



PHYSICS PAPER 1

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STAREHE GIRLS CENTER SCHOOL

232/1

PHYSICS

PAPER 1

TIME: 2 hours

Instructions to candidates

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

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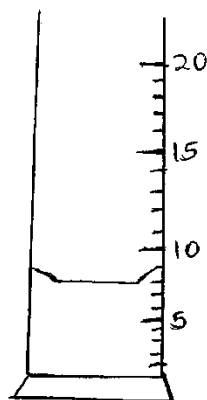
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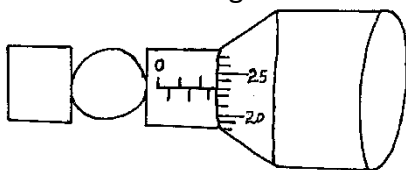
Section	Questions	Maximum score	Candidates score
A	1 – 12	25	
B	13	10	
	14	9	
	15	10	
	16	12	
	17	14	
	TOTAL	80	

SECTION A: (25 MARKS)
ANSWER ALL THE QUESTIONS IN THE SPACES PROVIDED

1. The figure below shows the level of water in a measuring cylinder. 20 lead shots each of volume 0.5cm^3 are dropped into the water. Indicate on the diagram the level water. (2 marks)

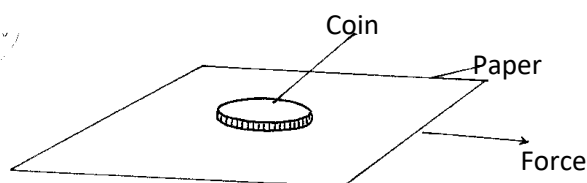


2. A ball bearing of mass 0.0015 Kg is held between the anvil and spindle of a micrometer screw gauge. The reading on the gauge when jaws are closed without anything in between is 0.11 cm . Use this information and the portion of the scale in the figure below to answer questions (i) and (ii).



- i) What is the diameter of the ball bearing? (2 marks)
- ii) Find the density of the ball bearing giving your answer correct to three significant figures. (2 marks)

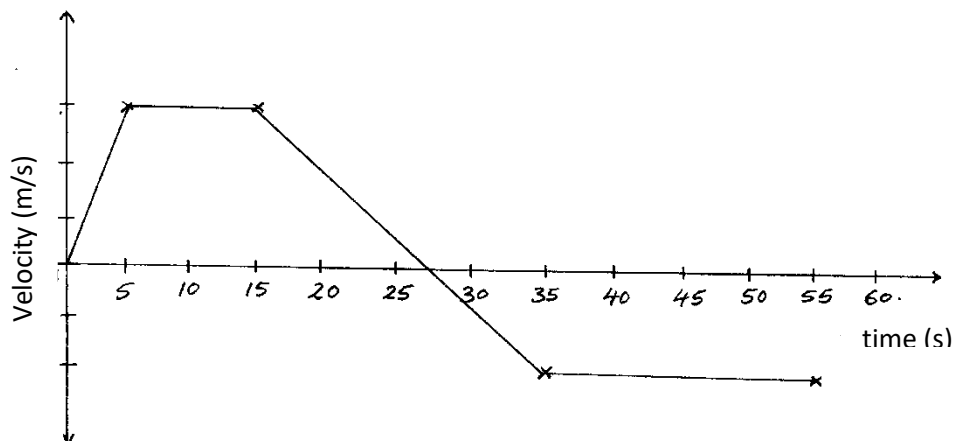
3. The diagram below shows a coin resting on the surface of a paper.



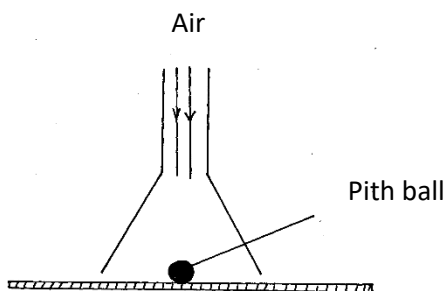
State, with reason, what happens to the coin when the paper is pulled sharply in the direction shown by the arrow. (2 marks)

4. A bullet is fired horizontally at a target, neglecting air resistance, give a reason why the horizontal acceleration of the bullet is zero. (1 mark)

5. The Figure below shows a velocity time graph for a car in motion. If the mass of the car is 920kg, determine the maximum kinetic energy acquired for part of the journey shown. (2 marks)



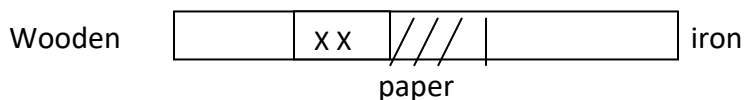
6. The diagram below shows a funnel inverted over a light pith ball on a table. Air is blown into the funnel as indicated on the diagram.



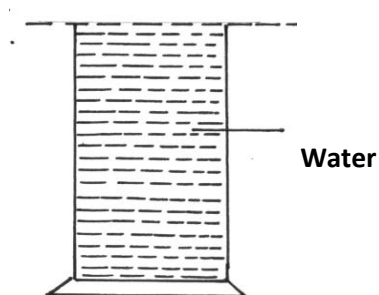
State and explain what is likely to be observed.

(2 marks)

7. The figure below shows a bar made of iron and wood, and a flame is passed the joint with a piece of paper. State what was observed at the junction between the two bars after sometimes. (1 mark)

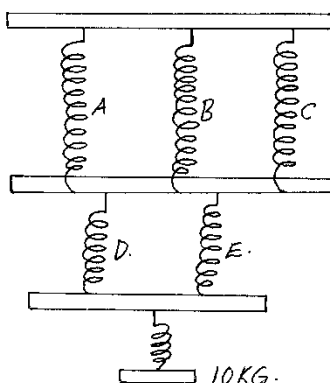


8. The figure below is a gas jar completely filled with water and covered with a wire gauze.



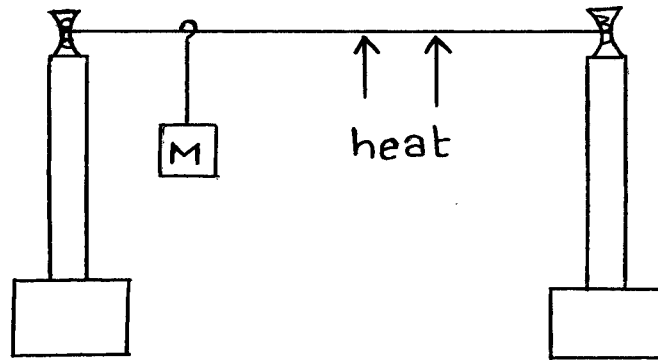
- (a) State the observation when the set-up is suddenly inverted. (1 mark)
- (b) Explain the observation made in (a) above. (1 mark)

9. The diagram below shows a mass of 10kg hanged on a set of 6 identical springs.



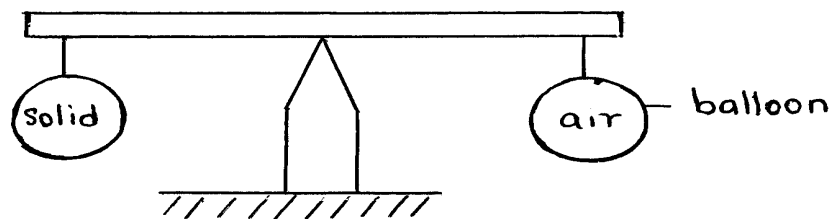
When a mass of 10g was hanged on spring A, its extension was 5cm. Find the extension of the combination shown if each spring has mass of 50g. (3 marks)

10. The mass M was suspended from a tight copper wire using a rider as shown .The copper wire was then heated.



State what was observed on the position of M as the wire was heated for sometime. (1 mark)

11. The system in the figure below is at equilibrium.

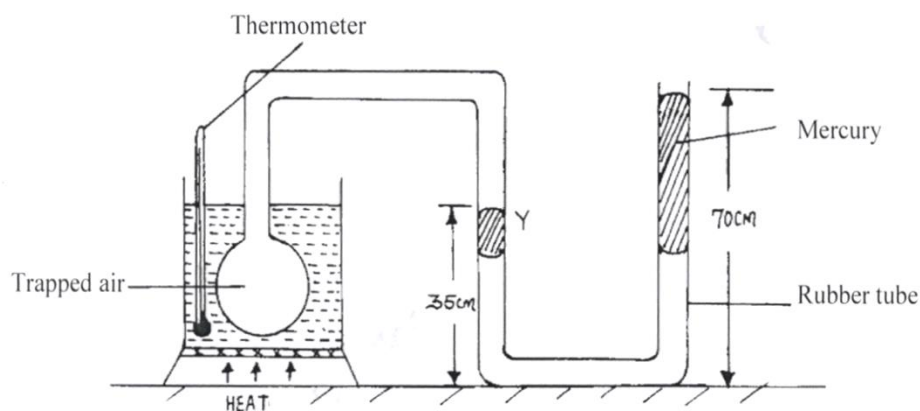


State and **explain** what may be observed as temperature of surrounding is increased. (2 marks)

12. A hole of diameter 1.0mm is made in the side of a water pipe. If the Pressure of the flow is maintained at $3.0 \times 10^6 \text{ Nm}^{-2}$, calculate the force with which the water jets out of the hole. (3 marks)

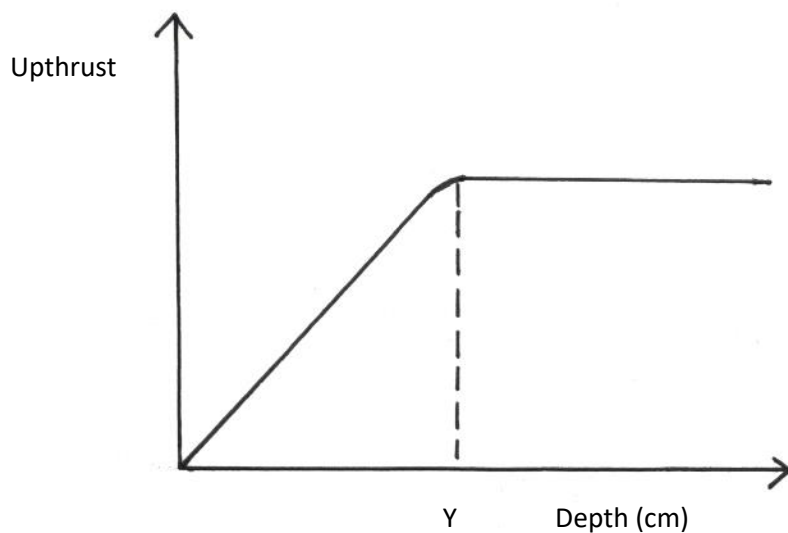
SECTION B: (55 MARKS)

13. Figure below shows the apparatus that a student used to investigate the relationship between temperature and pressure of a fixed mass of gas at constant volume.



- a) i) Describe how the student should ensure that all air trapped has the same temperature as indicated by the thermometer. (2 marks)
- ii) Give a reason why it is necessary to ensure that before taking any reading on pressure, the liquid level should reach the level marked Y. (1 mark)
- iii) Using the measurements given in the diagram, determine the total pressure of the trapped air. (Given your answer in cmHg, atmospheric pressure = 76cmHg) (3 marks)
- iv) State the law the student was investigating. (1 mark)
- b) Before starting a long journey a motorist checked her tyre pressures and found them to be 3×10^5 Pa. At the end of the journey, the pressures were found to be 3.3×10^5 Pa. The temperature of the tyres and contained air at the start of the journey was 17°C . Assuming the volume of the tyres remains constant, determine the temperature of the air in the tyres at the end of the journey. (3 marks)

- 14(a) i) State the law of floatation (1 mark)
- ii) 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)

- b) An ice cube of mass 50g floats on the surface of strong brine solution of volume 200 cm^3 inside a measuring cylinder. Calculate the level of the liquid in the measuring cylinder
- before (2 marks)
 - after all the ice melted (2 marks)
 - What happens to the level if the brine is replaced by 200 cm^3 of water and 50g of ice is again added (take density of ice and brine to be 900 kg/m^3 , 1100 kg/m^3 respectively) (2 marks)
15. i) The figure below shows a centrifuge and two tubes containing muddy water being whirled at high speed

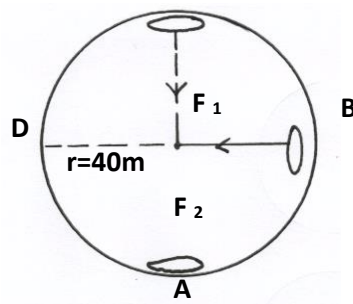


Explain how the high speed rotation causes the separation of mud from water. (2 marks)

- A perforated drum in a spin –dryer is used to dry wet clothes by rotating it at very high speed. Explain. (2 marks)

- (b) Below is a diagram of an aircraft of mass 2000 kg together with the pilot performing some air maneuvers in a vertical plane.

c



If the radius of the circular path is 40 m and the aircraft is moving at a velocity of 200 ms^{-1} . Calculate

- i) The external force F_1 provided by the air at point C. (3 marks)
- ii) The external force F_2 provided by the air at point B. (3 marks)

16(a) **Why** is a burn from steam of boiling water more severe than that of boiling water itself? (1 mark)

(b) An energy saving stove when burning steadily has an efficiency of 60%. The stove melts 0.03 kg of ice at 0°C in 180 seconds. Calculate: (*take the specific latent heat of formation of ice = 340000 Jkg^{-1}*)

- i) The power of the stove (3 marks)
- ii) The heat energy wasted by the machine (2 marks)

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

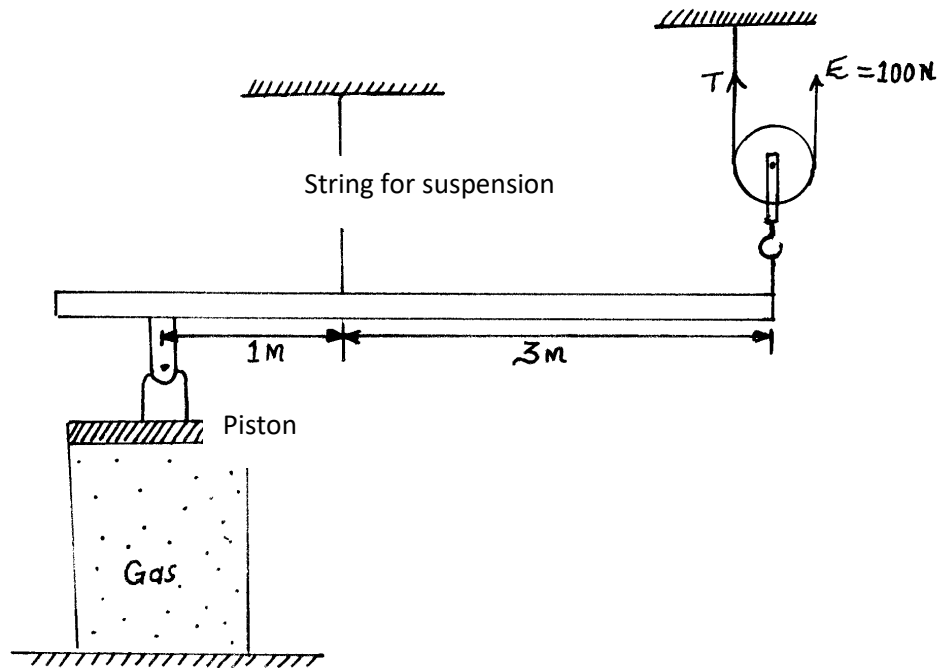
ii) In a coffee making machine steam at 100°C was passed into cold milk and coffee of mass 3kg at 12°C until its temperature rose to 80°C . Given that the specific heat capacity of the coffee and milk mixture is 4000 J/kgK and the specific latent heat of vapourization of water is $2.3 \times 10^6 \text{ J/kg}$. calculate

- i) the energy gained by the coffee and milk mixture assuming heat taken up by coffee pot is negligible and no heat lost. (2 marks)

II) the mass of steam condensed to warm the mixture

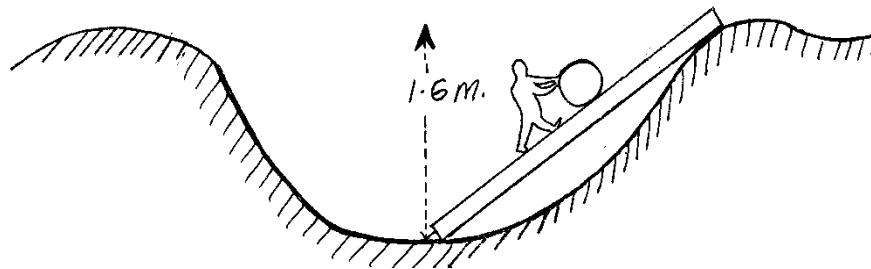
(2 marks)

- 17(a) The figure below shows an effort of 100N being applied on a single moving pulley to exert pressure on a gas in a cylinder.



The area of the piston is 10cm^2 and the volume of the gas is 20cm^3 . The weight of the pulley, the beam and the frictional forces at the movable parts are taken to be zero. If the beam is in equilibrium,

- Calculate the force acting on the piston. (2 marks)
 - Calculate the pressure exerted on the gas by the piston. (2 marks)
- b) A boy used a wooden plank 4 meters long to push a log of wood out of a ditch 1.6 meters deep as shown in the diagram below



i) Determine the velocity ratio of the arrangement (2 marks)

ii) Determine the mechanical advantage of the arrangement if its efficiency is 60%. (3 marks)

iii) Give one reason why the efficiency is less than 100% (1 mark)

(c) In areas of the world where a plane is unable to land, free fall air drops can be used to deliver supplies. A plane travelling at a speed of 80 m/s and at a height of 70 m releases a package of supplies.

i) Sketch the path of the falling package (1 mark)

ii) Calculate how far the package will land from the drop zone (3 marks)

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PAPER 1

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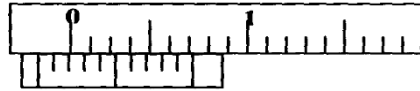
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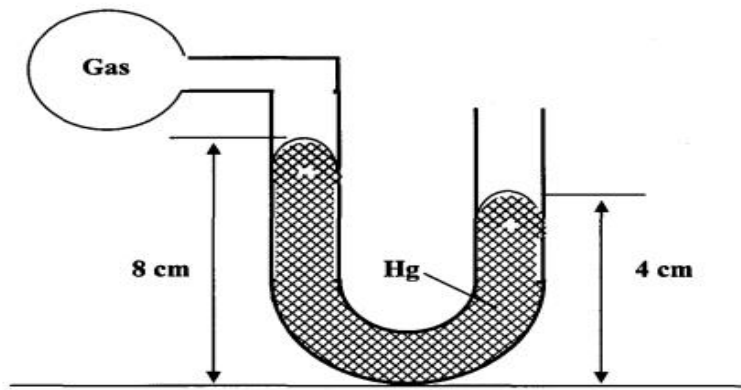
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SECTION A: 25 MARKS

1. The figure below shows part of a vernier calipers when the jaws are closed without an object in between the jaws.

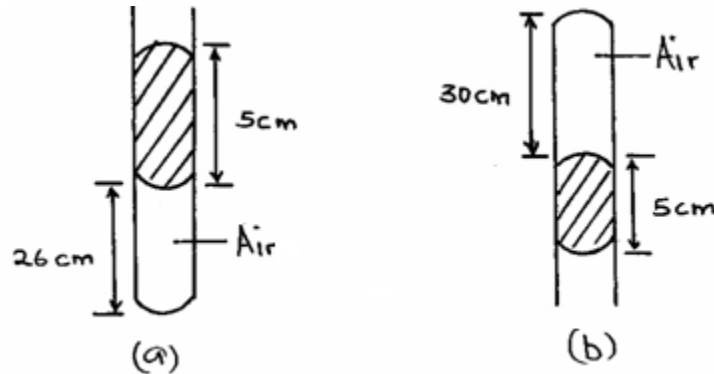


- a) State the zero error of the vernier calipers. (1mk)
- b) A student used the same vernier calipers to measure the diameter of a test tube of actual diameter 2.15cm. What was the reading shown by the vernier calipers? (2mks)
2. $X\text{cm}^3$ of substance A of density 800kgm^{-3} is mixed with 100cm^3 of water of density 1000kgm^{-3} . The density of the mixture is 960kgm^{-3} . Determine the value of x . (3mks)
3. Chalk is denser than air. Explain why chalk dust floats in air. (1 mark)
4. A bullet of mass 10g travelling at a speed of 400ms^{-1} hits a tree trunk, it penetrates the tree trunk and stops inside the trunk after 4 cm.
- (a) Calculate the average resistance force offered by the trunk to the bullet. (3mks)
- (b) State the energy changes that takes place. (1mk)
5. State **one** way of making surface tension of water stronger. (1mk)
6. State the law of conservation of energy. (1 mark)
7. An airtight flask containing a gas is connected to a mercury manometer. The levels of mercury in the two limbs of the manometer are as shown in the diagram below.



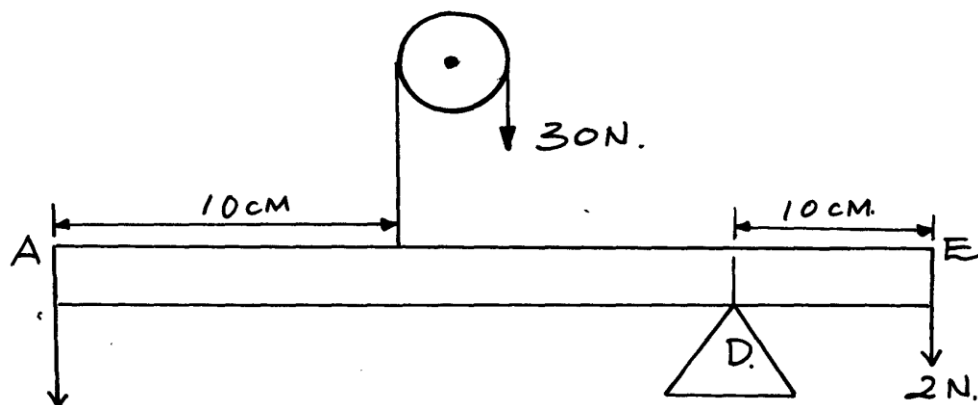
Calculate the pressure of the gas (Density of mercury = $1.36 \times 10^4 \text{ kg/m}^3$ and atmospheric pressure = $1.0 \times 10^5 \text{ N/m}^2$) (3mks)

8. A column of air 26cm long is trapped by mercury thread 5.0cm long as shown in the figure (a) below. When the tube is inverted as in figure (b) the air column becomes 30cm long. What is the value of atmospheric pressure? (3 marks)



9. a) State two conditions necessary for a body to be in equilibrium . (2mks)

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



X

Find the force **X** acting at end **A**

(3mks)

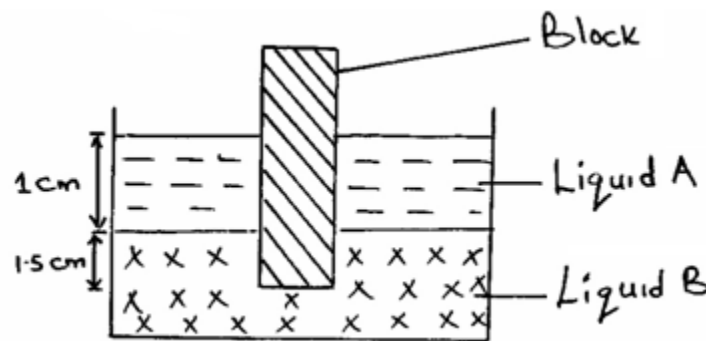
10. State the reason why a trailer carrying heavy loads has many wheels. (1 mark)

SECTION B

11. a) State the Archimedes Principle.

(1 mark)

(b) The figure below shows rectangular block of height 4cm floating vertically in a beaker containing two immiscible liquid A and B. The densities of the liquid are 8000 kg/m^3 and $12,000 \text{ kg/m}^3$ respectively.



The cross sectional area is 2 cm^2 . Determine.

(i) the weight of the liquid A displaced by the block. (2 marks)

(ii) the weight of the liquid B displaced by the block. (2 marks)

(iii) the mass of the block. (1 mark)

(iv) the density of the block. (2 marks)

12. (a) (i) What is meant by perfectly inelastic collision. (1 mark)

li) A minibus of mass 1600kg travelling at a constant velocity of 20m/s collides with a stationary car of mass 800kg. The impact takes 2 seconds before the two move together and come to rest after 15 seconds. Determine.

(a) The common velocity. 3marks

(b) The distance moved after the impact. (2 marks)

(iii) The impulse force. (3 marks)

13. (a) Sketch a block and tackle pulley system with three movable pulleys in the lower block and two fixed pulleys in the upper block. (2marks)

Find:

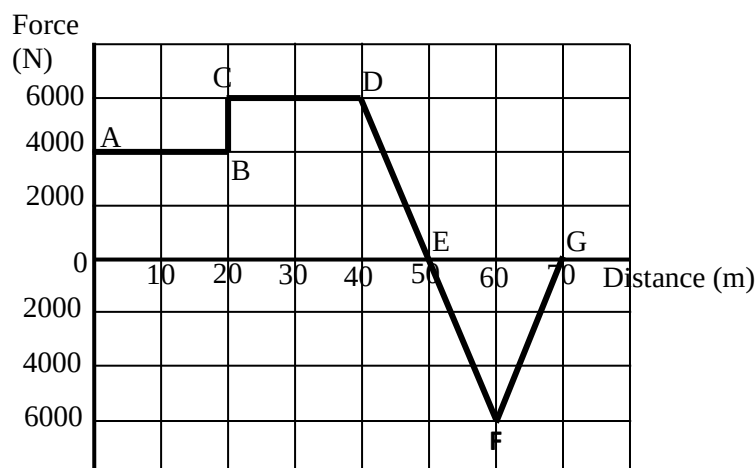
(b) (i) Velocity ratio (V.R.) (1mk)

(c) A man uses the inclined plane to lift a 50kg load through a vertical line height of 4.0m. The inclined plane makes an angle of 30° with the horizontal. If the efficiency of the inclined plane is 80%, determine.

i. The effort needed to move the load up the inclined plane at a constant velocity. (3 marks)

ii. The work done against friction in raising the load through the height of 4.0m. (Take $g = 10\text{N/kg}$). (3 marks)

d) The graph below shows the variation of force with distance for a body being towed



Calculate the total work done on the body.

(3 Marks)

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

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

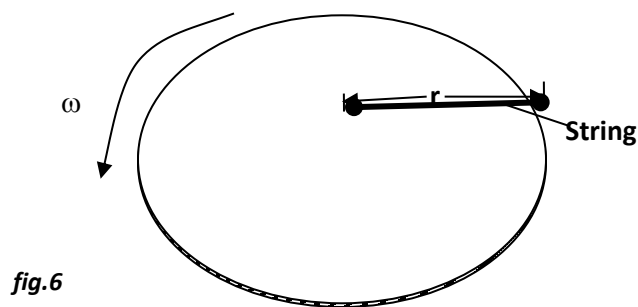
(i) The angular velocity. (1 mark)

(ii) The centripetal acceleration. (2 marks)

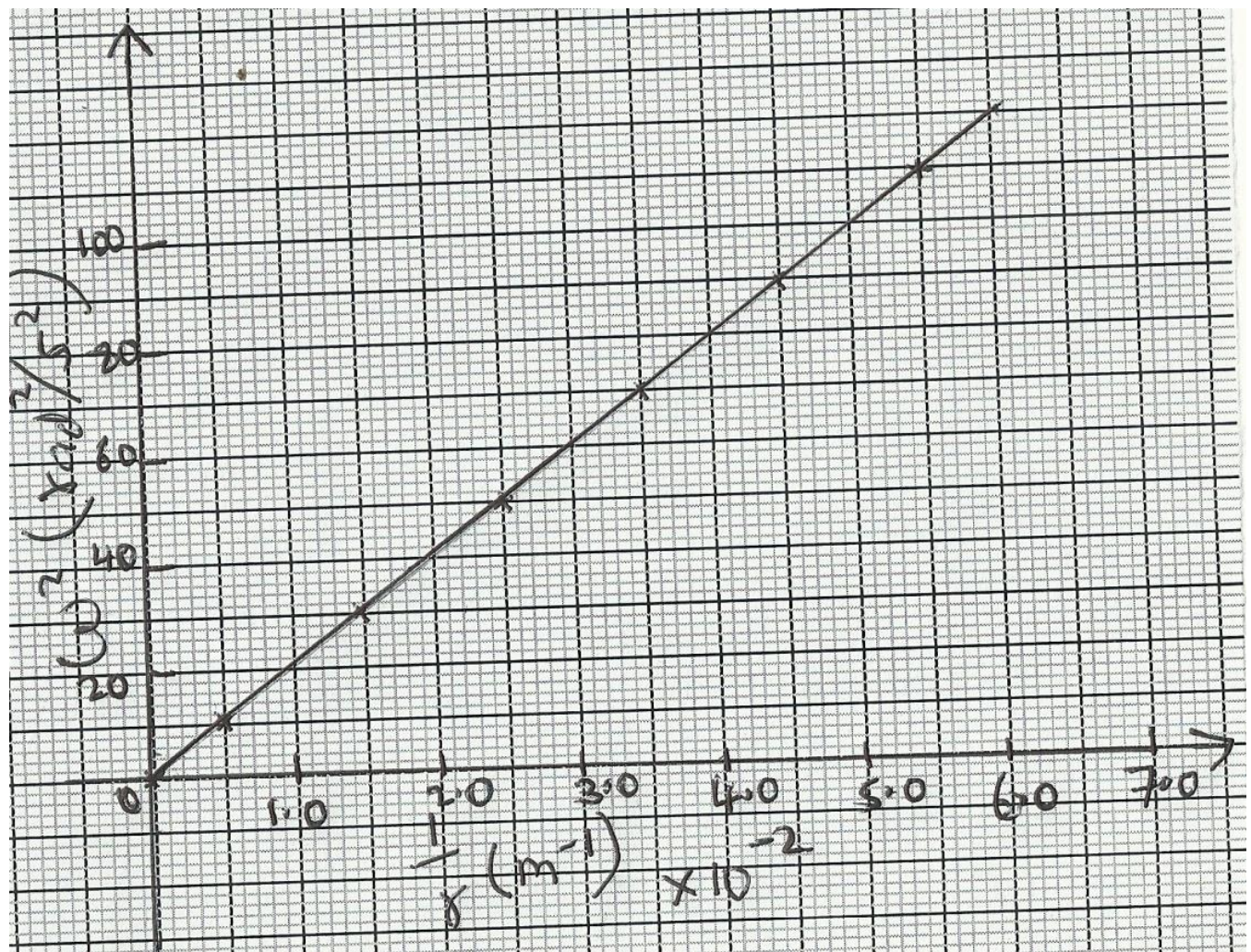
(iii) The tension on the string. (2 marks)

(iv) The linear velocity. (1 mark)

(c) Figure 6 shows a body of mass; $m = 200\text{g}$ 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)

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

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

(1mk)

15. a) Define the term specific heat capacity.

(1 mark)

(b) A block of metal of mass 150g at 100°C is dropped into a lagged calorimeter of heat capacity 40Jk⁻¹ containing 100g of water at 25°C. The temperature of the resulting mixture is 34°C. (Specific heat capacity of water = 4200Jkg⁻¹).

Determine;

(i) Heat gained by calorimeter.

(2 marks)

(ii) Heat gained by water. (2 marks)

(iii) Heat lost by the metal block. (1 mark)

(iv) Specific heat capacity of the metal block. (3 marks)

(c) 200 g of ice at 0°C is added to 400g water in a well lagged calorimeter of mass 40g. The initial temperature of the water was 40°C . If the final temperature of the mixture is $X^{\circ}\text{C}$,

(Specific latent of fusion of ice $L = 3.36 \times 10^5 \text{ Jkg}^{-1}$, specific heat capacity of water, $c = 4200 \text{ Jkg}^{-1}\text{K}^{-1}$, specific heat capacity of copper = $400 \text{ Jkg}^{-1}\text{K}^{-1}$.)

(i) Derive an expression for the amount of heat gained by ice to melt it and raise its temperature to $X^{\circ}\text{C}$ (2mks)

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

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SECTION A (25 MARKS)

1. The figure below shows a Vernier caliper scale.

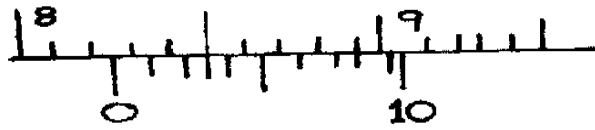


Fig. 1

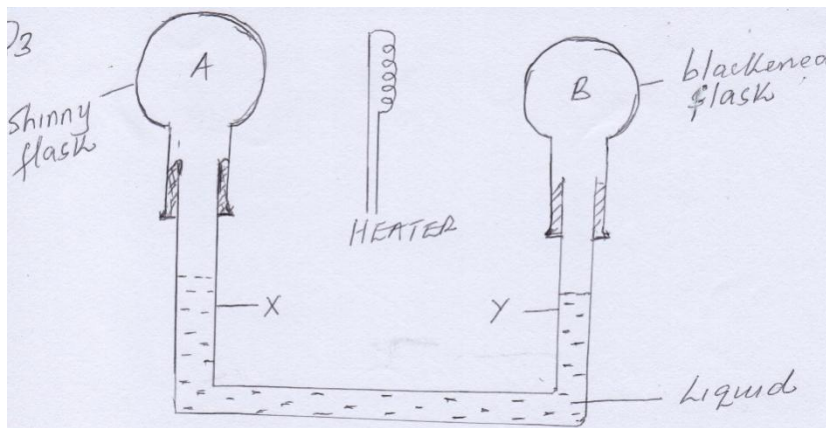
If the Vernier calipers used had a zero error of -0.02 what is the actual reading of the scale.
(2mks)

2. Find the total pressure experienced by a diver 8 meters below the sea surface. (3mks)

Take; Atmospheric pressure = 103360N

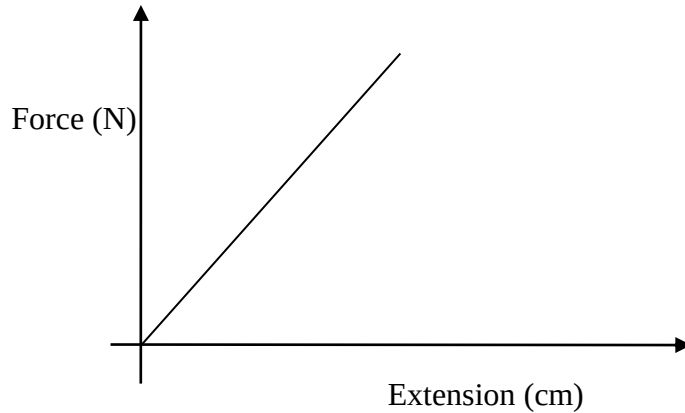
Density of sea water = 1030 kg/m^3

3. The figure below shows an electric heater placed midway between flask A and B. flask A is shiny on the outside and flask B is blackened on the outside.



- a) Name the process by which heat travels from heater to the flask. (1mk)
- b) State the observation that will be made. (1mk)

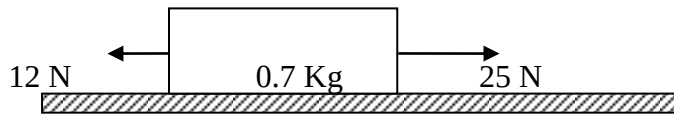
4. The following is a graph of force against extension for a spring



On the same axes, sketch a graph of force against extension for a spring double the length, same thickness, same material as the spring above (1mk)

5. Water flows steadily along a horizontal pipe at a volume rate of $8.0 \times 10^{-3} \text{ m}^3/\text{s}$. if the area of cross section of the pipe is 20cm^2 . Calculate the velocity of the fluid. (3mks)

6. Two parallel forces are acting on a body of mass 0.7 kg as shown in the figure below.



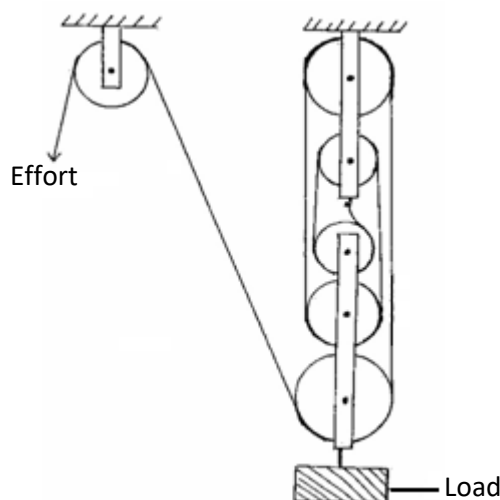
Calculate the acceleration of the 0.7Kg mass (3mks)

7. (a) State pressure law. (1mk)

- b) Air is compressed at a constant temperature until its pressure rises from 82cmHg to 140cmHg. If the initial volume of air is 85cm^3 , find the final volume of air. (3mks)

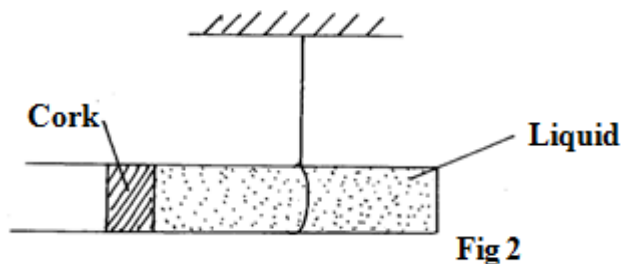
8. Explain the cause of random motion of particles as observed in Brownian motion in a smoke cell experiment. (1mk)

9. The figure **below** shows a machine being used to raise a load. Use the information given in the figure to answer questions **below**.



- (a) Determine the velocity ratio (V.R) of the machine. (1 mark)
- (b) If a load of 800N is raised by applying an effort of 272N, determine the efficiency of the machine. (3 mark)

10. Figure below shows a liquid in a long cylindrical tube closed at one end with a cork. The cork is tight fitting but movable.

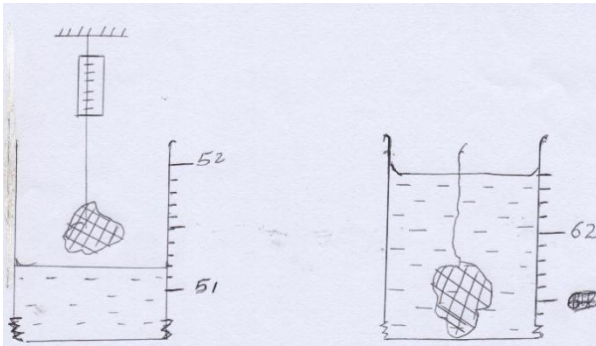


State and explain the observation that would be made when the tube is heated uniformly. (2mks)

SECTION B (55 MARKS)

11. A) state Archimedes principle. (1mk)

b) Figure below shows an experiment used to determine the density of an irregular piece of metal. The mass of metal in air is 200g.



i) Determine the volume of the stone in cubic metres. (2mks)

ii) Calculate the density of the metal to 3 significant figure. (2mks)

c) Given that the density of water is 1g/cm^3 , determine;

i) The mass of water displaced. (2mks)

ii) The upthrust acting on water. (2mks)

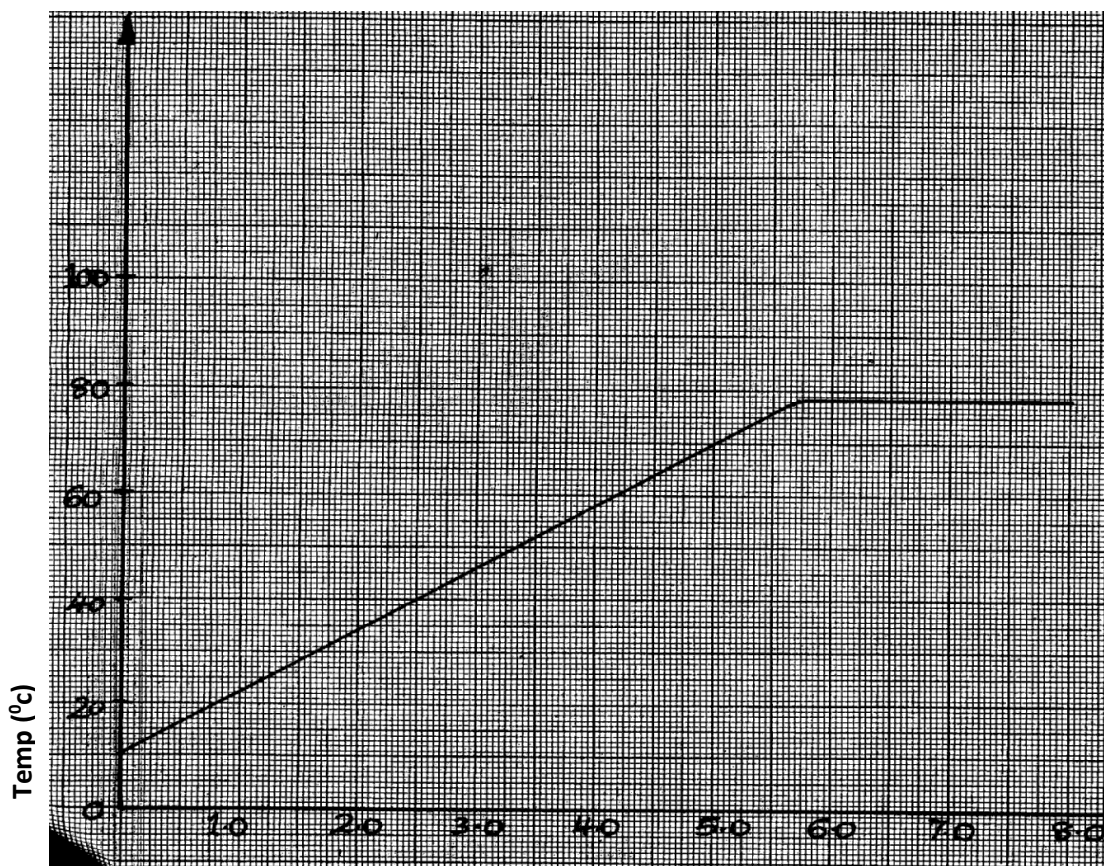
iii) The relative density of the metal. (2mks)

d) A solid displaces 5.5cm^3 of paraffin when floating and 20.5cm^3 when fully immersed. Given that the density of paraffin is 800kg/m^3 , determine the density of the solid. (3mks)

12. a) State **one** factor that affect the boiling point of a liquid.

(1mk)

b) 100g of a liquid at a temperature of 10°C is poured into a well lagged calorimeter. An electric heater rated 50W is used to heat the liquid. The graph in Figure 8 below shows the variation of the temperature of the liquid with time.



i) From the graph, determine the boiling point of the liquid. (1mk)

ii) I) Determine the heat given out by the heater between the times $t=0.5$ minutes and $t=5.0$ minutes. (2mk)

II) From the graph determine the temperature change between the times $t=0.5$ minutes and $t=5.0$ minutes.

(1mk)

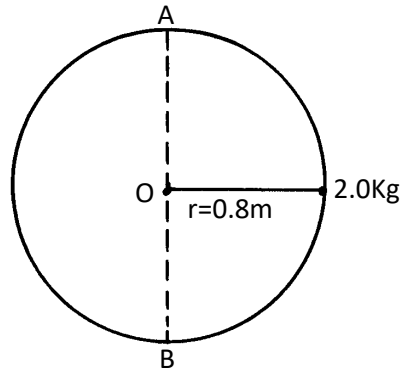
III) Hence determine the specific heat capacity of the liquid. (3mk)

iii) 1.8g of vapor was collected from the liquid between the times $t=6.8$ minutes and $t=7.3$ minutes. Determine the specific latent heat of vaporization of the liquid. (4mks)

13. a) Define angular velocity.

(1mk)

b) The diagram below shows an object of mass 2.0kg whirled in a vertical circle of radius 0.8m at a uniform speed of 50ms^{-1} .



Determine;

i) The centripetal force on the object.

(3mks)

ii) The tension in the string when the object is at **A**.

(2mks)

iii) The tension in the string when the object is at **B**.

(2mks)

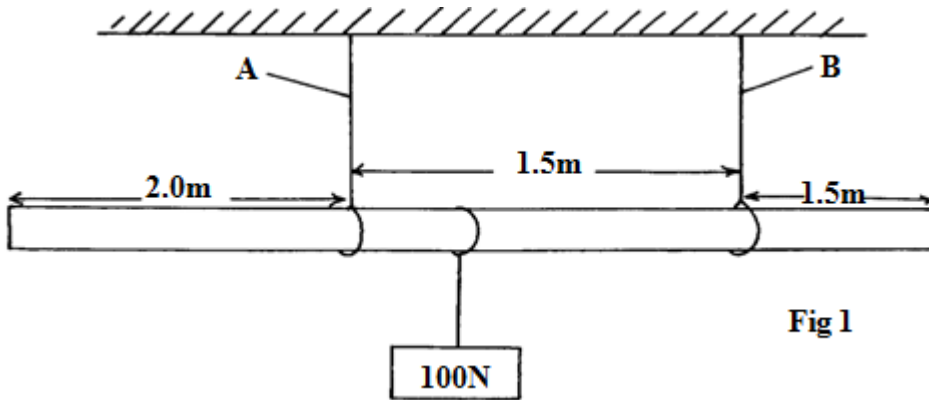
c) The speed of rotation is gradually increased until the string snaps. At what point is the string likely to snap? Explain.

(2mks)

14. a) State the principle of parallel forces.

(1mk)

- b) A uniform plank of wood weighing 50N and of length 5m is suspended by two ropes A and B, 1.5m apart. A is 2m from end and B is 1.5m from the other end, as shown in fig. 1 below. A concrete block of weight 100N is suspended from the center of the plank.



Calculate the tension, T_A on the string A

(3mks)

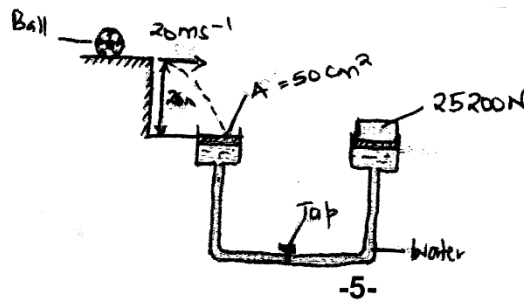
- c) I) state two ways in which the stability of a body can be increased.

(2mks)

- II) State one way in which vehicle assembling companies enhances stability in vehicles.

(1mks)

15. The figure below shows a ball of mass 50kg being thrown from a top of wall 20m high with a horizontal velocity of 20m/s. It struck the piston A of hydraulic lift and no water splashed out. The other piston B had a weight of 25200N placed on it. Assuming the tap was opened at the time the ball struck the piston A.



Determine;

- (i) The time taken by the ball to strike the surface of piston A. (3 mks)

- (ii) The distance from the foot of the wall to where it hit piston A. (2 mks)

- (iii) The vertical velocity with which the ball struck piston A. (2 mks)

- (iv) The force with which the ball struck piston A. (2 mks)

- (v) The area of piston B if the load on the piston B did not move and that the two pistons were initially at the same level. (3 mks)

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KANGA SCHOOL TRIAL SERIES

232/1

PHYSICS

PAPER 1

TIME: 2 hours

Instructions to candidates

- a) This paper consists of two sections A and B.*
- b) Answer **all** the questions in the two sections in the spaces provided after each question.*
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- d) Electronic calculators and mathematical tables may be used.*
- e) All numerical answers **should be expressed** in the **decimal** notations.*
- f) You may use 'gravitational acceleration, g, as 10m/s^2*

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SECTION A (25MKS)

1. Define pressure and state its SI units (2mks)
2. State 2 safety rules to be observed in the laboratory (2mks)
3. Sketch a section of a vernier calipers with a zero error of $+0.01\text{cm}$ reading a diameter of a ball bearing whose actual diameter is 2.54cm (3mks)
4. The diagram below shows a capillary tube inserted in water.

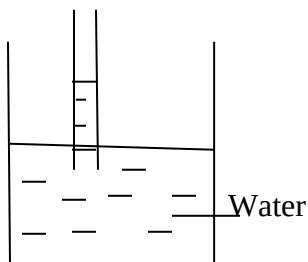


Fig a

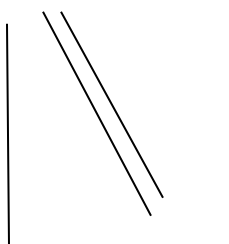
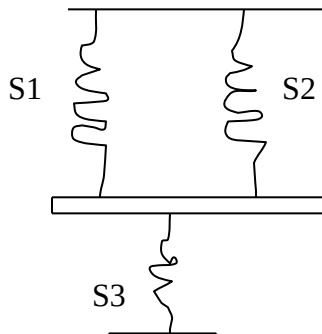


fig b

- (a) Make a sketch on figure (b) to show appearance of capillary tube if it was inserted in Mercury. (1mk)
 - (b) Explain the differences if any between figure (a) and (b) above (2mks)
5. When a thermometer is dipped in a warm liquid, the level of mercury first drops before rising. Explain (2mks)
 6. (a) State Hooke's Law (1mk)

(b) Define the following terms (3mks)
 - (i) Ductility
 - (ii) Brittleness
 - (iii) Elasticity

(c) The set up below was used in an experiment. Calculate the total extension given the springs are identical with a spring constant 10N/cm (3mks)



7. (a) State the 60N of matters (3mks)

(b) using kinetic theory of matter differentiate between solids and liquids. (3mks)

SECTION B (55 MKS)

8. (a) A tape attached to an accelerating trolley passes through a ticker timer that makes dots on it at a frequency of 50 Hz . The ticker timer makes 10 dots on a 10cm long tape such that; the distance A between the first two dots is 0.5cm and the distance B between the last 2 dots is 1.5 cm .

(i) Determine the velocity of the trolley at:

I. Distance A, (4mks)

II. Distance B (2mks)

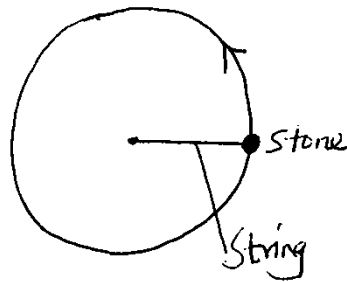
(ii) Determine the acceleration of the trolley (3mks)

(b) State with a reason what would be observed on the spacing between the dots on the tape when the trolley is made to move on a horizontal surface (2mks)

9. (a) Define the term centripetal force (1mk)

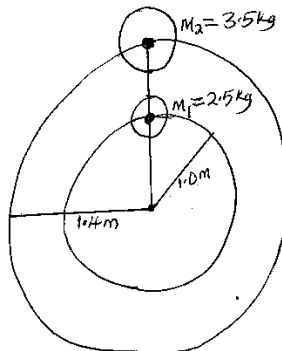
(b) When a car is travelling on a mud road, mud flies off the fast spinning wheels. Explain this observation. (1mk)

(c) The figure below shows the path of a stone attached to a string whirled in a space in a horizontal circle.



Sketch on the diagram the path the stone follows if the string breaks when the body is at the position shown (1mk)

(d) Two masses $m_1 = 2.5\text{kg}$ and $m_2 = 3.5\text{kg}$ are connected by a light string and are in uniform circular motion on a horizontal frictionless surface as shown in the figure below.



The masses describe circles of radii $r_1 = 1.0\text{m}$ and $r_2 = 1.4\text{m}$ respectively and the angular velocity of the masses is 5.0 radians per second

(i) Which of the two masses is moving faster? Give a reason for your answer (2mks)

(ii) Determine the

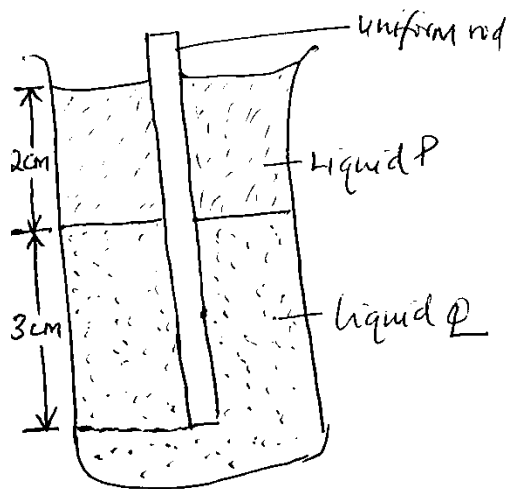
III. Centripetal force on m_1 (2mks)

IV. Centripetal force on m_2 (2mks)

V. The tension T on the string (2mks)

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

(b) The figure below shows a uniform rod of height 8cm floating vertically in a beaker containing two immiscible liquids P and Q. The densities of the liquids are 800kg/m^3 and 1200kg/m^3 respectively and the cross sectional area of the rod is 2cm^2 .



Determine

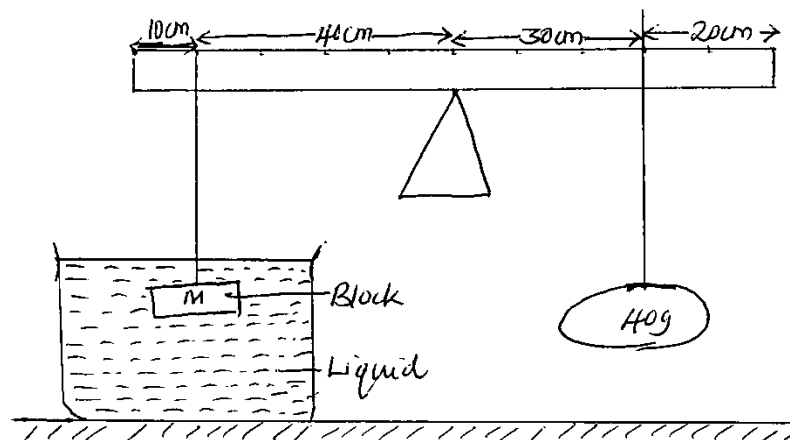
i. The weight of liquid p displaced by the rod. (3mks)

ii. The weight of liquid Q displaced by the rod. (2mks)

iii. The mass of the rod. (1mks)

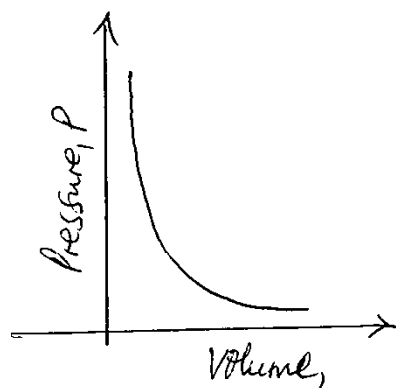
iv. The density of the rod (2mks)

(c) The figure below shows a block of volume 50cm^3 and density 2000kg/m^3 submerged in a liquid and suspended from a uniform horizontal beam by means of a thread. The beam is balanced by a spherical mass of 40g which is suspended from it on the other side of the pivot as shown.



Determine the Upthrust force acting on the block (3mks)

11. (a) The figure below shows a graph of pressure against volume for a fixed mass of a gas at constant temperature. In the spaces provided sketch a graph of pressure, P against $\frac{1}{V}$. (1mk)

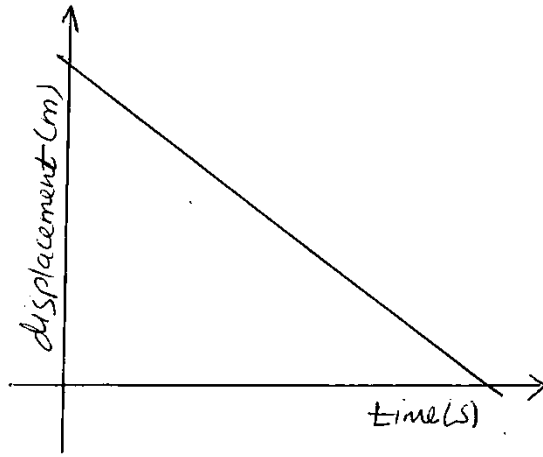


- (b) Explain the pressure law using the kinetic theory of matter (3mks)

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

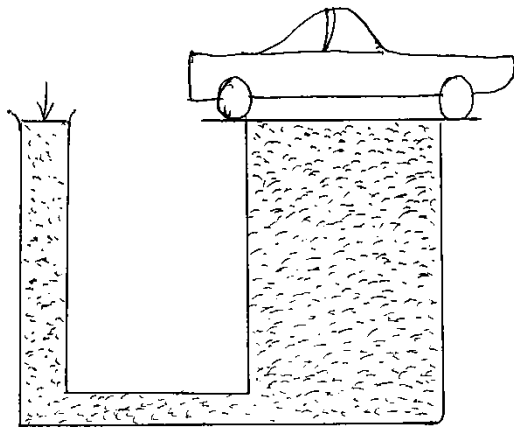
- d (i) A car undergoes uniform retardation to rest from 10m/s covering a distance of 25m . Determine its deceleration. (2mks)

- (ii) The figure below shows a displacement time graph for the motion of a particle. On the axes in figure below, sketch a velocity time graph for the same motion (1mk)



12. (a) Define the term velocity ratio of a machine (1 mk)

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



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

Determine:

- v. The mechanical advantage of the machine (3mks)

 - vi. Efficiency of the machine (3mks)

 - vii. The percentage of work that goes to waste (1mk)
- (c) A metallic box weighs 188N and measures 10cm by 30cm by 8cm. determine the maximum pressure it can exert when lying on one of its surfaces (3mks)

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PHYSICS

PAPER 1

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- b) Answer **all** the questions in the two sections in the spaces provided after each question.*
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- f) You may use 'gravitational acceleration, g, as 10m/s^2*

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SECTION A (25MARKS)

1. A salt solution of volume 30cm^3 and density 1.1 g/cm^3 is mixed with 25cm^3 of pure water of density 1g/cm^3 . determine

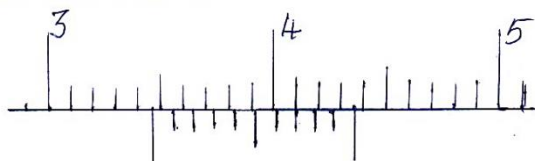
a. Total mass of the mixture

(1mark)

b. Density of the mixture

(2 marks)

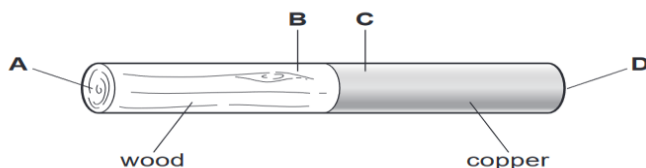
2. The figure below shows a section of Vernier callipers to measure the thickness of a wooden block.



What is the reading of the Vernier callipers

(1 marks)

3. A rod is made up of copper and wood joined together. Identical thermometers are placed at points A, B, C and D. The rod is heated at the junction for about a minute



State with a reason the thermometer that will record the lowest reading

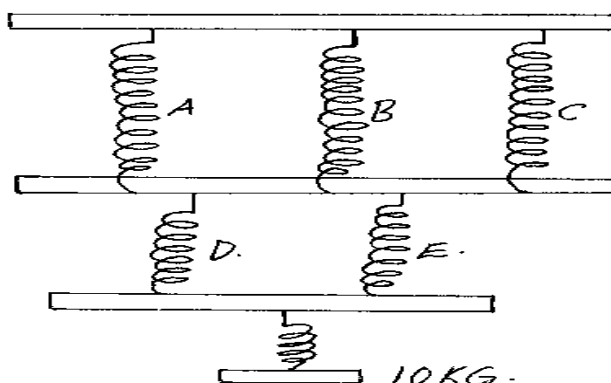
(1 marks)

4. A body is whirled in a horizontal circle at a frequency of 10Hz . Determine its angular velocity.

(2 marks)

5. State the immediate action that needs to be taken in the laboratory in case of electric fire. (1mark)

6. The diagram below shows a mass of 10kg hanged on a set of 6 identical springs.



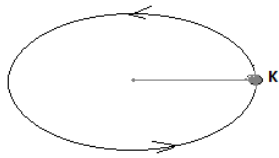
When a mass of 10g was hanged on spring A, its extension was 5cm. Find the extension of the combination shown if each spring has mass of 50g. (2 marks)

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

a) State the purpose of the hot water. (1mark)

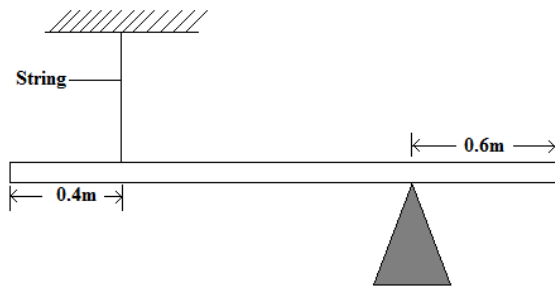
b) State the reason why the bottle is deformed. (1 mark)

8-.The figure shows an object O at the edge of a turntable. Study the diagram and answer the question that follow



The table spins anticlockwise. State one factor that will increase the force acting on the object
(1 mark)

9. The figure below shows a uniform bar of weight 5.4N and of length 2.8m is pivoted near one end. The bar is kept in equilibrium by a string as shown. Use the diagram to answer the questions 4 and 5



Determine the tension on the string.

(2 marks)

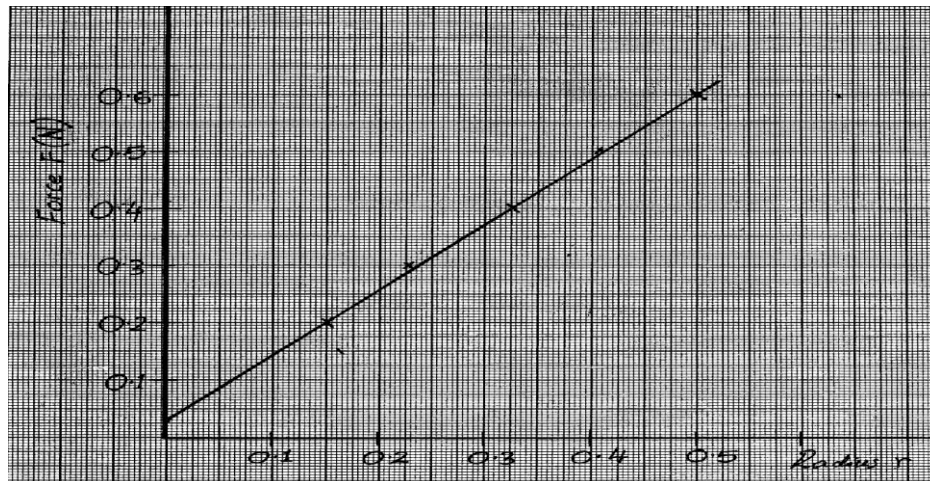
10. A turntable of radius 7.5cm is rotating at 35 revolutions per second. Determine the linear speed of a point on the circumference of the turntable.
(2 marks)

11. The graph below was obtained when an experiment to investigate the variation of the centripetal force, F , with the radius, r of the circle on which a body rotates was performed.

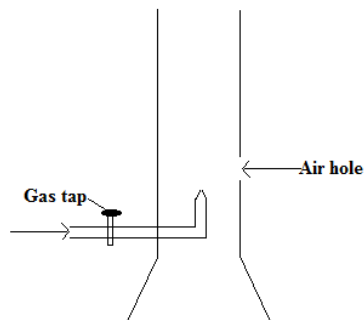
From the graph, determine the angular velocity, ω of the body given that $m = 100\text{g}$ and

$$F = m\omega^2 r + c \text{ where } c \text{ is a constant.}$$

(2marks)



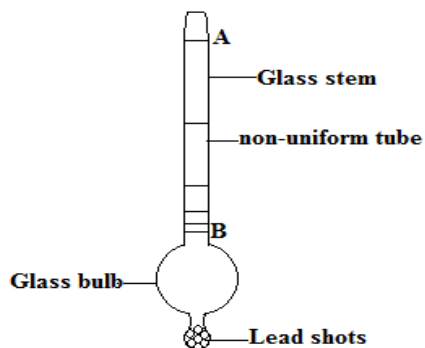
12. The figure shows parts of a Bunsen burner. Study it and answer the questions that follow



Explain how air is drawn into the air hole when the gas tap is opened

(2 marks)

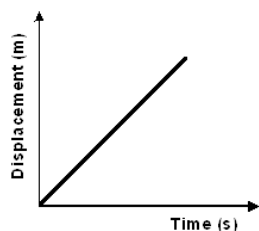
13 The figure shows a type of hydrometer that is used to measure relative density of liquids ranging from 0.79-1.14. Study the diagram and answer the questions that follow



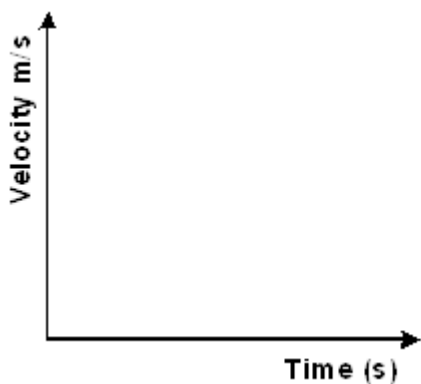
a) The letters A and B are used to label the values of relative density. State the letter which corresponds to a relative density of 1.14 (1 mark)

b) State the purpose of the lead shots (1 mark)

14.) The motion of a body is described by the graph shown in the figure. Study it and answer the questions that follow



Sketch a velocity-time graph for the motion on the grid provided (1 mark)

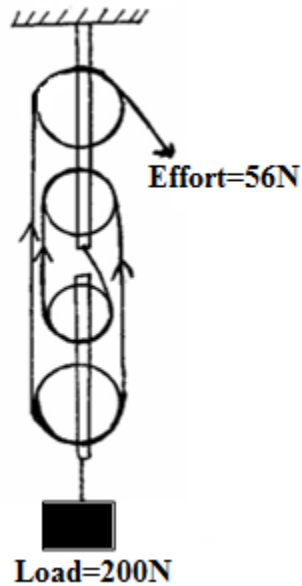


SECTION B (55 MARKS)

ANSWER ALL QUESTIONS IN THIS SECTION IN THE SPACES PROVIDED

15.

- a) The figure shows a pulley system being used to raise a load.



Determine the

- i. Velocity ratio of the system (1 mark)
- ii. Mechanical advantage of the system (2 marks)
- iii. The efficiency of the system (2 marks)

iv. Give ONE reasons why the efficiency of such a system is always less than 100% (1 marks)

b) A body of mass 40kg is lifted through from a height of 4.0m to 8.2m in one minute.

Determine

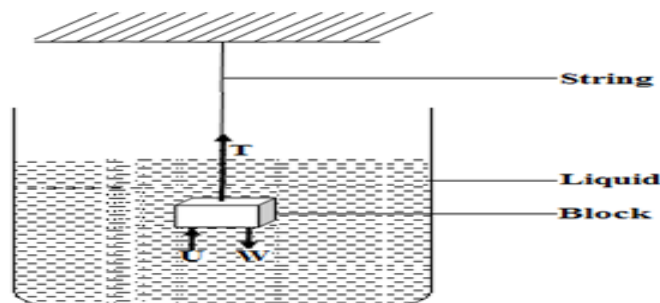
i. The potential energy gained by the body (2 marks)

ii. The average rate of doing work in the one minute (2 marks)

16.

a) State the law of flotation. (1 mark)

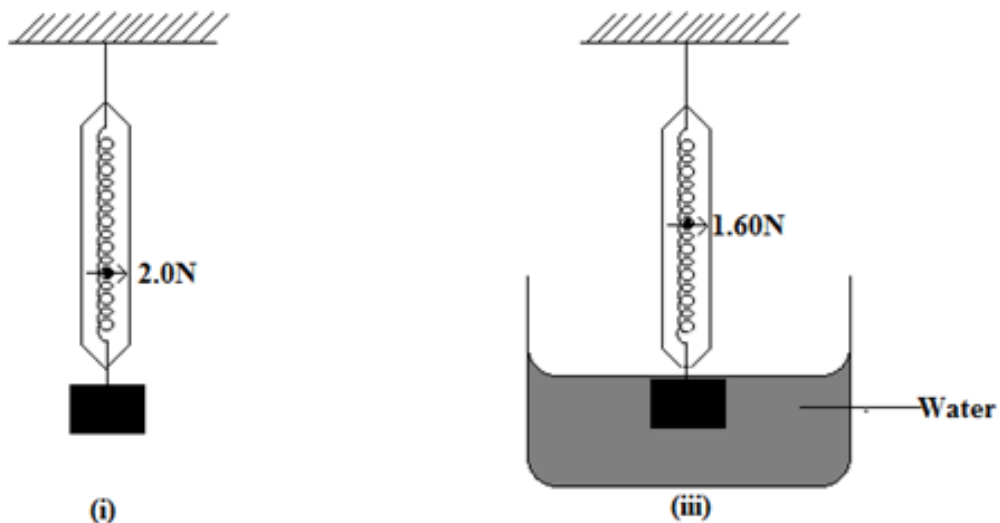
b) The figure shows a rectangular metal block of density 10800kgm^{-3} and dimensions 40cm x 15cm x 15cm suspended inside a liquid of density 1180kgm^{-3} by a string attached to a point above the liquid. The three forces acting on the block are; the tension, **T**, on the string, the weight, **W** of the block and the up thrust, **U**, due to the liquid.



i. Write the expression relating to **T**, **W** and **U** when the block is in equilibrium inside the liquid. (1 mark)

- ii. Determine the weight, W , of the block (2 marks)
- iii. Determine the weight of the liquid displaced by the fully submerged block. (2 marks)
- iv. Hence determine the Tension, T , in the string. (2 marks)
- v. A certain solid of volume 52cm^3 displaces 8.5cm^3 of kerosene (density 800kgm^{-3}) when floating. Determine the density of the solid. (3 marks)

c.) The figure shows the same metal block weighed in air and in water. The reading of the level of water becomes 150cm^3 when the metal is fully immersed. Study the diagram and answer the questions that follow

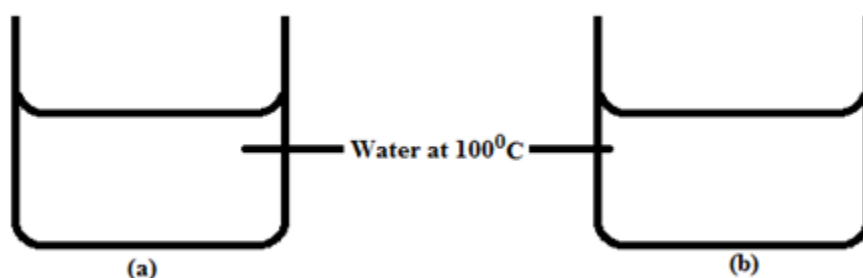


Determine the volume of the metal block (2 marks)

17.

- a) A burn from steam at 100°C is more severe than water at the same temperature. Explain this observation (1 mark)

- b) **The figure** shows samples of water at 80°C placed in two identical containers. the volume of water is the same



The beaker in figure (a) is wrapped with a wet cloth dipped in methylated spirit while figure (b) is wrapped with a wet cloth dipped in cold water at the same temperature as the spirit. State with a reason the water that will record a lower temperature after being left in the open for same time period.

(2 marks)

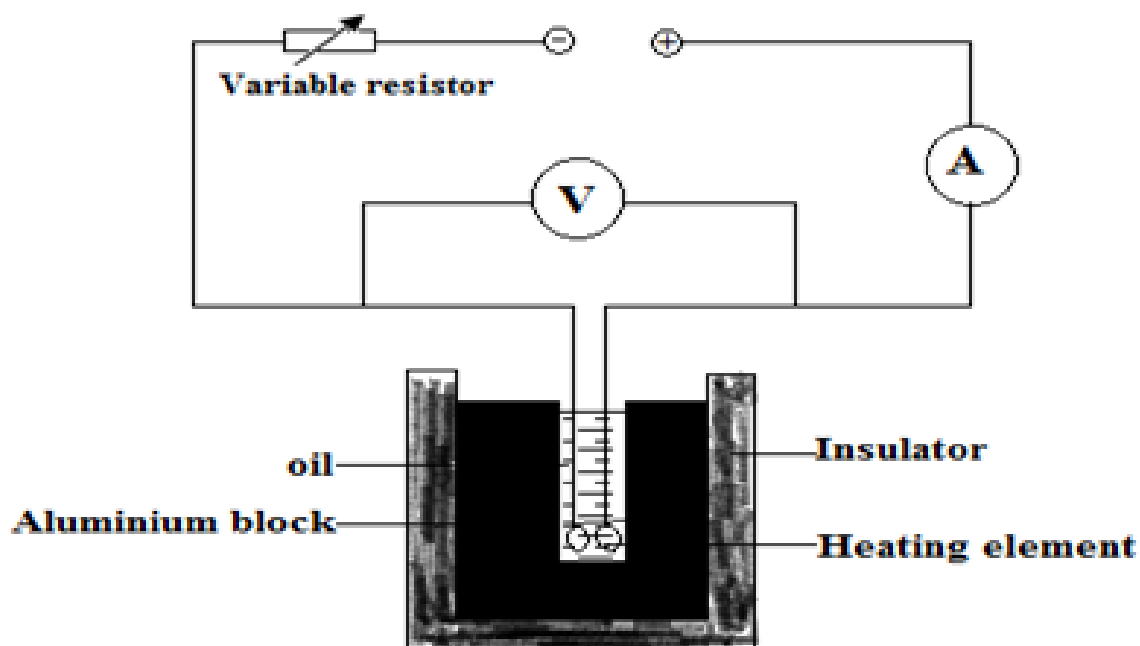
- c) An electric heat rated 6000W is used to heat 2kg of ice initially at -5°C until all the mass turns to steam. Given that, the specific Latent heat of fusion of ice = 334000Jkg^{-1} Specific heat capacity of ice = $2100\text{Jkg}^{-1}\text{K}^{-1}$ Specific heat capacity of water = $4200\text{Jkg}^{-1}\text{K}^{-1}$ Specific latent heat of vaporization of steam = 226000Jkg^{-1} Calculate:

- i. The amount of heat required to convert ice into water at 0°C . (2 marks)

ii. The amount of heat required to convert water to steam at 100°C . (2 marks)

iii. The minimum time required in minutes for activity in (i) and (ii) to take place. (2 marks)

d) The figure shows a set-up that was used to determine the specific heat capacity of aluminium block. Study the diagram and answer the questions that follow

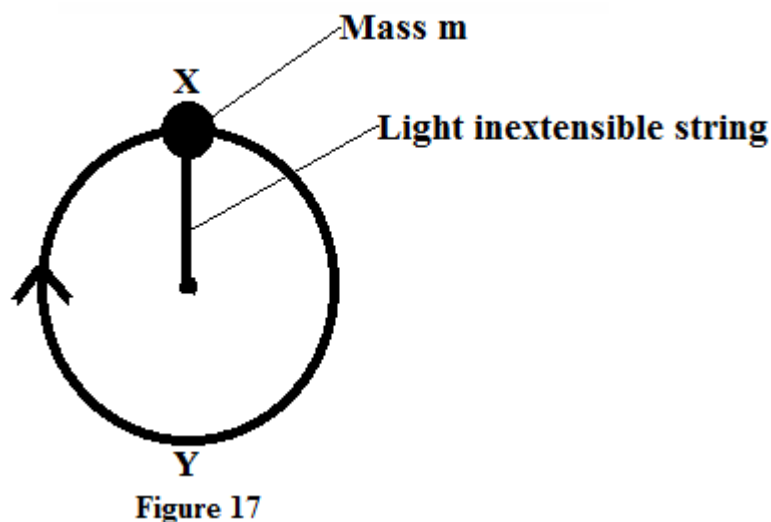


i. State the purpose of the variable resistor (1 mark)

ii. Apart from voltage current and temperature, state any other quantity that is required for the determination of the specific capacity of the aluminium block (2 marks)

18.

- i. A body having uniform motion in a circular path always accelerates and yet the speed remains constant. Explain this observation (1mark)
- ii. An object is whirled in a horizontal plane at an angular velocity of 40rad/s . given that the radius of the circular path is 3.0m . Determine the linear velocity of the body (2 marks)
- iii. Figure 17 below shows the path of a body t of mass 400g tied to a string of length 0.4 m and being whirled in a vertical circle at a linear speed of 10m/s .



State what provides the centripetal force on the mass m

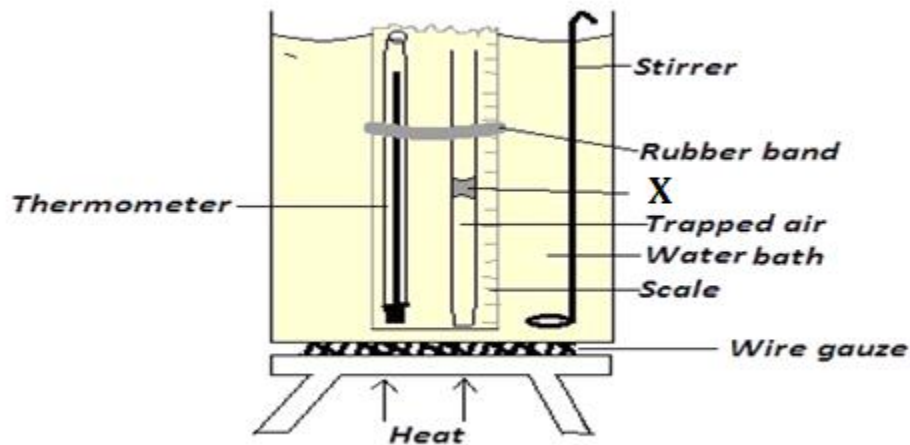
(1 mark)

19.

- a) State Charles' law.

(1 mark)

b) The diagram below shows a set up used to verify Charles law.



i. Give the name of part labeled X. (1 mark)

ii. Give the function of the part labeled in (i) above. (1 mark)

b.) Briefly explain how the set up above can be used to verify Charles law. (2 marks)

c) A weather balloon contains 100m^3 of Helium when the atmospheric pressure is 90kPa . If the atmospheric pressure changes to $100,000\text{Pa}$, determine the new volume at constant temperature.

(3 marks)

20.

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

b) 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 . Determine the takeoff velocity of the ball. (2 marks)

c) A body moving with a velocity of 20m/s decelerates to a stop in 10s . Represent this motion of a Velocity-time graph. (2 marks)

d) An object released from a height h attains a velocity of 60m/s just before hitting the ground. Determine the value of h . (take $g = 10\text{m/s}^2$) (3 marks)

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PHYSICS

PAPER 1

TIME: 2 hours

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- a)** This paper consists of two sections **A** and **B**.
- b)** Answer **all** the questions in the two sections in the spaces provided after each question.
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- e)** All numerical answers **should be expressed** in the **decimal** notations.
- f)** You may use 'gravitational acceleration, g , as 10m/s^2

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

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SECTION A (25 MARKS)

1. A form one student measured the length of a wire four times using a metre-rule and obtained the following readings: 10.2 cm, 10.3cm, 10.1cm and 10.0 cm. determine the length the student should record (2 marks)

2. The figure 1 below shows a reading of micrometer screw gauge with a positive zero error of 0.06mm.

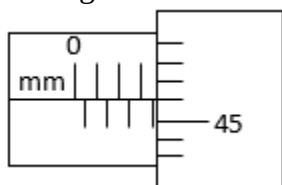


Figure 1

State the actual reading of the micrometer screw gauge

(2marks)

3. It is not correct to quote weight of an object in kilogram. Explain

(1mark)

4. Figure 2 shows a section of a curved surface ABCD. Point A is higher than point B while BCD is horizontal. Part ABC is smooth while CD is rough. A mass M is released from rest at A and moves towards D.

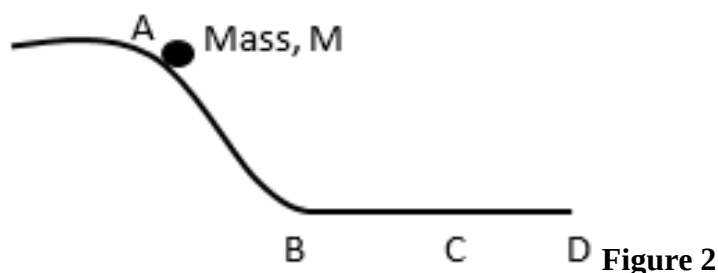


Figure 2

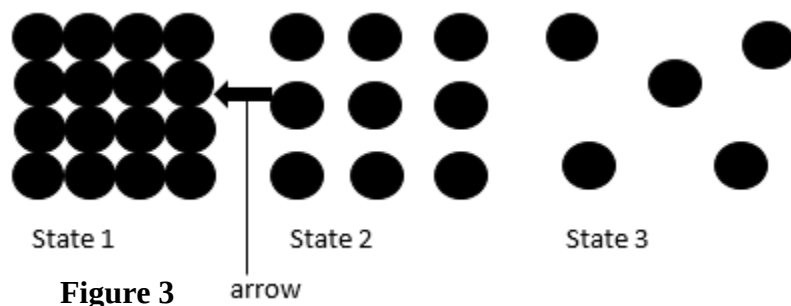
State the changes in velocity of M between:

- i. BC

(1mark)

5. A student wearing sharp pointed heeled shoes is likely to damage soft wooden floor. Explain. (2marks)

6. Figure 3, shows the arrangement of molecules in the three states of matter



a) Name the process represented by the arrow

(1mark)

b) State the reason for the arrangement of molecules in state 3

(1mark)

7. Figure 4 shows a uniform metal rod balanced at its centre by different forces.

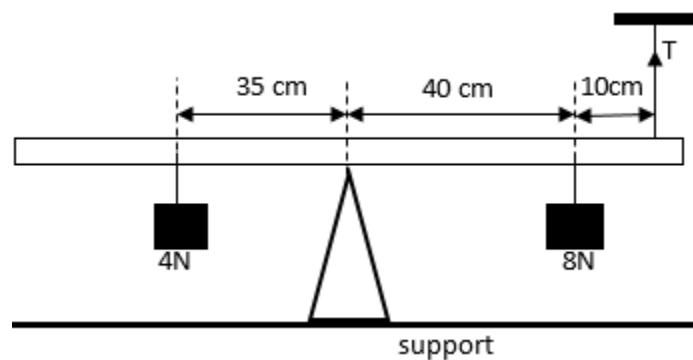


Figure 4

Determine the value of T

(3marks)

8. A balloon is filled with hydrogen gas and then released into the air. It is observed that as it rises up into the air, it expands. Explain. (2marks)
9. A person carrying a heavy luggage using one hand leans his body away from the luggage. Give a reason for this. (1mark)
10. Figure 5 shows a glass tube with water and fitted with two identical thermometers A and B. It is heated as shown.

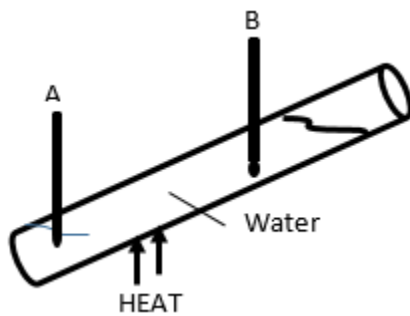


Figure 5

State and explain which of the two thermometers shows a higher reading (2marks)

11. Mechanics is one of the branches of physics. State what it deals with (1mark)

12. Figure 6 shows parts A, B and C of a non-uniform glass tube

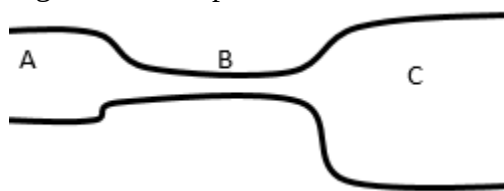


Figure 6

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

13. In an experiment to determine the density of a liquid R, a student obtained the following data:

Mass of an empty density bottle = 55.0 g

Mass of the density bottle + water = 80.0 g

Mass of the density bottle + liquid R = 70.0 g

Determine the density of liquid, R (density of water is 1000 kg/m^3) (3marks)

SECTION B (55 MARKS)

14.

a) Define the following terms:

i. Displacement (1mark)

ii. Acceleration (1mark)

b) A tape attached to an accelerating trolley passes through a ticker timer that makes dots on it at a frequency of 50 Hz. The ticker timer makes 10 dots on a 10 cm long tape such that; the distance, a, between the first two dots is 0.5 cm and the distance b, between the last two dots is 1.5 cm.

Determine the velocity of the trolley at:

i. Distance, a (3marks)

ii. Distance, b (2marks)

c) Determine the acceleration of the trolley (3marks)

d) State and explain what would be observed on the spacing of the dots on the tape when the trolley is made to move on a horizontal surface (2 marks)

15.

a) State the law of flotation

(1mark)

b) Figure 7 shows two solids A and B made of the same material and immersed in water.

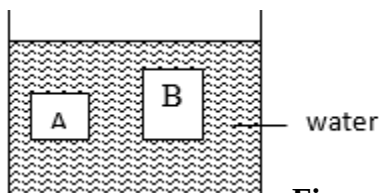


Figure 7

State and explain which of the two containers experience greater upthrust

(2marks)

c) Solid A weighs 12 N in air and 2N in water, 4N in another liquid. Determine the density of the other liquid

(3 marks)

d) Figure 8 shows two identical wooden blocks each of mass 0.2 kg suspended in water by two strings M and N.

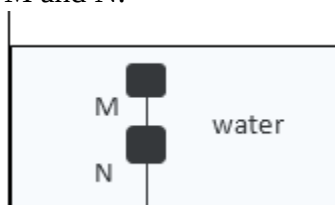


Figure 8

Given that the upthrust on each block is 3.2 N, determine the tension in string:

i. M

(2marks)

ii. N

(2marks)

e) State any one application of hydrometers

(1mark)

16.

a) When a bus goes round a bend on a flat road, it experiences centripetal force. State what provides this centripetal force. (1 mark)

b) State the purpose of banking roads at bends

(1mark)

c) A student whirls a stone of mass 0.2 kg tied to a string of length 0.4 m in a vertical plane at a constant speed of 2 revolutions per second. (acceleration due to gravity is 10m/s^2).

i. State two forces acting on the stone when it is at its highest point (2marks)

ii. Determine the angular velocity of the stone (3marks)

iii. Determine the tension in the string when the stone is at the highest point (3marks)

17.

a) Figure 9 shows a graph of pressure against temperature for a fixed mass of gas at constant volume.

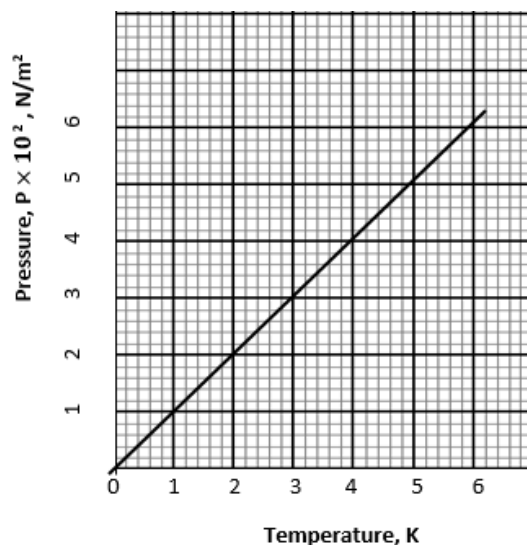


Figure 9

From the graph, determine the values of n and C given that: $P = nT + C$; where n and C are constants
(4marks)

b) It is not possible to obtain a zero pressure of gas in a real gas situation. Explain (2marks)

c) A fixed mass of a gas occupies $1.5 \times 10^{-3} m^3$ at a pressure of 760mmHg and a temperature of 273K. determine the volume the gas will occupy at a temperature of 290K and a pressure of 720mmHg
(3 marks)

d) State any three assumptions made in the kinetic theory of gases (3marks)

18.

a) State two differences between boiling and evaporation (2marks)

b) State two ways in which heat loss by conduction is minimized in a vacuum flask
(2 marks)

c) In a certain experiment, 50 g of dry steam at 100°C was directed into some crushed ice at 0°C .
(latent heat of vaporization of water is $2.26 \times 10^6 \text{ J/kg}$, latent heat of fusion of ice is $3.34 \times 10^5 \text{ J/kg}$ and specific heat capacity of water is 4200 J/kgK). Determine the:

i. Quantity of heat lost by steam to change to water at 100°C (2marks)

ii. Quantity of heat lost by water formed to cool to 0°C (2marks)

iii. Mass of ice melted at 0°C (2marks)

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Name Admission number
Candidate's Signature.....Date.....

ALLIANCE GIRLS' HIGH SCHOOL

232/1

PHYSICS

PAPER 1

TIME: 2 hours

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.*

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Section	Question	Maximum Score	Candidate's Score
A	1 – 10	25	
B	11	15	
	12	8	
	13	11	
	14	9	
	15	11	
Total Score		80	

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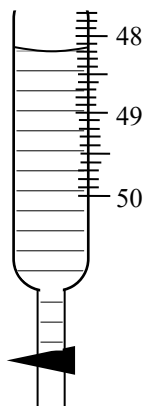
SECTION A (25 Marks)

Answer all the questions in this section in the spaces provided

1. Name two main factors that should be put into consideration when choosing a measuring instrument for a given task. **(2 marks)**

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2. The figure below shows a section of a burette containing water to the level indicated.



The tap of the burette is opened to release 20 drops each of volume 15 mm^3 . On the same diagram, show the new water level. **(3 marks)**

3. A form one student was doing an experiment to investigate surface tension. She poured some water on a trough and allowed it to settle. She then took a razor blade and tried to make it float/rest on water surface but never succeeded. Give two possible reasons why her experiment failed. **(2 marks)**

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4. Why do solids particles have a knit structure? **(1 mark)**

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5. (a) Give a reason why metals are good heat conductors compared to other solids. **(1 mark)**

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- (b) Apart from nature of the material, give two other factors that determine thermal conductivity of a material. **(2 marks)**

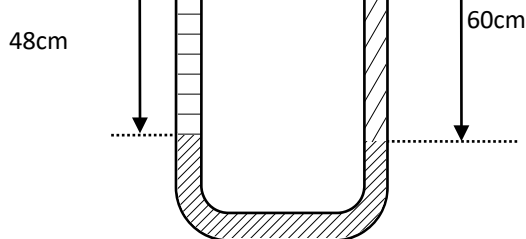
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6. A U-tube contains some mercury. Water is poured into one arm of the U-tube and oil is poured into the other arm, as shown below.

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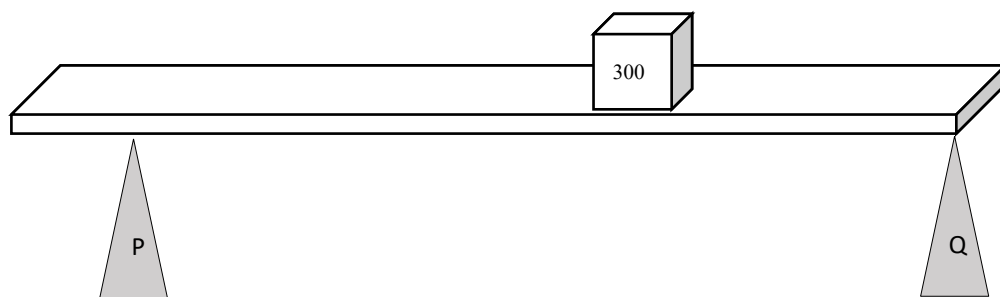
The amounts of oil and water are adjusted until the surface of the mercury in the two arms is at the same horizontal level. The column of water, density 1000kg/m^3 is 48cm high. The column of oil is 60cm high. Calculate the value of density of oil. **(3 marks)**

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7. A uniform metre rule of mass 200g is placed on two knife edges P and Q as shown in the figure below. P is at 10 cm mark while Q is at 100 cm mark



A mass of 300g is placed at 65 cm mark as indicated. Calculate the reactions given by supports P and Q. **(4 marks)**

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8. In terms of the change in the position of the centre of gravity, show the difference in the three states of equilibrium. **(3 marks)**

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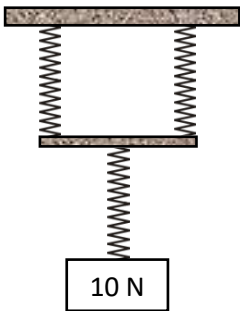
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9. The figure below shows a system of three identical springs of springs constant 200 N/m.



Neglecting the weight of the springs and their connectors, calculate the work done by the force of 10N to stretch the system. (3 marks)

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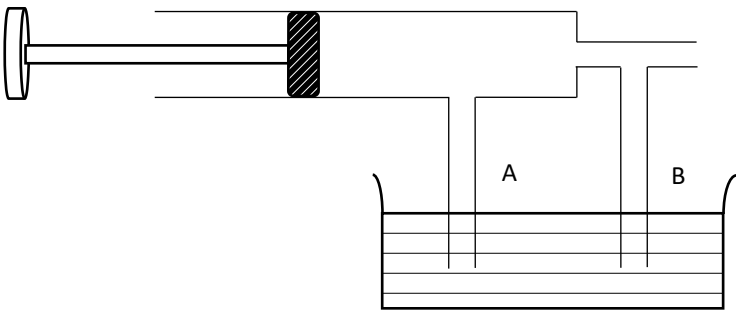
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10. The figure below shows two pipes with different cross-sections areas each having a pipe dipped into walls. The pipes A and B are equal cross sectional areas.



Show the new level of water in column A and B as the piston is pushed on. (1mark)

SECTION B (55 Marks)

Answer all the questions in this section in the spaces provided

11. (a) Differentiate the following terms, (3 marks)

(i) Distance and displacement

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(ii) Speed and velocity

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(iii) Acceleration and deceleration.

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(b) A ball on a snooker table is hit by another ball and travels a distance of 50 cm due south. It is then hit again and travels a distance of 25 cm due west. What is its displacement from its initial position? (2 marks)

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(c) The world record for men's 100 m sprint stood at 9.58 s as set by Usain Bolt in 2009.

(i) What average speed does this represent? (2 marks)

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(ii) If the athlete accelerates to a steady speed in the first 1.5 seconds and then runs at this speed to the finish line, at what steady speed does he run? (3 marks)

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(d) An object is released from a helicopter which is hovering (stationary) 180 m above the ground. Ignoring the effect of air resistance

(i) Calculate how long it takes the object to reach the ground? (2 marks)

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(ii) The helicopter then sets off horizontally at a speed of 40 m/s as it drops a second object from the same position and height. Calculate the horizontal distance on the ground between the two objects. **(3 marks)**

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12. (a) State the Newton's first law of motion **(1 mark)**

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(b) Define momentum and give its SI unit **(2 mark)**

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(c) A force of 100N acts on a ball of mass 500 g for 0.5 s before the ball rolls down on the horizontal ground.

(i) Calculate the velocity at which the ball set off with. **(2marks)**

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(ii) If the frictional force between the ball and the ground is 2 N, calculate the distance the ball travels before it comes to a stop. **(3 marks)**

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13. (a) Define the following

(i) Velocity ratio **(1 mark)**

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(ii) Mechanical advantage (1 mark)

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(iii) Efficiency (1 mark)

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(b) A small pump develops an average power of 80W. It raises water from a borehole to a point 15m above the water level. Calculate the mass of water delivered in one hour. (3 marks)

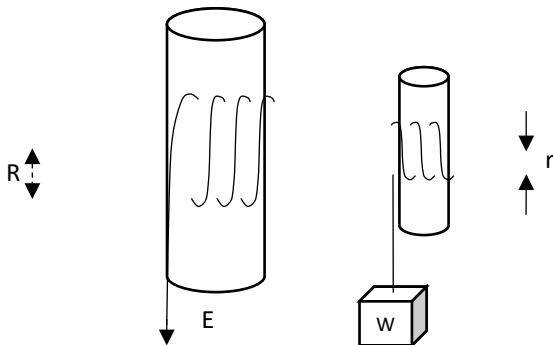
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(c) The figure shows a wheel and axle being used to raise a load W by applying an effort 'E'. The radius of a large wheel is 'R' and that of a small wheel is 'r'.



(i) Show that the velocity ratio (V.R) of this machine is given by R/r . (2marks)

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(ii) If $r=5\text{ cm}$ and $R=8\text{ cm}$, determine the effort 'E' required to raise a load of 40 N, given the efficiency of the machine is 85%. (3marks)

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14. (a) Define specific latent heat of fusion

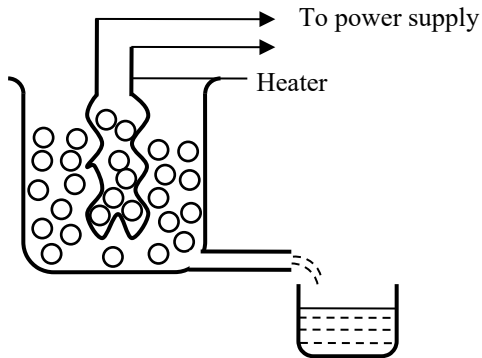
(1 mark)

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- (b) In an experiment to determine the power of an electric heater, melting ice was placed in a container with an outlet and the heater placed in the ice as shown below. The melted ice was collected.



- (i) Other than the current and voltage, state the measurement that would be taken to determine the quantity of heat absorbed by the melted ice in unit time. (1 mark)

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- (ii) If the latent heat of fusion of ice is L_f , show how measurement in (i) above would be used in determining the power P of the heater. (2 marks)

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- (iii) It is found that the power determined in this experiment is lower than the manufacturer's value indicated on the heater. Explain.

(1 mark)

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

- (i) Derive an expression for the amount of heat gained by ice to melt it and raise its temperature to $X^{\circ}\text{C}$ (2 marks)

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- (ii) Derive an expression for the amount of heat lost by the calorimeter and its content when their temperature falls to $X^{\circ}\text{C}$. (2 marks)

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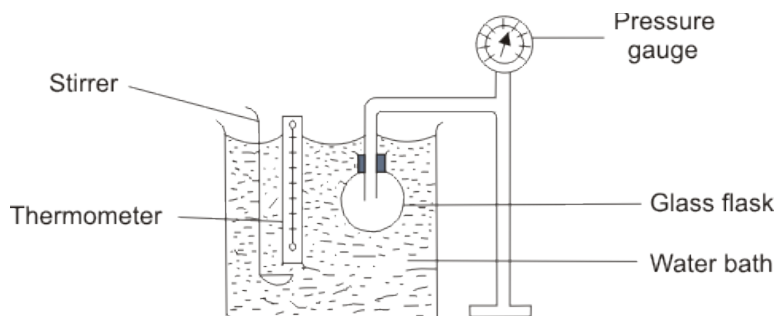
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15. (a) The figure below shows a set-up that may be used to verify pressure law.



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

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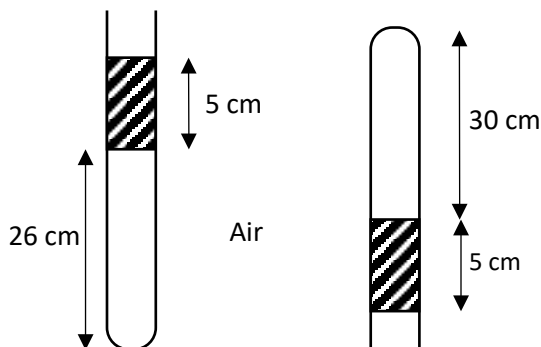
(ii) Explain how the measurements in (i) above may be used to verify pressure law. **(3 marks)**

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(b) A column of air 26cm long is trapped by mercury thread 5.0cm long as shown in the figure (a) below. When the tube is inverted as in figure (b) the air column becomes 30cm long. What is the value of atmospheric pressure? **(3 marks)**



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(c) A steel cylinder of capacity 0.5m^3 contains nitrogen at a pressure of $30,000\text{Pa}$ when the temperature is 27°C . What will be the pressure of nitrogen if it is allowed to flow into another cylinder of capacity 9.5m^3 with the temperature reduced to -23°C ? **(3 marks)**

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(d) State the difference between the temperature measured in Kelvin scale and Celsius scale. **(1 mark)**

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232/1

PHYSICS

PAPER 1

TIME: 2 hours

Instructions:

1. Write your name and index number in the spaces provided above.
2. Sign and write the date of the examination in the spaces above.
3. This paper consists of two sections A and B
4. Answer all the questions in section A and B in the spaces provided.
5. Mathematical tables and electronic calculators may be used.
6. All working *MUST* be clearly shown where necessary.
7. Candidates should answer all questions in English.

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Section	Question	Maximum Score	Candidates Score
A	1- 14	25 marks	
B			

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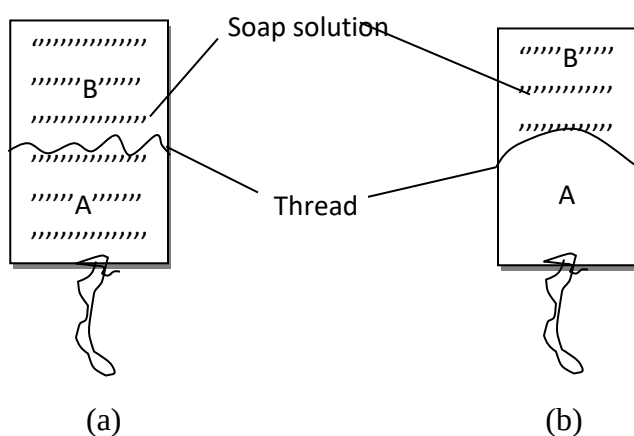
SECTION A (25 MARKS)

Answer all question in the spaces provided

1. Fig. 1 below shows the meniscus of a liquid of density 1.36g/cm^3 in a measuring cylinder. Determine the mass of the liquid in SI units. **(2 marks)**



2. The fig.2 below shows a cotton thread tied across a soap solution. Fig. 2(a) shows the thread across the surface undisturbed, while fig. 2(b) shows the thread when region marked A has been punctured. Explain the observation **(1 mark)**



3. The fig 3 below represents two identical capillary tube dipped into the beakers containing water and mercury.

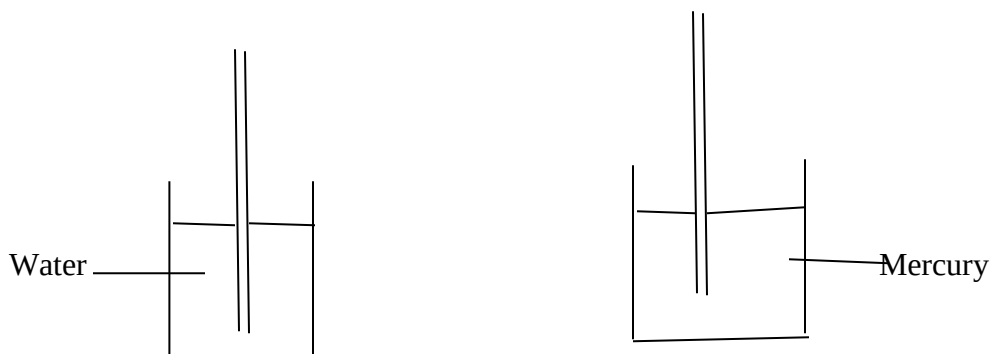


Fig 3 (a)

(b)

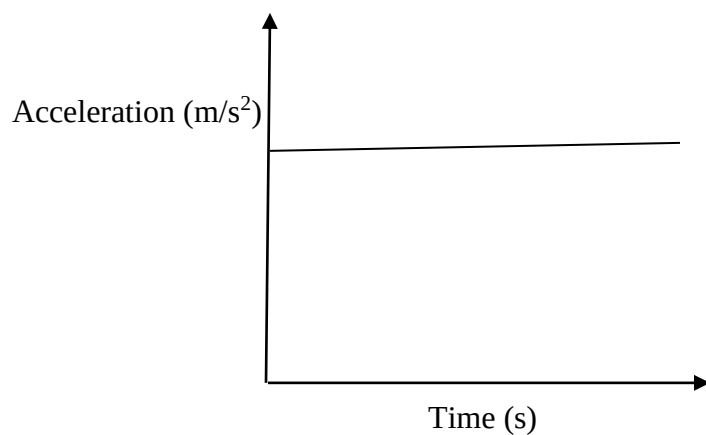
Indicate on the diagrams the appropriate levels of the liquids in the capillary tubes (2 marks)

4. Two identical containers P and Q with same quantities of water are placed over identical lit Bunsen burners. P has a dull black surface while Q is shinny surface. State with reason in which container temperature will be higher after some time. **(2 marks)**

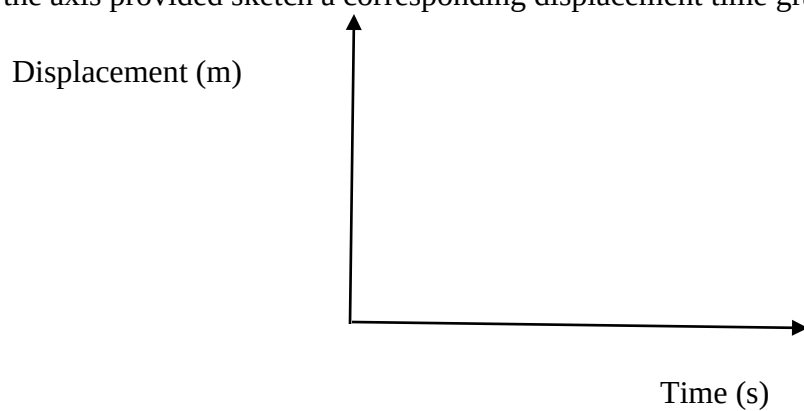
5. A Uniform wooden beam 5 meters long weighs 200N. The beam is placed horizontally on two supports A and B, such that support A is 0.5 m from the end and while the support B is 1m from the other end. Determine the force exerted by each support for the beam to remain horizontal. **(3marks)**

6. A student blew a stream of air between two pieces of paper and observed the pieces of paper moving closer to each other. Explain this observation. **(2 marks)**

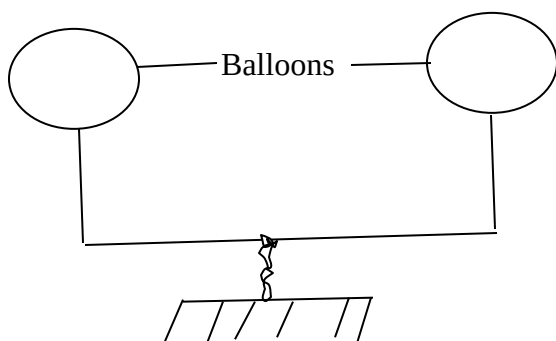
7. The graph below shows acceleration time graph for a body.



On the axis provided sketch a corresponding displacement time graph for the body. (1mark)



8. A uniform light bar is balanced under action of two balloons filled with different light gases and tied at the middle as shown below.



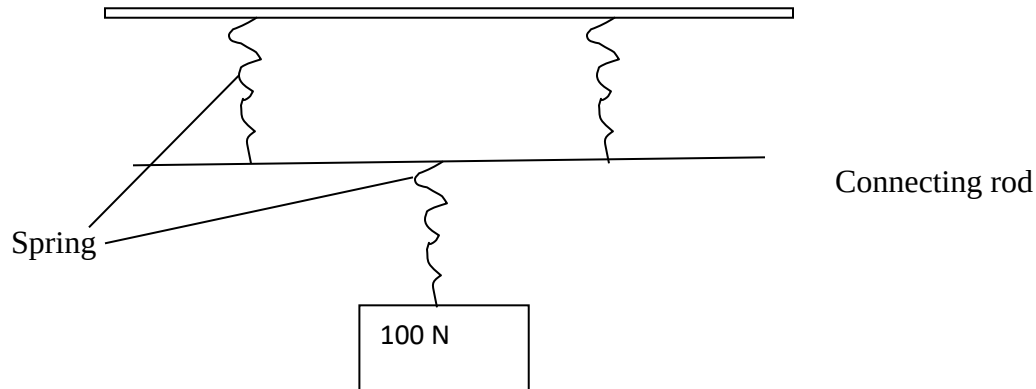
Explain why the system may not remain in equilibrium when the temperature of the surrounding changes.

(2 marks)

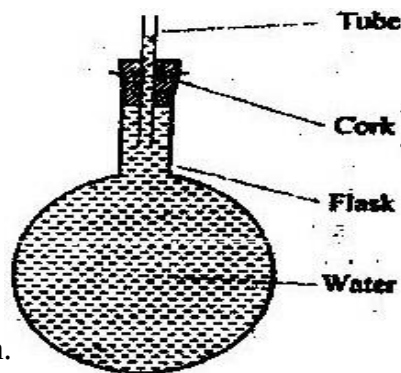
9. Differentiate between Brownian motion and diffusion.

(1 mark)

10. The fig below shows three identical springs connected by a rod of negligible weight. Each spring has a mass of 0.5 kg and a spring constant of 300N/M. determine the total extension produced by a force of 100N on the spring. (3 marks)



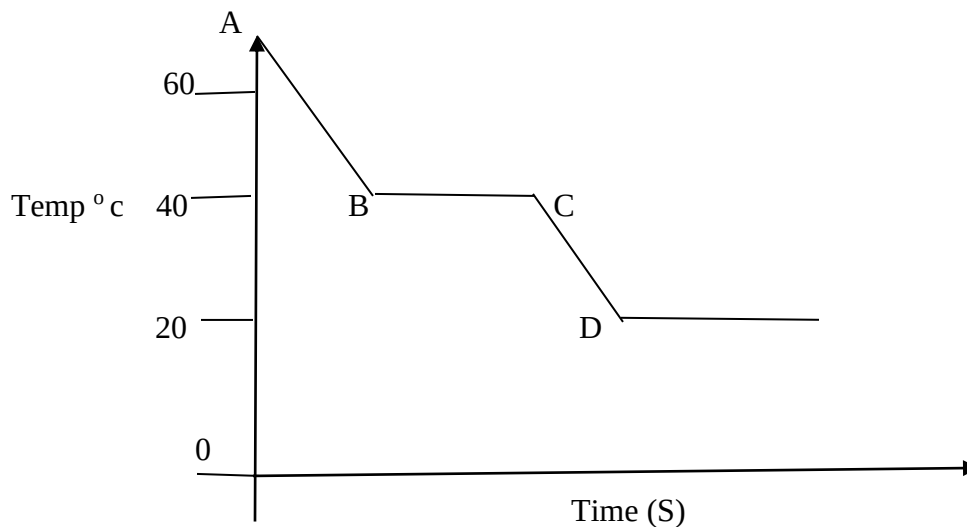
11. a) The figure below shows a flask filled with water. The flask is fitted with a cork through which a tube is inserted. When the flask is cooled, the water level rises slightly, then falls steadily. (2 marks)



Explain the observation.

(2 marks)

The figure below shows the cooling curve of naphthalene. Use it to answer question 12 and 13



12. Determine the room temperature

(1 mark)

13. Explain the shape of the graph for the section AB and BC

(2 marks)

14. A mini bus of mass 1200kg travelling at a constant velocity of 15m/s collides with a stationary car of mass 600kg. The impact takes 1.5 seconds before the two move together at a constant velocity for 25 seconds. Determine the common velocity.

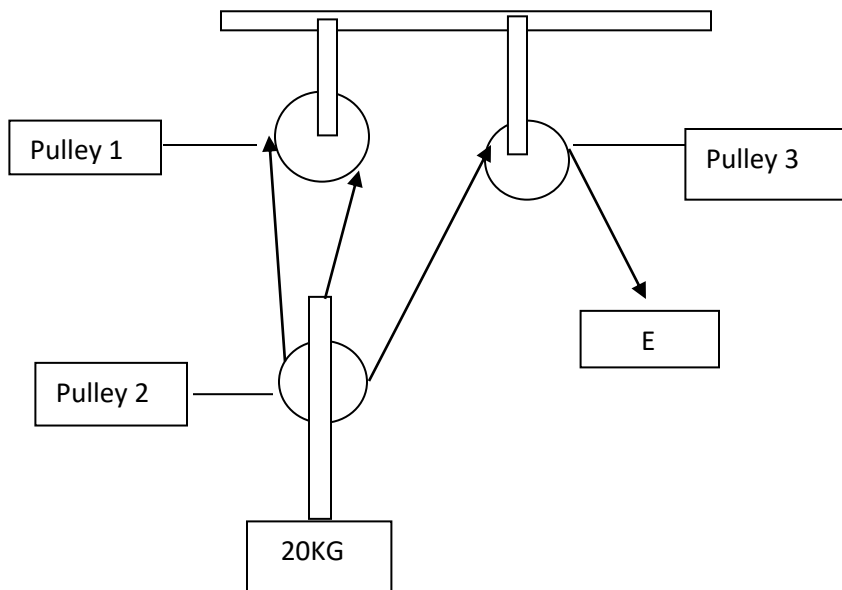
(3 marks)

SECTION B

15. a) A gear wheel system has 20 teeth on the driving wheel and a velocity ratio (VR) of 2.5. Determine the number of teeth on the driven wheel.

(3 marks)

b) The figure below shows a pulley system used to raise a mass of 20 kg.



State the

i. Velocity ratio of the system.

(1 mark)

- ii. Purpose of pulley 3. (1 mark)
- iii. Given that the machine has an efficiency of 80 %, determine the minimum effort that can be applied to lift the load. (3 marks)
- iv. State two reasons why the efficiency of this pulley system cannot be 100%. (2 marks)

16. In an experiment to determine the relative density of benzene, a student was provided with a spring balance, three masses, a piece of thread, water in a beaker and benzene in a beaker. The results obtained are in the table below.

Mass (g)	50	100	200
Weight in air (N)	0.5	1.0	2.0
Weight in water(N)	0.44	0.88	1.78
Weight in benzene (N)	0.46	0.9	1.81

- I. State the principal that was applied in this experiment. (1 mark)
- II. (i) For each mass determine the relative density of benzene (3 marks)

(ii) Determine the relative density of benzene

(2 marks)

16 (a). A weather balloon of volume 1.2m^3 is tied to rigid support being filled with helium gas. The mass of the fabric making the balloon is 0.30kg . given that the density of Helium $= 0.1785\text{kg/m}^3$ and air $= 1.2041\text{ kg/m}^3$

Determine

i. The total downward force

(3 marks)

ii. The up thrust force on the balloon.

(2 marks)

iii. The tension on the spring tying the balloon on the rigid support.

(2 marks)

17. A ball was thrown horizontally from a cliff at a velocity of 30m/s . if the ball takes 3 seconds to reach the ground. Determine

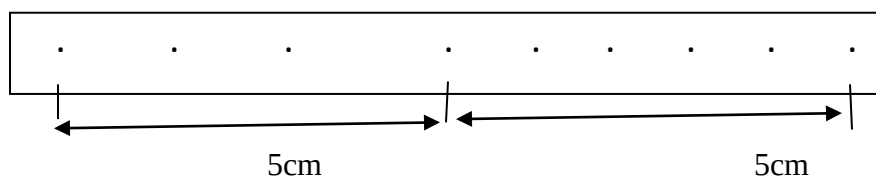
i. The velocity with which it hits the ground.

(3 marks)

ii. The horizontal distance covered by the ball

(2 marks)

(b) The diagram below shows dots which were made by a ticker timer on a tape attached to an acceleration trolley.



If the frequency of the power used was 50 Hz

i. Determine the deceleration of the trolley. (3 marks)

ii. Using an arrow on the above diagram, show the direction of motion of the tape. (1 mark)

18.

I. Draw a well labelled diagram of the apparatus you would use to verify the relationship between pressure and volume of fixed mass of a gas. (3 marks)

II. Describe how to use the apparatus to verify the law. (3 marks)

III. A Gas has a volume of 20cm^3 at 27°C and normal atmospheric pressure. Calculate the volume of the gas if it is at 54°C at the same pressure. (4 marks)

19. (i) What is meant by specific latent heat of Vaporization? (1 mark)

(ii) In an experiment to determine the specific latent heat of vaporization of water, steam at 100°C was passed into water contained in a well lagged copper calorimeter.

The following measurements were made:

Mass of calorimeter = 60g

Initial mass of water = 80g

Initial temperature of water = 7°C

Final mass of water + Calorimeter + condensed steam = 125g

Final temperature of mixture = 31°C

Specific heat capacity of water = $4200\text{Jkg}^{-1}\text{K}^{-1}$

Specific heat capacity of copper = $390\text{J kg}^{-1}\text{K}^{-1}$.

Determine the

(i) Mass of condensed steam (2 marks)

- (ii) Heat gained by water and calorimeter. (3 marks)
- (c) Given that Q is the specific latent heat of vaporization of steam
- (i) Write an expression for the heat given out by steam. (1 mark)
- (ii) Determine the value of Q (3 marks)
- (d) 450g of water at 20°C is mixed with 200g of water at 55°C Find the final temperature of the mixture. (3 marks)

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Name Admission number
Candidate's Signature..... Date.....

KENYA HIGH SCHOOL TRIAL 1

232/1

PHYSICS

PAPER 1

TIME: 2 hours

Instructions to the candidates:

- a) This paper consist of two Section A and B
- b) Answer all questions in section A and B in the spaces provided
- c) All working **must** be clearly shown, and use the *CONSTANTS* given,
- d) Ensure that the paper has all the questions

Take $g = 10\text{N/kg}$, Atmospheric pressure = 760mmHg, density of mercury = 13600Kg/m^3

For Examiners' Use Only

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A	1-11	25	
B	12	15	
	13	11	
	14	10	
	15	10	
	16	09	
	TOTAL	80	

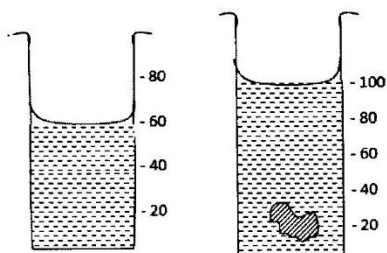
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FOR MORE PAPERS FOR ALL SUBJECTS AND MARKING SCHEMES

SECTION A (25 MARKS)

Answer All Questions in This Section in the Spaces Provided

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

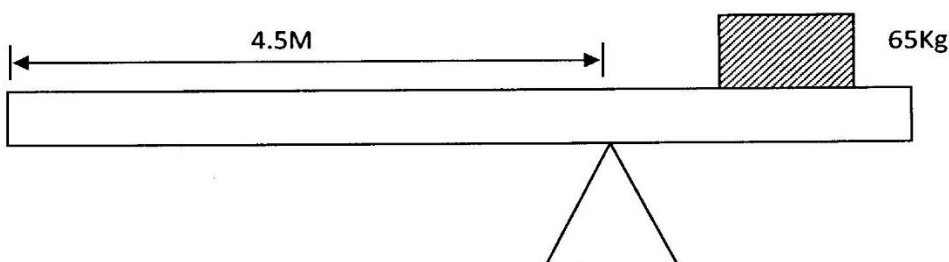


Given that the mass of the solid is 567g determine the density of the solid in Kg/m^3 . (3 marks)

2. In a ball and ring experiment, the ball goes through the rings at room temperatures. 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. (2marks)

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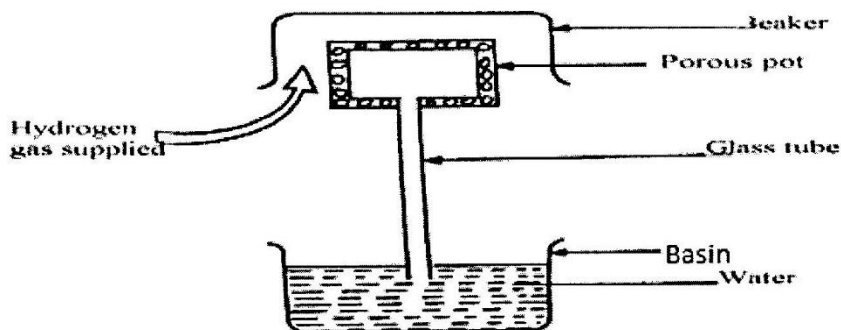
3. The diagram below shows a uniform wooden beam of length 6m and mass 30kg pivoted as shown below.



How far from the pivot will the 65kg mass be placed for the beam to be in equilibrium? (3 marks)

.....

4. 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 marks)

.....
.....
.....

5. State how the pressure in a moving fluid varies with speed of the fluid. (1 mark)

.....

6. A piece of metal weighs 3N in air and 2N when totally immersed in water. Calculate the volume of the metal. (density of water = 1000kg/m^3) (3 marks)

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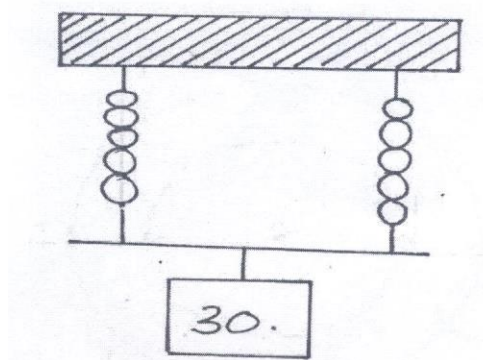
7. Explain how a person is able to drink a soda using a drinking straw. (2 marks)

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

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9. The identical springs of spring constant 3N/cm are used to support a load of 30N as shown.



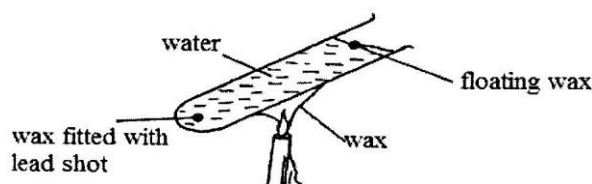
Determine the extension on each spring.

(3 marks)

10. In a vacuum flask, the walls enclosing there vacuum are silvered on the inside. State the reason for this.

(1 mark)

11. A student set up the apparatus as shown below. The boiling tube was heated in the middle as shown



a. State the role of the lead shot in the experiment

(1 mark)

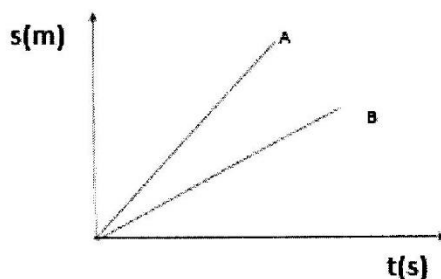
b. With reason, state the wax that will melt first.

(2 marks)

SECTION B (55 MARKS)

Answer all questions in this section in the spaces provided

12. (a). The figure below shows displacement-time graphs of two objects A and B of equal masses drawn on same axes.



- i) What does the slope of the graph represent? (1mark)
- ii) The same size of force is applied against each object. State with a reason which of the two objects stops in a shorter distance. (2 marks)

.....

.....

- (b). An object moving at 30m/s starts to accelerate at 5m/s^2 so that its velocity becomes 50/ms
 - i) Find the distance moved during this acceleration (3marks)

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- ii) The object is now braked so that it comes to rest in a time of 5 seconds. Find the braking force if its mass was 2000g. (3 marks)

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- (c) State the law of conservation of linear of linear momentum. (1 mark)

.....

- (d) Anobject of the mass 100kg moving at 20 m/s collides with a stationary object of mass 20kg. They stick together after collision. Determine the:

- (i) Total momentum below collision (2marks)

.....

.....

(ii) Total momentum after collision

(1mark)

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(iii). Their common velocity after collision

(2 marks)

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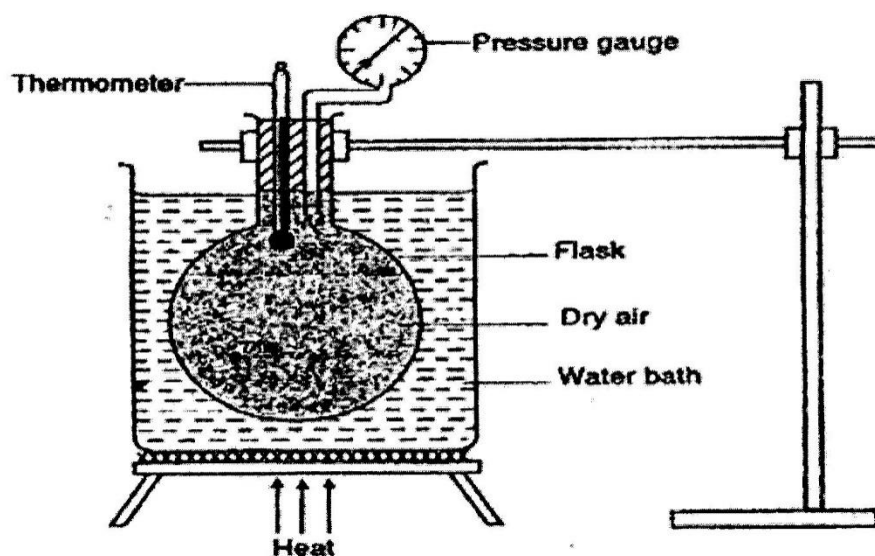
13. (a). Explain why an air bubble increasing volume as it rise from the bottom of a lake to the surface. (2 marks)

.....

.....

.....

(b) The diagram below shows a set-up used to investigate a particular gas law. Study the diagram and answer the questions that follow.



i. State with a reason which gas law is being experimented by the set-up. (2 marks)

.....

.....

ii. Name the two factors that are held constant in the experiment (2marks)

.....

.....

iii. Give the reason why heating is done through a water bath. (1 mark)

(c) A balloon of volume 1.5m^3 containing helium gas at a pressure of $3.0 \times 10^6 \text{ pa}$ is released from the ground when the temperature is 20°C . What will be the pressure when it reaches an altitude where the volume becomes 3.0m^3 and the temperature 5°C . (3 marks)

(d) State the kinetic theory of gases. (1 mark)

14. (a) An immersion heater rated 2.5W is immersed into a plastic jug containing 2kg of water and switched on for one minute. Determine (i) The quantity of heat gained by water. (2marks)

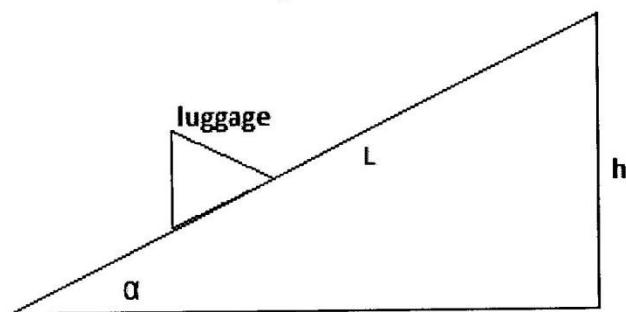
(ii) The temperature change for water. (Specific heat capacity of water = $4.2 \times 10^3 \text{Jkg}^{-1}\text{K}^{-1}$) (3 marks)

(b) Explain why a drop of methylated spirit on the back of the hand feels cold. (2marks)

(c) What makes Freon suitable for use as a refrigerant? (1 mark)

(d). State two differences between boiling and melting. (2 marks)

15. The figure below shows an inclined plane used to load heavy luggage's onto a lorry. The length of the plane is L metres and the height is h metres, the plane makes angle α with the horizontal



(a) Show that the velocity ratio is given by $1/\sin \alpha$ (3 marks)

.....

(b) A man uses the inclined plane above to lift a 50kg load through a vertical height of 4m. The inclined plane makes an angle of 30° with the horizontal. If the efficiency of the inclined plane is 72%. Calculate

I. The effort needed to move the load up the inclined plane at a constant velocity. (4 marks)

.....

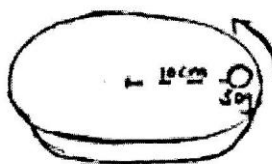
II. The work done against friction in raising the load through the 4.0 m height. (3 marks)
 [Take $g = 10\text{N/kg}$]

.....

16. (a). State what provides centripetal force for the moon moving round the earth. (1 mark)

.....

(b). The figure (6) below shows a turnable on which a mass of 50g is placed 10cm from the center.



The Frictional force between the 50g mass and the turnable is 0.2N. When the turnable is made to rotate with angular velocity of ω rad/sec, the mass starts to slide off.

i) Determine the

I. Angular velocity

(3marks)

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II. Time taken to make a complete revolution when moving with the above angular velocity. (2 marks)

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ii On the figure, draw a path that would be taken by the 50g mass at above position if the turnable suddenly came to stop. (1 mark)

.....

(c) State two changes can be made to keep the 50g mass from sliding off.

(2marks)

.....

.....

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KCSE TOP NATIONAL SCHOOLS TRIAL SERIES 2025

Name Admission number

Candidate's Signature.....Date.....

MANGU SCHOOL TRIAL 1

232/1

PHYSICS

PAPER 1

TIME: 2 hours

Instructions to candidates

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

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FOR MORE PAPERS FOR ALL SUBJECTS AND MARKING SCHEMES

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.

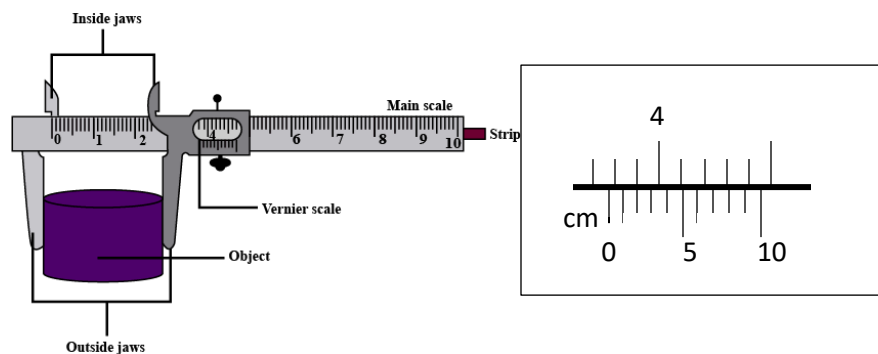
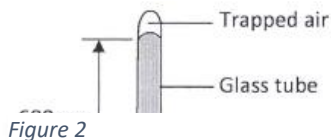


Figure 1

- Determine the diameter of the container (2 marks)
 - Estimate the volume of a liquid which can completely fill the container (2 marks)
2. State **one** factor that affects the turning effect of a force on a body. (1 mark)
3. **Figure 2** shows some air trapped by mercury in a glass tube. The tube is inverted in a dish containing mercury.



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)



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

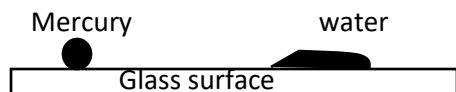


Figure 3

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)
6. Explain **one** advantage of mercury over alcohol as a thermometric liquid. (1mark)
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)
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)
9. Explain the meaning of thermodynamics as a branch of physics. (1 mark)
10. a. State the Hooke's Law. (1mark)

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

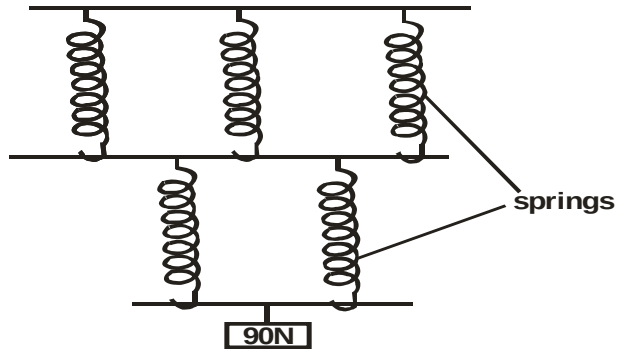


Figure 4

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

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

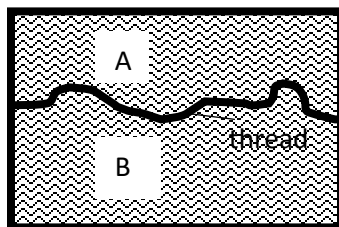


Figure 5

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.

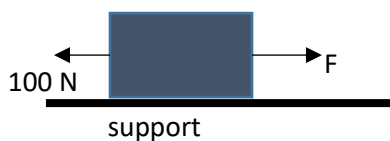


Figure 6

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)

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

SECTION B (55 MARKS)

14. (a) State the principle of conservation of linear momentum. (1 mark)
- (b) Distinguish between elastic and inelastic collision. (1 mark)
- (c) A striker kicks a ball of mass 200g initially at rest with a force of 78N. Given that the foot was in contact with the ball for 0.30s; determine the takeoff velocity of the ball. (3 marks)
- (d) A high jumper usually lands on thick soft mattress. Explain how the mattress helps in reducing the force of impact. (2 marks)
- (e) A ball is thrown horizontally from the top of a vertical tower of height 75m and strikes the ground at a point 80m from the bottom of the tower. Determine the:
- (i) Time taken by the ball to hit the ground. (*Acceleration due to gravity* = 10m/s^2) (3 marks)

(ii) Initial horizontal velocity of the ball.

(3 marks)

15.

a) State two factors that affect the boiling point of a liquid

(2 marks)

b) 100g of a liquid at a temperature of 10°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.

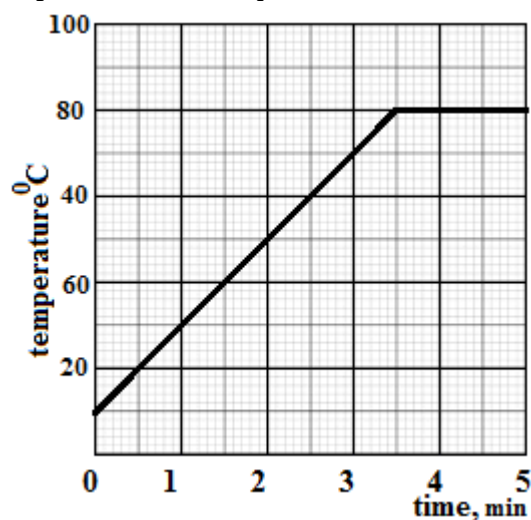


Figure 7

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

(1 mark)

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

(3 marks)

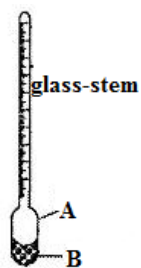
c) From the graph determine the temperature change between the times $t = 0.5$ minutes and $t = 5.0$ minutes, hence determine the specific heat capacity of the liquid (3 marks)

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)

16.

a) State the law of floatation (1 mark)

b) Figure 8 below shows a simple hydrometer



A

B

Figure 8

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

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

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

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

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)

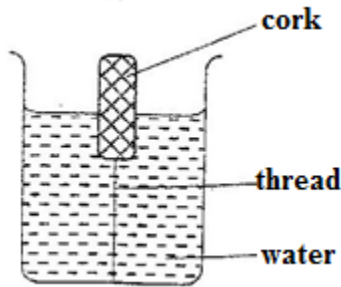


Figure 9

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

17.

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

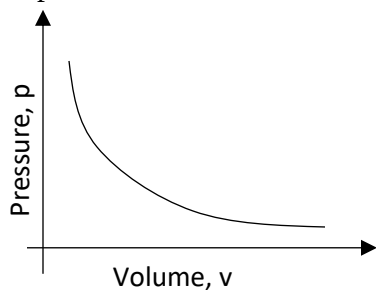


Figure 10

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)

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

18.

a) Define the term velocity ratio of a machine

(1 mark)

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)

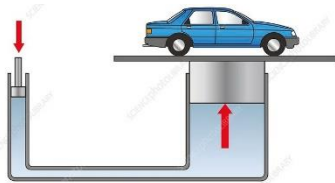


Figure 11

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)

ii. Efficiency of the machine

(3 marks)

iii. The percentage of work that goes to waste

(1 mark)

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2025

Name Admission number
Candidate's Signature.....Date.....

MARANDA SCHOOL TRIAL 1

232/1

PHYSICS

PAPER 1

TIME: 2 hours

Instructions to the candidates:

- a) This paper consist of two Section A and B*
- b) Answer all questions in section A and B in the spaces provided*
- c) All working **must** be clearly shown, and use the **CONSTANTS** given,*
- d) Ensure that the paper has all the questions*

Take $g = 10\text{N/kg}$, Atmospheric pressure = 760mmHg, density of mercury = 13600Kg/m^3

SECTION	QUESTIONS	MAX SCORE	CANDIDATE SCORE
A	1 - 13	25	
B	14	14	
	15	11	
	16	11	
	17	11	
	18	8	
	TOTAL	80	

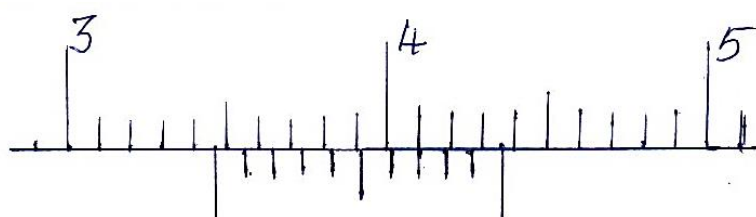
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FOR MORE PAPERS FOR ALL SUBJECTS AND MARKING SCHEMES

1. A salt solution of volume 30cm^3 and density 1.1 g/cm^3 is mixed with 25cm^3 of pure water of density 1g/cm^3 . determine
 - a. Total mass of the mixture (1mk)

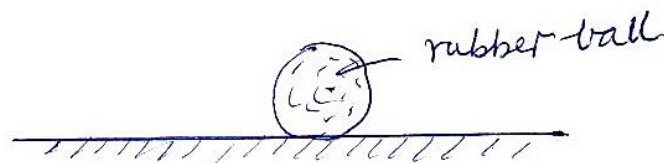
- b. Density of the mixture (2 mks)

2. The figure below shows a section of a vernier callipers to measure the thickness of a wooden block.

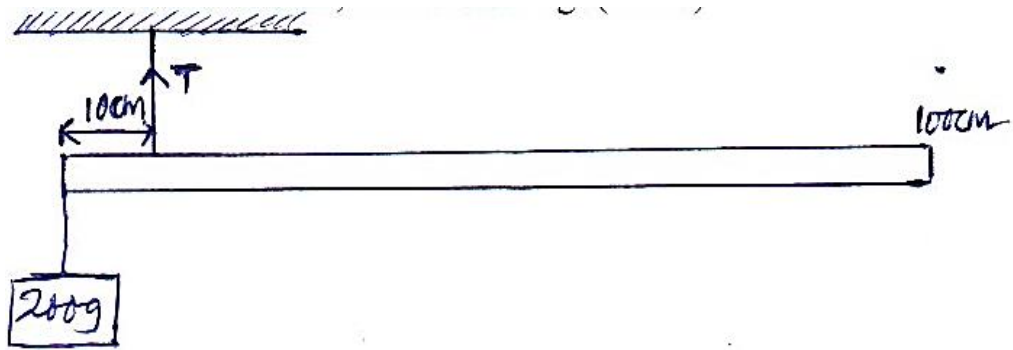


If the vernier calliper has zero error of. What is the actual reading of the vernier callipers (2mks)

3. State the type of equilibrium for a rubber ball placed on a horizontal table as shown below (1mks)



4. A ball is thrown vertically upwards and return to its starting point after 6 seconds. Calculate the maximum height reached ($g=10\text{m/s}^2$) (3 mks)
5. A piece of paper is held in front of the mouth and air is blown horizontally over the paper.it is observed that the paper get lifted up. Explain this observation (2mks)
6. The figure below shows a uniform metre rule balancing when a mass of 200g is hung at one end. Determine the tension, T in the string. (3mks)



7. A diver is 12m below the surface of water in a dam. If the density of the sea water is 1000kg/m^3 determine the pressure due to the water on the diver. ($g = 10\text{N/kg}$) (2mks)
8. A crystal of potassium permanganate was carefully introduced at the bottom of water column held in a gas jar. After sometime the whole volume of water was coloured. Explain this observation (1mks)
9. Define absolute zero temperature for an ideal gas (1mk)
10. A substance of mass 2kg and specific heat capacity $400\text{Jkg}^{-1}\text{K}^{-1}$ initially at 80°C is immersed in water at 19°C . If the final temp is 20°C . Calculate the mass of water specific heat capacity of water = $4200\text{Jkg}^{-1}\text{K}^{-1}$. (3mks)
11. The cover of a ball point has a small hole on the stem as shown below
Explain its function (1mk)



12. Give a reason why hot water put in a sufuria covered with a blackened aluminium foil cools faster than one covered with a shiny foil. (1mks)

13. A mass of 7.5kg has a weight of 30N on a certain planet .calculate the acceleration due to gravity on this planet (2mks)

SECTION B (55MARKS)

14. (a) Define **angular velocity** and state its SI unit (2mk)

(b) A stone of mass 500g is whirled in a vertical circle at 5 revolutions per Second. If the length of the string used is 1.5m, determine

- i. The angular velocity (3mks)

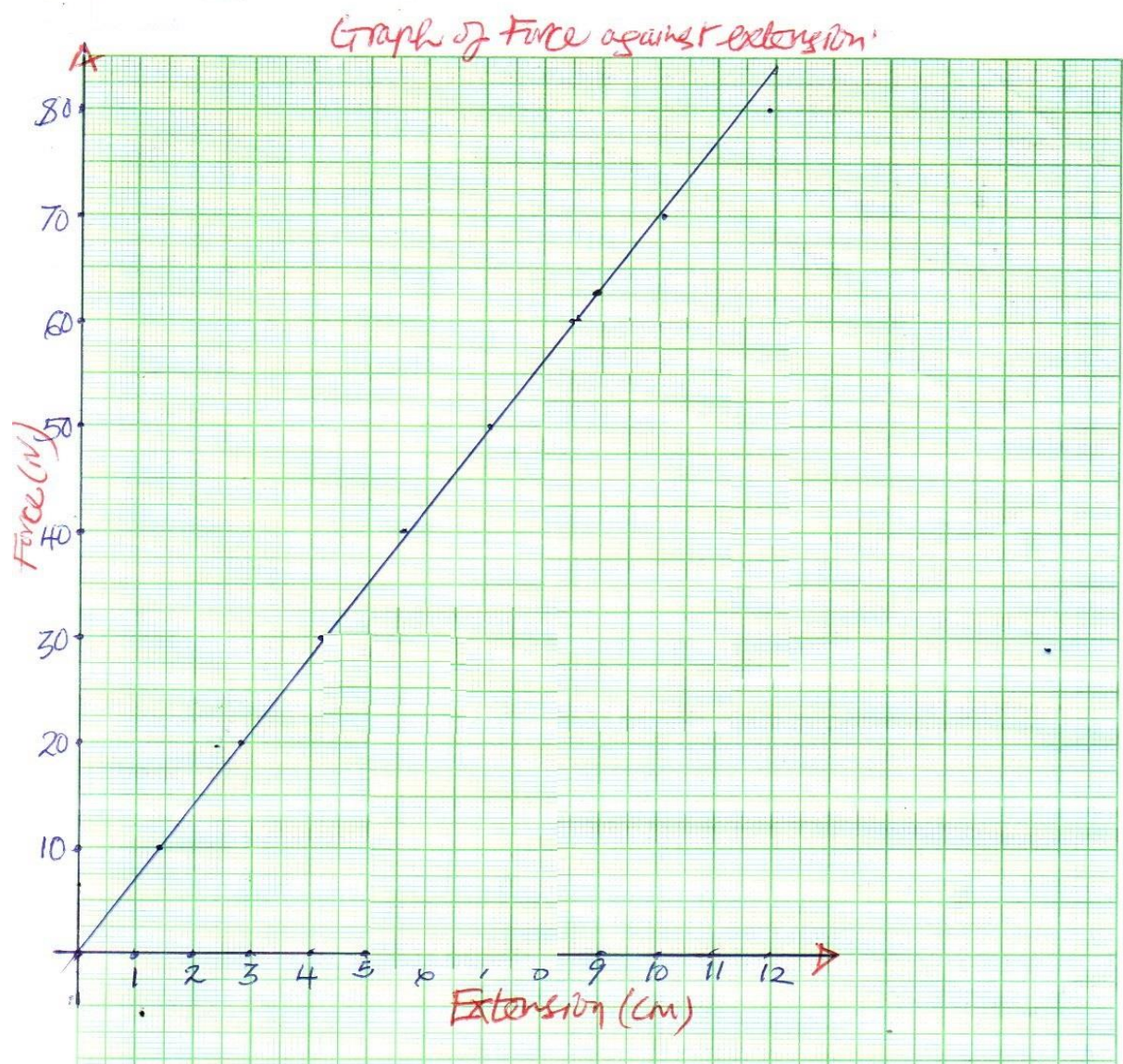
- ii. The maximum tension of the string (3mks)

(c) State three factors that will make the stone to remain in a state of vertical motion (3mks)

(d) A glass block of mass 300g is placed on a frictionless rotating table while fixed 10cm from the centre of the table by a light thread. The string can withstand a maximum tension of 6.6N. Determine the maximum velocity that the table can attain before the string cuts. (3mks)

15. (a) State hooke's law (1mk)

(b) A form 4 student did an experiment on hooke's law and from his data drew the following graph.



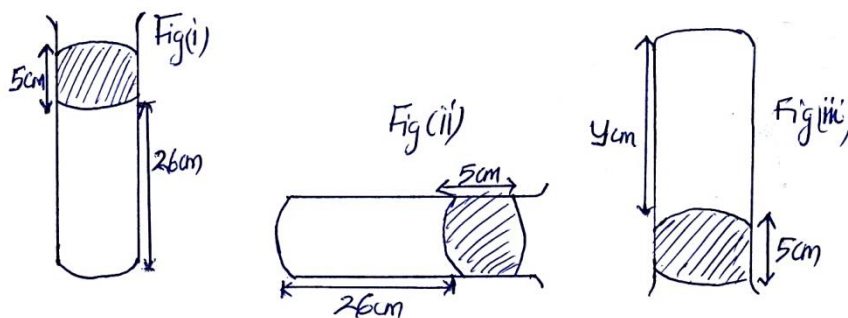
From the graph,

i) Determine the spring constant (2mks)

(ii) Work done in producing an extension, e of 8cm. (2mks)

c) State the factors which affect the spring constant calculated in b (i) above (2mks)

d) A column of air 26cm is trapped by mercury thread 5cm long as shown in the diagram below.



- e) When the tube is laid horizontally as in figure (ii) the air column is now x cm long. When inverted as shown in figure (iii), the length of the column is y cm. Find

(i) The values of x (2mks)

(ii) The values of y (2mks)

(Take atmospheric pressure to be 70cmHg)

16. (a) State newtons third law of motion. (1mk)

(b) A car of mass 900kg is initially moving at 20m/s, calculate

i) Acceleration of the car (2mks)

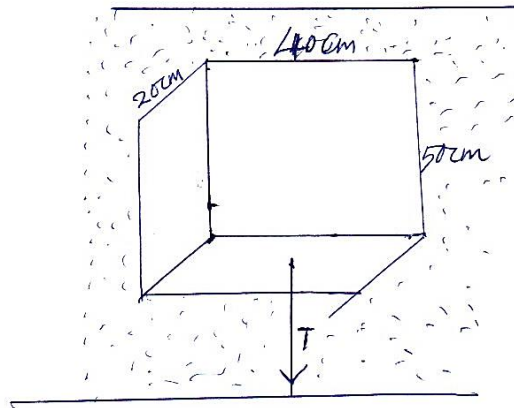
(ii) The force required to bring the car to rest over a distance of 15M. (2mks)

(c) Two trolleys of masses 2.0 kg and 1.5kg travelling towards each other at 0.20m/s and 0.35m/s respectively combine head on. The trolleys combine on collision. Calculate the velocity of the combined trolleys. (3mks)

(d.)A stone is projected vertically upwards with a velocity of 30m/s from the ground. Determine the maximum height reached (3mks)

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

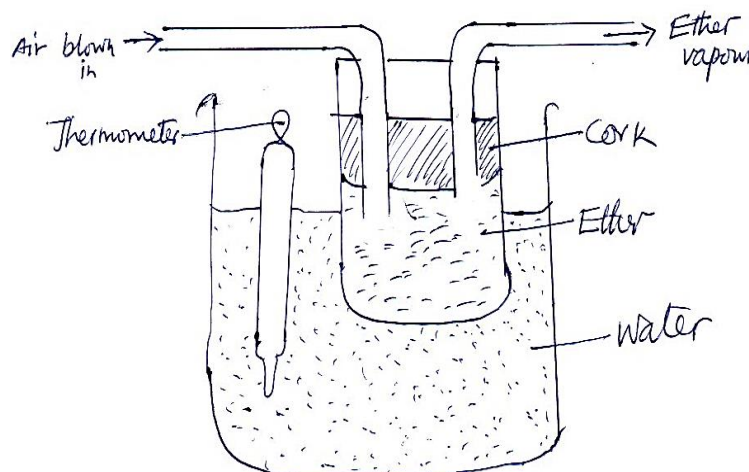
(b) The diagram below shows a wooden block of dimensions 50cm by 40cm by 20cm held in a position by a string attached to the bottom of a swimming pool. (density of block is 600kg/m^3 , density of water = 1000kg/m^3)



The three forces acting on the block are tension (T) in the string, the weight (W) of the block and the up thrust (U) due to water.

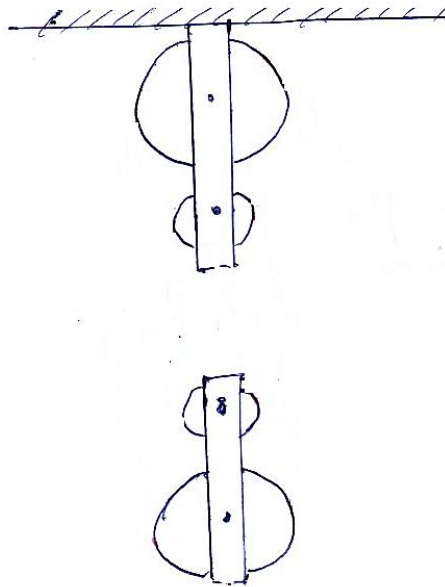
- i. Write an equation relating T, W and U when the block is at stationery position. (1mk)
- ii. What is the weight of the block (3mks)
- iii. What is the weight of the water displaced by the block (2mks)
- iv. Determine the tension (T) on the string. (2 mks)

(c) Some ether is put in a combustion tube and two glass tubes inserted into the tube through a cork as shown in the figure below. The combustion tube is then put into a smaller beaker containing some water and a thermometer dipped in the water.



When air is blown into the ether, the reading in the thermometer lowers. Explain this observation (2mks)

18. (a) Complete the diagram below to show how the pulleys can be used to raise a load, L by applying an effort, E (2mks)



- (b) The pulley system above has a mechanical advantage of 3. Determine
- The velocity ratio of the system (2mks)
 - The efficiency of the system (2mks)
 - The effort when a load of 60N is raised (2mks)

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Name Admission number
Candidate's Signature..... Date.....

MASENO SCHOOL TRIAL 1

232/1

PHYSICS

PAPER 1

TIME: 2 hours

INSTRUCTIONS TO CANDIDATES

- i) Write your name and admission number in the spaces provided above.
- ii) Sign and write the date of examination in the spaces provided above
- iii) This paper consists of **TWO** sections **A** and **B**.
- iv) Answer **ALL** the questions in section **A** and **B** in the spaces provided.
- v) All working **MUST** be clearly shown.
- vi) Non programmable silent calculators may be used.
- vii) **This paper has 12 pages. It is the responsibility of the candidate to ascertain that all the pages are printed as indicated and that no questions are missing.**
- viii) **Candidates should answer the questions in English.**

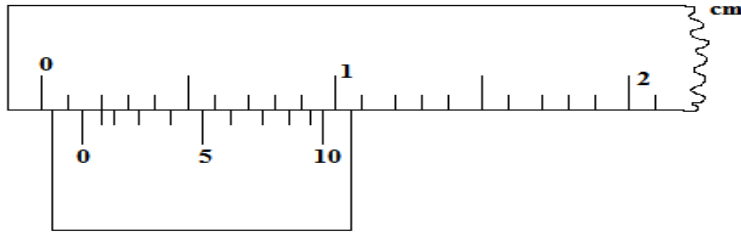
Constant: $g=10\text{N/kg}$ or 10m/s^2

For Examiners Use Only

Section	Question	Maximum Score	Candidate's Score
A	1 – 13	25	
B	14	10	
	15	12	
	16	11	
	17	11	
	18	11	
	TOTAL SCORE	80	

SECTION A: (25 MARKS)

1. The figure below shows part of a vernier callipers when the jaws are closed without an object in between the jaws.



- a) State the zero error of the vernier callipers. (1mark)

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- b) A student used the same vernier calipers to measure the diameter of a test tube of actual diameter 2.15cm. What was the reading shown by the vernier callipers? (1mark)

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- 2 State a reason why a burn from steam at 100°C is more severe than a burn from boiling water at the same temperature (1 mark)

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3. Apart from temperature difference between the ends of a material, state any other two factors that determines rate of heat flow in a material (2marks)

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4. A point in the rim of a wheel has a linear velocity of 5.6 m/s. if the rim has a radius of 40cm determine the angular velocity of the point (2marks)

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5. A wooden block of mass 2kg is placed on a horizontal surface. A horizontal force of 12N is exerted on it makes it to accelerate at 5ms^{-2} . Find the coefficient of friction between the surfaces.
(3marks)

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

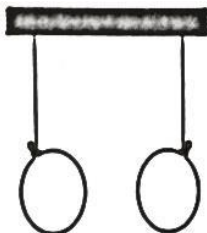
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7. The figure below shows two inflated balloons hanging vertically on light threads.



State and explain the observation that will be made when a stream of air is blown in the space between the balloons. (2 marks)

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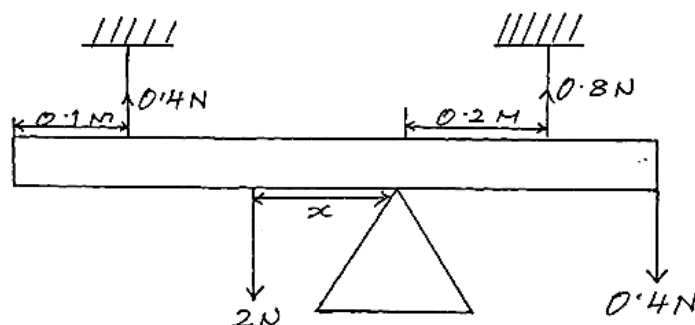
8. Explain why a hole in a ship near the bottom is more dangerous than the one near the top
(1mark)

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9. The diagram below shows a uniform meter rule pivoted at its center and balanced by the forces shown. (3 marks)



Determine the value of x .

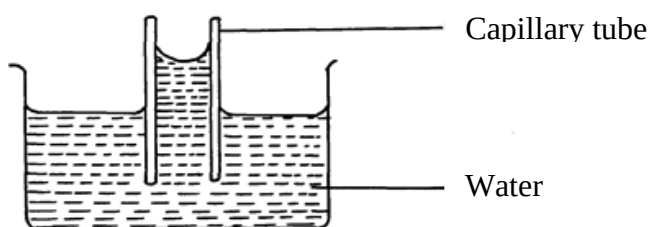
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10. The figure shows a capillary tube dipped in water.



State **two** differences that will be observed when water is replaced with mercury in the set up above. (2 marks)

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11. Give the transducer used to convert mechanical energy to electrical energy. (1 mark)

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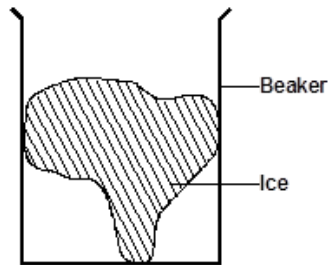
12. A body is uniformly accelerated from rest to a final velocity of 100 m/s in 10 seconds. Calculate the distance covered. (2 marks)

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13. The figure below shows beaker containing a block of ice.



State and explain the change in stability when the ice melts.

(2marks)

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SECTION B (55 MARKS)

14. a) Define the term heat capacity.

(1 mark)

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b) A metal block of mass 2.0kg is heated electrically. The voltmeter read 12 volts and ammeter 4.0A. The temperature of the metal block increased from 25°C to 75°C in 10 minutes. Assuming no heat is lost to the surrounding. Determine:

i) Heat supplied by the heater.

(2marks)

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ii) Heat gained by the metal cylinder

(1mark)

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iii) Specific heat capacity of the metal block.

(2marks)

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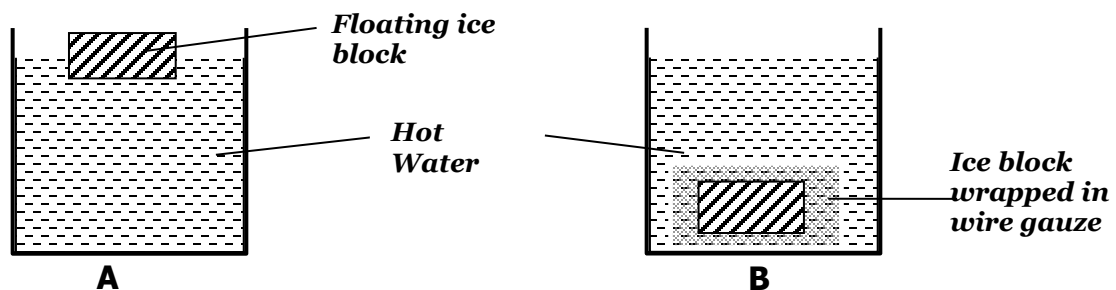
c) Explain why food cooks faster in a pressure cooker than in an open sufuria

(2marks)

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



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

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15 a) State Newton's second law of motion in terms of in momentum.

(1mark)

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b) (i) A bullet of mass 20.0 g is fired with a velocity of 300m/s into a wooden block of mass 4.98 kg suspended from a long in extensible string. The bullet sticks into the wood and the two moves together.

Find the velocity of the block and bullet immediately after collision took place.

(2marks)

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(ii) Calculate the height to which both swings upwards.

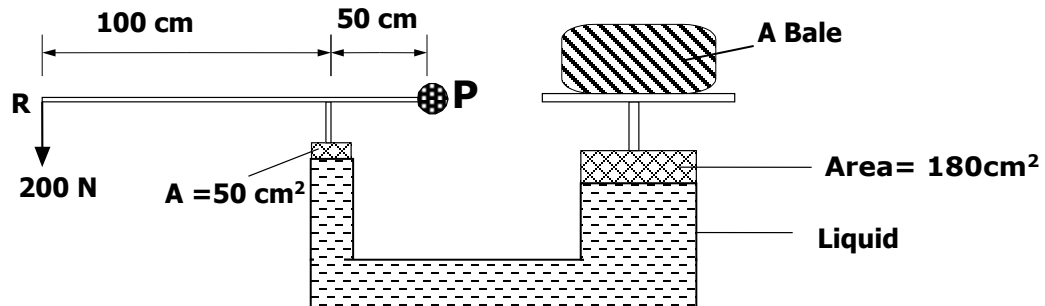
(2marks)

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c) Figure shows a hydraulic press system using a lever of negligible mass on the side of a small piston pivoted at point **P**. A force of 200N is applied at **R**.



Calculate ;

(i) The force **F** exerted by small piston on the liquid.

(2marks)

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(ii) The weight of the Bale supported by the large piston

(2marks)

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(iii) Efficiency of the system.

(3marks)

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16. (a) State Archimedes principle

(1mark)

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(b) A cylinder of length 5.0 cm and uniform cross section area 50.00 cm^2 is suspended from a spring balance and totally immersed in water. If the density of the material of the cylinder is 1.25 g/cm^3 and density of water 1 g/cm^3 , determine:

i. The up thrust on the cylinder

(2marks)

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ii. Weight of the cylinder

(2marks)

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iii. The reading on the spring balance

(2marks)

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(b)(i) State the reason why lead shots are fixed at the bottom of hydrometer.

(1 mark)

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(ii) A hydrometer of mass 30.0 g floats in water of density 1.0 g/cm^3 . If the bulb of the hydrometer had a volume of $2.8 \times 10^{-5} \text{ m}^3$ and stem has a cross – section area of 1.0 cm^2 , what length of the stem would be submerged in the water.

(3marks)

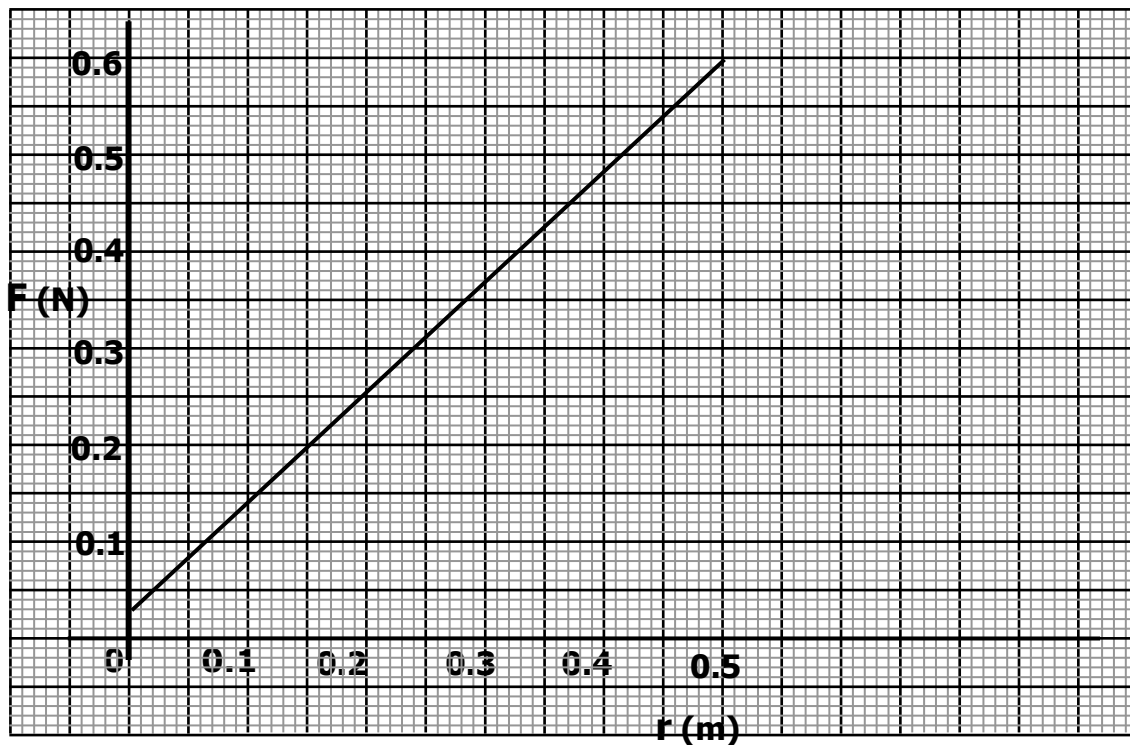
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17. a) Define the term angular velocity.

(1mark)

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b) The graph below was obtained from an experiment to investigate the variation of the centripetal force, F with the radius, r of the circle on which a body rotates was performed.



From the graph, determine the angular velocity, ω of the body given that $m = 100\text{g}$ and

$F = m\omega^2 r + c$ where c is a constant.

(3 marks)

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c) A stone of mass 40g is tied to the end of a string 50cm long and whirled in a vertical circle at 2 revolutions per second. Calculate the maximum tension in the string.

(3marks)

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d) A stone is thrown horizontally with a velocity of 45m/s from the top of a vertical tower 50m high. Determine:

i. The time taken by the bullet to reach the ground (2marks)

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ii. The maximum horizontal distance covered by the bullet (2marks)

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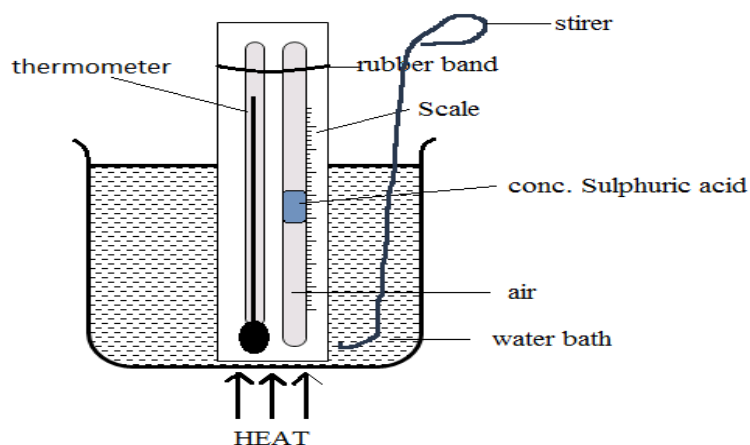
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18. a) Define the absolute zero of the Kelvin temperature scale. (1 mark)

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



(i) While stating any measurements to be made, explain how the set up would be used to verify Charles law. (3marks)

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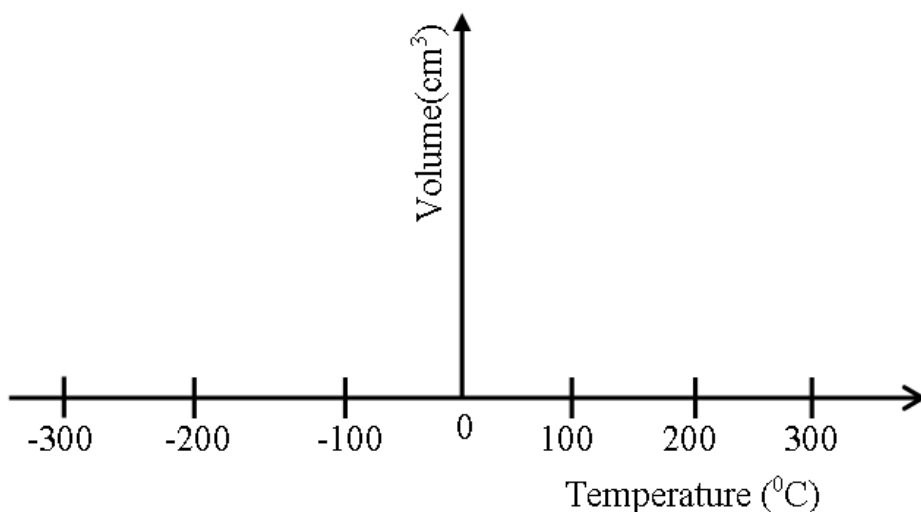
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(iii) On the grid shown in the figure below sketch a graph of volume (cm^3) against temperature ($^{\circ}\text{C}$) for the experiment above. Clearly mark with the letter T the absolute zero temperature. (1 mark)



c) A mass of air of volume 750cm^3 is heated at constant pressure from 10°C to 100°C . determine the final volume of the air. (2marks)

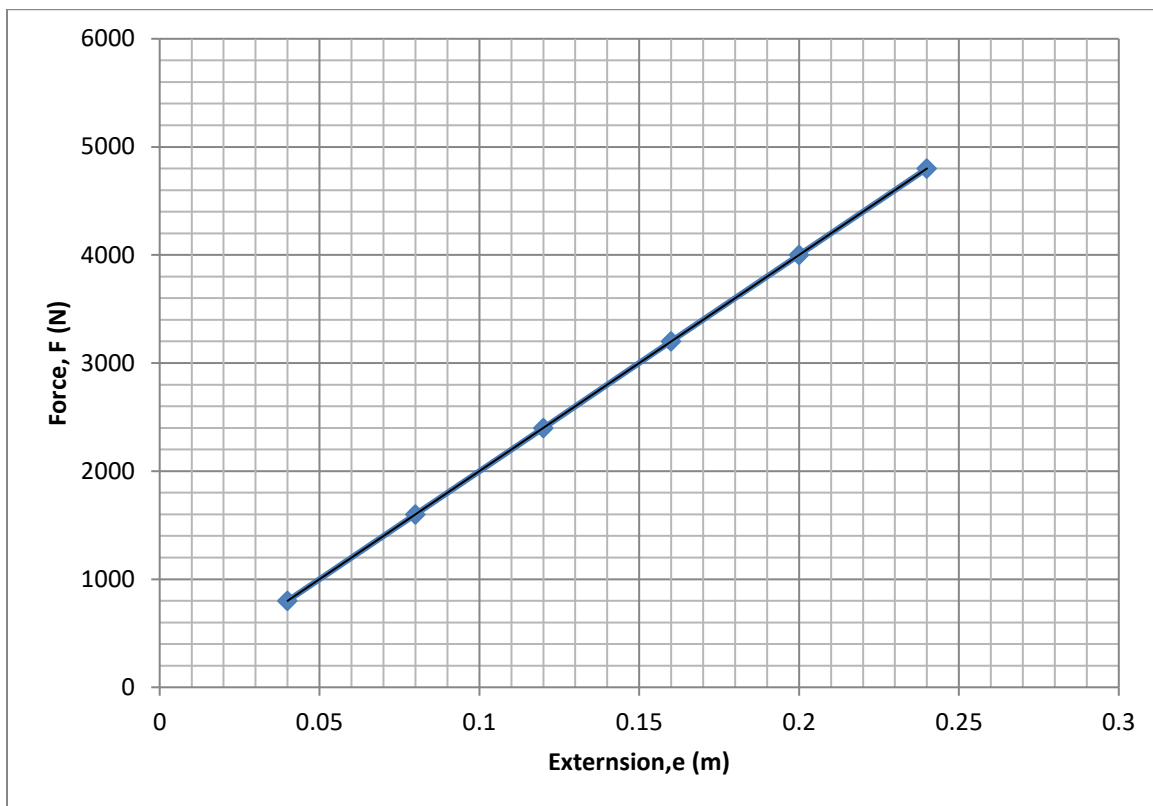
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d) The figure below shows a graph of weights of persons entering a lift against the extension of four similar springs supporting a lift. From the graph determine,



- (i) The spring constant of the springs (3marks)

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- (ii) The spring constant of a single spring (1mrk)

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Kenya Certificate of Secondary Education

KCSE TOP NATIONAL SCHOOLS TRIAL SERIES 2025

Name Admission number

Candidate's Signature.....Date.....

MERU SCHOOL

232/1

PHYSICS

PAPER 1

TIME: 2 hours

INSTRUCTIONS TO CANDIDATES

- a) Write your name and 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 section A and B in the spaces provided
- e) All working must be clearly shown
- f) Mathematical tables and silent electronic non programmable calculators may be used.

Take $g = 10\text{Nkg}^{-1}$

FOR EXAMINER'S USE ONLY

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

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FOR MORE PAPERS FOR ALL SUBJECTS AND MARKING SCHEMES

SECTION A: (25 MARKS)

Answer ALL the questions in this section in the spaces provided

1. A body weighing 100N in air is found to weigh 80N when fully immersed in a certain fluid. Account for the difference in the two weights? (1 mark)

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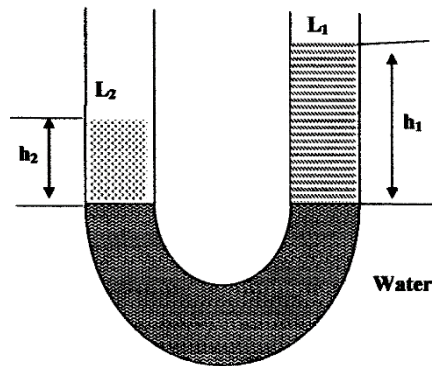
2. State how the pressure of a fixed mass of gas can be increased at constant temperature. (1 mark)

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3. The figure below shows a U – tube containing two liquids L_1 and L_2 of densities 0.5g/cm^3 and 0.8g/cm^3 respectively floating on a water surface. If the system is in equilibrium, determine the ratio $h_1 : h_2$ (3mks)



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4. A uniform metre rule pivoted at its 15cm mark is balanced by a 200 g mass suspended at the 5 cm mark. Determine the weight of the metre rule. (3mks)

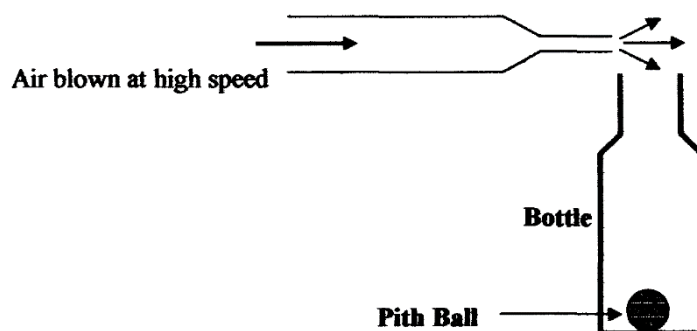
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5. The Figure below shows a pith ball at the bottom of a bottle container.



State and explain what would happen if air is blown over the mouth of the container. (3mks)

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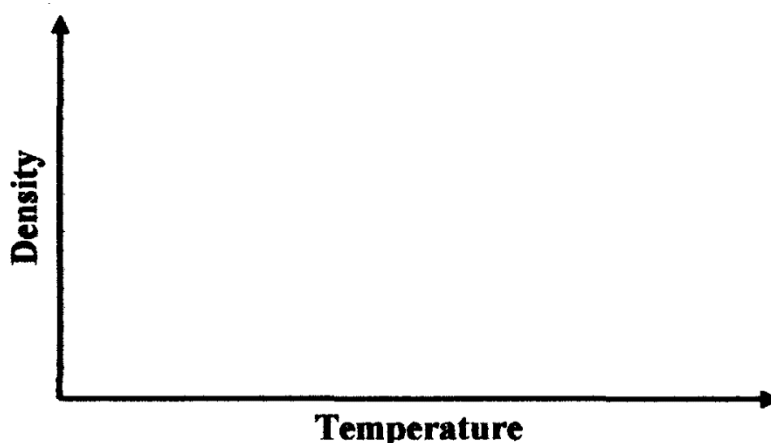
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6. Sketch a density – temperature graph for water being heated from 0°C to 10°C on the axes provided. (1 mark)



7. Sketch a section of a vernier calipers showing a reading of 2.33 cm. (2mks)

8. Two identical helical springs are connected in series. When a 50g mass is hang at the end of the springs, it produces an extension of 2.5 cm. Determine the extension produced by the same mass when the springs arc connected in parallel. (3mks)

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9. A body of mass m kg moves uniformly around a circle of radius r m with a linear velocity v m/s. Derive an expression for the relationship between its linear velocity v and angular velocity ω . (3mks)
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10. State three assumptions made when determining the diameter of an oil molecule in the oil drop experiment (3mks)
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11. A faulty mercury thermometer reads 40°C and 120°C when placed in pure melting ice and steam from boiling water respectively. Determine the actual temperature when this thermometer reads 50°C . (2mks)
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SECTION B (55 MARKS)

Answer ALL questions in this section in the spaces provided on the question paper.

12. (a) Differentiate between heat capacity and Specific heat capacity of a substance. (1 mark)
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- (b) Briefly describe an experiment to determine the specific heat capacity of a liquid substance using the electrical method. (6 marks)

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- (c) An immersion heater rated 1000W is used to heat a block of ice of mass 500g initially at -10°C until the all the water evaporates at 95°C . Assuming that all the heat supplied is used to heat the ice, calculate the time in minutes for the whole process to take place. (Take specific heat capacity of water as 4200J/KgK , specfic heat capacity of ice = 2100J/KgK specific latent heat of fusion = $3.35 \times 10^5 \text{ J/Kg}$ and specific latent heat of vapourization $2.26 \times 10^5\text{J/Kg}$) **(5 marks)**

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13. (a) A mountain climber with a mercury barometer discovered that the readings of the barometer at the bottom and top of a certain mountain were 750mmHg and 520mmHg respectively. Given that the density of air between the bottom and top of the mountain is uniform and equal to 1.25 Kg/m^3 , estimate the height of the mountain. (Take the density of mercury to be $1.36 \times 10^4 \text{ Kg/m}^3$) **(3 marks)**

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- (b) (i) State Newton's second law of motion **(1 mark)**

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- (ii) A driver driving a car of mass 1200 Kg at a constant speed of 72Km/hr is flagged down by a traffic police officer. It takes him 2 seconds to react to the police signal and brings the car to rest by applying a constant breaking force in 10 seconds. Determine the minimum stopping distance and the constant breaking force. **(5 marks)**

- (c) Water flows through a pipe with varying cross sectional area. The narrower section has an area of 5cm^2 while the wider section has an area of 15cm^2 . If the velocity of the water through the narrow section is 20m/s , determine the velocity in the wider section. **(3 marks)**

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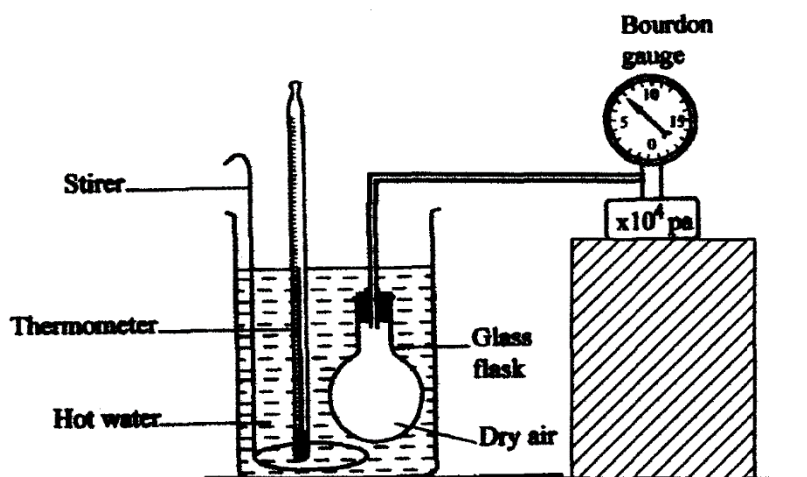
14. (a) Which gas law relates pressure with temperature **(1 mark)**

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- (b) The diagram below shows a set up that a student used to investigate the pressure law.



- (i) State the measurements that should be taken in the experiment **(3 marks)**

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- (ii) Explain how the measurement in (i) above may be used to verify the law. **(3 marks)**

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(iii) Name one limitation of the gas laws.

(1 mark)

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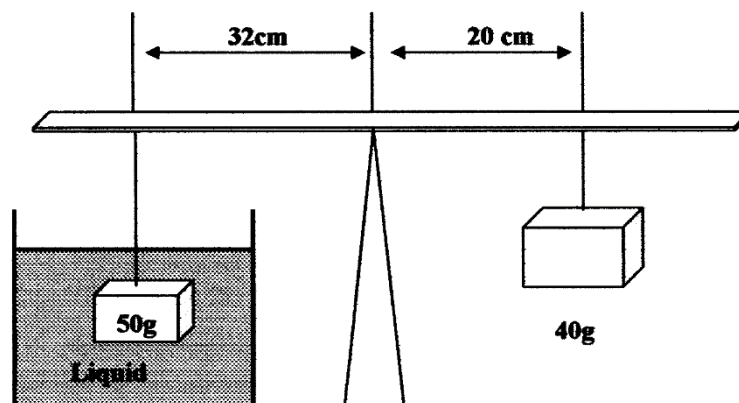
(iv) Hydrogen gas of volume 2400cm^3 at 54°C and pressure of 2.4N/m^2 is compressed until its volume is 300cm^3 at a pressure is 6N/m^2 . Determine the temperature of the gas after this compression. (2 marks)

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15. (a) Which Principle relates the upthrust with the weight of the fluid (1 mark)

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(b) The figure below shows a block of mass 50g and density 2000kg/m^3 submerged in a certain liquid and suspended from uniform horizontal beam by means of a string. A mass of 40g suspended from the other end of the beam puts the system in equilibrium.



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

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

- (iii) Calculate the new balance point of the 50 g mass (the 40g mass remains fixed) if the liquid was replaced with one whose density was 1500Kg/m^3 (3 marks)

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16. The figure below shows a block and tackle pulley system. When a cylinder of aluminium mass 2.7kg is hung from the lower block, an effort of 12N is needed to raise the load at steady speed.

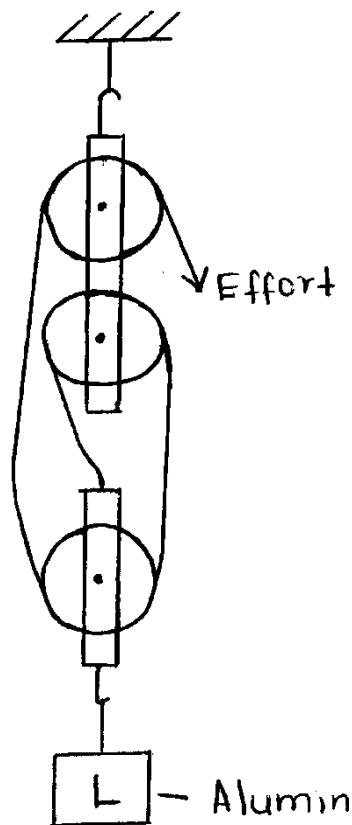


Figure 1

(a) Calculate

- (i) The work done by the effort in raising the load through 2 metres (2 marks)

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(ii) The efficiency of the machine

(2 marks)

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b) The marks AB, BC etc on the tape are ten –tick intervals and timer made 50 dots per second.

The tape was drawn to scale.

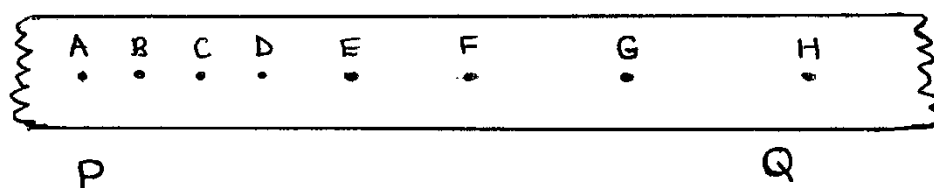


Figure 2

(i) What was instantaneous velocity at

(I) P

(2 marks)

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(II) Q

(2 marks)

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(ii) Find the acceleration given by the tape

(2 marks)

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Name Admission number
Candidate's Signature.....Date.....

STAREHE BOYS CENTER SCHOOL

232/1

PHYSICS

PAPER 1

TIME: 2 hours

INSTRUCTIONS TO CANDIDATES

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

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	

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

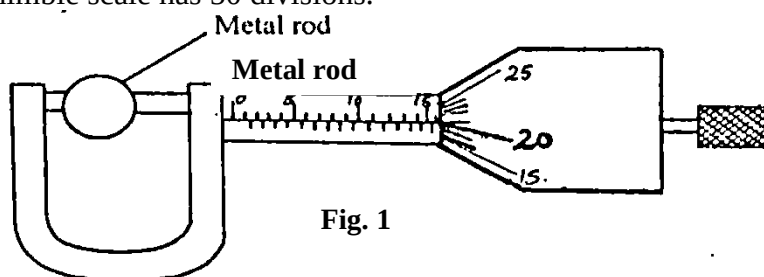


Fig. 1

Find the diameter of the metal rod.

(1 mark)

- 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)

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

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.

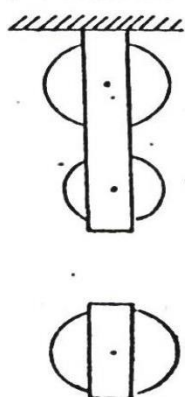


Fig. 2

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

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

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

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

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)

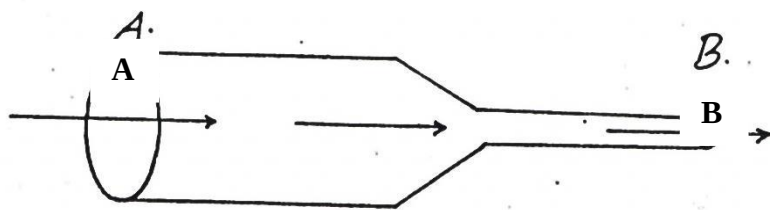
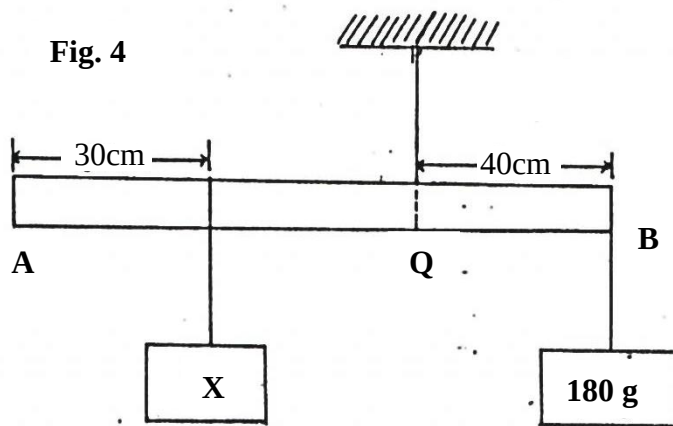


Fig. 3

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)

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° to 70°C ? (3 marks)

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)



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

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)
- ii) E to I. (2 marks)
- c) Calculate the acceleration of the trolley. (2 marks)
- d) What end of the tape was fixed onto the trolley? (1 mark)
- e) State **two** precautions that the student should take before she takes her final samples of the dots. (2 marks)
13. a) i) What is Brownian motion? (1 mark)

- 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)

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

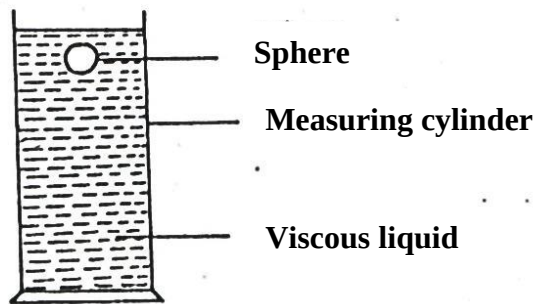
- i) Calculate the thickness of the oil film. (3 marks)

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

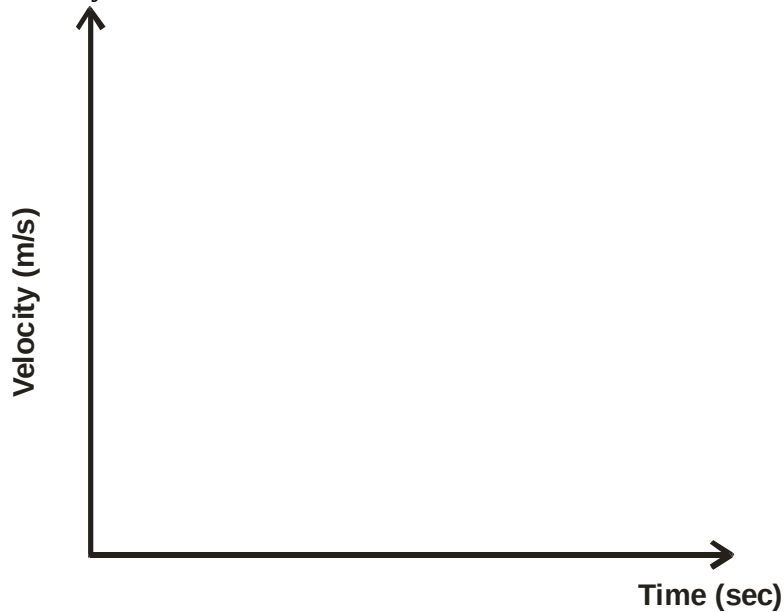
14. a) i) Distinguish between inelastic and elastic collisions. (2 marks)

- 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)

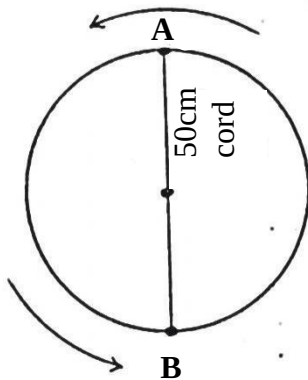
- b) The diagram in Figure 5 below shows a sphere moving in a viscous liquid in a tall measuring cylinder.



- 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)



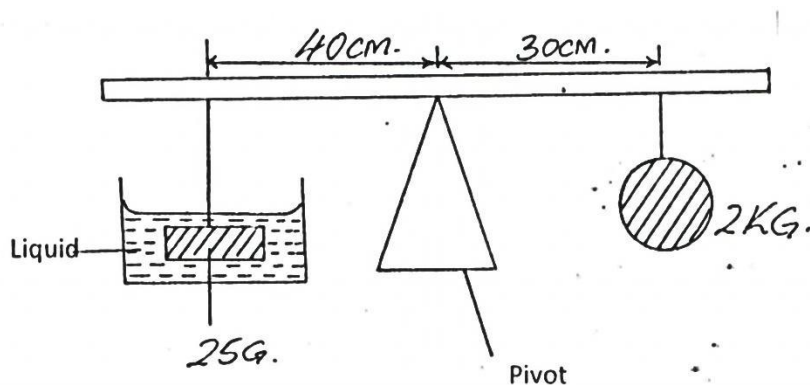
15. A mass of 1kg is attached to a cord of length 50cm. It is whirled in a circle in a vertical plane at 10 revolutions per second as shown in the figure below.



- a) Find the tensions in the cord when the mass is at:
 - i) Highest point of the circle A. (2 marks)
 - ii) Lowest point of the circle B. (2 marks)

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

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 is suspended from the beam as shown in the figure below.

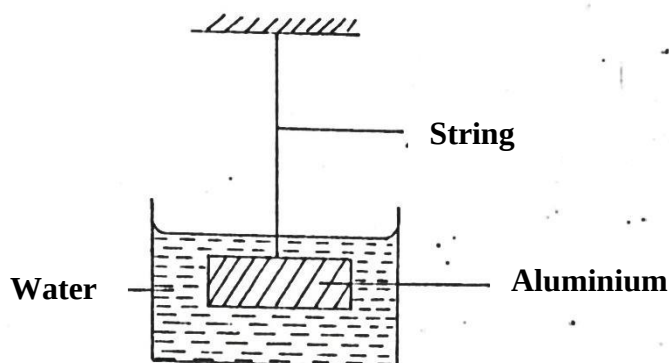


- i) Determine the upthrust force acting on the block. (3 marks)

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

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

- 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 $2.7 \times 10^3\text{kg/m}^3$



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