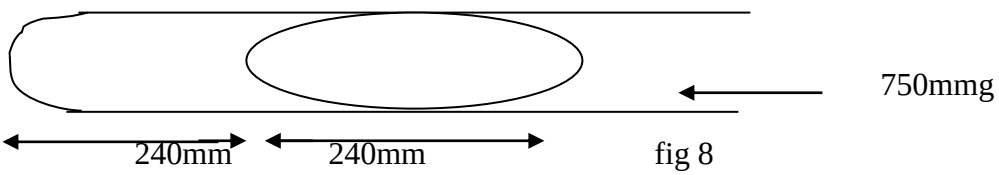

fig 8

Assuming that the atmospheric pressure is 750mmHg and the temperature is constant, calculate the length of the air column when the tube is vertical with open and down.

(3 marks)

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13. (a) An object is released to fall vertically from height of 100m. At the same time another object is projected vertically upward with velocity of 40m/s.

(i) Calculate the time taken before the objects meet ***(3mks)***

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(ii) At what height do the objects meet? ***(2mks)***

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(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 ***(2mk)***

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(ii) The angular acceleration ***(2mks)***

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(iii) The tension on the string ***(2mks)***

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(iii)The linear velocity ***(1mk)***

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14. a) State Archimedes' principle. ***(1mk)***

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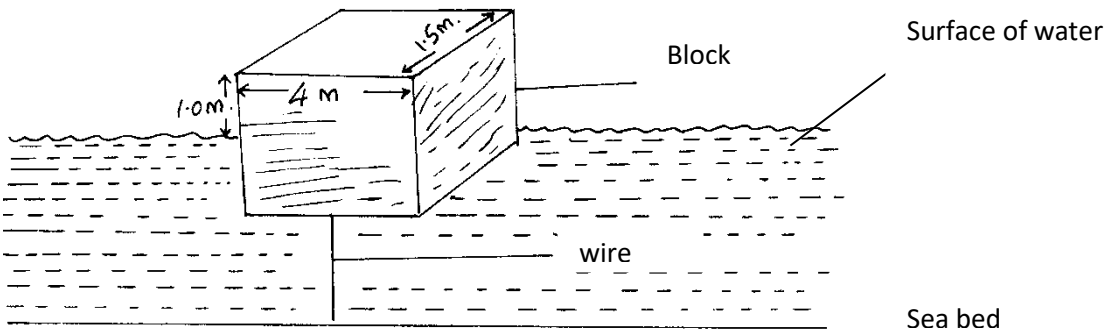
(b) The figure 9 below shows a rectangular buoy of mass 4000kg tethered to the sea-bed by a wire. The dimensions are 4m x 1.5m x 2.2m.



Calculate the :-

(i) Weight of sea water displaced by the buoy (density of sea water = 1100kg/m^3)

(3 mks)

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(ii) Upward force exerted on the buoy by the water. ***(1mk)***

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(iii) Tension in the wire (2mks)

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(c) A test tube of mass 10g and uniform cross-sectional area 4cm^2 is partly filled with lead shots and floats vertically in water with 5cm of its length submerged.

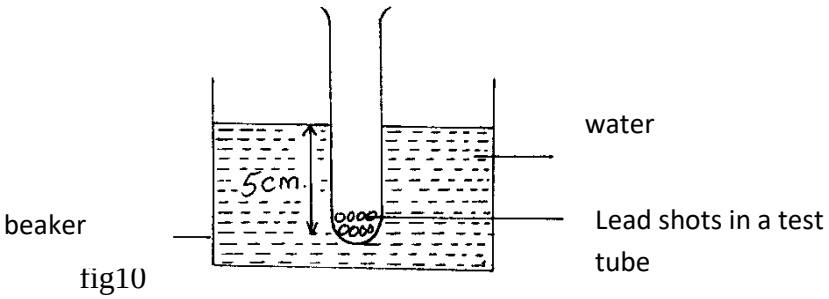

fig10

Find the:-

(i) Mass of the lead shots. ***(2mks)***

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(ii) Length of the test tube that would be submerged in a liquid of density 0.75g/cm^3.

(***2mks)***

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15. (a) State two differences between boiling and evaporation. ***(2 mk)***

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(b) 1200g of a liquid at 10^0C is poured into a well-logged calorimeter. An electric heater rated 1KW is used to heat the liquid. The graph in fig 4 below shows the variation of temperature of the liquid with time.

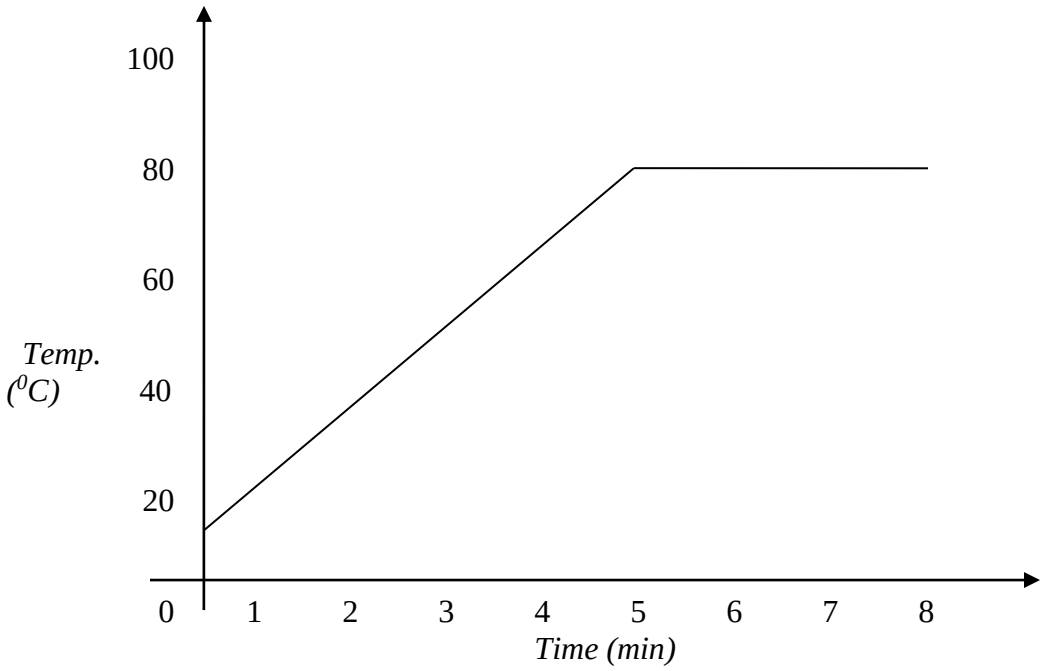

Fig. 4

Use the graph to answer the following questions:

(i) What is the boiling point of the liquid? ***(1 mk)***

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(ii) How much heat is given out by the heater to take the liquid to the boiling point? ***(2 mks)***

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(iii) Determine the specific heat capacity of the liquid stating any assumptions made. ***(2 mks)***

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(iv) If 50g of the liquid vapour was collected by the end of the 8^{th} minute, determine the specific latent heat of vaporization of the liquid. ***(2 mks)***

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16. (a) (i)State Newton's second law of motion. ***(1 mk)***

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(ii) A striker kicks a ball of mass 250g initially at rest with a force of 75N. if the foot was in contact with the ball for 0.10sec. Calculate the take off velocity of the ball. ***(2 mks)***

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(b)A bullet of mass 20g moving at 400 m/s strikes a block of wood of mass 3.5kg initially at rest. The bullet sticks into the block and the two move off together on a horizontal surface,where a frictional retarting force of 4N is acting between the block and surface.

(i) Determine the initial common velocity of bullet and wooden block. ***(2 mks)***

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(ii) What distance does the block move before coming to rest? ***(3 mks)***

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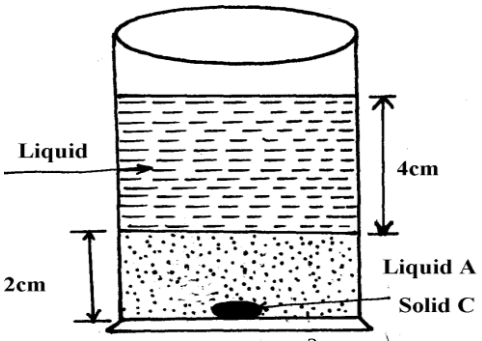
(c) Two immiscible liquids are poured in an open container to the levels shown in the diagram below.

Figure 11



If the densities of the liquids **A** and **B** are 1g/cm^3 and 0.8g/cm^3 respectively and the atmospheric pressure 760 mmHg, find the total pressure acting upon solid **C** at the bottom of the container. (Take density of mercury to be 13.6g/cm^{3}and g = 10 N/Kg***)*** ***(3 mks)***

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**End **

232/1

PHYSICS

PAPER 1

Time: 2 hours

KCSE 2023 TOP PREDICTION MASTER CYCLE 3

Name ……..……` **Index No.** ……..……

Candidates Sign: ……...…..…

Date: ……..

Instruction to Candidates

(a) *Write your name, index number in the spaces provided above.*
(b) *Sign and write the date of examination in the spaces provided above.*
(c) *This paper consists of* **two** *sections:* **A** *and* **B**.
(d) *Answer* **all** *the questions in sections* **A** *and* **B** *in the spaces provided.*
(e) ***All*** *working* **must** *be clearly shown.*
(f) *Silent non-programmable electronic calculators may be used.*
(g) *Candidates should answer the questions in English.*

For Examiners Use Only

Section	Question	Maximum Score	Candidate's Score
A	1 – 12	25	
B	13	5	
	14	11	
	15	14	
	16	13	
	17	12	
Total Score		**80**	

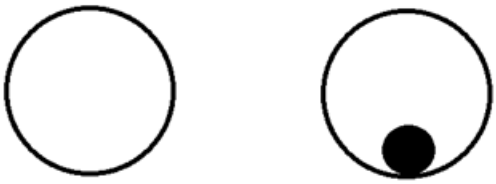
This paper consists of 11 printed pages, candidate should check the questions to ascertain that all pages are printed as indicated and that no questions are missing

SECTION A (25 marks)

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

1. Sketch the scale of a vernier caliper showing a reading a 3.00 cm. (2 marks)

2. The figure below shows two drums A and B. Drum A is empty while drum B has a cylindrical rod.



A B

If the two drum are given the same rolling force, state and explain which drum stops first. (2 marks)

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3. An astronaut weighs 500 N on earth and 80N on the surface of another planet. Given that the gravitational field strength of the earth is 10 N/kg, calculate the gravitational field strength of the planet. (2 marks)

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4. In order to estimate the height of a tree, a student measured the length of its shadow and found it to be 3.2 metres. A metre rule that she had produced a shadow of length 240 centimetres. What is the estimation of the tree height? (3 marks)

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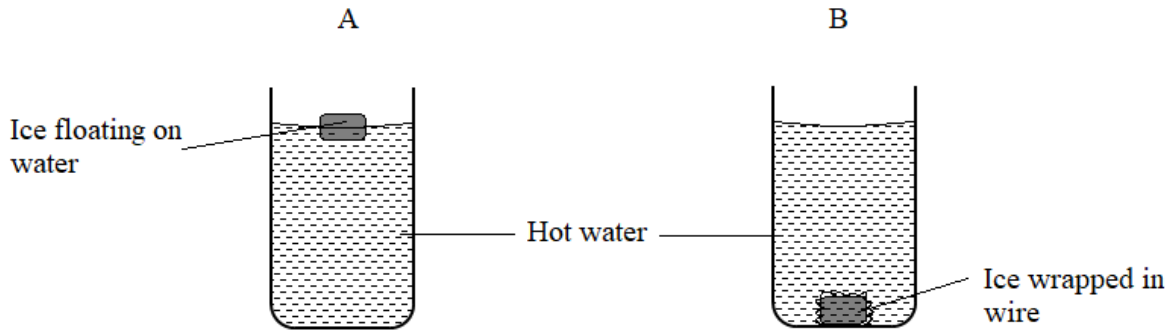
5. The figure below shows two identical containers A and B containing equal amounts of water and an identical ice block.



State with reason, which water cools faster, assuming the gauze absorbs negligible heat (2 marks)

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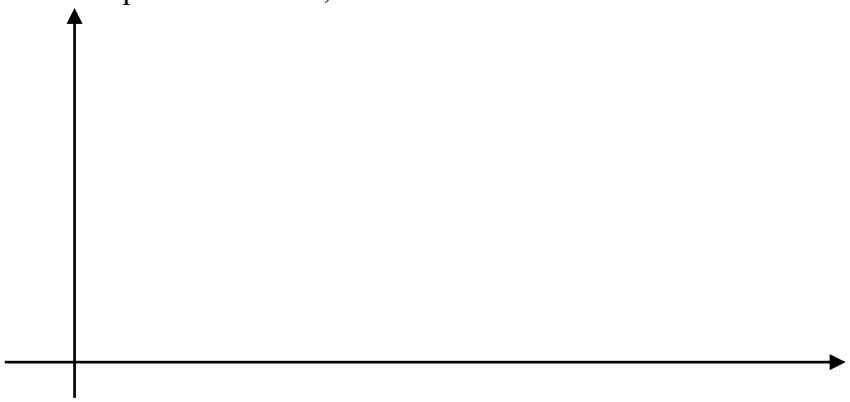
6. On the axes provided below,



(i) Sketch a graph of pressure (P) against reciprocal of volume $(^1/_V)$ of a fixed mass of an ideal gas at a constant temperature. (1 mark)

(ii) State the physical quantity represented by the gradient. (1 mark)

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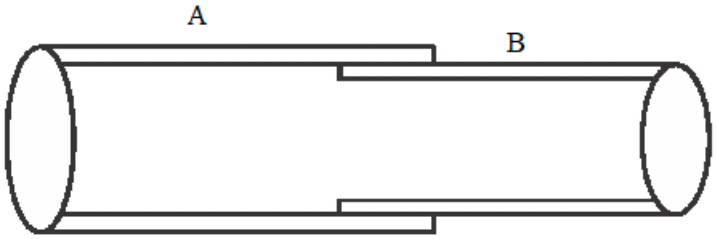
7. The figure below shows two pipes A and B of different expansivities tightly fitted onto each other at the junction. When some ice was placed at the junction, it became easy to separate the conductors.



Explain which of the two was a better conductor of heat. (2 marks)

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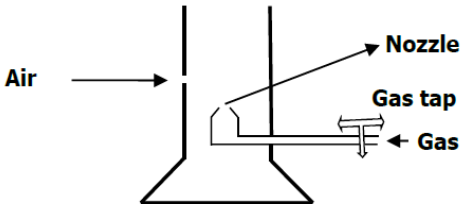
8. The figure below shows a Bunsen burner.



Explain how air is drawn into the burner when the gas tap is open. (2 marks)

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9. (a) Define Brownian motion (1 mark)

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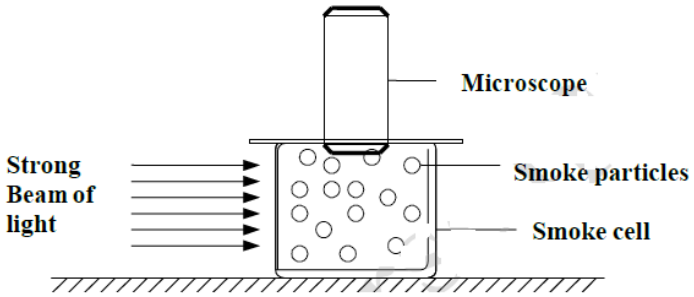
(b) The figure below shows apparatus used to observe the behaviour of smoke particles in a smoke cell



State one reason why smoke is used in the experiment. (1 mark)

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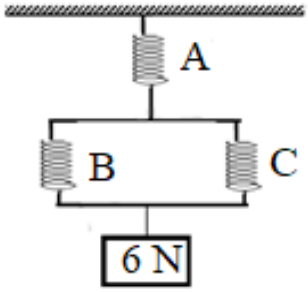
10. Three identical springs each of spring constant 10N/m and weight 0.5N are used to support a load as shown.



Determine the total extension of the system (2 marks)

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11. Other than the friction in a screw jack, state the reason it why it can't be 100% efficient. (1 mark)

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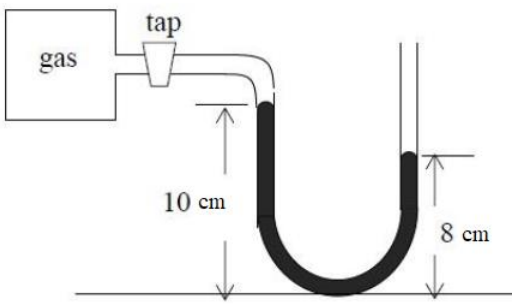
12. A U-tube containing mercury is used as a manometer to measure the pressure of a gas in a container. When the manometer has been connected and the tap opened, the mercury in the U-tube settles as shown in the diagram below.



If the atmospheric pressure is 760 mmHg and the density of mercury is 13 600 kg/m^3, calculate the pressure of the gas in Pascals. (3 marks)

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SECTION B (55 marks)

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

13. (a) State two ways of increasing the stability of a body (2 marks)

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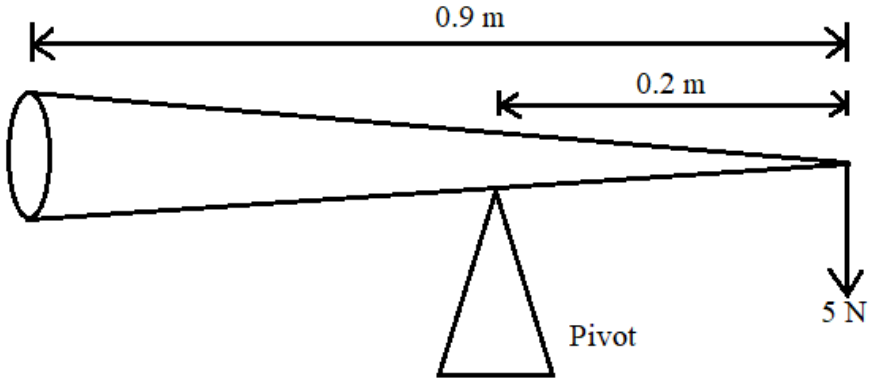
(b) The figure below shows a solid cone which has a uniform density in equilibrium under action of force F.



Determine the weight of the cone. (3 marks)

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14. (a) State the law of floatation. (1 mark)

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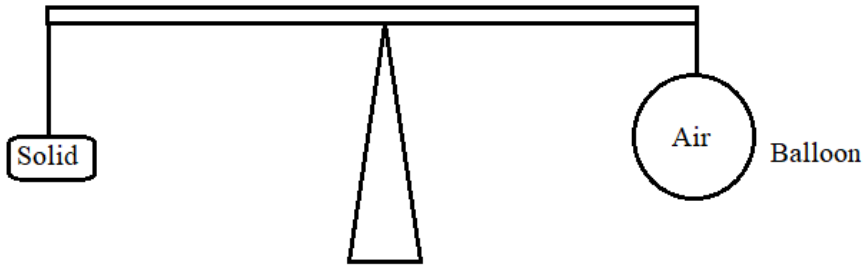
(b) The system in the figure below is at equilibrium.



State and **explain** what may be observed as temperature of surrounding is increased. (2 marks)

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(c) A hot air balloon is tethered to the ground on a windless day. The envelop of the balloon contains 1200 m^3 of hot air of density 0.8kg/m^3. The mass of the balloon *(not including the hot air)* is 400kg. The density of the surrounding air is 1.3 kg/m^3.

(i) Explain why the balloon would rise if it were not tethered. (2 marks)

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(ii) Calculate the tension in the rope holding the balloon to the ground. (3 marks)

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(iii)Calculate the acceleration with which the balloon begins to rise when released. (3 marks)

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15. A string of negligible mass has a metal ball tied at the end of the string 100cm long and the ball has a mass of 0.04kg. The ball is swinging horizontally, making 4 revolutions per second.

Determine;

(a) the angular velocity. (3 marks)

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(b) the angular acceleration (2 marks)

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(c) The tension on the string (2 marks)

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(d) The linear velocity (2 marks)

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(e) A muddy water was put in a container and whirled at a high speed in a horizontal circle. Explain how the high speed causes the separation of mud from water (2 marks)

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(f) What provides for the centripetal force the following cases of circular motion? (3 marks)

(i) The moon moving around the earth.

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(ii) A cyclist negotiating a curve.

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(iii) Aeroplane taking a bend.

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16. (a) Define specific latent heat of vaporization (1 mark)

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(b) A jet of dry steam at 100_0C is sprayed on to the surface of 100g of dried ice at 0^0C contained in a well-lagged copper calorimeter, until all the ice has melted and the temperature begin to rise. The mass of water in the calorimeter when the temperature reaches 40^0C is found to be 120 g. Assuming that the specific latent heat of fusion of ice is 336000JKg^{-1}, specific heat capacity of water is 4200J/Kg/K, heat capacity of the calorimeter is 300J/K. Determine the:

(i) Heat gained by ice to melt (2 marks)

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(ii) Heat gained by the calorimeter and the melted ice (3 marks)

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(iii)The specific latent heat of vaporization of water. (3 marks)

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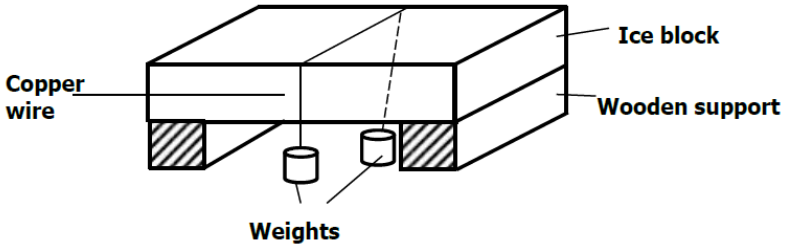
(c) Figure below shows a block of ice with two heavy weights hanging such that the copper wire connecting them passes over the block of ice.



(i) It is observed that the wire gradually cuts its way through the ice block, but leaves it as one piece. Explain. (2 marks)

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(ii) What change would be observed if the copper wire used in the experiment was replaced an iron wire. Explain your answer. (2 marks)

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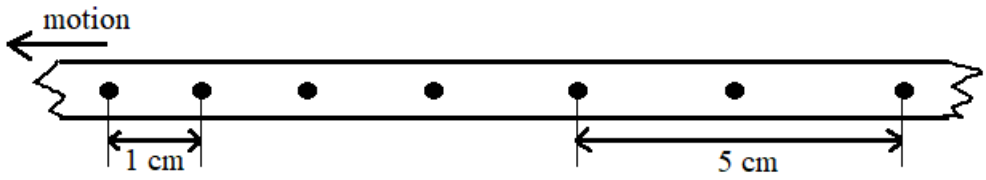
17. (a) The figure below shows the pattern formed on a tape in an experiment to determine the acceleration of a trolley. The frequency of the ticker tape used was 50Hz.



Calculate

i) The initial velocity of the trolley (2 marks)

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ii) The final velocity of the trolley (2 marks)

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iii) The acceleration of the trolley (3 marks)

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(b) Define the terms;

(i) Inelastic collision. (1 mark)

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(ii) Inertia (1 mark)

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(c) A bullet of mass 20g leaves the muzzle of a gun at a speed of 250m/s. If the mass of the gun is 3.5kg, calculate the recoil velocity of the gun. (3 marks)

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Name: ……Index No. ……..……

School: …… Candidate's Sign. …….....

ADM.NO: …… Date: …….....

PHYSICS THEORY
PAPER 1
232/1
TIME: 2 HOURS

KCSE TOP PREDICTION MASTER CYCLE 4

INSTRUCTIONS TO THE CANDIDATES:

- **a)** Write your **name and index number** in the spaces provided above.
- **b)** Write the date of the examination and your SIGNATURE in the spaces provided above.
- **c)** This paper consists of **TWO** sections; **A** and **B.**
- **d)** Answer ***ALL*** the questions both in section **A** and **B** in the spaces provided below each question.
- **e)** **ALL** workings ***MUST*** be clearly shown.
- f) Non-programmable silent electronic calculators may be used.
- g) This paper consists of **11** printed pages.
- h) Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

For Examiners' Use Only

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A	1-12	25	
B	13	11	
	14	11	
	15	12	
	16	10	
	17	11	
	TOTAL	80	

SECTION A (25 MARKS)

Answer All Questions In This Section In The Spaces Provided

1. Figure 1 shows part of the scales of a micrometer screw gauge when it is completely closed.

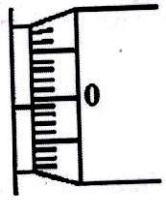

Figure 1

Find the zero error of this micrometer screw gauge. ***(1 mark)***

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2. A barometer reads 760mmHg at sea level. Find it's reading at an altitude of 2500m above sea level. (Density of mercury = 13600kgm^{-3} and density of air 1.25kgm^{-3}) ***(3 marks)***

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3. Figure 4 shows a velocity-time graph of a small metal sphere falling through water in a tall jar.

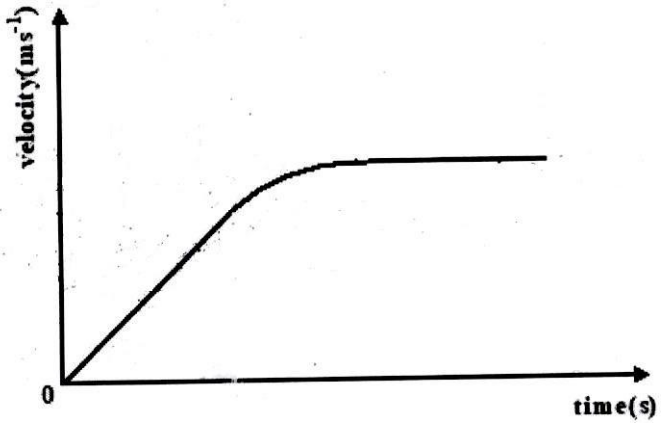

Figure 4

On the same axes, draw a velocity-time graph for the same metal sphere falling through air. ***(1 mark)***

4. Figure 5 shows the tension, T on a pendulum bob suspended from a support.

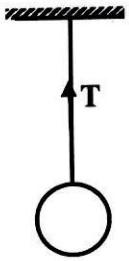

Figure 5

Indicate on the diagram the other force acting on the pendulum bob. ***(1 mark)***

5. A stone and a feather are dropped from rest from a building 20m tall. If they reach the ground at the same time,

a) State the condition under which they fall. ***(1 mark)***

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b) Find the velocity with which they reach the ground. (take g = 10m/s^2) ***(2 marks)***

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6. Define a radian as applied in circular motion. ***(1 mark)***

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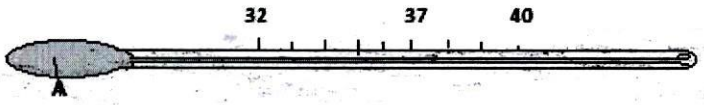
7. The figure below shows a thermometer used by a doctor to determine the temperature of a patient. Why is it difficult to work with this thermometer? ***(2 marks)***



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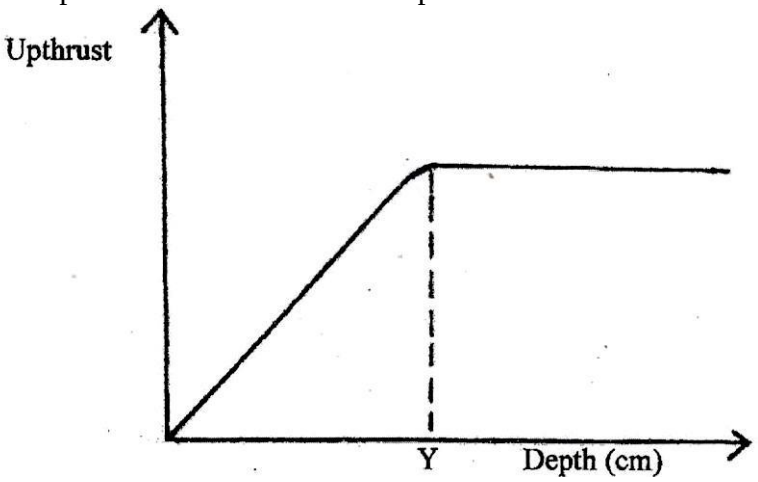
8. A glass block is suspended from a spring balance and held inside a beaker without touching the beaker. Water is added gradually into the beaker. The figure below shows the variation of the upthrust on the block with depth of water in the beaker.



State the reasons for the observation at Y ***(2 marks)***

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9. Which branch of Physics deals with kinetic energy within matter? ***(1 mark)***

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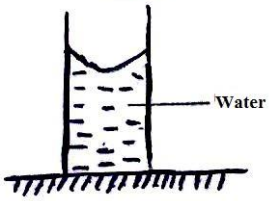
10. The figure 2 below shows a beaker containing water placed on a flat bench. State and explain the changes in stability of the beaker when the water freezes to ice. ***(2 marks)***

Fig 2



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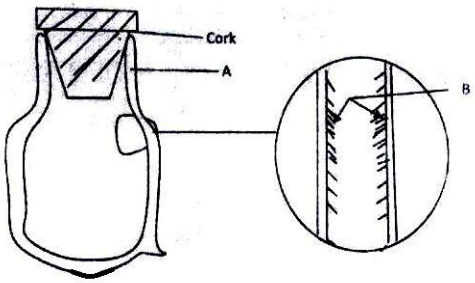
11. Figure 5 is a simple diagram of a vacuum flask with an enlarged view of the part of it in the circle. Use it to answer question (a) and (b).



a) Name the material in A and B.

A: …… ***(1 mark)***

B: …… ***(1 mark)***

b) What type of energy losses are minimized or prevented by the parts A and B?

A: …… ***(1 mark)***

B: …… ***(1 mark)***

12. (a) State Newton's Third Law of Motion ***(1 mark)***

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(b) A car of mass 900kg is initially moving at 20m/s. Calculate the force required to bring the car to rest over a distance of 15m. ***(3 marks)***

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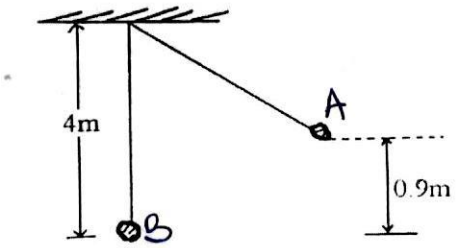
SECTION B – 55 MARKS

Answer All the Questions

13. (a) A body of mass 20Kg hangs 4m and swings through a vertical height of 0.9m as shown in the figure below.



Determine;

(i) The potential energy at position, A ***(2 marks)***

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(ii) The speed of the body when passing through the lowest point, B ***(2 marks)***

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(b) A Crane lifts a load of 2000kg through a vertical distance of 3.0m in 6 seconds. Determine the:

(i) Work done by the crane. (Take g= 10N/Kg) ***(2 marks)***

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(ii) Power developed by the crane. ***(2 marks)***

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(iii)Efficiency of the crane given that it is operated by an electric motor rated 12.5kW ***(3 marks)***

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14. (a) Figure 9 shows a suspended copper solid immersed in a fluid.

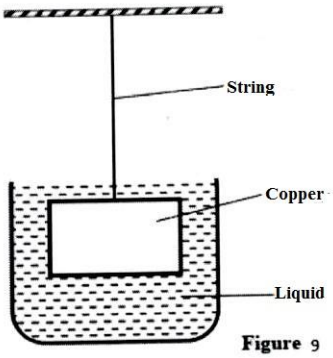

Figure 9

Explain what will happen to the tension in the string if a liquid of higher density is used.
(2 marks)

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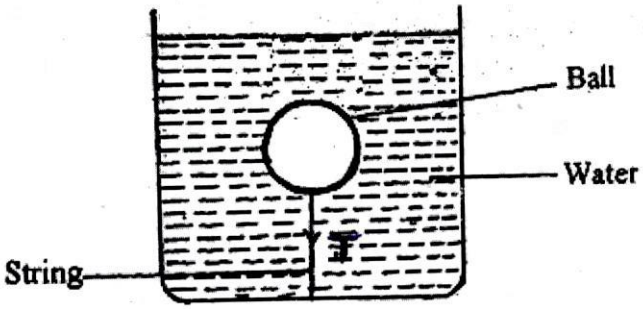
(b) Figure 10 below shows a ball fully immersed in water and held with a string attached at the bottom.



(i) If the mass of the ball is 0.5kg, calculate the weight of the ball. ***(1 mark)***

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(ii) The volume of the water displaced by the immersed ball is 8.0×10^{-4} m^3. Calculate the up thrust on the ball. (ρ water = 1000 kg m^{-3}) ***(3 marks)***

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(iii)Determine the tension T on the string ***(2 marks)***

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(c) An object weighs 5.0N in air, 3.0N when fully immersed in water and 4.0N when fully immersed in a certain liquid. Determine the density of the liquid. ***(3 marks)***

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

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b) A block of metal of mass 150g at 100^0C is dropped into a well lagged calorimeter of mass 215g and specific heat capacity of 400J/Kg/K containing 100g of water at 25°C. The temperature of the resulting mixture is 34°C (Specific heat capacity water is 4200J/Kg/K).Determine;

(i) Heat gained by calorimeter. ***(2 marks)***

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(ii) Heat gained by water. ***(3 marks)***

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(iii)Specific heat capacity of the metal block ***(3 marks)***

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c) A copper block of mass 500g is electrically heated with a heater rated 5W.The heater is on for 8 minutes. Calculate the temperature rise in the block. (Specific heat capacity of copper is 460J/Kg/K) ***(3 marks)***

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16. a) A car negotiating a corner at a constant speed is said have a change of momentum. Explain this observation. ***(1 mark)***

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b) Figure 15 shows the overview of a turn table on which glass blocks A and B are placed at different radii from the centre along a straight line. The radius **r1** is 50cm while that of **r2** is 120cm. The mass of A is 300g that of B is 900g.

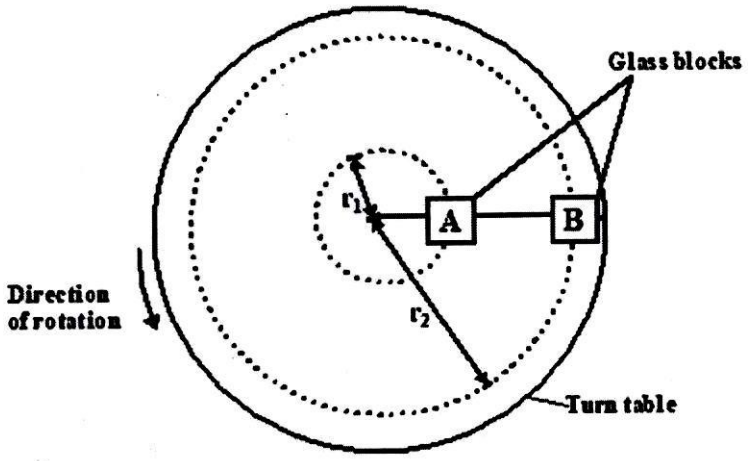

Figure 15

Both blocks maintain the same straight line as the turn table moves in uniform circular motion. Block A has a linear velocity of $40ms^{-1}$.

I. Determine the:

(i) Centripetal force on block A. ***(3 marks)***

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(ii) Linear velocity of block B. ***(3 marks)***

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II. (i) State which block is likely to slide off the turn table. ***(1 mark)***

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(ii) Explain your answer in (II) (i) above. ***(2 marks)***

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17. (a) Figure 8 shows a sealed glass syringe that contains smoke particles suspended in air.

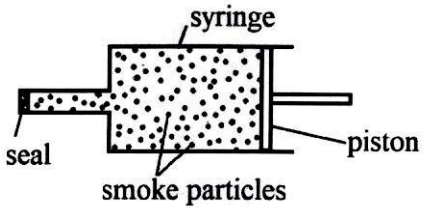

Figure 8

(i) Explain why the smoke particles are suspended in the air and do not settle to the bottom. ***(2 marks)***

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(ii) The air in the syringe is at a pressure of 2.0×10^5 Nm^{-2}. The piston is slowly moved into the syringe until the volume of the air is reduced from 80 cm^3 to 25 cm^3.

i. State why the piston must be moved slowly. ***(1 mark)***

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ii. Calculate the final pressure of the air in the syringe. ***(3 marks)***

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b) State what is meant by an ideal gas. ***(1 mark)***

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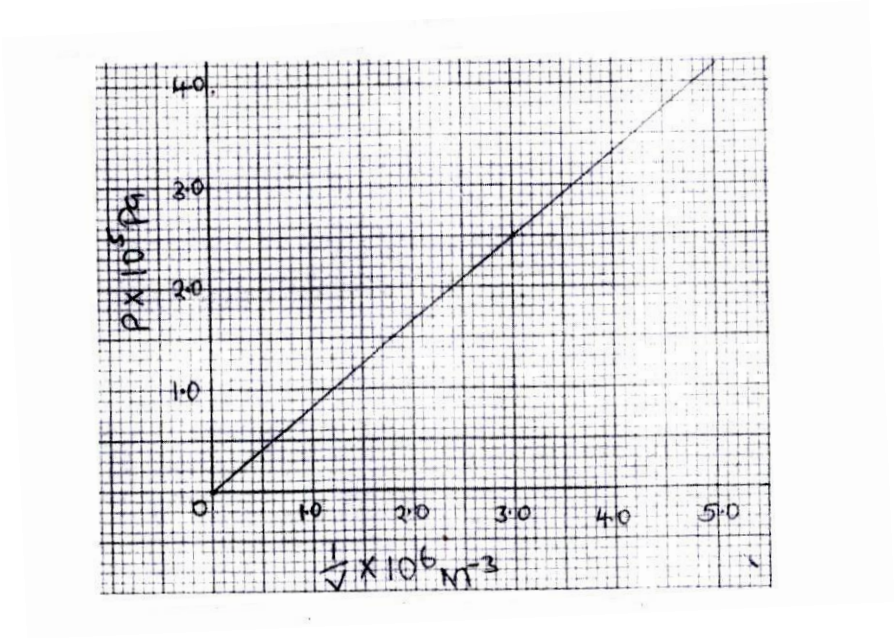
c) The pressure acting in a gas in a container was changed steadily while the temperature of the gas was maintained constant. The value of volume, V, of the gas was measured for various values of pressure. The graph in the figure A shows the relation between the pressure. P_1 and the reciprocal of volume, I/V.



(i) Given that the relation between the pressure P and the volume V of the gas is given by PV=k, where k is a constant use the graph to determine the value of k. ***(3 marks)***

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(ii) What physical quantity does k represent? ***(1 mark)***

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Name: …… **Adm No**: ……
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Signature: …….. **Date**: ……...

PHYSICS (232/1)
FORM FOUR (4)
Time: 2 Hours

KCSE TOP PREDICTION MASTER CYCLE 5

Instructions to candidates

- This paper consists of two sections ***A*** and ***B***.
- Answer **all** the questions in the two sections in the spaces provided after each question
- All working **must** be clearly shown.
- Electronic calculators, mathematical tables may be used.
- All numerical answers **should be expressed** in the **decimal** notations.
- You may use 'g' as $10m/s^2$

For Examiner use only

SECTION	QUESTION	MAX MARKS	CANDIDATE'S SCORE
A	1 – 13	25	
B	14	13	
	15	13	
	16	14	
	17	07	
	18	08	
	TOTAL	80	

This paper consists of 10 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

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SECTION A (25 MARKS)

1. Figure 1, shows a Vernier caliper of zero error 0.02 cm being used for measuring the diameter of a cylindrical container of height 10 cm. The scale reading of the Vernier is as shown alongside.

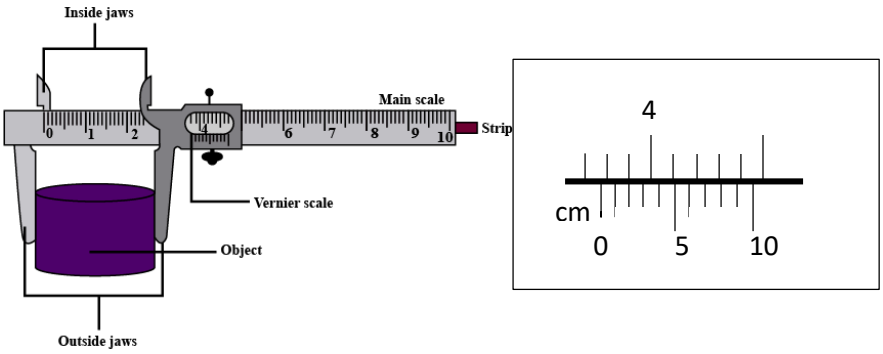

Figure 1

a. Determine the diameter of the container ***(2 marks)***

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b. Estimate the volume of a liquid which can completely fill the container ***(2 marks)***

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2. State **one** factor that affects the turning effect of a force on a body**.** ***(1 mark)***

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3. **Figure 2** shows some air trapped by mercury in a glass tube. The tube is inverted in a dish containing mercury.

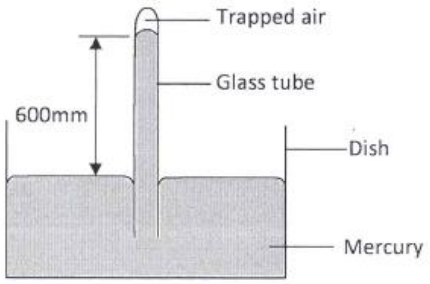

Figure 2

Given that the atmospheric pressure is 760 mmHg and the height of mercury column in the tube is 600 mm, determine the pressure of the air trapped in the tube in mmHg. ***(2 marks)***

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4. Figure 3 shows drops of mercury and water on a glass surface, Explain the difference in the shapes of the drops. ***(2marks)***

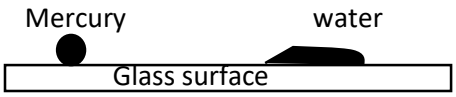

Figure 3

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5. A ball is thrown from the top of a cliff 20m high with a horizontal velocity of $10ms^{-1}$. Calculate the distance from the foot of the cliff to where the ball strikes the ground. ***(3 marks)***

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6. Explain o**ne** advantage of mercury over alcohol as a thermometric liquid. ***(1mark)***

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7. A body of mass **M** is allowed to slide down an inclined plane. State **two** factors that affect its final velocity at the bottom of the inclined plane. ***(2marks)***

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8. A stopwatch reads 08:10:84 and 09:10: 90 before and after an experiment respectively. Determine the duration of the event in SI units. ***(2marks)***

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9. Explain the meaning of thermodynamics as a branch of physics. ***(1 mark)***

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10.

a. State the Hooke's Law. ***(1mark)***

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b. **Figure 4** shows identical spiral springs supporting a load of 90N. Each spring has a spring constant k = 200N/m

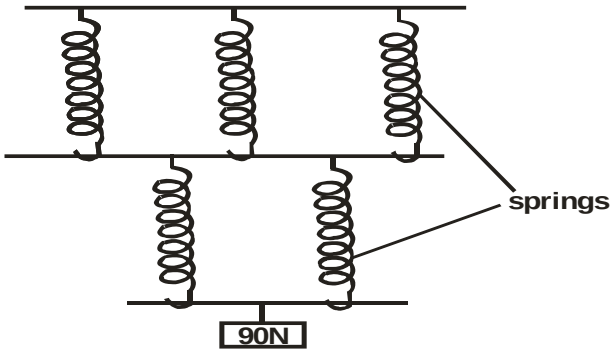

Figure 4

Determine the total extension of the system (take the weight of the cross bars and springs to be negligible) ***(2 marks)***

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11. **Figure 5** shows a rectangular loop with a thin thread loosely tied and dipped into a soap solution.

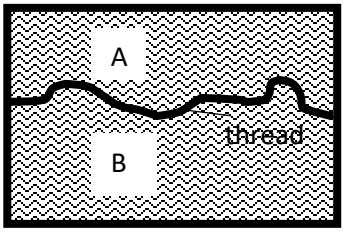

Figure 5

Draw on the space provided what is observed when point **A** is punctured. (1mark)

12. Two horizontal strings are attached to a block, resting on a frictionless surface, as shown in figure 6.

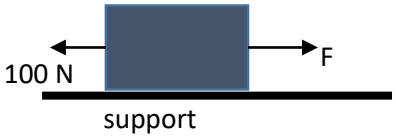

Figure 6

A force of 100N pulls on one string. The block does not move. Find the value of the force, F on the other string. ***(1 mark)***

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13. A wooden bench feels neither warm nor cold when touched by your bare hands. Explain this observation. ***(2 marks)***

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SECTION B (55 MARKS)

14.

a) Explain why bodies in circular motion undergo acceleration even when their speed is constant. ***(1mark)***

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b) A particle moving along a circular path of radius 5cm describes an arc of length 2cm every second. Determine:

i. Its angular velocity. ***(1mark)***

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ii. Its periodic time. ***(2marks)***

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c) A stone of mass 150g is tied to the end of a string 80cm long and whirled in a vertical circle at 2rev/s. Determine the maximum tension in the string. ***(3marks)***

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d) State **one** factor affecting centripetal force ***(1mark)***

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e) State the principle of conservation of linear momentum ***(1 mark)***

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f) A bullet of mass 60g is fired horizontally with a velocity of 200 m/s into a suspended stationary wooden block of mass 2940g. Determine:

i. Common velocity of both the bullet and the block, if the bullet embedded into the block. ***(2 marks)***

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ii. Height to which the block rises. ***(2 marks)***

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15.

a) State two factors that affect the boiling point of a liquid ***(2 marks)***

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b) 100g of a liquid at a temperature of 10^0 C is poured into a well lagged calorimeter. An electric heater rated 50W is used to heat the liquid. The graph in figure 7 shows the variation of the temperature of the liquid with time.

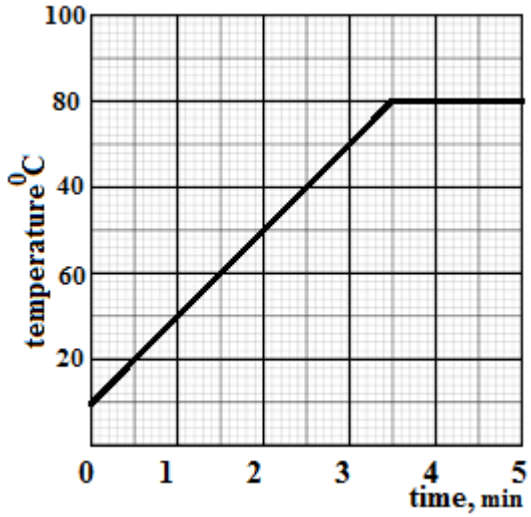

Figure 7

(i) From the graph, determine the boiling point of the liquid ***(1 mark)***

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(ii) Determine the heat given out the by the heater between the times t = 0.5 minutes and t = 5.0 minutes ***(3 marks)***

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c) From the graph determine the temperature change between the times t = 0.5 minutes and t = 5.0 minutes, hence determine the specific heat capacity of the liquid ***(3 marks)***

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d) 1.8 g of vapor was collected from above the liquid between the times t= 3.5 minutes and t= 4.5 minutes. Determine the specific latent heat of vaporization of the liquid ***(4 marks)***

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16.

a) State the law of floatation (1 mark)

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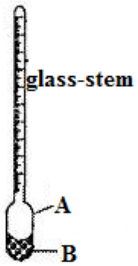
b) Figure 8 below shows a simple hydrometer



A .....

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Figure 8

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

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ii. State the purpose of the part labelled B (1 mark)

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c) How would the hydrometer be made more sensitive? (1 mark)

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d) Describe how the hydrometer is calibrated to measure relative density (3 marks)

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e) Figure 9 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 (3 marks)

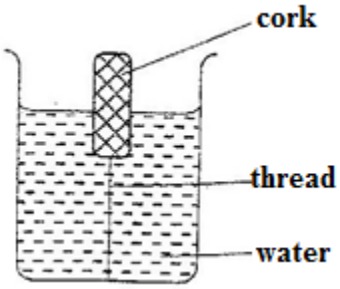

Figure 9

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ii. Describe how each of the forces mentioned in (i) above changes when water is added until the container is completely filled ***(3 marks)***

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17.

a) Figure 10 shows a graph of pressure against volume for a fixed mass of a gas at constant temperature.

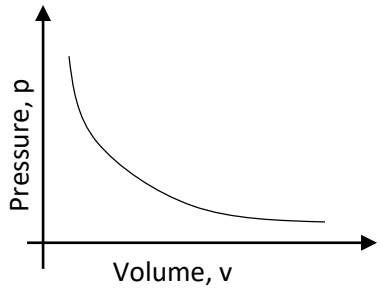

Figure 10

In the space provided, sketch a graph of pressure, p against $\frac{1}{v}$ ***(1 mark)***

b) Explain the pressure law using the kinetic theory of matter ***(3 marks)***

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c) $20cm^3$ of a gas exerts a pressure of 760mmHg at 25^0C. Determine the temperature of the gas when the pressure increases to 900mmHg and the volume decreases to 15 cm^3. ***(3 marks)***

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18.

a) Define the term velocity ratio of a machine ***(1 mark)***

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b) The figure 11, below shows part of the hydraulic lift system. State any **one** property of the liquid under which the hydraulic system works ***(1 mark)***

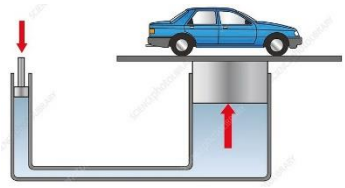

FIGURE 11

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c) The hydraulic lift machine above has velocity ratio 45 and it overcomes a load of 4500 N when an effort of 135 N is applied. Determine:

i. The mechanical advantage of the machine ***(2 marks)***

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ii. Efficiency of the machine ***(3 marks)***

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iii. The percentage of work that goes to waste ***(1 mark)***

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Name: …… **Adm No**: ……

School: …….. **Class**: ……..

Signature: ……..**Date**: ……..…..

PHYSICS (232/1)
FORM FOUR (4)
PAPER 1
Time: 2 Hours

KCSE TOP PREDICTION MASTER CYCLE 6

Instruction to candidates

- This paper consists of two sections: **A** and **B**
- Answer all questions in section **A** and **B** in the spaces provided
- All workings **must** be clearly shown, and Use the **CONSTANTS** given.
  - ✓ **Gravitational acceleration, 'g' = 10m/s^2**
  - ✓ **Atmospheric pressure = 76mmHg**
  - ✓ **density of water = 1000kg/m^3**
  - ✓ **density of mercury = 13600kg/m^3**
- Silent, non-programmable calculator may be used

FOR EXAMINER'S USE ONLY:

QUESTION	MARKS	CANDIDATES' SCORE
1-12	25	
13	13	
14	14	
15	15	
16	13	
TOTAL	80	

SECTION A (25 MARKS)

1. Distinguish between density and relative density of a substance ***(1 mark)***

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2. Figure 1, below shows a wire loop with a string that has been dipped into soap solution.

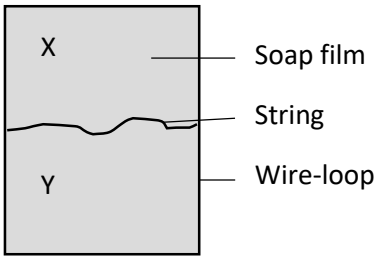

Figure 1

(i) On the space alongside figure 1, Sketch a similar diagram to show the observed effect if the soap film is punctured at X ***(1 mark)***

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(ii) Explain the observations made in **(i)** above ***(2 marks)***

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3. State **two** reasons why gas particles diffuse faster than liquid particles *(2 marks)*

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4. A ball-bearing of mass 0.250 kg is held between the anvil and spindle of a micrometer screw gauge as shown in figure 2. The reading on the gauge when the jaws are closed without anything in between is 0.011cm. Use this information to answer the questions **(a)** and **(b)** below:

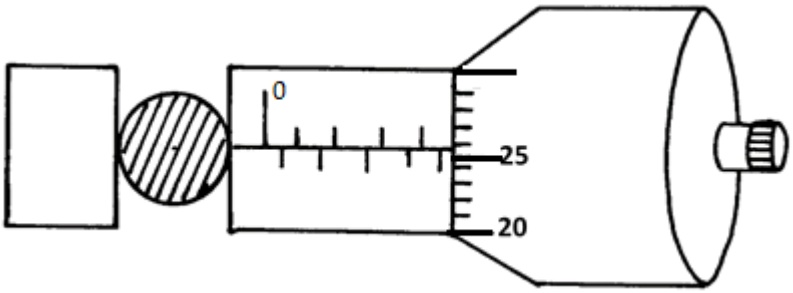

Figure 2

(a) What is the diameter of the ball bearing? *(2 marks)*

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(b) Determine the density of the ball bearing *(3 marks)*

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5. The diagram in figure 3, shows a system in equilibrium and at room temperature.

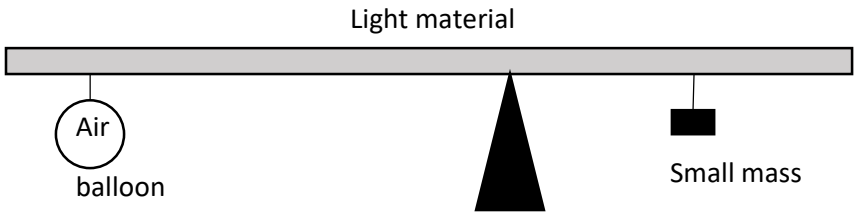

Figure 3

State and explain what is observed when the temperature of the room is raised by 25^0c.

(2 marks)

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6. ***Figure 4,*** shows two glass tubes of different diameters, dipped in a glass beaker half full of water

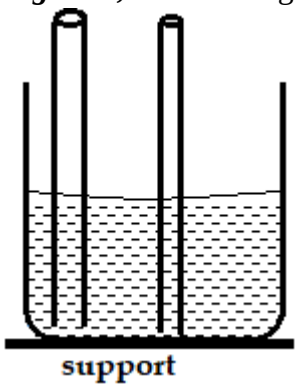

Figure 4

Complete the diagram to show how water will rise up in the two glass tubes ***(1 mark)***

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7. State the conditions necessary for the law of conservation of linear momentum to hold
(1 mark)

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8. The diagram in ***figure 5,*** below shows a steel ball bearing gently falling down through a viscous liquid contained in a tall cylinder

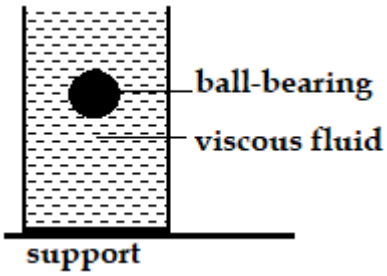

Figure 5

Label on the diagram (giving direction), the forces acting on the ball bearing as it moves down the cylinder
(3 marks)

9. A string vest keeps a person warm though it is a collection of holes bounded by strings. Explain
(2marks)

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10. The figure 6, below represents a bimetallic strip of metals **X** and **Y** at room temperature (a) and when dipped into crushed ice (b) respectively. Sketch a diagram in the space alongside, to show the shape when the strip is heated to a temperature above the room temperature

(1 mark)

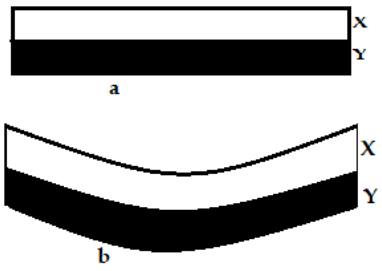

Figure 6

11. Figure 7, below shows the cross-section of an aero-foil, with the aero-plane moving in the direction shown by the arrow.

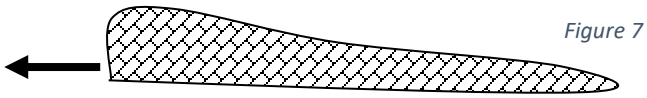

Figure 7

Using a sketch of the streamlines showing how air flows past the wing as the aero-plane moves, explain how the aero-plane achieves the dynamic lift ***(3 marks)***

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12. The diagram in figure 8, below shows a ball being whirled in a vertical plane at a uniform speed of 20m/s. If the maximum tension on the string is exceeded, suggest, by drawing on the diagram, the path which is likely to be taken by the ball. ***(1 mark)***

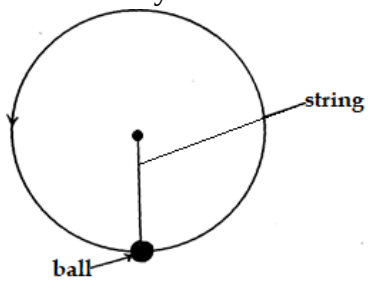

Figure 8

SECTION B ***(55 MARKS)***

13. The diagram below represents a u-shaped glass tube sealed at one end and containing mercury.

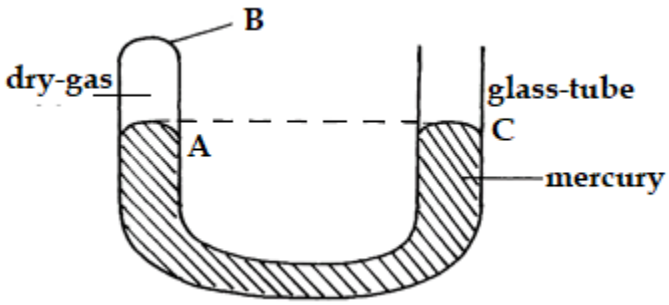

Figure 9

(a) Determine the pressure (in N/m^2) of the dry gas as shown in the diagram above
(2 marks)

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(b) Explain why the gas should be dry if it is to be used to verify a gas law ***(1 mark)***

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(c) Describe how the arrangement can be used to verify Boyle's law. ***(4 marks)***

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(d) Using the kinetic theory of gases, explain why the pressure of a gas increases with temperature increase ***(3 marks)***

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(e) Figure 10 below shows a measuring cylinder of height 30cm filled to a height of 20cm with water and the rest occupied by kerosene.

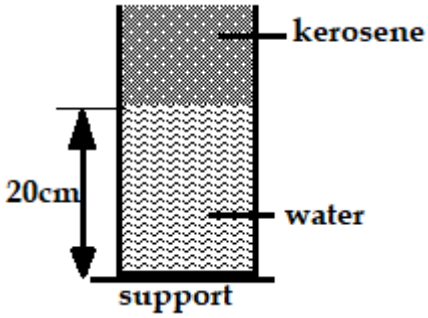

Figure 10

Given that density of water = 1000Kgm^{-3}, density of kerosene = 800Kgm^{-3} and atmospheric pressure = 1.03x10^{5} Pascal, determine the total pressure acting on the base of the container
(3 marks)

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14.

(a) Distinguish between uniform velocity and instantaneous velocity ***(1 mark)***

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(b) The velocity-time graph in the figure 11, below illustrates the motion of a ball which has been projected vertically upwards from the surface of the moon. The weight of the object on earth's surface is 20N.

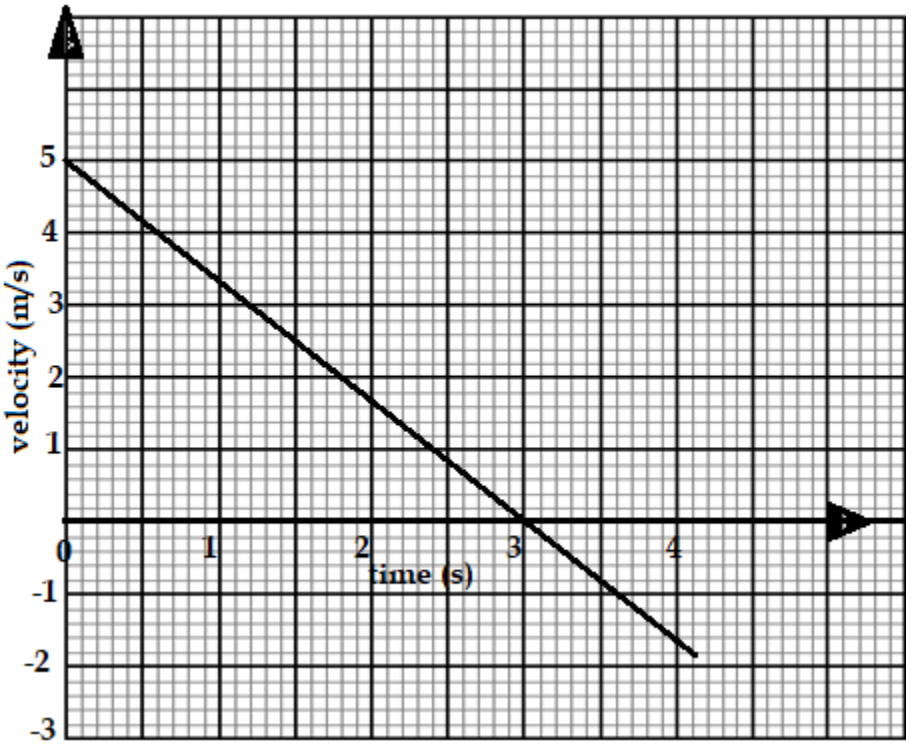

Figure 11

i. State why the velocity becomes negative after 3seconds. ***(1 mark)***

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ii. Determine the acceleration of gravity on the moon showing clearly your work ***(3 marks)***

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iii. Determine the total distance travelled by the ball in 4.0seconds ***(3 marks)***

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iv. Find the weight of the ball on the moon ***(2 marks)***

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(c) A body starts from rest and attains a velocity of 10m/s after 4 seconds. Use the axes provided below to represent this motion ***(2 marks)***

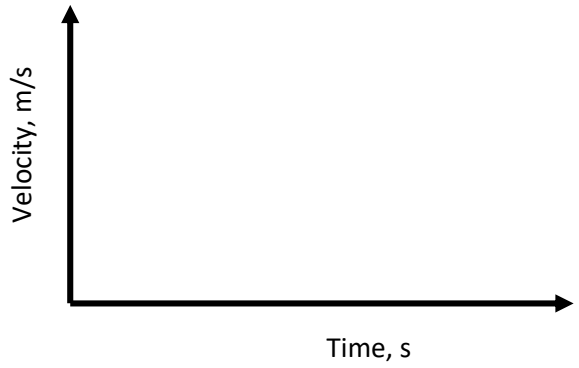

Figure 12

(d) Define angular velocity and state its SI unit ***(2 marks)***

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15.

(a) Define the term "velocity ratio" as used in the working of machines ***(1 mark)***

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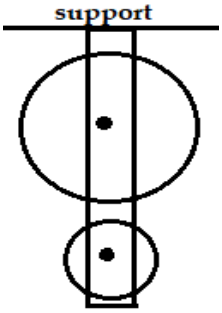
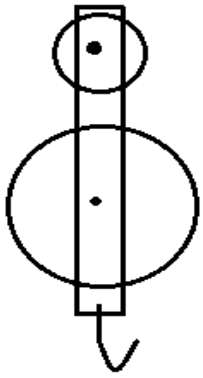
(b) A civil engineer wanted to raise sand from the ground to the third floor of a house he was working on. He began by assembling the following pulley system in figure 13.



i. Complete the diagram in figure 13, by threading the pulley so that it can be used to raise the load **L** by applying an effort **E** from the third floor.

(2 marks)



ii. The pulley system has a mechanical advantage of 3. Calculate the total work done when a load of 600N is raised through a height of 9m

(3 marks)

Figure 13

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(c) On the axes provided, sketch a graph of mechanical advantage against load for the pulley system

(2 mark)

(d) The graph below shows the potential energy against displacements for a body of mass 80g.

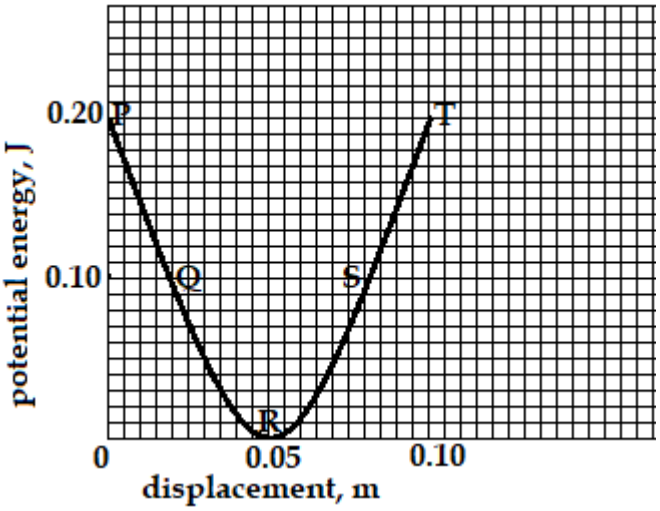

Figure 14

The body oscillates about point **R**. Calculate the velocity of the body at:

i. **P** and **T** ***(3 marks)***

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ii. **Q** and **S** ***(2 marks)***

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iii. at **R** ***(2 marks)***

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16.

(a) State Archimedes' principle ***(1 mark)***

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(b) A rectangular brick of mass 10kg is suspended from the lower end of a spring balance and gradually lowered into water until its upper end is some distance below the surface.

i. State and explain the changes observed in the reading of the spring balance during the process ***(2 marks)***

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ii. If the spring reads 80N when the brick is totally immersed, determine the volume of the brick. ***(3 marks)***

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(c) The figure below shows a hydrometer.

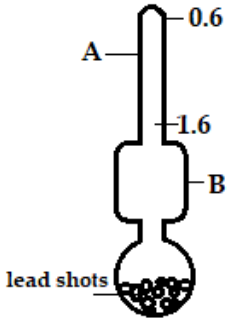

Figure 15

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

A ……

B ……

ii. Explain why the bulb should be made wide ***(2 marks)***

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iii. State the function of the lead-shots ***(1 mark)***

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(d) The diagram, ***figure 16,*** shows a block of wood floating on water in a beaker. The set-up is at room temperature before the Bunsen burner is lit. State and explain the changes that are likely to occur in depth **X** when the Bunsen burner is lit. ***(2 marks)***

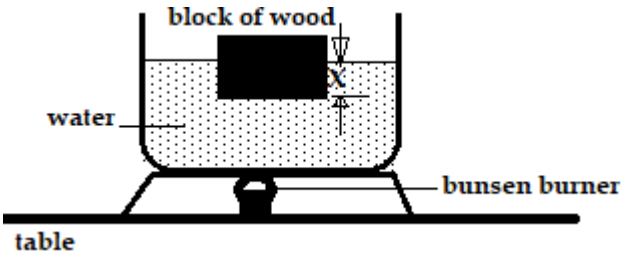

Figure16

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NAME……. **ADM NO** ……

SCHOOL…… **SIGNATURE**……

DATE…… **CLASS** …….

231/1
PHYSICS
FORM FOUR
PAPER 1
TIME: 2 hours

KCSE TOP PREDICTION MASTER CYCLE 7

Instruction to The Candidates

a) *Write your **name** and **ADM number** in the spaces provided above.*
b) *Sign and write the **date** of examination in the spaces provided above.*
c) *This paper consists of **two** Sections **A** and **B**.*
d) *There are 14 printed pages, with 18 questions check to confirm that your paper is complete.*
e) *Answer **all** the questions in sections **A** and **B** in the spaces provided.*
f) *All working must be clearly shown in the spaces provided.*
g) *Mathematical tables and electronic calculators **may be** used.*

For Examiners Use Only

Section	Question	Total Score	Candidates Score
A	1-13	25	
B	14	08	
	15	09	
	16	08	
	17	09	
	18	06	
	19	07	
	20	08	
Total		80	

SECTION A (25 MARKS)

Answer all Questions in the space provided

1. State the branch of physics applied by a soldier when firing a gun. ***(1mrk)***

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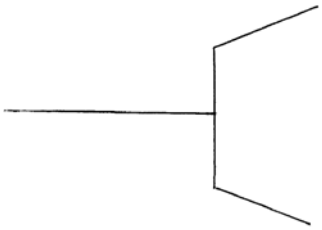
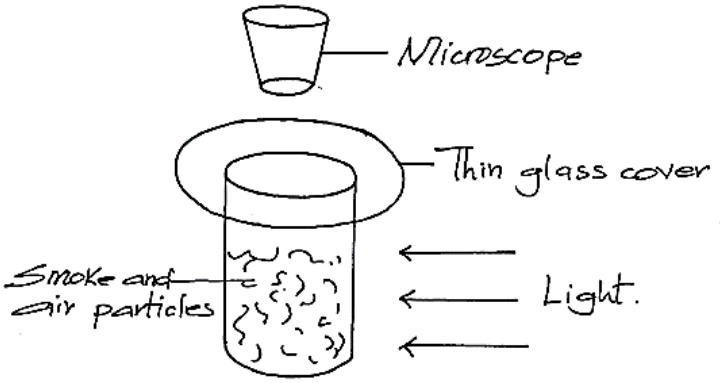
2. The figure bellow shows part of micrometer screw gauge with 100 divisions on the thimble scale. Complete the diagram to show a reading of 5.79mm ***(2mks)***



3. The diagram bellow shows apparatus used to observe the behavior of smoke particles in air.



i) Why are smoke particles suitable for use in this experiment? ***(1mk)***

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ii) What difference if any would be seen in the motion of the smoke particles if a source of light of weaker energy was used ***(1mk)***

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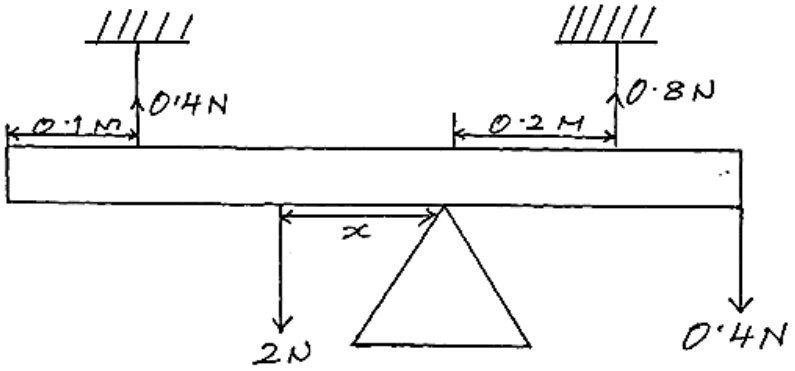
4. The diagram bellow shows a uniform meter rule pivoted at its center and balanced bay the forces shown. ***(3mks)***



Determine the value of *x*.

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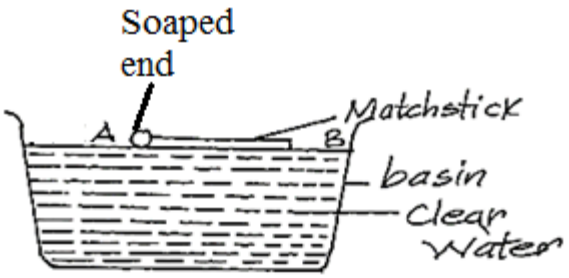
5.a) The Figure below shows a matchstick soaped on one end and placed on the surface of water as shown below. If soap solution is poured at A



The matchstick is observed to move in a certain direction.

i) State the direction (A or B) ***(1mk)***

……

ii) Explain your answer in (i) above. ***(1mk)***

……

b) A physics teacher writing on a board uses a piece of chalk or white board marker. Explain why any ink or chalk particles sticks on the board. ***(1mk)***

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6. A student pulls a block of wood along a horizontal surface by applying a constant force. State the reason why the block moves at a constant velocity. ***(1mk)***

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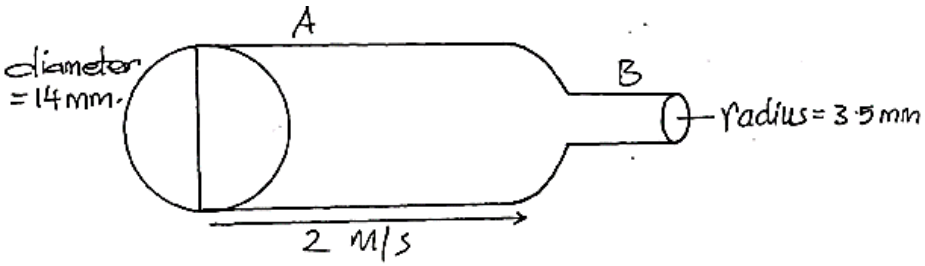
7. Water moves through a horizontal pipe of varying crossection area as shown below.



Determine the velocity of the water in pipe B given the velocity of A is 2m/s ***(3mks)***

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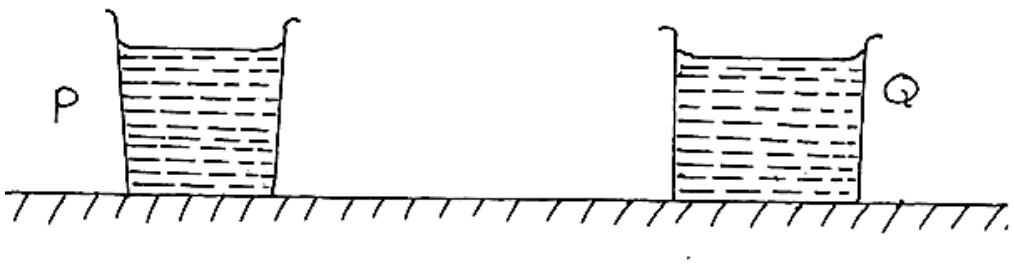
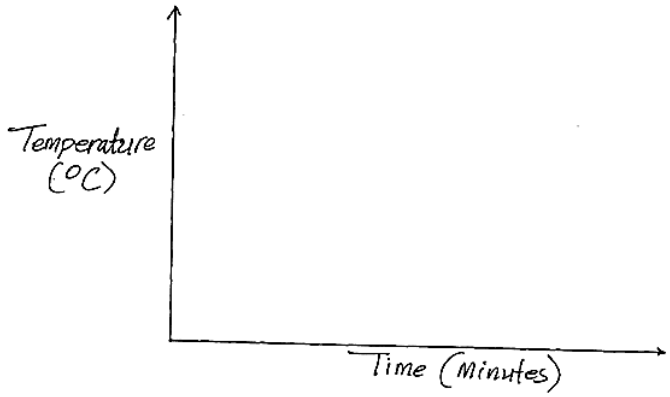
8. Equal amount of hot water at 100^{o}C is poured in to vessels P and Q as shown below and left to cool up to the room temperature. P is painted black and Q is polished.



The readings of the thermometer are taken at interval of five minutes. On the axes below, sketch a graph of temperature against time for P and Q ***(2mks)***



9. In a ball and ring experiment the ball goes through the ring at room temperature. When it is heated it does not go through the ring but when left on the ring for some time it goes through. Explain this observation. ***(2mks)***

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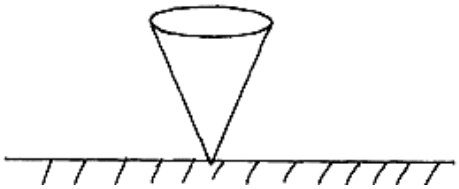
10) State the type of stability shown below ***(1mk)***



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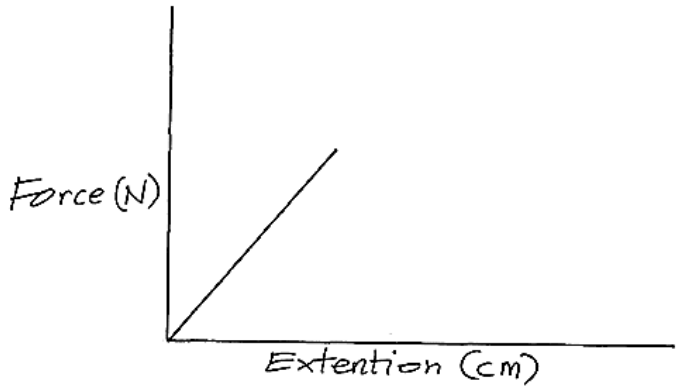
11) The graph below shows Force against extension of the spring. ***(1mk)***



On the same axes sketch a graph of force against extension for a spring double the length same thickness and same material as the given spring.

12. A small stone in your shoes is painful when you step on it but does not hurt you when removed from the shoe and placed in on the hand.

Explain ***(2mks)***

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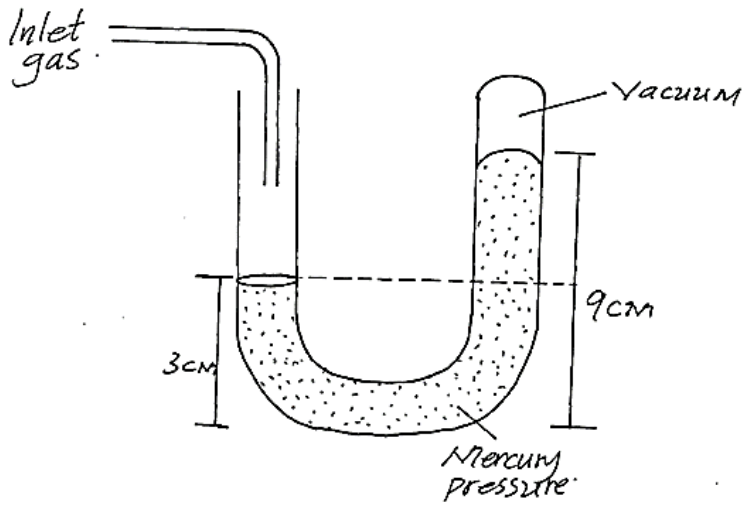
13. Consider the Figure below.



Mercury ρ = ($13.6gcm^{-3}$) and Pa=760mmHg

Calculate the pressure of the gas in cm Hg. ***(2mks)***

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EXPLAIN B (55 MARKS)

Answer all question in the space provided

14.i) Define the term momentum. ***(1mk)***

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ii) Explain why high jumpers flexes their knees when landing on the ground. ***(2mks)***

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b) A body of mass 150Kg travelling at a constant velocity of 72km/h collides with a stationary object of mass 90kg. If the impact takes 3s before the two moves together at a constant velocity for 20s. Find

i) Their common velocity ***(2mks)***

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ii) Impulsive Force. ***(3mks)***

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15.i) State one similarity between boiling and evaporation. ***(1mk)***

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ii) Explain why pieces of ice at 0^oC added to a drink at room temperature are more effective in cooling the drink than equal mass of water at 0^oC. ***(2mks)***

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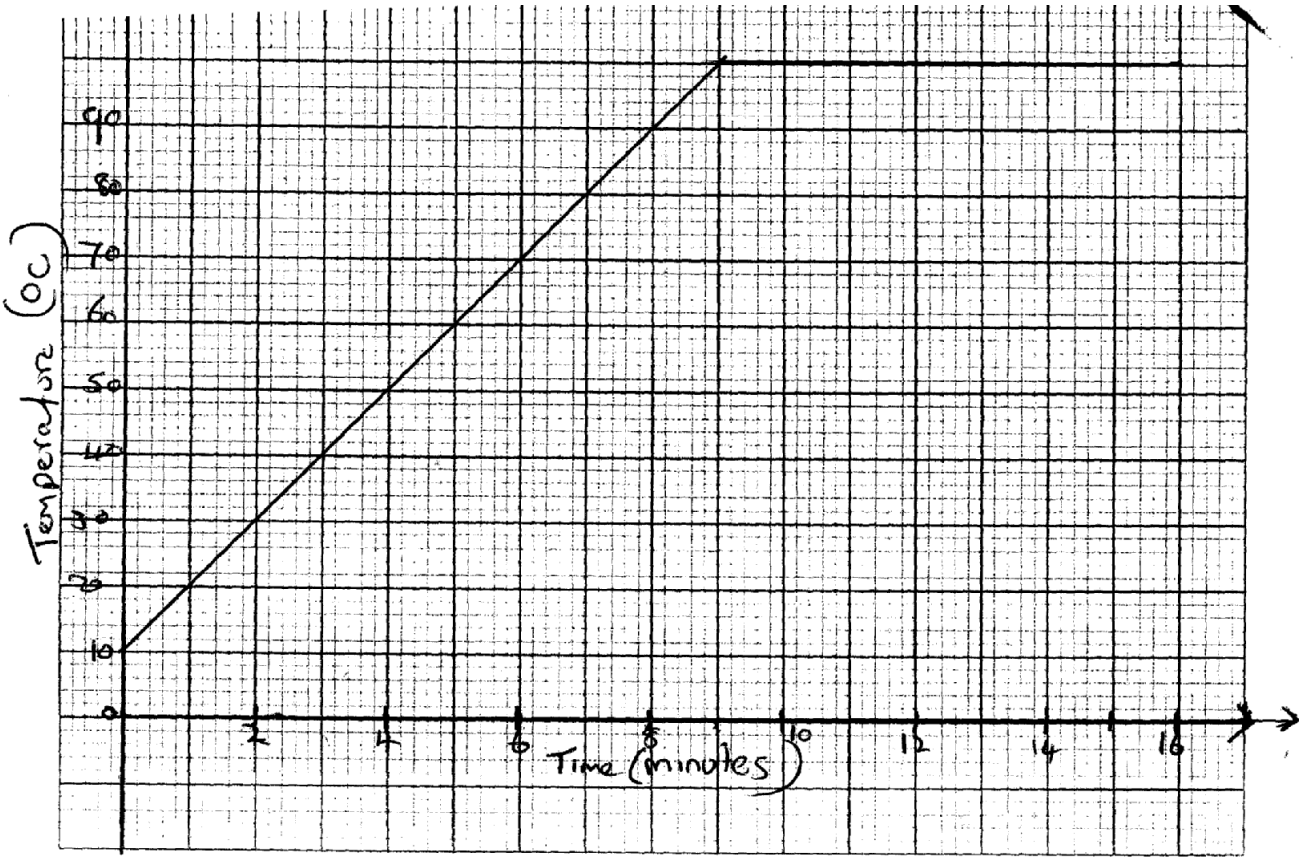
b)i) 200g of a liquid at a temperature of 10^oC is poured into a well lagged calorimeter. An electric heater rated 1500W is used to heat the liquid. The graph below shows a variation of temperature of the liquid with time.



From the graph determine the specified latent heat of vaporization assuming that the liquid evaporates.

(3mks)

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c)i) A small electric heater rated 20W 240V is immersed in crushed ice in a funnel. Before the heat is switched on, the water drops from the funnel at a rate of 0.5g/min and when the heater is working the water drop at the rate of 4g/min.

Calculate the specified latent heat of fusion. ***(3mks)***

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16.a) A ball is thrown verticality upwards from hands at 125m/s and the thrower receives it back.

i) Calculate the time of flight. ***(2mks)***

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ii) Calculate how high the ball rises ***(2mks)***

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b)i) A bullet is fired horizontal at a target. Neglecting air resistance, give a reason why the horizontal acceleration of the bullet is zero. ***(1mk)***

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ii) A bullet is fired horizontally from a flat form 15m high. If initial speed is 300m/s determine maximum horizontal distance covered g=10m/s^2 ***(3mks)***

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17.a)i) Name the device that is used to convert electrical energy to light energy ***(1mk)***

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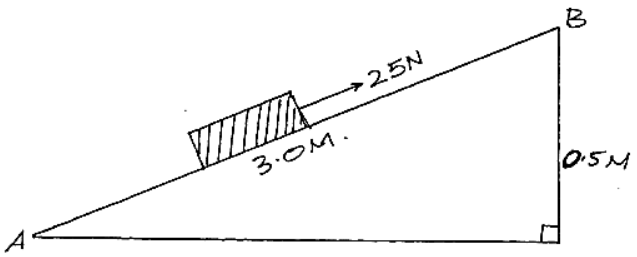
b) The figure below shows a load of 100N being raised by pulling it along a incline plane of length 3m.



i) Calculate the efficiency of the system ***(3mks)***

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ii) Calculate the work done against the friction when moving the body from point A to B. ***(2mks)***

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c)i) Assuming that you know your weight, Explain how you can calculate your own power given the following:

Tape measure, stopwatch, A partner to record the time, Flight of stairs. ***(3mks)***

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18.a) Define the term "Absolute zero temperature" as applied in gas laws. ***(1mk)***

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b) State two assumptions used in gas laws. ***(2mks)***

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c) An air pump is taking in air at 1.01×10^5Pa and supplies it into a rigid container of volume 2 liters. The barrel of the pump has a volume of 0.2 liters. If the pressure in the receiver is initially at 101×10^5Pa what is the pressure in the receiver after five strokes of the pump. Assuming temperature is constant. ***(3mks)***

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19.a) State the Archimedes principle ***(1mk)***

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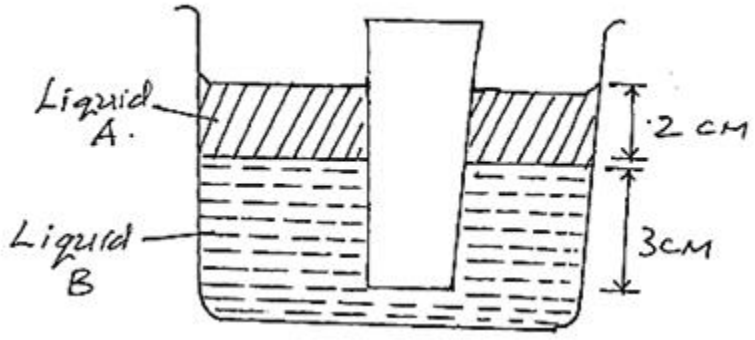
b)i) The figure below shows a rectangular block of height 6cm floating. Vertically in a beaker containing two immiscible liquids A and B. The density of the liquid is 800kgm^3 and 1200kgm^3 respectively.



The cross-section area of the block is 2cm^2

Determine:

i) The total weight of the liquid displaced by both liquids A and B. (***3mks)***

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ii) Density of the block ***(2mks)***

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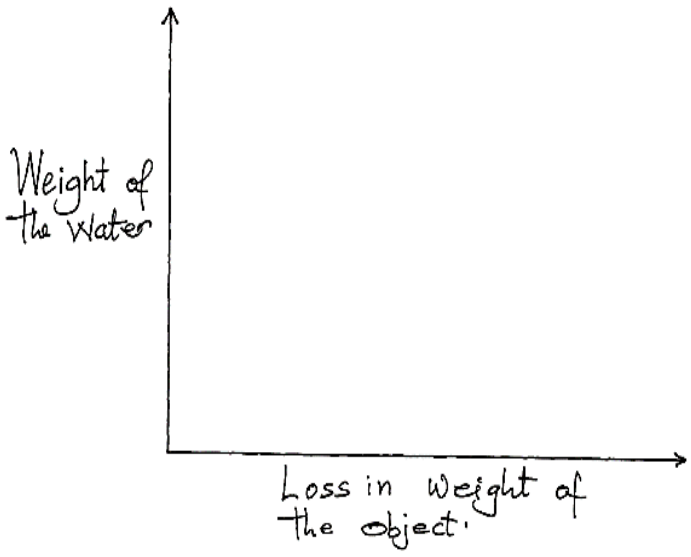
c) In the space provided sketch a graph of the weight of the water displaced against the lost in weight of the object when the object is lowered in the water until it is fully submerged. ***(1mk)***



20.a) State two parts of the earth which have zero angular velocity of linear velocity as it completely one rotation. ***(1mk)***

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b) A particle moving along a circular path of radius 5cm describes an arch length of 2cm every 2 seconds. Determine:

i) Its Angular velocity ***(2mks)***

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ii) Its periodic time ***(2mks)***

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c) A car of mass 1500kg negotiates a bend of radius 45m on horizontal road. If the friction force between the road and the tires is 7200N, calculate the maximum speed at which the car can be driven at the bend without skidding. ***(3mks)***

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232/1
PHYSICS
PAPER 1 (THEORY)
2 HOURS
KCSE 2023 TOP PREDICTION MASTER CYCLE 8

NAME_____**ADMNO** _____

SIGNATURE_____**DATE**_____**CLASS**_____

INSTRUCTIONS

- Write your name and admission number in the space provided
- Sign and write the date of the examination in the space provided above
- This paper consists of two sections A and B.
- Answer all the questions in the spaces provided.
- All workings must be clearly shown.
- Mathematical tables and silent electronic calculators may be used.
- This paper consists of11 printed pages. Candidates should check to ensure that all pages are printed as indicated and no questions are missing

For examiner's use only

SECTION	QUESTION	TOTAL MARKS	CANDIDATE'S SCORE
A	1-13	25	
B	14	12	
	15	10	
	16	12	
	17	10	
	18	11	
	GRAND TOTAL	80	

TOTAL CANDIDATE'S SCORE

Section A [ ] + section B [ ] = [ ]

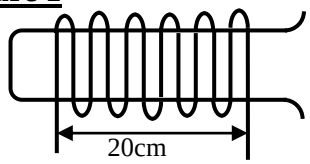
SECTION A (25 MARKS)

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

(Take g=10N/kg or 10m/s^2)

1. The figure1 below shows a wire wound on a test tube. The windings just touch each other. If the total number of complete loops was found to be 15, and the distance covered by the windings on the test tube is 20cm; find the radius of the wire. (2marks)

Figure 1



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2. A paratrooper flexes his legs when he lands. Explain (1mark)

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3. A needle may float on clean water but sinks when a detergent is added. Explain. (1 mark)

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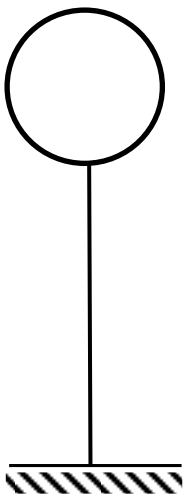
4. The mass of a fabric of a large balloon is 100kg. the balloon is filled with 200 m3 of helium and attached to a cable fixed to the ground as shown below.



Given that the densities of air and helium are 1.3 kg/m^3 and 0.018kg/m^3 respectively, determine the tension in the string. (3 marks)

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5. Water flows in a pipe of diameter 7cm at a speed of 5m/s. The water then gets to the perforated end which has 20 holes of diameter 0.7cm each.Determine the speed of water jets. (3 marks)

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6. For an enclosed system with a liquid, a force is applied at one point.
   a) Briefly explain how force is transmitted to other parts of the system. (2 marks)

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   b) State one application of such a system. (1 marks)

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7. A 150g mass tied on a string is whirled in a vertical circle of radius 30cm with a uniform speed. At the lowest position the tension in the string is 9.5N.Calculate the velocity of the mass. (3 marks)

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8. A spring of elastic constant K has its length increased from 4.00m when unloaded to 4.25m when loaded with a 75N weight. Assuming that the elastic limit is not exceeded, determine the value of K. (2 marks)

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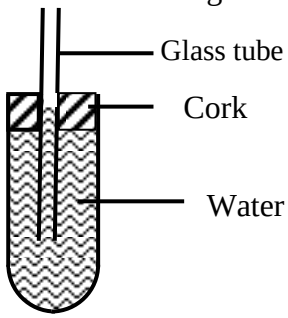
9. The figure 2 below shows a glass tube fitted on to a boiling tube filled with water. State and explain what is observed when the boiling tube is heated. (2marks)

Figure 2



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10. A bus that carries goods in the roof carrier is less stable than one that carries goods in the boot. Explain why this is so. (1 mark)

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11. A rod consists of glass on one part and copper on the other. The rod is wrapped with a piece of paper and then a flame passed below it. It is observed that the paper on the side with glass is charred while that on the side of copper is not. Explain this observation. (1 mark)

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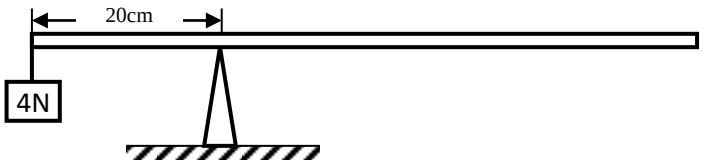
12. The figure 3 below shows a uniform 50cm rod. It is balanced horizontally by a load of 4N on one end. Calculate the weight of the rod. (2marks)

fig. 3



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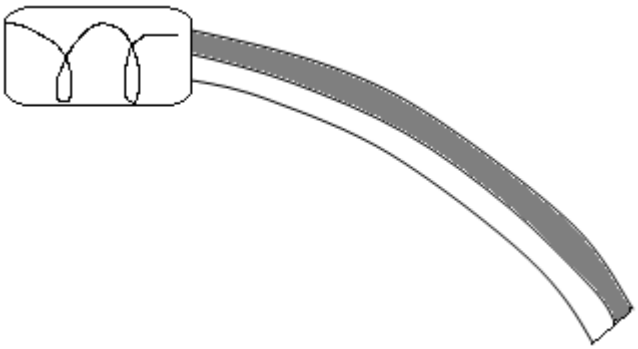
13. The figure 4 below shows a bimetallic strip cooled below room temperature. Sketch on the side the bimetallic strip at room temperature. (1Mark)

Figure 4.



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SECTION B (55 Marks)

Answer all questions in this section in the spaces provided.

14. a) Define "absolute zero temperature" for an ideal gas (1 Mark)

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b) Using kinetic theory, explain Boyle's law for an ideal gas. (2Marks)

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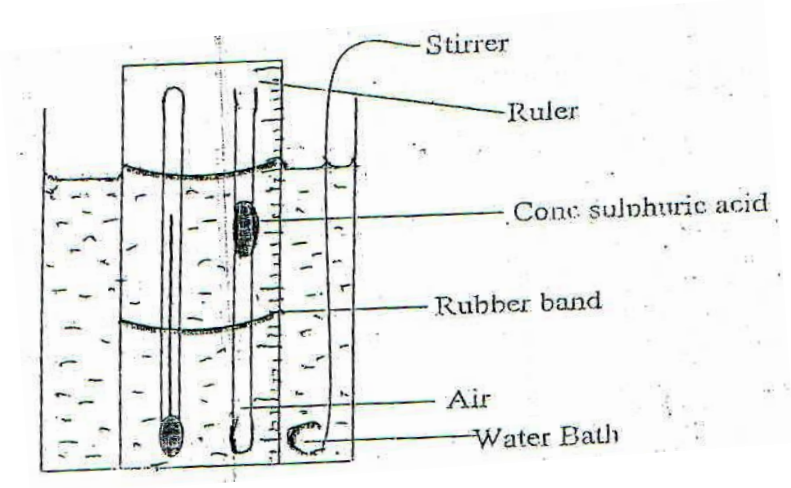
c) The diagram shows an experiment to investigate the relationship between volume and temperature of a fixed mass of gas at constant pressure.



i) Explain the function of;

(I) Concentrated sulphuric acid (1 Mark)

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(II) Stirrer (1 Mark)

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ii). Explain how the set up above can be used to verify Charles law for an ideal gas (3Marks)

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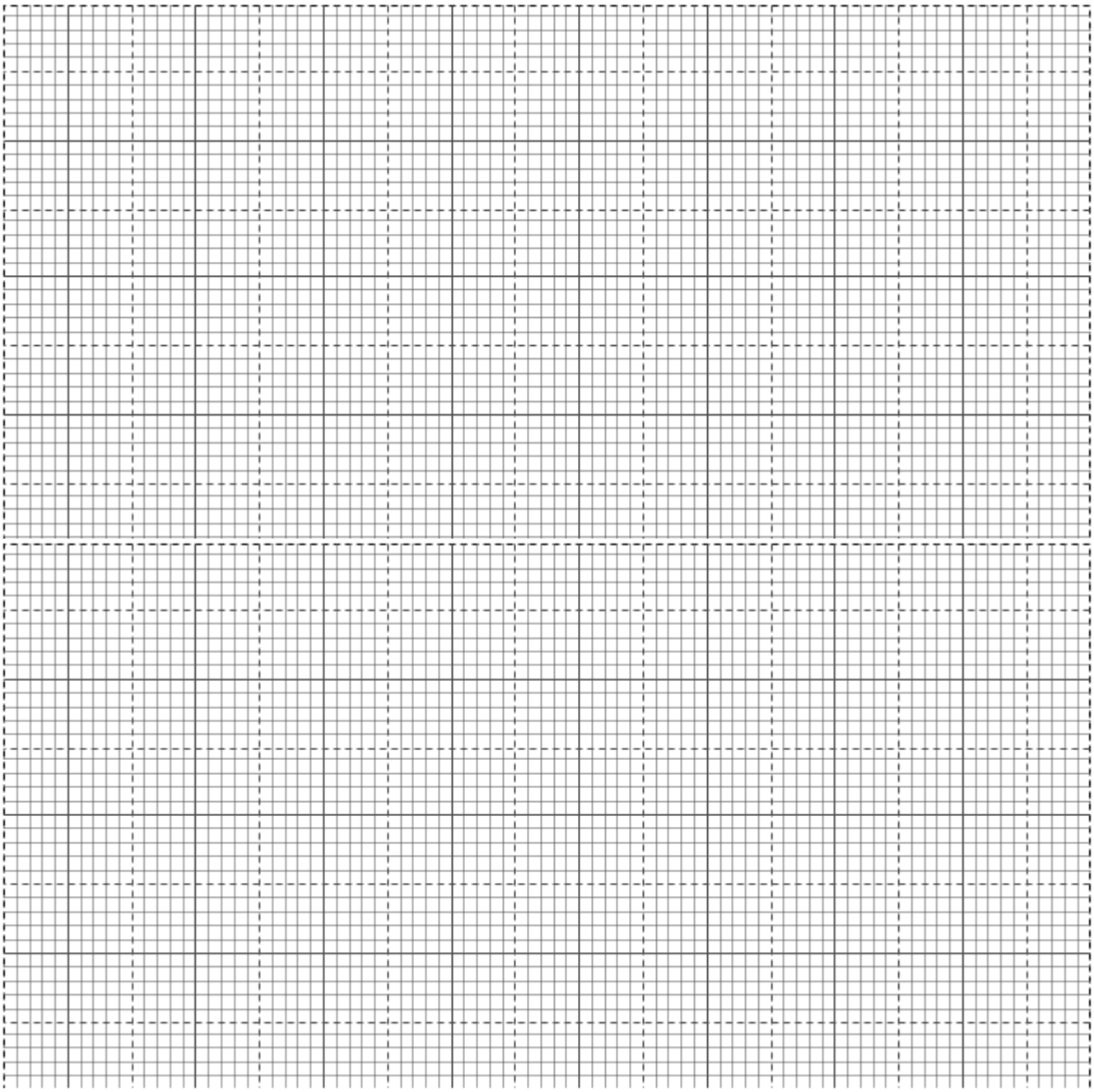
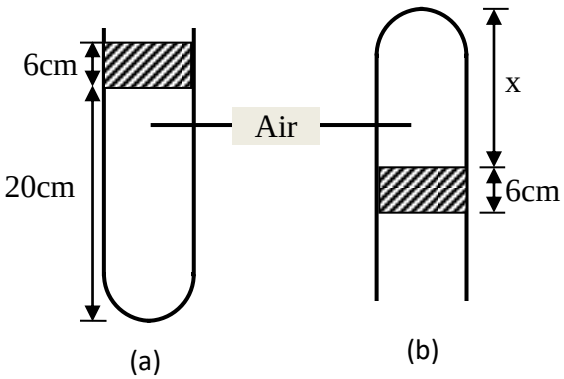
iii. On the grid below sketch a graph of volume (cm^3) against temperature (^0c). Mark with letterT the absolute zero temperature. (2 Marks)



(d)A column of air 20cm long is trapped by mercury thread 6cm long as shown in figure 7 (a) below.

Fig 7



If the tubeis now inverted,determine column X in figure b).Take atmospheric pressure as 76cm of mercury. (2Marks)

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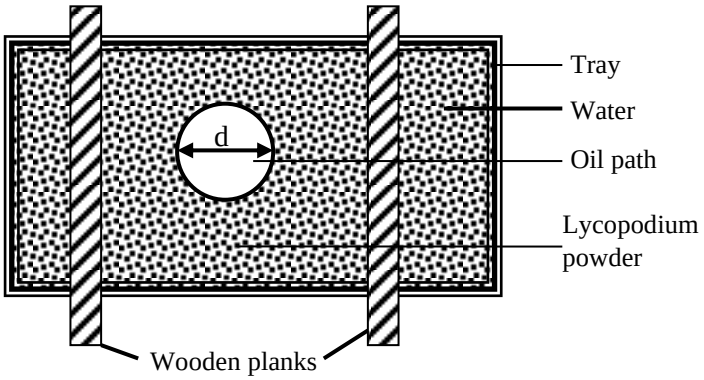
15. The figure 8 below shows an experimental set up for estimating the diameter of an oil molecule.

Figure 8



a) Describe how the oil patch is formed (2Marks)

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b) i)In this experiment the diameter 'd' of the oil patch was measured to be 21cm for an oil drop of radius 0.28mm. Determine the diameter of the oil molecule. (3Marks)

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ii)State any two assumptions made in calculating the diameter of the oil molecule. (2Marks)

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c) What is the role of the lycopodium powder in this experiment? (1Mark)

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d) Describe one method of determining the diameter of an oil drop. (2Marks)

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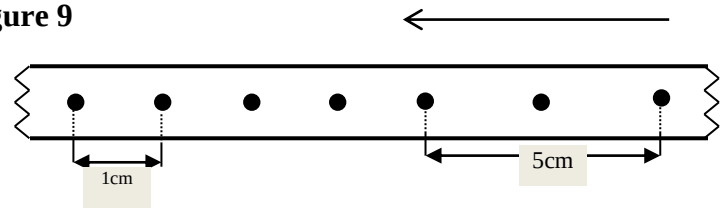
16. The figure 9 below shows the pattern formed on a tape in an experiment to determine the acceleration of a trolley.The frequency of the ticker tape used was 50Hz

Figure 9



Calculate

i) The initial velocity of the trolley (2Marks)

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ii) The final velocity of the trolley (2Marks)

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iii) The acceleration of the trolley (2Marks)

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b) A gun is fired vertically upwards from the top of an open truck moving horizontally at a uniform velocity of 50m/s. The bullet attains a maximum height of 45m.

Calculate

i) The time taken by the bullet to reach the maximum height (3Marks)

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ii) The distance covered by the truck just before the bullet reaches the level from which it was fired. (3Marks)

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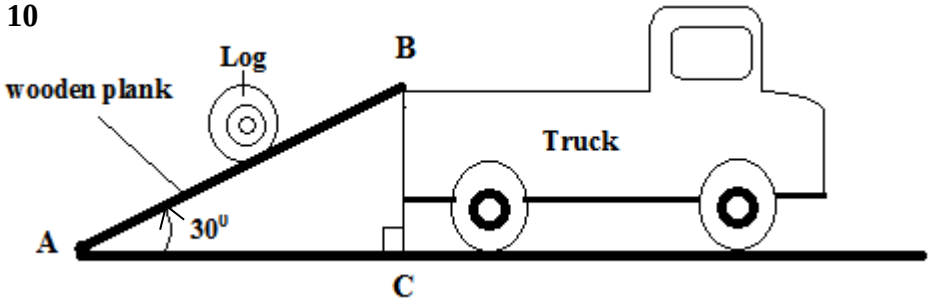
17. A man used a wooden plank to lift a wooden log from the ground to a stationary truck as shown in the figure. The wooden plank is inclined at an angle of 30^0 to the ground.

Figure 10



i) Show that the velocity ratio of the system is given as V.R=$\frac{1}{Sin\ 30^0}$ (3Marks)

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ii) Given that the system is 65% efficient, determine the Mechanical Advantage. (3 marks)

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iii) Explain why the efficiency of this system cannot be 100%. (1Mark)

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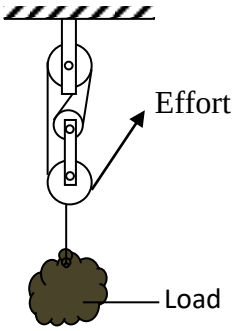
b) The figure 11 shows a pulley system.

Figure 11



i) State the velocity ratio of the machine. (1Mark)

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ii) Explain what happens to the Mechanical Advantage of the machine as the load is increased gradually. (1Mark)

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c) Water drops from a waterfall to the bottom. The temperature of the water is found to be higher at the bottom than at the top.State the energy transformations. (1Mark)

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18. a) Define "specific heat capacity" of a substance (1Mark)

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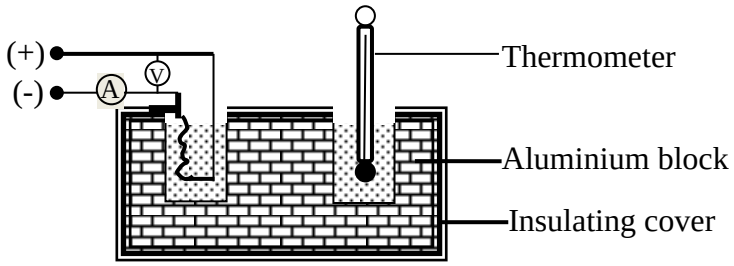
b) In an experiment an aluminium block of mass 2kg was heated using an immersion heater as shown in figure 12 below

Figure 12



The temperature of the block was recorded every minute for exactly five minutes and then the heater was switched off. A graph of temperature in ^{0}c against time in minutes for the experiment is shown below.

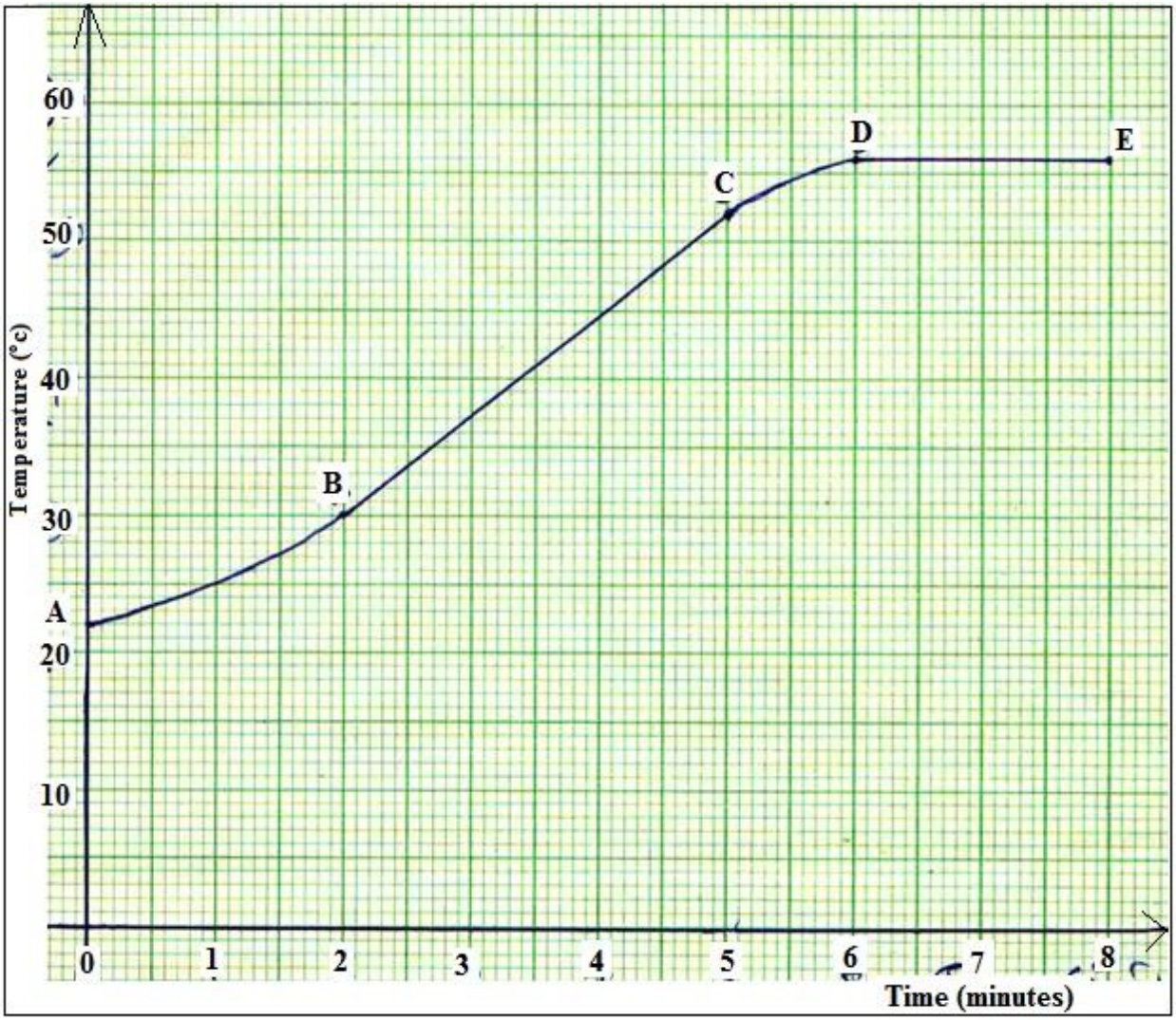


Figure 13

Study the graph above and answer the questions that follow.
Suggest why;

i) The reading in the thermometer rose relatively slowly between point A and B. (1Mark)

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ii) The temperature continued to rise after the heater was switched off (1Mark)

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iii) Use the straight portion of the graph (Bto C)to calculate the specific heat capacity of the aluminium given that the voltmeter read 22.00V and ammeter 10A throughout the course of the experiment. (3Marks)

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c) Explain the two reasons why the value calculated in b) iii) will not be accurate. (2Marks)

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d) A temperature scale X has an ice point of 40^0 and a steam point of 240^0 .What is the temperature in X^0 when the Celsius temperature is 50^0C. (3Marks)

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NAME…… CLASS……ADM NO……

SIGNATURE…….. INDEX NO…… DATE……

232/2
PHYSICS
PAPER 1
FORM FOUR
TIME:2 Hours

KCSE TOP PREDICTION MASTER CYCLE 9

INSTRUCTION TO CANDIDATES.

. Write your ***name ,class*** and ***admission number*** in the spaces provided above
. This paper contain ***two sections***; Section A and Section B
. Answer all the questions in section A and B, In the spaces provided
. All workings and answers **must** be written on the question paper in the spaces provided below each question.
. Marks may be given for correct working even if the answer is wrong.
. Calculators and KNEC Mathematical tables may be used EXCEPT where stated otherwise.
. Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.

FOR EXAMINER'S USE ONLY

SECTION	QUESTION	MAX MARKS	CANDIDATE'S SCORE
A	1-10	25	
B	11	13	
	12	8	
	13	13	
	14	10	
	15	11	
	TOTAL	80	

SECTION A: *(25 MARKS)*

1. Sketch a graph of volume of paraffin against temperature when heated from 0^0C to 10^0C ***(2 marks)***

2. State two reasons why diffusion is more rapid in gases than in liquids. ***(2 marks)***

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3. A trolley of mass 20kg moving at 0.8m/s on frictionless horizontal surface was acted upon by a force of 2.5N. After impact the body moves at 4.8m/s. Determine the time of impact of the force. ***(3 marks)***

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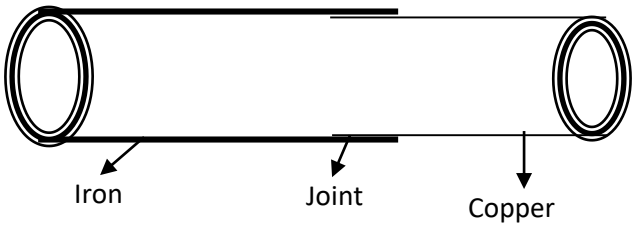
4. The diagram below shows a metal tube made of iron and copper. The joint is tight at room temperature.



Explain how you would separate the two by changing the temperature given that copper expands more than iron for same change in temperature. ***(2 marks)***

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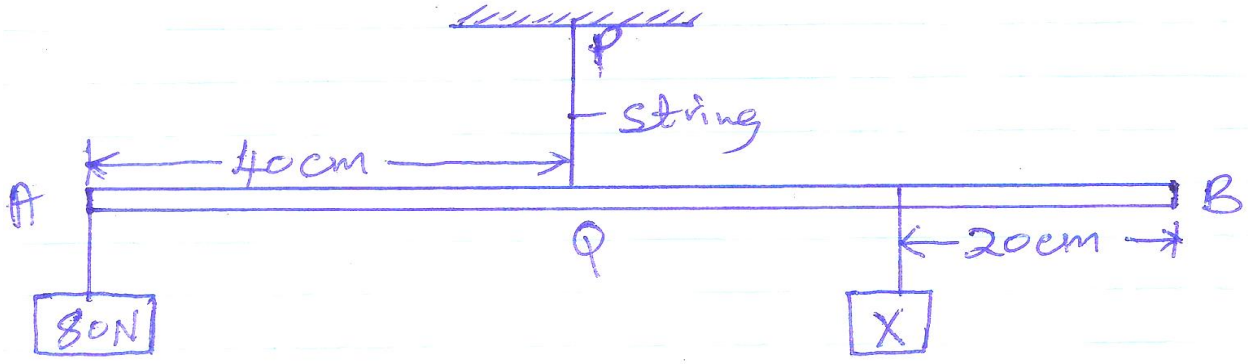
5. The figure below shows a system in equilibrium with the horizontal level.



AB is an uniform rule of length 1.0m and weighs 20N.

Calculate

(a) Weight of the block X *(3 marks)*

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(b) Tension in the string PQ *(1 mark)*

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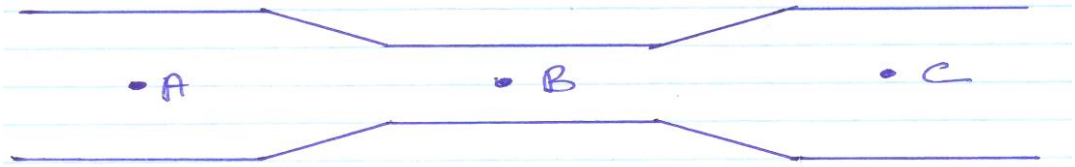
6. The figure below shows parts A, B and C of a glass tube



State with a reason the part of the tube in which the pressure will be lowest when air is blown through the tube from A to C. (2 marks)

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7. The mass of an empty density bottle is X g. When full of water its mass is 70g and 68.4g when full of another liquid L whose density is 0.96g/cm^3. Determine the value of X.(Density of water is 1g/cm^3) ***(3 marks)***

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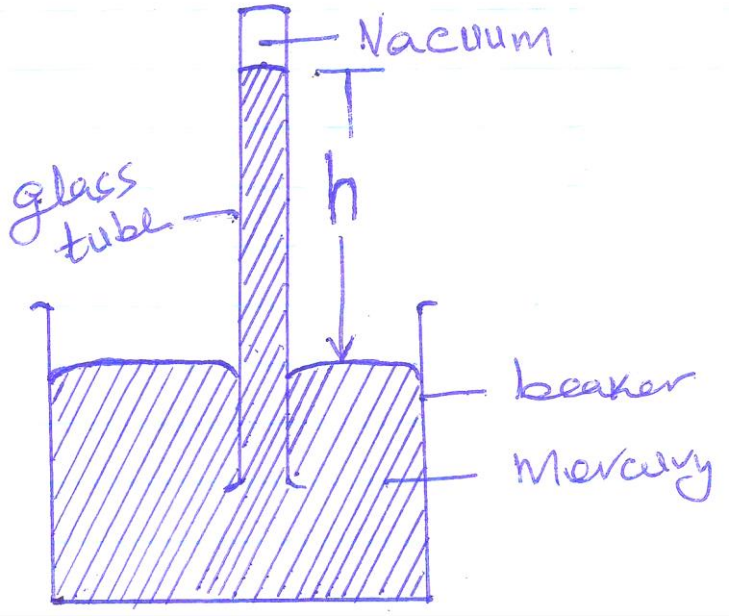
8. The figure below shows a simple apparatus used to measure atmospheric pressure at sea-level.



State what will happen to the value of h if;

(a) The apparatus is taken to the top of a mountain ***(1 mark)***

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(b) Some air is introduced in the space above the mercury in the glass tube. ***(1 mark)***

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(c) The glass tube is tilted a little. ***(1 mark)***

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9. An air bubble at the bottom of a beaker full of water becomes larger as it rises to the surface. State the reasons why.

   (a) The bubble rises to the surface ***(1 mark)***

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   (b) It becomes larger as it rises ***(1 mark)***

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10. When a solid is heated, its volume increases. Explain the effect on its density. ***(2 marks)***

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SECTION B: (55 MARKS)

11.

(a) A body of a given mass was projected vertically upwards. Explain the factor that will determine time taken to reach maximum height. ***(2 marks)***

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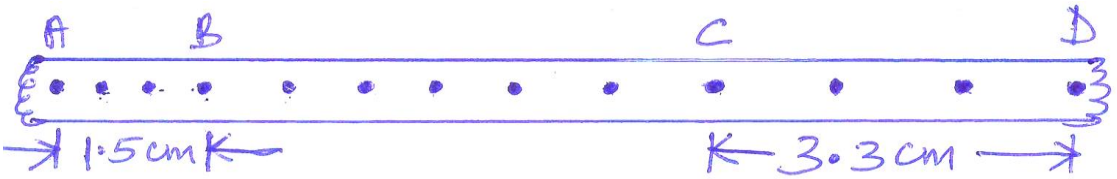
(b) A tape attached to a moving trolley is run through a ticker timer. The figure below shows a section of the tape after running.



If the frequency of the ticker timer is 100Hz.

Determine the

(i) Average velocity at interval

I) AB ***(2 marks)***

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II) CD *(2 marks)*

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(ii) Acceleration of the trolley. *(2 marks)*

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(c) A car is brought to rest from a velocity of 100m/s in 4 seconds.

(i) Determine the average acceleration *(2 marks)*

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(ii) If the driver's reaction time is 0.1 seconds, determine the shortest stopping distance. *(3 mks)*

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12.

(a) State Hooke's Law. ***(1 mark)***

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(b) A spring is made of a steel wire of a given thickness and length. State two factors that will determine its spring constant. ***(2 marks)***

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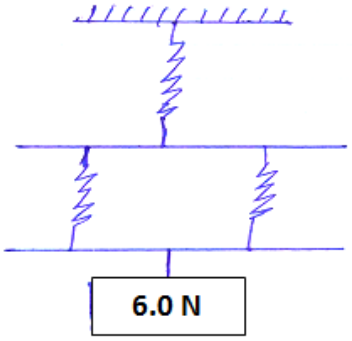
(c) Three identical springs each of spring constant 10N/m and weight 0.5N are used to support a load as shown. Ignore the weight of the connecting rods.



Determine the total extension produced. ***(3 marks)***

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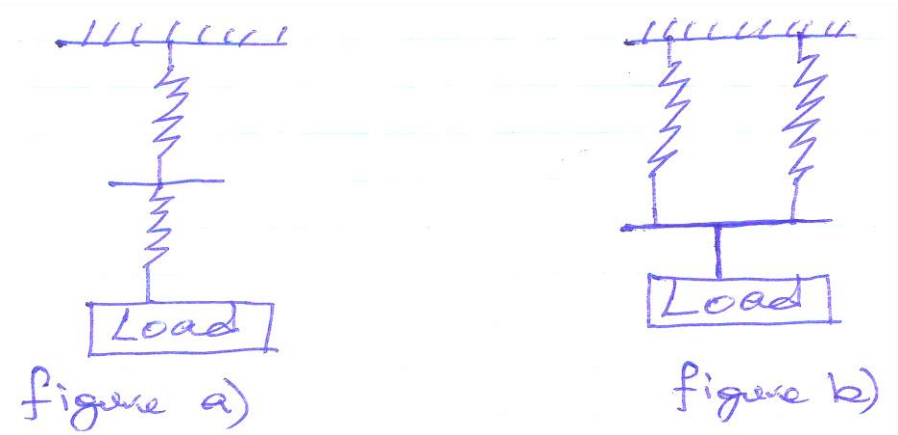
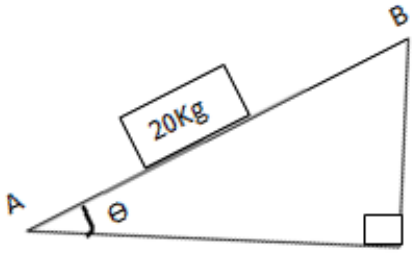
(d) A set of identical springs are arranged as shown below.



On the same axes sketch a force (N) against extension (m) for the two sets and label them as (a) and (b). ***(2 marks)***

13.

(a) The figure below shows a body of mass 20kg placed on an inclined surface AB. It is allowed to slide down the incline from B to A.



State two factors that will determine the magnitude of the velocity at which the mass will be moving at as it reached A. ***(2 marks)***

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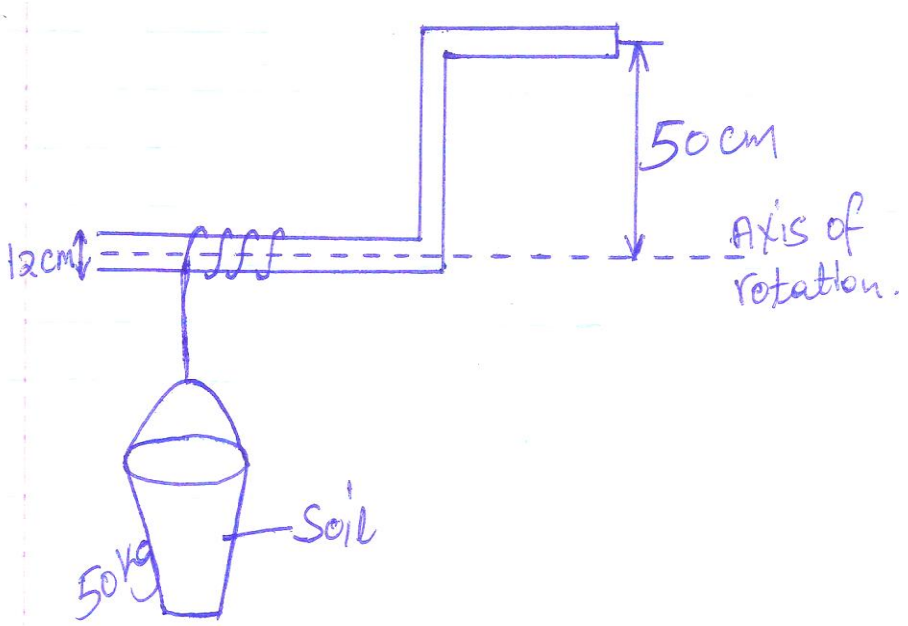
(b) The wheel and axle in the figure below is used by well diggers to raise soil from the pit. The axle has a diameter of 12cm.



The 50kg of soil is raised through a distance of 10m, when an effort of 100N is applied on the handle.

Calculate

(i) The mechanical advantage of the system *(2 marks)*

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(ii) The velocity ratio of the system *(2 marks)*

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(iii) The efficiency of the wheel and axle system *(3 marks)*

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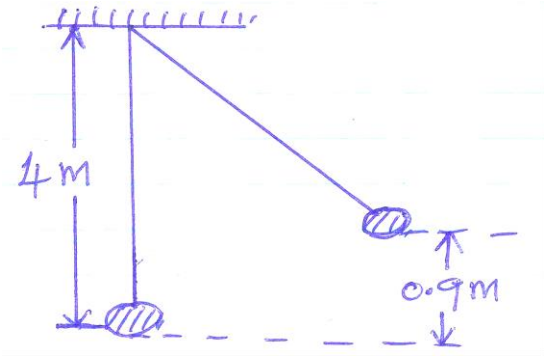
(c) A body of mass 20kg hangs 4m and swings through a vertical height of 0.9m as shown in the figure below.



Determine

(i) The potential energy at its highest point. (1 mar*k)*

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(ii) The speed of the body when passing through the lowest point. *(3 marks)*

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14.

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

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(b) A 180W heater is immersed in a copper calorimeter of mass 100g containing 200g of alcohol. When the heater is switched on for 4 minutes the temperature of the calorimeter and its contents raises by 72^{o}C. (Specific heat capacity of copper=400J/kgK)
Calculate

(i) The amount of heat energy supplied by the heater in the 4 minutes ***(2 marks)***

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(ii) The specific heat capacity of alcohol ***(2 marks)***

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(c) State two differences between boiling and evaporation. ***(2 marks)***

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(d) State three ways of increasing the sensitivity of a liquid - in – glass thermometer. ***(3 marks)***

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15.

(a) State the Law of floatation ***(1 mark)***

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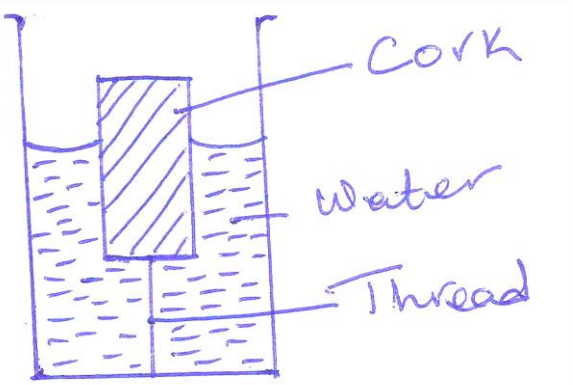
(b) The figure below shows a cork floating on water and held to the bottom of the beaker by a thin thread.



Indicate on the figure the forces acting on the cork. (3marks)

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(i) Describe how each of the forces mentioned in (i) above changes when water is added into the beaker untill it fills up. ***(3 marks)***

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(c) The weight of a solid in air is 5.0N. When it is fully immersed in a Liquid of density 800kg/m^3. Its weight is 4.04N. determine

(i) The upthrust in the Liquid ***(1 mark)***

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(ii) The density of the solid ***(3 marks)***

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NAME……..…… **INDEX NO.: ……...**

STREAM: ………… **ADM NO: ……**

DATE: ……..……

PHYSICS

Paper 232/1

(THEORY)

Time: 2 Hours

KCSE TOP PREDICTION MASTER CYCLE 10

FORM FOUR

INSTRUCTIONS TO CANDIDATES:-

- *Write your **Name**, **Index number, Admission number** and **school** in the spaces provided above.*
- *This paper consists of **two** sections; **A** and **B***
- *Answer **all** the questions in section **A** and **B** in the spaces provided*
- *All working **must** be clearly shown.*
- *Mathematical tables and electronic calculators may be used*
- *Take the earth's gravitational field strength g = 10 m/s^2.*

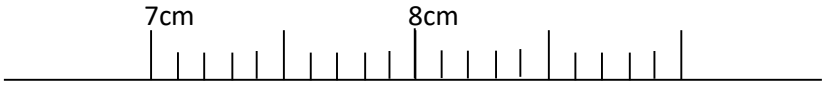
For Examiner's Use Only:

SECTION	QUESTION	TOTAL SCORE	CANDIDATES SCORE
A	1 – 11	25	
B	12	11	
	13	12	
	14	12	
	15	10	
	16	10	
TOTAL		80	

SECTION A (25 MARKS)

Answer all questions in this section in the spaces provided.

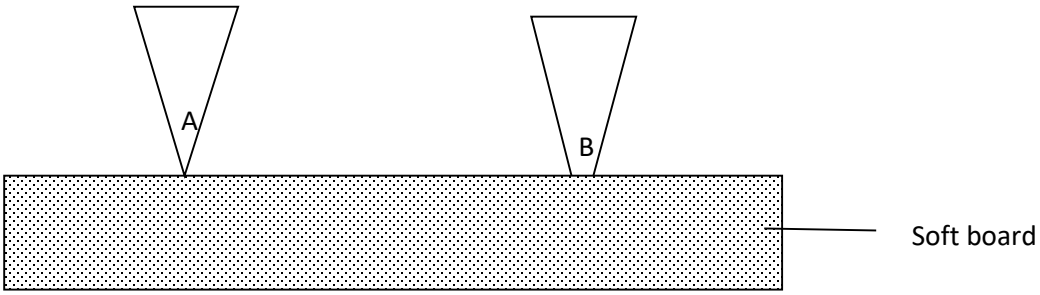
1. The figure below shows part of scales of a vernier caliper with a negative error of 0.04cm. It was used to measure the length of a wooden block whose actual length is 7.57cm.



Insert the vernier scale to show how the reading was. ***(3mks)***

2.

a) The figure below shows two pins of the same mass and both pressed into a soft board by equal amount of force.



State and explain which pin penetrates the least into the soft board. ***(2mks)***

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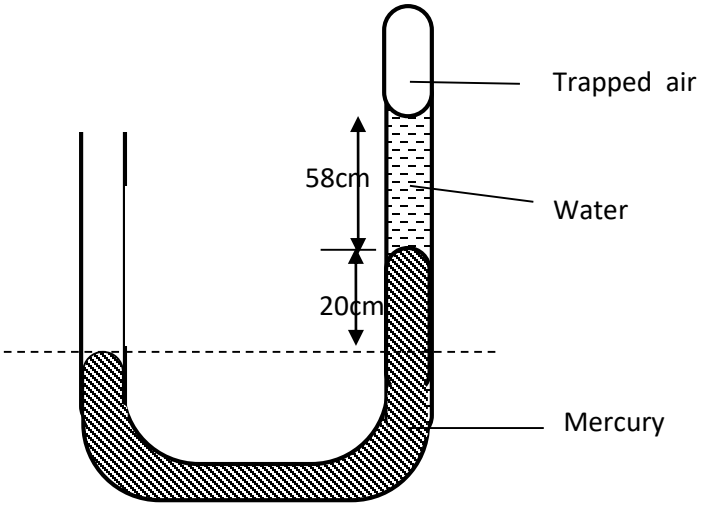
b) The figure below shows a uniform manometer that is closed at one end.



Determine the pressure of the trapped air. (Take atmospheric pressure as 75cmHg, density of mercury = 13600kg/m^3 and density of water = 1000 kg/m^3) ***(3mks)***

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3. The displacement S of a body at time t moving with acceleration a is given by $\boldsymbol{S = ut + \frac{1}{2}at^2}$. State the condition for this equation to apply. ***(2mks)***

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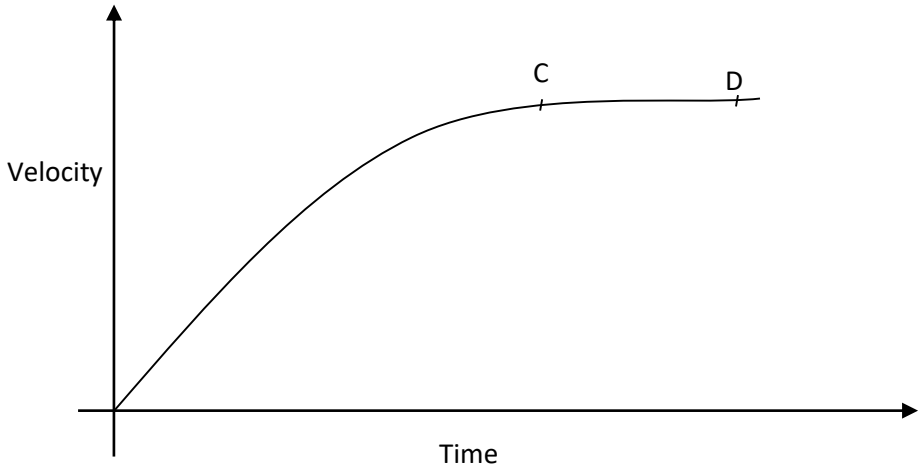
4. The figure below shows a sketch of a velocity-time graph for a body falling through a liquid.



Explain the motion between C and D. ***(2mks)***

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5. Using the kinetic theory of gases, explain how an increase in temperature causes increase in pressure of an enclosed gas. ***(2mks)***

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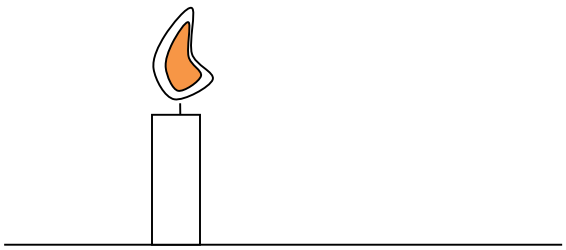
6. A dripless candle is lit and placed on a level bench as shown.



State and explain the changes in stability of the candle as it continues to burn. ***(2mks)***

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7. Give a reason why diffusion is an evidence that matter is made up of tiny particles. ***(1mk)***

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8. Explain the cause of surface tension on the surface of a liquid. ***(2mks)***

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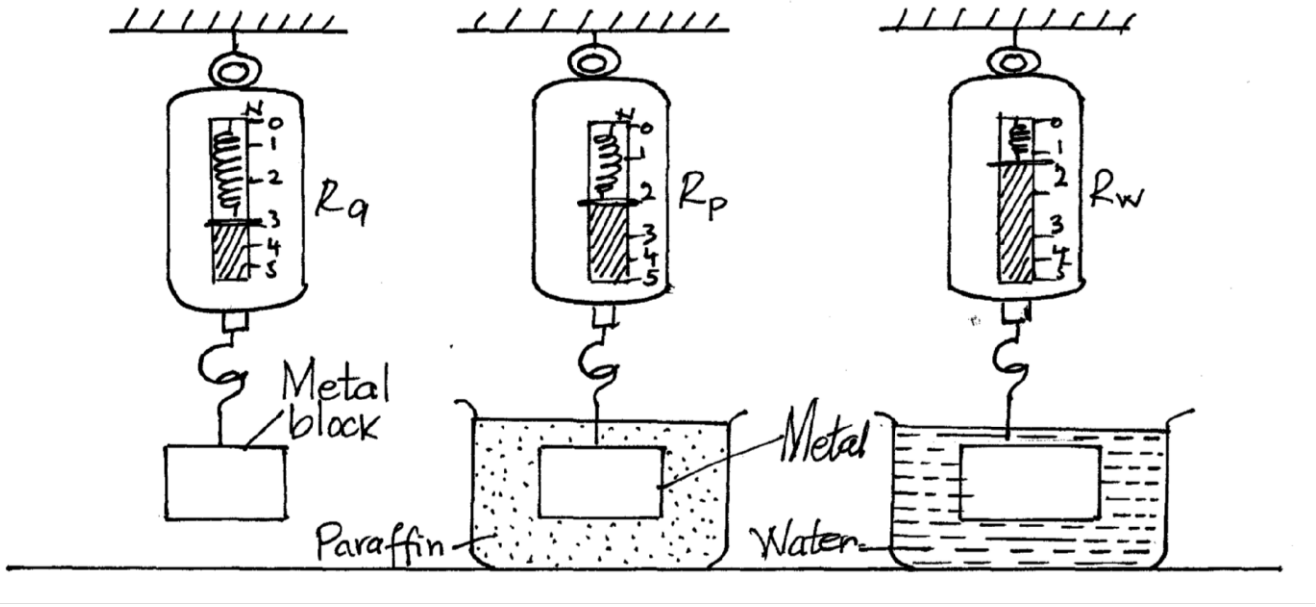
9. A metal block is weighed in air and then in paraffin and water as shown in the Figure below.



Calculate the density of paraffin given that the density of water is 1000kg/m^3.
(Take g = 10 m/s^2)

(3mks)

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10. The figure below shows two sheets of paper tolled into tubes. one has holes on it.

A stream of air is blown into each tube as shown. State with reason the tube that collapses.
(2mks)

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11. Differentiate between conduction and convection modes of heat transfer in terms of molecules.
(1mk)

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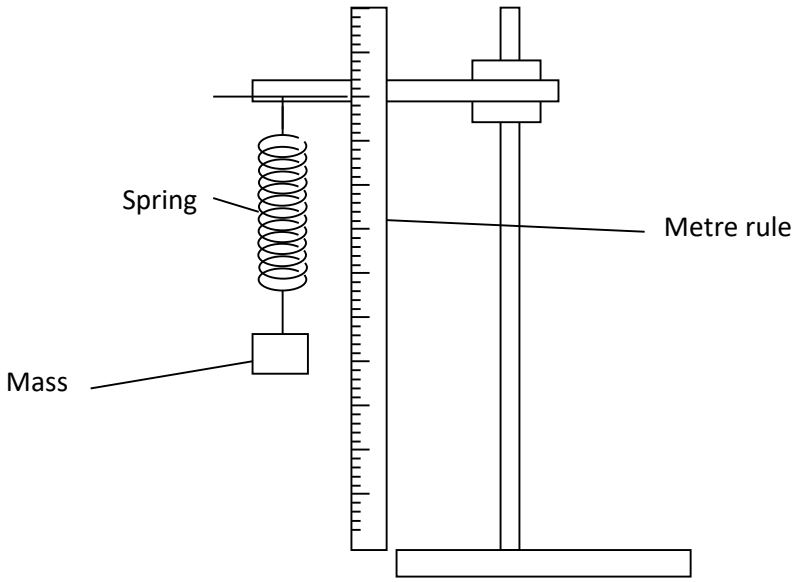
SECTION B *(55 MARKS)*

Answer all questions in this section in the spaces provided.

12.

a) A form Two student wanted to carry out an experiment to verify Hooke's law. the student assembled the apparatus as shown.



If the student had access to several other masses;

i. State what was missing in the set up. ***(1mk)***

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ii. Outline how the extension of the above spring is determined. ***(3mks)***

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iii. Other than extension of the spring, state one other measurement that should be determined. ***(1mk)***

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iv. Considering the measurements above, describe how the above set up can be used to verify Hooke's law. ***(3mks)***

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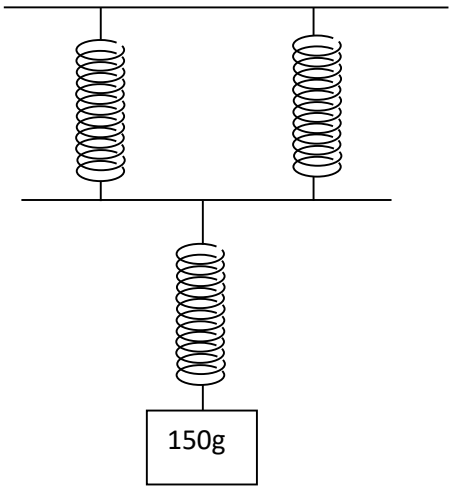
b) Three identical springs are joined together as shown below to support a mass of 150g.



Assuming that the springs have negligible weight and if the total weight of the above set up is 3cm, Determine the spring constant of one spring used in the set up. ***(3mks)***

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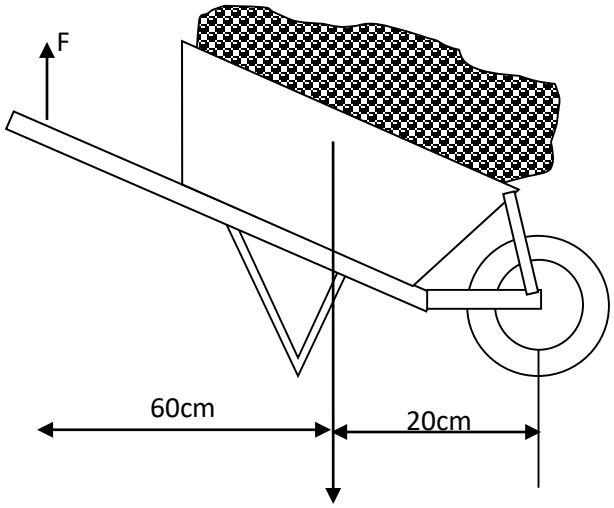
13. The diagram below shows a wheelbarrow used to raise a 90kg sack of potatoes. The wheelbarrow has a mass of 20kg.



a) Using the principle of moments, determine the effort that need to be applied at F in order to lift the load. ***(3mks)***

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b) What is the velocity ratio of the wheelbarrow? ***(3mks)***

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c) Determine the mechanical advantage of this machine. ***(2mks)***

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d) Determine the efficiency of the machine. ***(3mks)***

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e) Why is the efficiency of this particular machine less than 100%? ***(1mk)***

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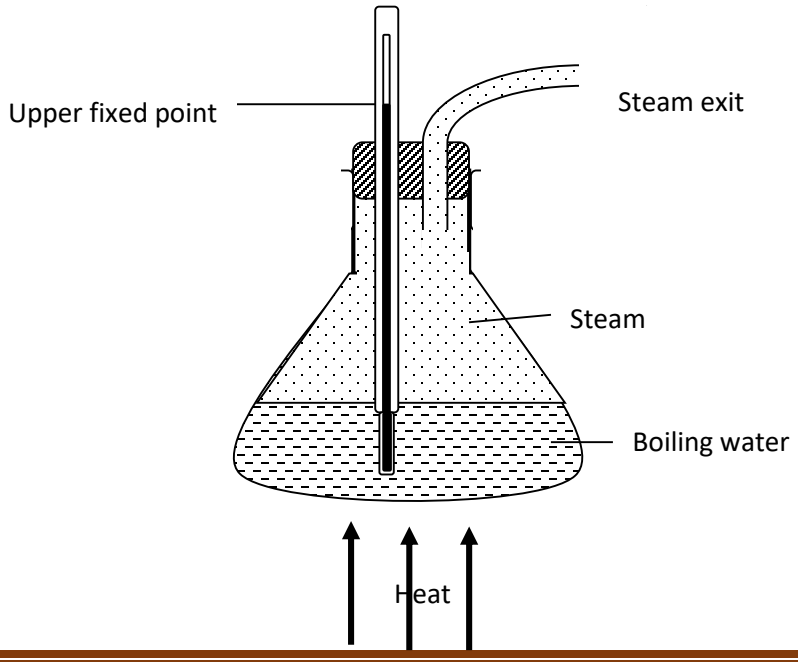
14.

a) The diagram below shows a set up that is used in determining the upper fixed point of a thermometer.



i. Identify the mistake in the set up. ***(1mk)***

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ii. Explain how the mistake would affect the value obtained as the upper fixed point.

(2mks)

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iii. What is the purpose of the steam exit. ***(1mk)***

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b) When marking the fixed points of a thermometer, it is observed that at 0^{o}C, the mercury thread is of length 3cm and 11cm at 100^{o}C. What would be the length of the thread if the bulb of the thermometer is dipped in oil whose temperature is 80^{o}C? ***(2mks)***

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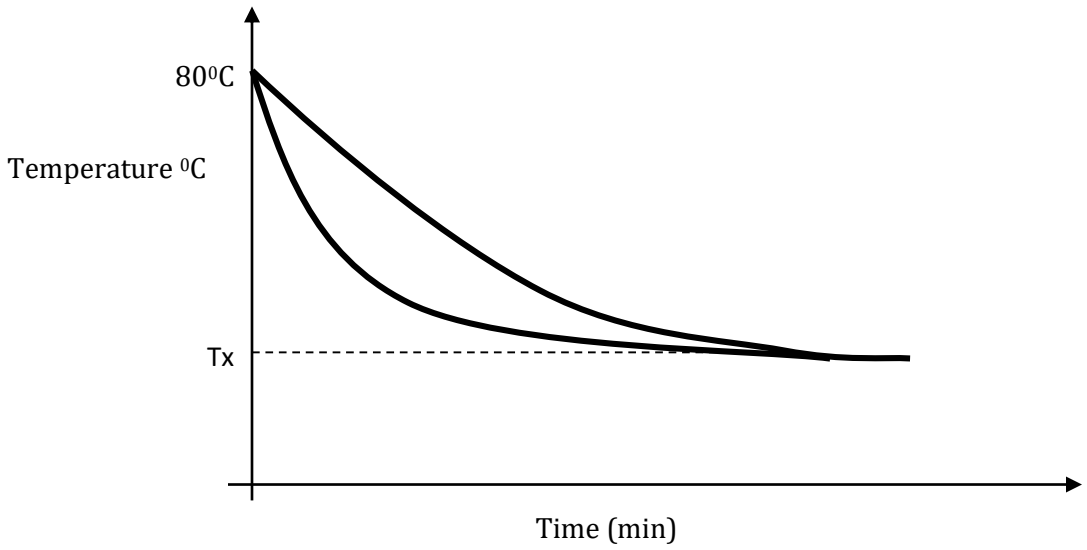
c) The graphs below show the cooling curves obtained when water at 800C was poured into two identical cans A and B painted silverly and black on their outside respectively.



i. On the graph, name the curve T_B for the can B. **(1mk)**

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ii. Identify the temperature Tx. ***(1mk)***

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iii. Name the mode of heart of heat Transfer tested above. ***(1mk)***

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iv. Apart from length of the material and its cross section area, name two other factors on which conduction depends. ***(2mks)***

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v. Why are gases generally poor conductors of heat? ***(1mk)***

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15.

a) Define specific latent heat of fusion of ice. ***(1mk)***

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b) Ice cube of mass **m** at 0^o float in water of mass 100 g at 0^o contained in a copper calorimeter of mass $50g$. Steam of mass $60g$ at 100^0 is passed through the mixture until a temperature 40^0 is attained. (Specific latent heat of vaporization of water is $2.26 \times 10^6\ J/kg$, specific latent heat of fusion of ice is $3.34 \times 10^5\ J/kg$, specific heat capacity of water is $4.2 \times 10^3\ J/kg/\text{K}$ and specific heat capacity of copper is $400\ J/kg/\text{K}$).

Determine the;

i. Quantity of heat lost by steam to condense to water and cool to 40^0. ***(3 mks)***

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ii. Quantity of heat absorbed by ice, water and calorimeter to raise its temperature to 40^0.

(3 mks)

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iii. Mass **m** of ice that melted at 0^o. ***(3 mks)***

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16.

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

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b) A string of negligible mass has a bucket tied at the end. The string is 60m long and the bucket has a mass of 45g. The bucket is swung horizontally making 6 revolutions per second. Calculate the centripetal acceleration of the bucket. ***(3mks)***

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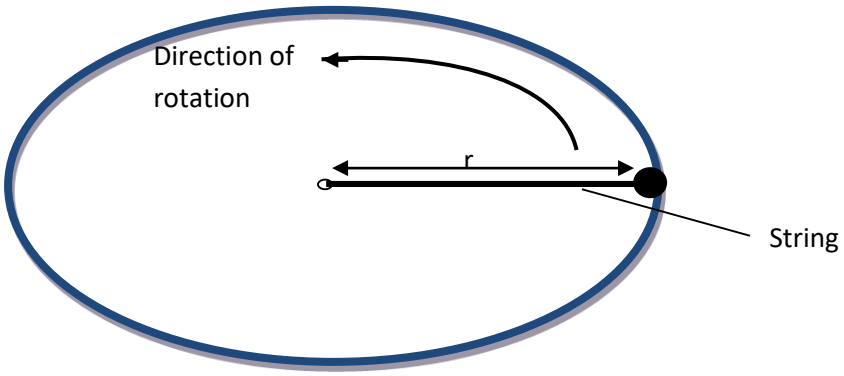
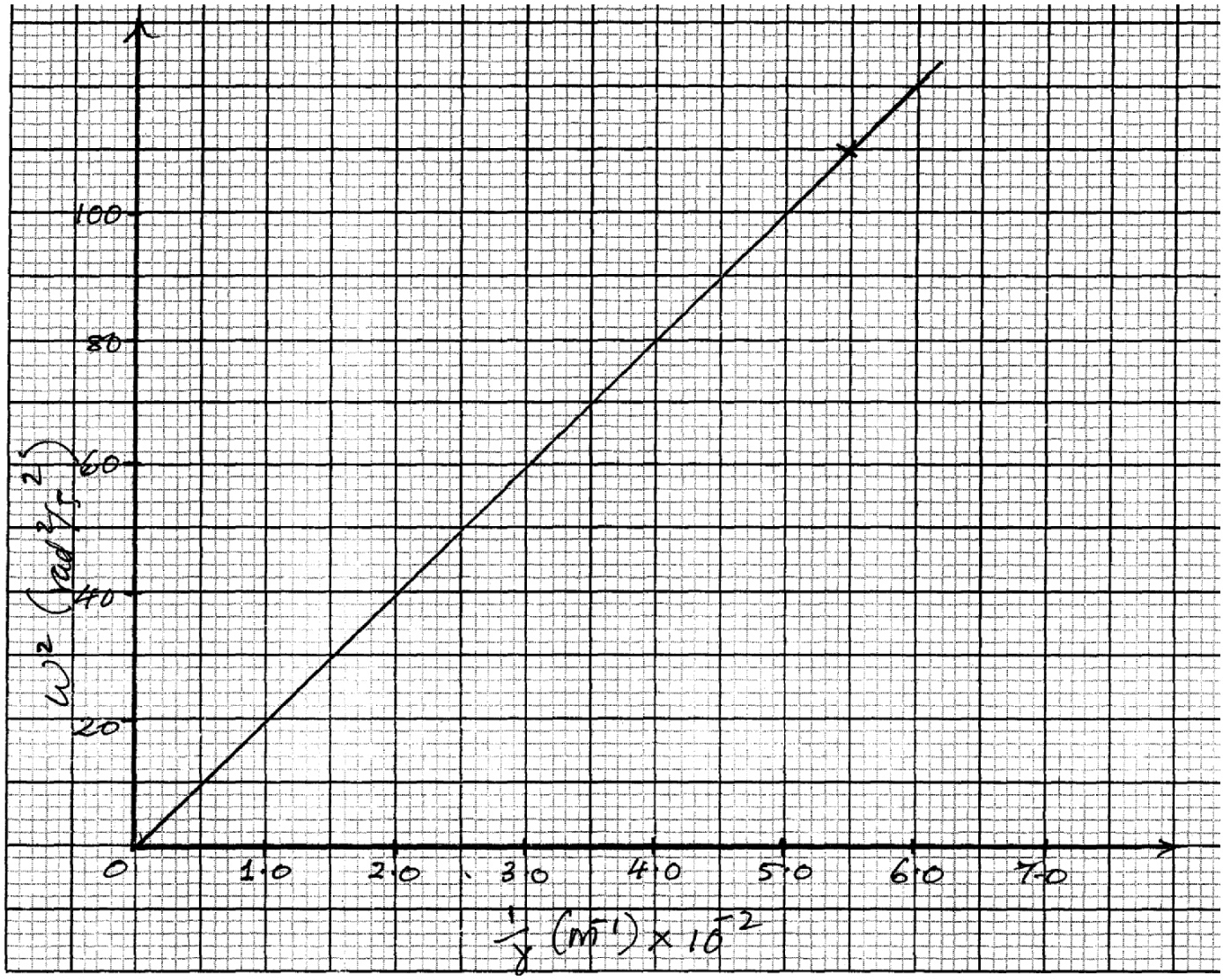
c) The figure below shows a body of mass m = 200g attached to the centre of a rotating table with a string. The radius of the string was varied and different values of angular velocity recorded. the mass of the body remained constant throughout the experiment.



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. ***(2mks)***

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ii. If $\omega^2 and \frac{1}{r}$ are related by the equation $\omega^2 = \frac{P}{r} \times \frac{1}{m}$, find the value of P. ***(3mks)***

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iii. State the significance of P. ***(1mk)***

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