K.C.S.E 2024 BLUEPRINT PREDICTION

PHYSCIS PP1 10 QUESTION PAPERS

KCSE BLUEPRINT PREDICTION

PHYSICS PP1

10 QUESTION PAPERS

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K.C.S.E BLUEPRINT PREDICTION

QUESTION PAPER NO: 1

PHYSICS
PAPER 1
(THEORY)
TIME: 2 HOURS

SECTION A: (25 MARKS)

1. Figure 1 shows a measuring cylinder, which contains water initially at level A.

A solid of mass 0.32g is immersed in the water, the level rises to B.

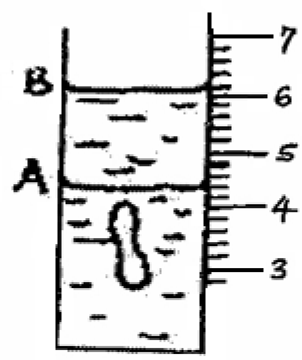


Figure 1

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

2. The figure 2 below shows part of micrometer screw gauge with 50 divisions on the thimble scale.

Complete the diagram to show a reading of 5.73mm. **(1mk)**

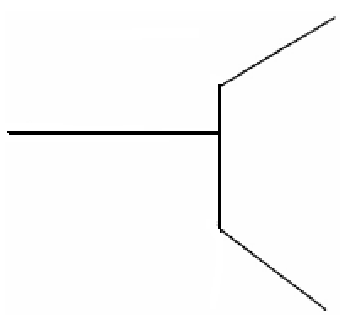
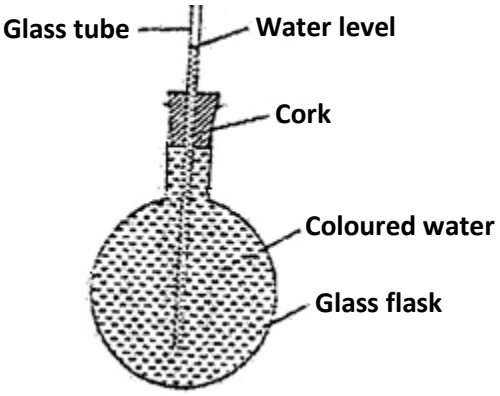


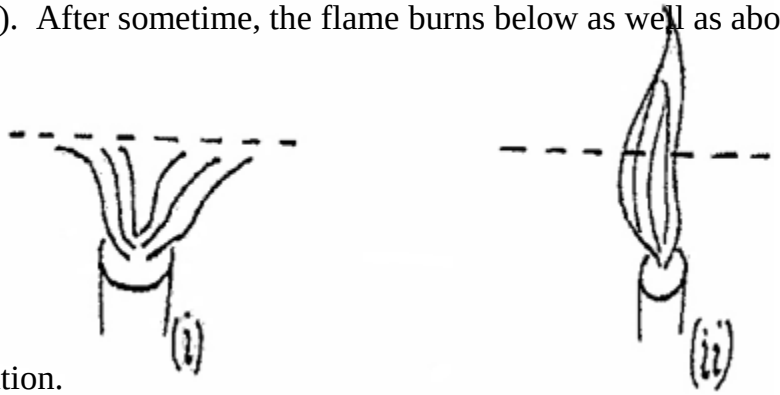
Figure 2

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



Explain this observation. **(2mks)**

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

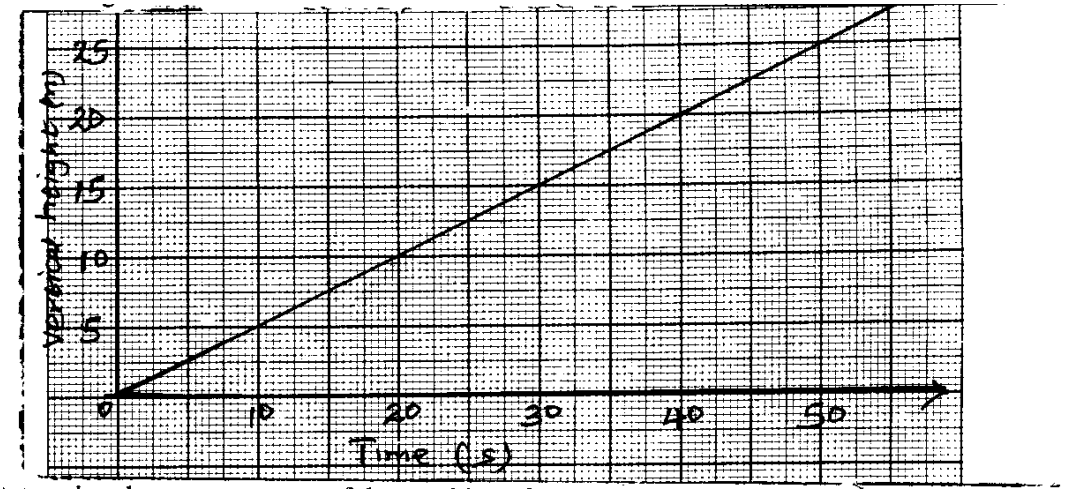


Explain this observation. **(2mks)**

5. The reading on a mercury barometer at a place in 690mm. The barometer contains some air which exerts a pressure of 15Nm^{-2}. What is the pressure at the place Nm^{-2}

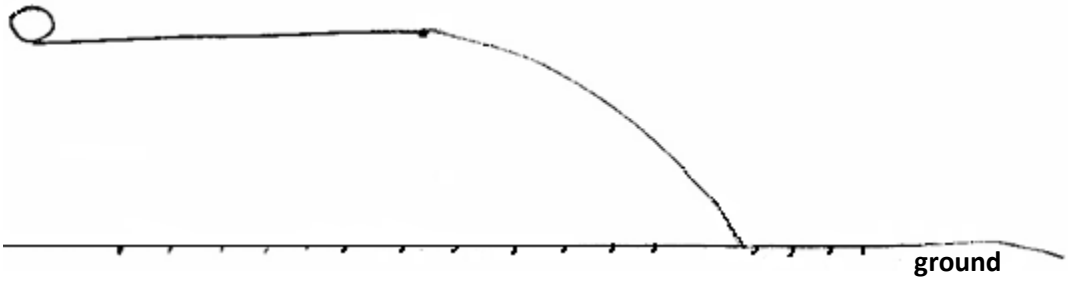
(Density of mercury is 1.36 x 104kgm^{-3}). **(3mks)**

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



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

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



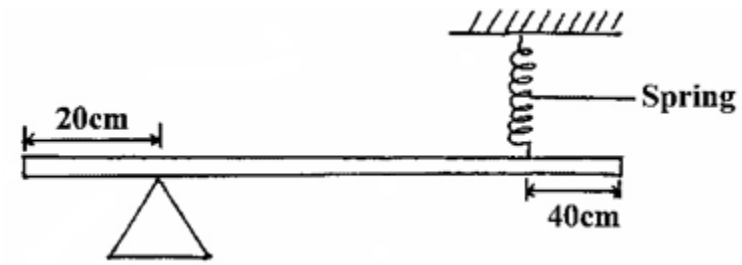
A player taps the ball and makes it spin in anticlockwise direction as it moves.

7. Show the new path followed by the ball. **(1mk)**

8. Explain how the ball attains the new path above. **(2mks)**

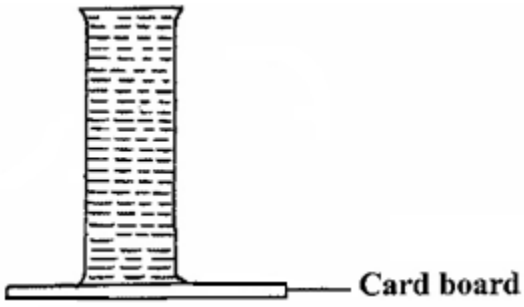
9. A constant force is applied to a body moving with a constant speed. State **one** observable change in the state of motion of the body likely to occur? **(1mk)**

10. The figure below is a uniform bar of length 2.0m pivoted near one end. The bar is balanced horizontal by a spring.



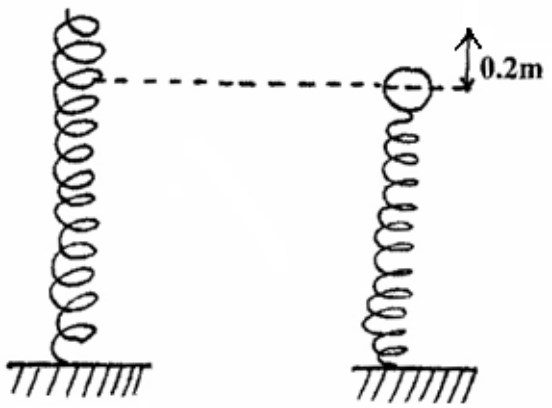
Given that the tension on the spring is 1.2N, determine the weight of the bar. **(3mks)**

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



Explain the observation. **(1mk)**

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

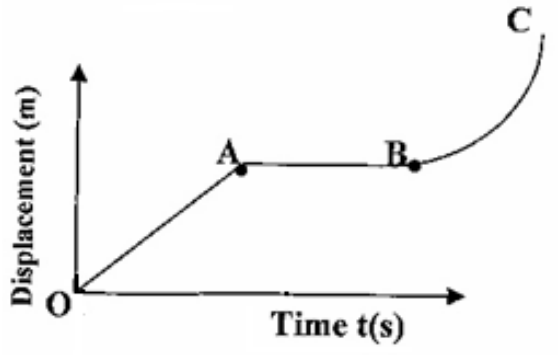


If the spring constant is 15N/m. Calculate the maximum height reached when the spring is released. **(3mks)**

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

SECTION B: (55 MARKS)

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



Describe the motion of the particle in the region. **O-A, A-B, B-C** **(3mks)**

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

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

(d) A ball of mass 0.2kg is thrown vertically upwards with velocity of $8ms^{-1}$.
The air resistance is 0.5N. Determine:

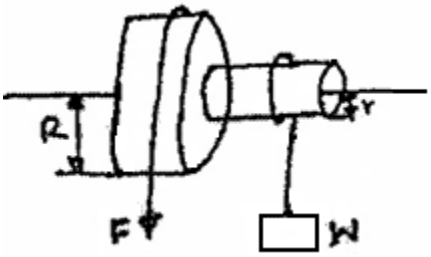
(i) The resultant force on the ball as it moves up;
(Take acceleration due to gravity g = $10ms^{-2}$). **(2mks)**

(ii)The acceleration of the ball. **(3mks)**

(iii) The maximum height reached by the ball. **(2mks)**

15.(a) Draw a single pulley arrangement with a velocity ratio of 2. **(2mks)**

(b) Figure shows a wheel and axle being used to raise a load W by applying an effort F. the radius of the large wheel is R and of the small wheel r as shown.



(i) Shows that the velocity ratio (V.R) of this machine is given by R/r. **(3mks)**

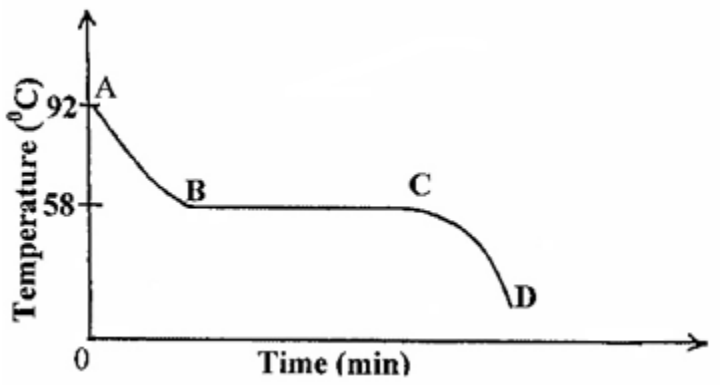
(ii) Given that r = 5cm, R = 8cm, determine effort required to raise a load of 20N if the efficiency of the machine is 80%. **(4mks)**

(iii) It is observed that the efficiency of the machines increases when it is used to lift large loads. Give a reason for this. **(1mk)**

16.(a)(i) Define the term latent heat of fusion. **(1mk)**

(ii) 9816J of heat energy is required to completely convert m kg of ice at 0^oC to steam. Determine the value of m. (Take latent heat of fusion of ice = $2.34 \times 10^{5}Jkg^{-1}$; specific heat capacity of water = $4200Jkg^{-1}k^{-1}$, latent heat of vaporization of steam = $22.26 \times 106Jkg^{-1}$). **(4mks)**

(b) The cooling curve shown in figure below is for a pure substance.



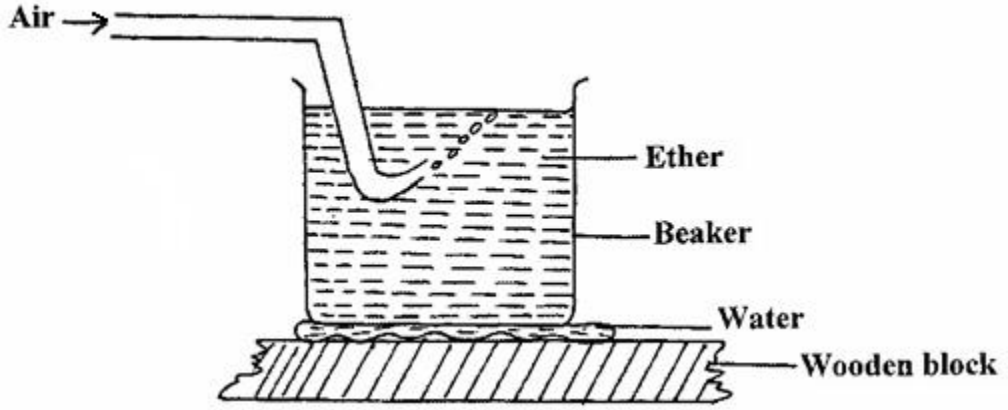
(i) What is the melting point of the substance? **(1mk)**

(ii) Explain what happens in the region. **(3mks)**

I CD **II AB** **III BC**

(c) A beaker containing ether was placed on some water on a wooden block.

Air was then blown through the ether using a pump as shown in figure below.



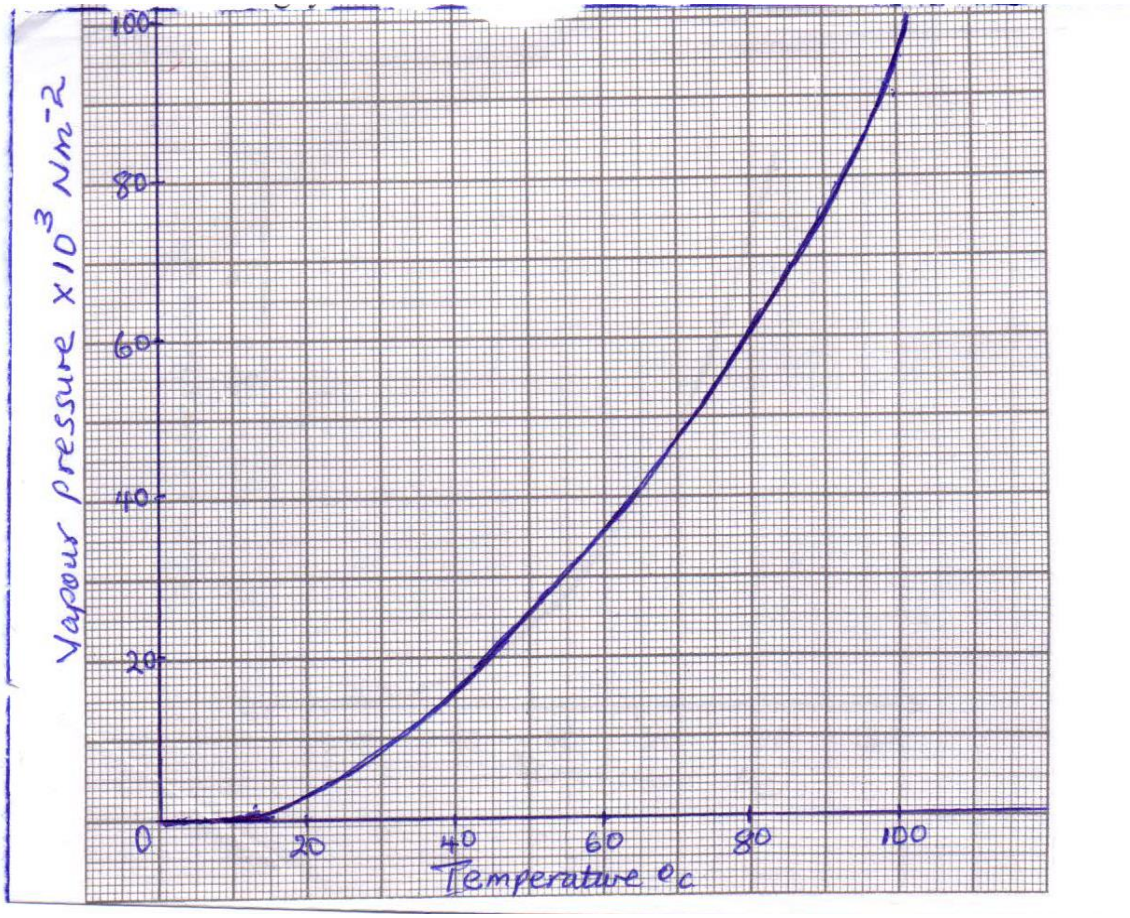
State and explain what observation is made after sometime. **(2mks)**

17.(a) When the temperature of water reaches the boiling point, bubbles rise to the surface.

(i) State what is contained in the bubbles. **(1mk)**

(ii) State the reason why bubbles rise to the surface only at the boiling point. **(1mk)**

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



(i) Determine the atmospheric pressure of the town in Nm^{-2}.

(Take g = $10m/s^2$ and density of mercury = $13600kg/m^3$). **(3mks)**

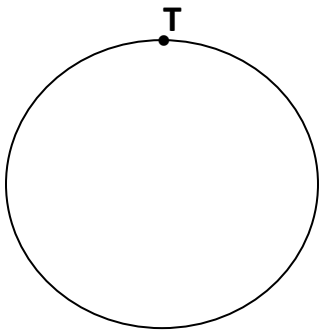
(ii) Use the graph to determine the boiling point of water in the town. **(1mk)**

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

18.(a) One of the factors that affect the centripetal force is the mass of the body.

State **two** other factors. **(2mks)**

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



(i) Determine the velocity V of the mass at point T. **(3mks)**

(ii) Determine the maximum tension in the string. **(2mks)**

(c) The anchor of a ship is made of steel and has a weight of 3200N in air. A ship floating in water is held by the anchor submerged in water. (Density of steel is $8000kgm^{-3}$).

Calculate.

(i) The volume of the anchor. **(2mks)**

(ii) The up thrust on the anchor. **(2mks)**

(iii) The apparent weight of the anchor. **(2mks)**

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QUESTION PAPER NO: 2

PHYSICS

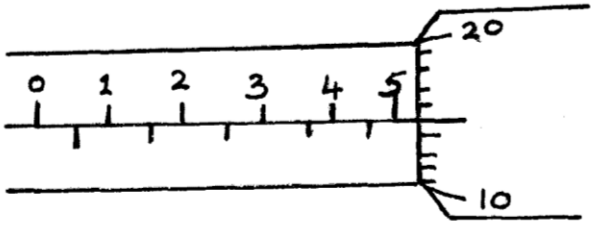
PAPER 1

(THEORY)

TIME: 2 HOURS

SECTION A (25MKS)

1. State the reading on the micrometer gauge shown belowFig 1 **(1mk)**



2. An oil drop forms a circular patch of area $5x10^{-3}m^2$. If the oil drop has a volume $9 \times 10^{-12}M^2$. Calculate the thickness of the oil molecule. **(2mks)**

3. Name one non contact force **(1mk)**

4. A crane just lifts 9940N when an effort of 11 6N is applied. Find its velocity ratio if the crane has an efficiency of 72% **(3mks)**

5. A vessel weighs 90g and has a specific heat capacity of 420J/Kg/K. Calculate its heat capacity **(2mks)**

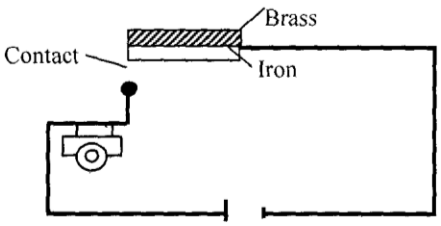
6. Explain why a high jumper flexes his knees when landing on the ground **(2mks)**

7. Two tennis balls are suspended from support by a thin string and air blown between them. Explain the consequent motion of the balls **(2mks)**

8. Give a reason why heat transfer by radiation is faster than heat transfer by conduction **(1mk)**

9. The fig below shows a fire alarm circuit. Explain how the alarm works **(2mks)**

Figure 2



10. Two liquids of density 1100kg/rn^3 and 850kg/rn^3 are mixed in equal volumes. The mixture fills a tank of 300cmx 40cm x 50cm to the bring calculate the mass of each liquid **(3mks)**

11. In Brownian motion experiment, smoke particles are observed to move randomly. Explain how this motion is caused **(2mks)**

12. Give a reason why the weight of a body vary from place to place on the earth's surface **(lmk)**

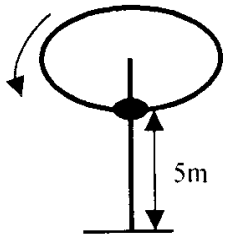
13. The pressure in a moving fluid varies with speed of the fluid. Explain **(2mks)**

SECTION B (55 MKS)

14.a) Distinguish between velocity ratio and mechanical advantage **(1mk)**

The diagram in the figure below shows a mass (m), which is rotated in a vertical circle. The speed of the mass is gradually increased until the string breaks. The string breaks when the mass is at its lowest point A at a speed of 30m/s. point A is 5m above the ground.

Fig 3



I. Show on the diagram:

i. The initial direction of the mass at the point the string breaks **(lmk)**

ii. The path of the mass from A until it strikes the ground at point B **(1mk)**

11 calculate

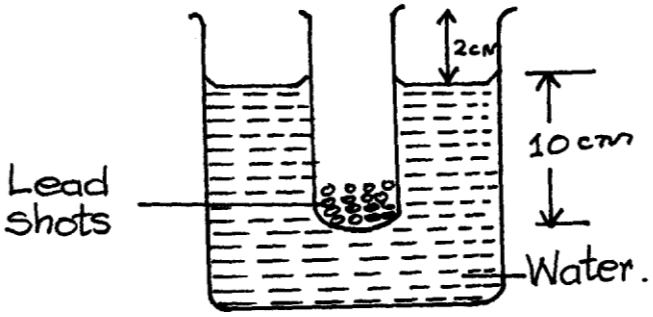
i. The time the mass takes to reach the ground after breaking off **(3mks)**

ii The horizontal distance the mass travels before it strikes the ground **(2mks)**

15 a) State the law of flotation **(1mk)**

b) A body weighs 40N in air, 30N in water and 35N when in liquid X. Find the relative density of liquid X **(3mks)**

c) A Simple hydrometer is set up with a test tube of mass 10g and length 12cm with a flat base and partly filled with lead shots. The test tube has a uniform cross section area 2.0cm2 and 10cm of its length is under water as shown in the figure below



b) Name a device that is used to convert sound energy to electrical energy **(1mk)**

c)A bullet of mass 20g travelling at 400m/s is strapped by a concrete wall.Calculate the amount of energy tranfered to the wall **(2mks)**

d) A spring with a spring constant of 68N/M stretches by O.22m when a force is applied on it. Determine the energy stored in the stretched spring **(3mk)**

e) A pulley system having a velocity ratio of 4 is used to raise a load of 80N through a height of O.6m at constant speed using an effort of 20N in a time of 15 seconds. Calculate the power developed by the effort **(3mk)**

16a) (a) Give a reason why it is possible to whirl a bucket full of water in a vertical plane without the content pouring **(1mk)**

b) A body of mass 5kg is attached to the end of a string of length 50cm and whirled continuously in a horizontal circle. If the tension in the string is 81N determine the angular velocity of the body **(3mks)**

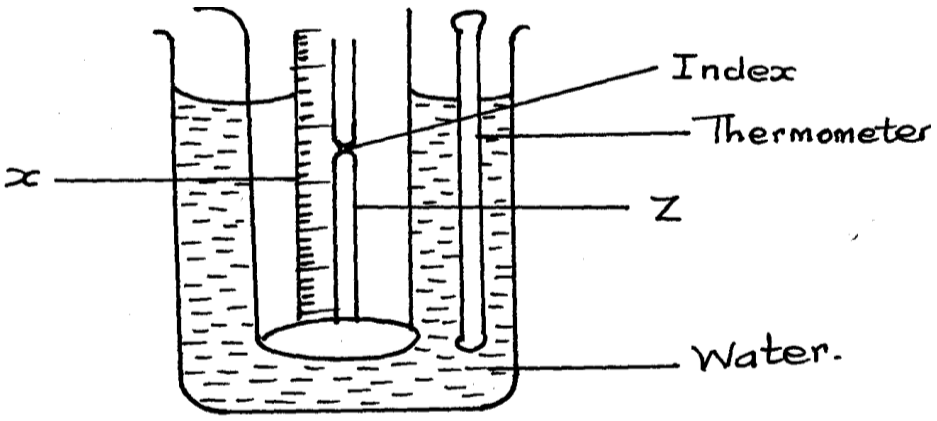
On what principle does a speed governor work **(1mk)**

(i) Taking the density of water as 1000kg/rn^3 calculate the mass of the lead shots in the tube**(3mks)**

(ii) The mass of the lead shots to be added if it has to displace an equal volume of a liquid of density 1 .25g/cm^3 **(3mks)**

17. (a) Two identical containers A and B are placed on a bench, container A is filled with oxygen gas and B with hydrogen gas such that the two gases have equal masses. If the containers are maintained at the same temperature, state with a reason the container which pressure is higher. **(2mks)**

b) The fig below shows a set-up of an experiment used to investigate Charles's law



(i) Name the parts labeled X and Z **(2mks)**

(ii) State the measurements to be taken in this experiment **(2mks)**

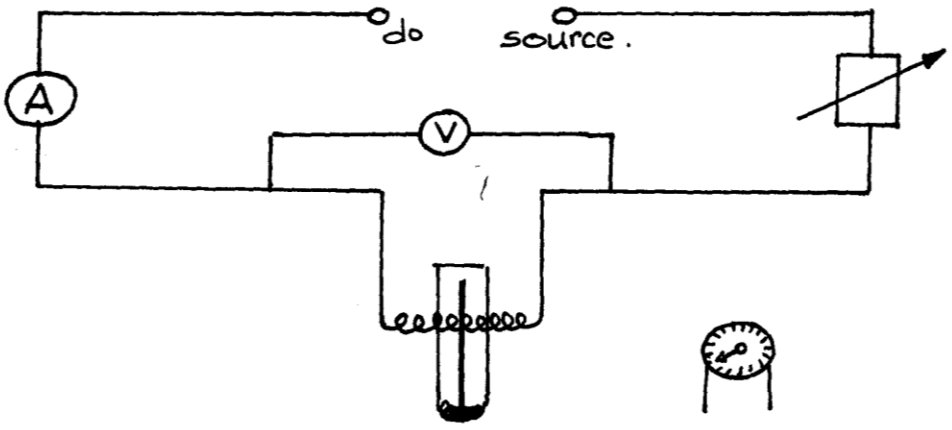
(iii) Explain how the readings taken in (ii) above may be used to investigate Charles law **(2mks)**

(iv) State two purposes of mercury index **(2mks)**,

A constant mass of hydrogen gas occupies a volume of $4.0cm^3$ at a pressure of $2.4x\ 10^5$ Pa and temperature of 288k. Find its volume at a pressure of $1.6xl0^5$ Pa when the temperature is 293K **(3mks)**

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

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



Explain why:

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

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

ii. If the apparatus is used to determine the specific heat capacity of the liquid. The accuracy of the experiment will be increased if the liquid is first cooled to about 5°c below room temperature and the current passed until is about 5°c above room temperature. Explain how heat losses are minimized **(2mks)**

c) A 50W heating coil is totally immersed in 1 00g of water contained in an insulated flask of negligible heat capacity the initial temperature of water in the flask is 20°C

i. Determine how long it takes for the water to boil at 100°c when the heater is switched on **(2mks)**

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

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QUESTION PAPER NO: 3

PHYSICS
PAPER 1
(THEORY)
TIME: 2 HOURS

SECTION A (25 MARKS)

1 The water level in a burette is 40.6cm^3. 50 drops of water each of volume 0.2cm^3 are added to the water in the burette. What is the final reading of the burette? **(2mks)**

2.The springs in figure 2 are identical.

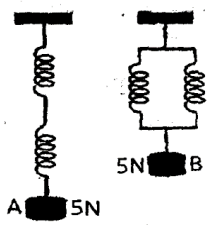


Figure 2

The extension produced in A is 4cm. What is the extension in B? **(3mks)**

3. Why are the tanks for storage of fuel by the Kenya pipeline company painted silvery? **(1mk)**

4. A dripless candle is weighted slightly on the bottom so that it floats upright in a container filled with water as shown in figure 4.

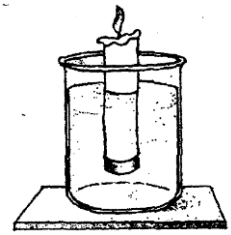
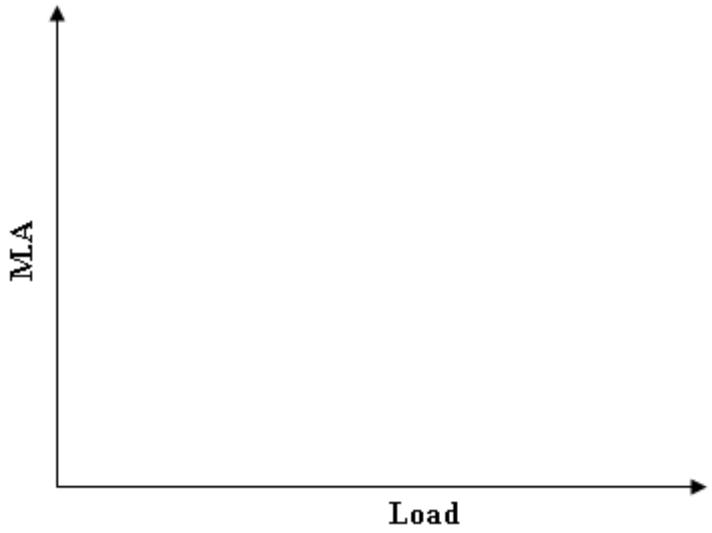


Figure 4

Explain what happens to the candle as it bums. **(2mks)**

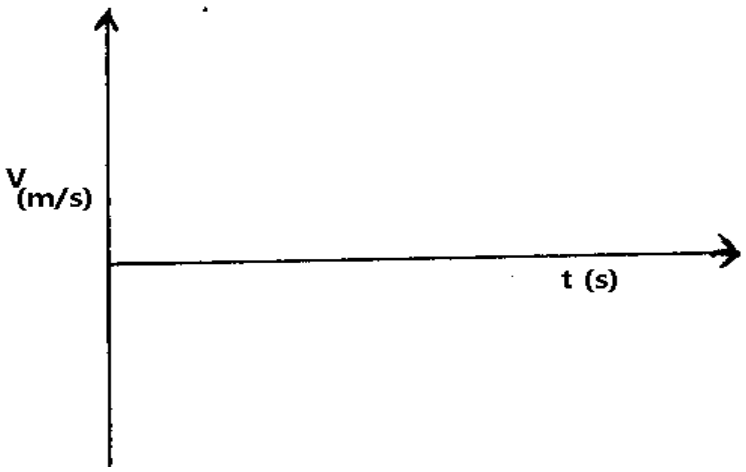
5. In an experiment to estimate the size of an oil molecule, a spherical oil drop is introduced on a clean water surface. It spreads to form a circular oil film. State **one** assumption made in this experiment. **(1mk)**

6. On the axes provided sketch a graph of mechanical advantage (MA) against load for a pulley system. **(1mk)**



7. State and explain how the motion of the smoke particles changes when the temperature inside the smoke cell is lowered. **(2mks)**

8. Sketch on the axis provided below a velocity – time graph of a motion of a stone thrown vertically upward from the edge of a platform and eventually the stone lands without bouncing on the ground below the platform. **(1mk)**



9. The barometric height at sea level is 76cm of mercury while that at a point on a highland is 74cm of mercury. What is the altitude of the point? Take g = 10m/s^2, density of mercury = 13600 Kg/m^3 and density of air as 1.25Kg/m^3. **(3mks)**

10. Oil is injected at a coastal town with a speed of 12m/s where the diameter of the pipe is 7cm,flows at some point inland where the radius of the pipe is 10.5cm. Determine the speed of the oil at this point. **(3mks)**

11. A student inverted a rounded flask with a glass tube and inserted it into water as shown in figure 6.0 below;

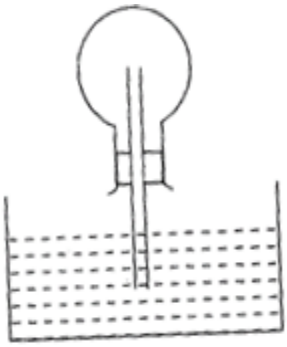
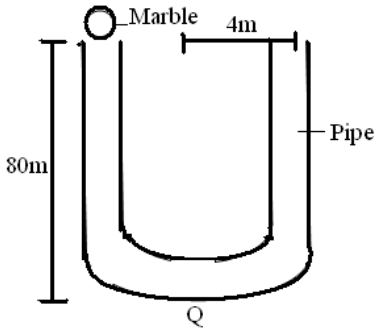


Fig.6

(a) When the student warmed the flask by rubbing it with his hands he noticed some bubbles escaping from the end of the tube into the water. Explain. **(1mk)**

(b) What happens in the glass tube when the student stops rubbing and lets the flask to cool? **(1mk)**

12. The figure **below** show a smooth spherical marble of mass 0.2kg released from height of 80m from the ground into a smooth circular pipe curved to a radius of 4m. The pipe is placed vertically on the ground surface.



(a) What is the velocity of marble at point Q. **(2mks)**

(b) What is the angular velocity at point Q. **(2mks)**

SECTION B

13.(a) Define impulse and state its SI units. **(2mks)**

(b) A policeman fires a bullet of mass 20g from a gun of mass 2kg, if the bullet emerges at a velocity of 300m/s from the muzzle, calculate the force the gun exerts on the policeman. **(4mks)**

(c) The diagram below shows a spherical object falling through a fluid

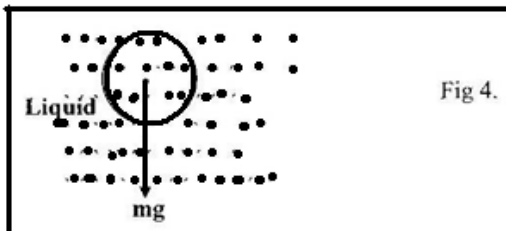


Fig 4.

(i)On the diagram bellow shows two other forces acting on the object **(2mks)**

(d) If a graph of velocity against time for the object above is plotted for various fluids, the sketch below is obtained.

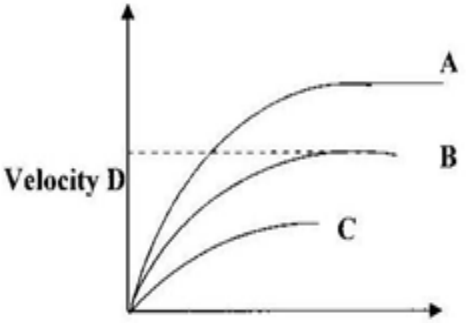


Fig 5

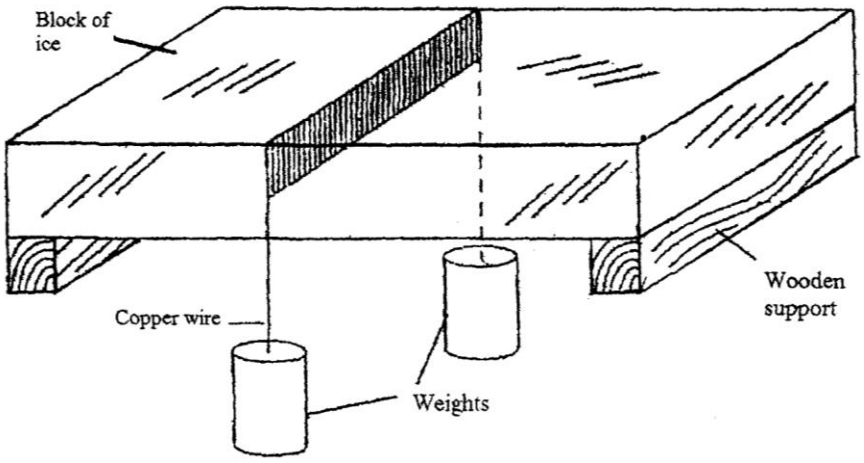
(i) Name the part D **(1mk)**

(ii) Arrange the fluids A,B, & C in order of decreasing density **(1mk)**

(iii) State **one** factor that affects the resultant force of the body above as it falls through the fluid. **(1mk)**

14.(a) Distinguish between latent heat of fusion and specific latent of fusion. **(1mk)**

b) Figure 8 shows a block of ice. A thin copper wire with two heavy weights hanging from its ends-passes over the block. The copper wire is observed to pass through the block of ice without cutting it in a process known as regelation.



(i) Explain this observation, **(3mks)**

(ii) What would be the effect of replacing the copper wire with a cotton thread? Explain. **(2mks)**

c) Figure 9 shows one method of measuring the specific latent heat of fusion of ice. Two funnels A and B, contain crushed ice at 0°C.

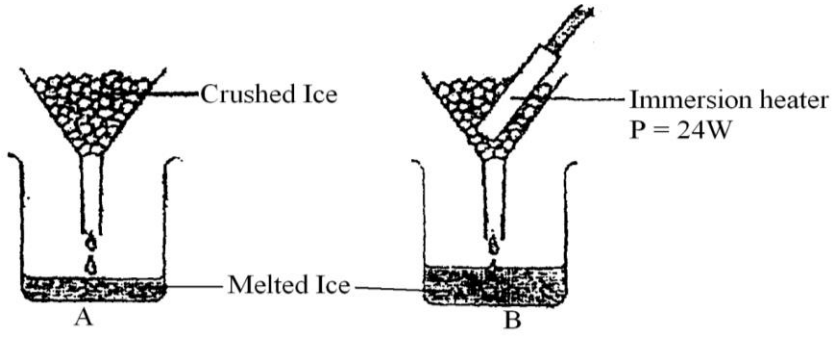


Figure 9

The mass of melted ice from each funnel is measured after 11 minutes. The results are shown below.

Mass of melted ice in A = 24g

Mass of melted ice in B = 63g

(i) What is the reason for setting up funnel A? **(1mk)**

(ii) Determine the:

I. Quantity of heat supplied by the heater. **(2mks)**

II. Mass of ice melted by the heater. **(1mk)**

III.Specific latent heat of fusion of ice. **(3mks)**

15.(a) Fig 8 below shows a stone moving with uniform speed in a horizontal circle.

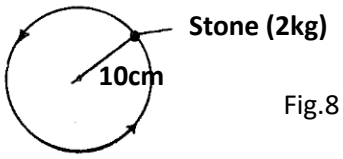


Fig.8

Indicate on the figure the centripetal force (T). **(1mk)**

(b) If the stone takes 15 seconds to describe an arc length of 5 cm. Calculate:-

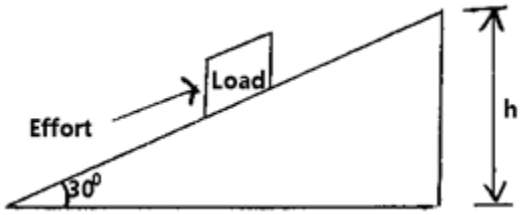
(i) The angle it subtends at the centre. **(2mks)**

(ii) The angular velocity, ω **(2mks)**

(iii) The linear velocity V of the stone **(2mks)**

(iv) The centripetal force (T) **(2mks)**

16. (a) The figure below shows an inclined plane placed at 30^0 to the horizontal so that it can be used to raise a load through a height 'h'. The efficiency is 76%.



(i) Determine Velocity Ratio of the machine **(2mks)**

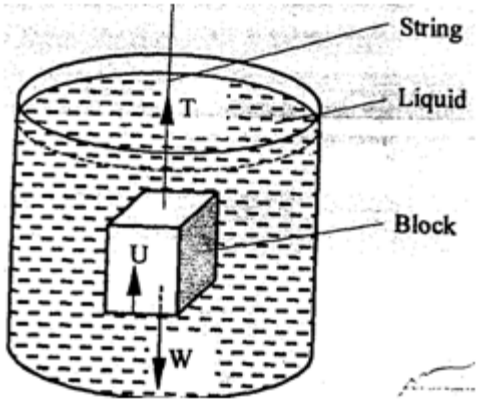
(ii) The efforts needed to move a load of 800N along the plane at a constant velocity. **(3mks)**

(b) (i) Draw a block and tackle pulley system of velocity ratio 4. In your diagram, **Show** the effort and load position. **(2mks)**

(ii) If the pulley system raises a load of 100N at steady rate. **Calculate** the efforts required to raise the load if it is 80% efficient. **(3mks)**

17.(a) State the law of flotation **(1mk)**

The figure below shows a rectangular metal block of density $10500Kg/m^3$ and dimensions 30cm by 20cm by 20cm suspended inside a liquid of density $1200Kg/m^3$ 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 upthrust, U, due to the liquid.



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

(ii) Determine the weight, W, of the block **(3mks)**

(iii) Determine the weight of the liquid displaced by the fully submerged block. **(2mks)**

(iv) Hence determine the tension T, in the string **(2mks)**

(c) A certain solid of volume $50cm^3$ displaces $10cm^3$ of kerosene (density $800Kg/m^3$) when floating. Determine the density of the solid **(3mks)**

NAME: ……..……..……..……..

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K.C.S.E BLUEPRINT PREDICTION
QUESTION PAPER NO: 4

PHYSICS
PAPER 1
(THEORY)
TIME: 2 HOURS

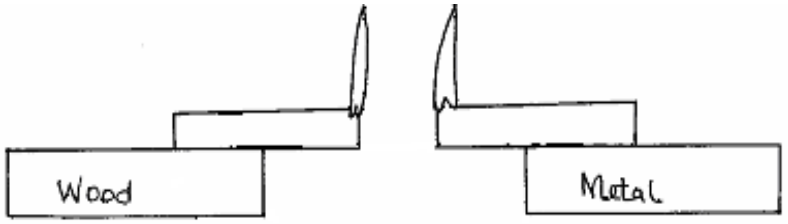
SECTION A: (25 MARKS)

1. χcm of substance A of density 800kg/m³ is mixed with 1000cm³ of water of density 1000kg/m³. The density of the mixture is then 0.96/cm³. Determine the value of χ. **(3mks)**

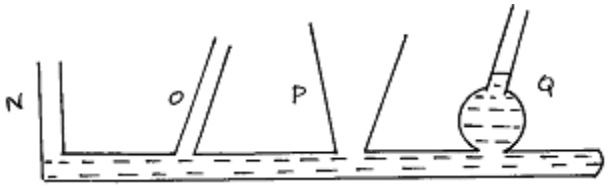
2. When washing clothes, it is easier to remove the dirt using some warm water containing soap than cold water. Explain this observation. **(1mk)**

3. Explain why a thick glass is more likely to break when hot water is poured on it than thin glass. **(2mks)**

4. The figure below shows two identical burning splints. Placed on wood and metal blocks respectively it was observed that when the flame reached the edge of the metal block the splint was extinguished while the other on the wooden block continued to burn. Explain this observation. **(1mk)**



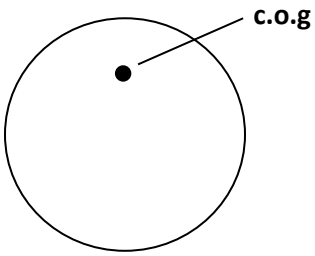
5. The figure below shows water level in limb Q of a glass tube. Indicate the corresponding water levels in limb N, O and P. Explain your answer. **(2mks)**



6. A spring has a spring constant 4N/m. Two identical springs are connected end to end. Find their effective spring constant. **(2mks)**

7. The figure below shows a solid sphere with its centre of gravity marked with a dot.

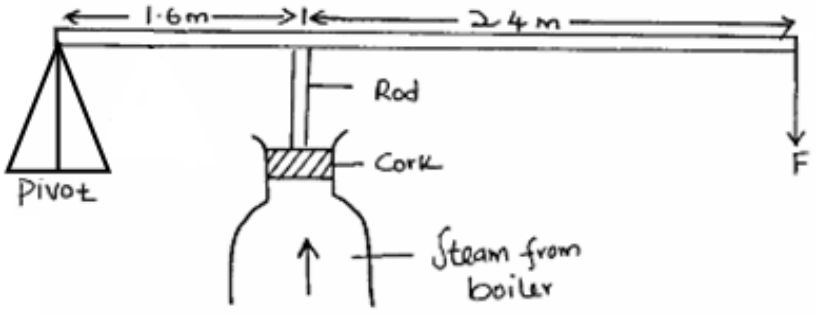
The sphere is rolled on a horizontal ground and comes to rest after. Some time.



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

8. Seen through a hand lens pollen grains particles in water move about randomly. Explain this observation. **(1mk)**

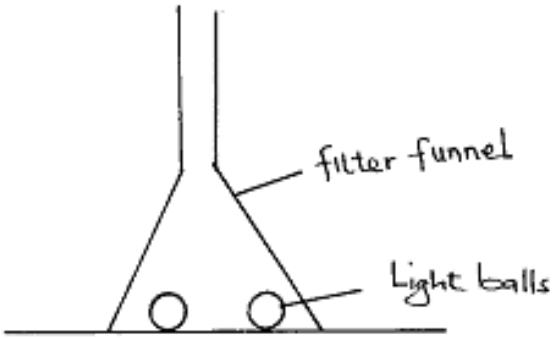
9.A cork enclosing steam in a boiler is held down by the system shown below.



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

10. The figure below shows light balls resting on a flat surface. A filter funnel is then inverted over them.

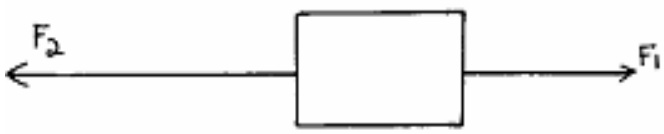
State what is observed when air is blown through the funnel. **(1mk)**



11. Using the kinetic theory for gases, explain how a rise in temperature of a gas causes a rise in the pressure of the gas if the volume is kept constant. **(2mks)**

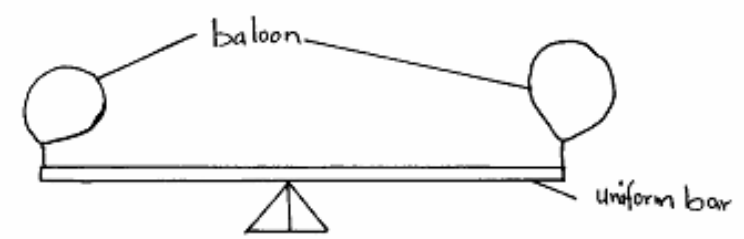
12. An aircraft 320m from the ground travelling horizontally at 50m/s releases a bomb. Calculate the horizontal distance covered by the bomb from the point of release (ignore air resistance and g = 10m/s²). **(2mks)**

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



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

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



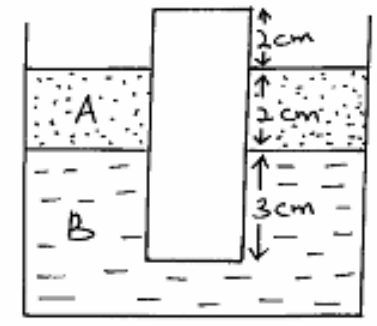
Explain why the bar may not remain in equilibrium if the temperature of the surrounding changes. **(2mks)**

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

SECTION B: (55 MARKS)

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

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



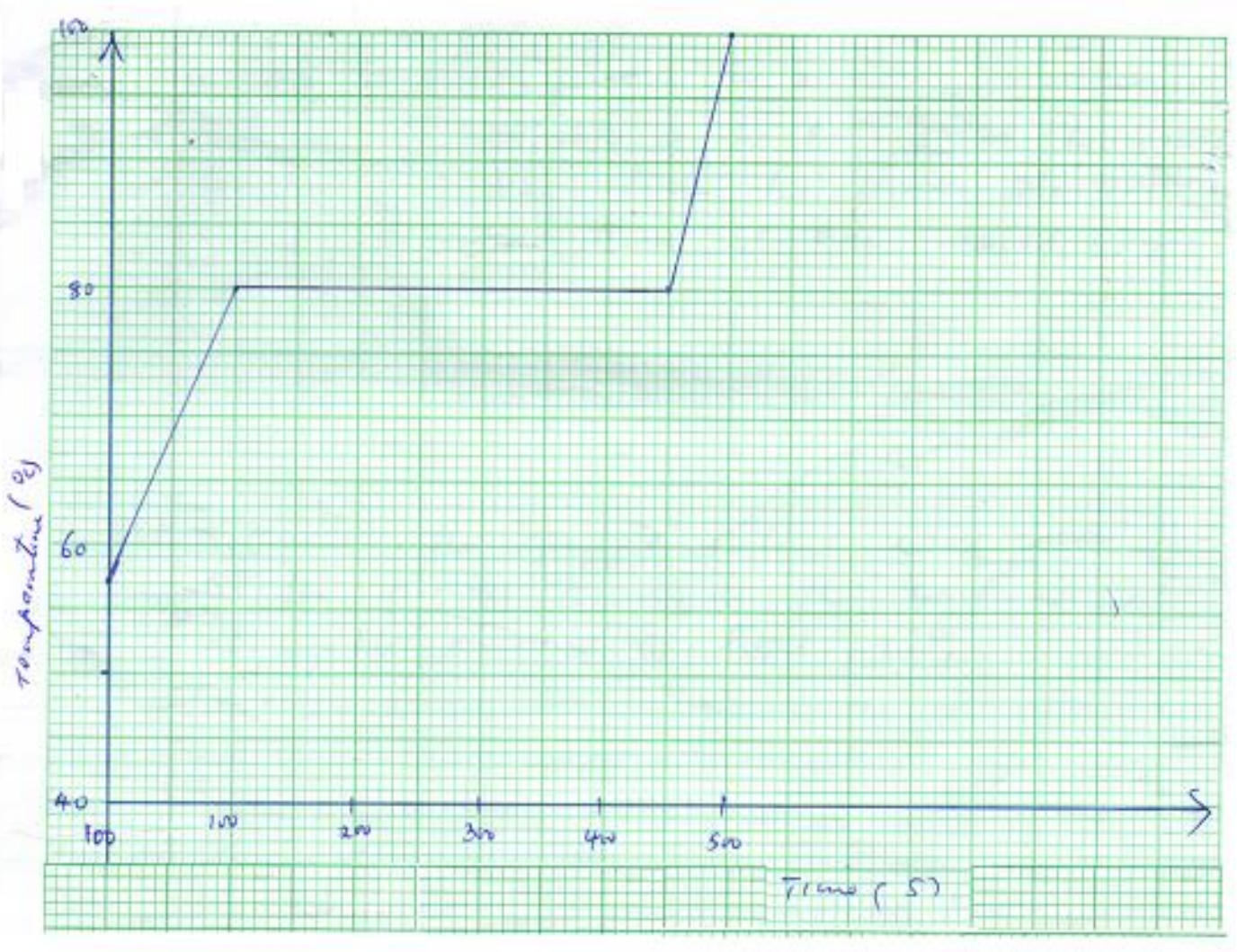
Given that the density of liquid A is 800kg/m³ and that of liquid B is 1000kg/m³ determine.

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

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

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

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



Use the graph to:

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

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

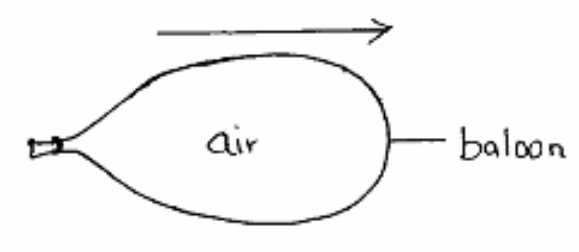
(iii) Determine the specific latent heat of fusion of the powder assuming the container absorbs negligible amount of heat. **(3mks)**

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

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

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

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



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

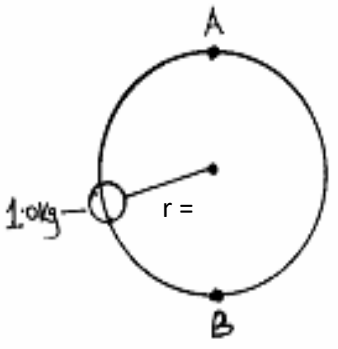
(c) A rock of mass 150kg moving at 10m/s collides with a stationary rock of mass100kg. They fuse after collision. Determine the

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

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

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

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



(i) Determine:

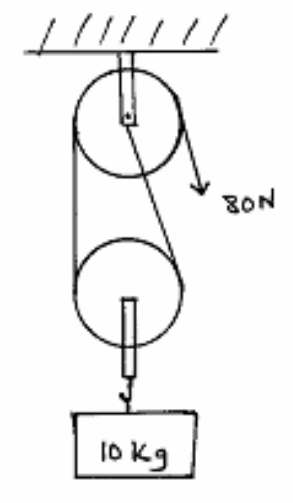
I The centripetal force on the object. **(3mks)**

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)**

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

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



(i) Calculate the distance the effort moves. **(2mks)**

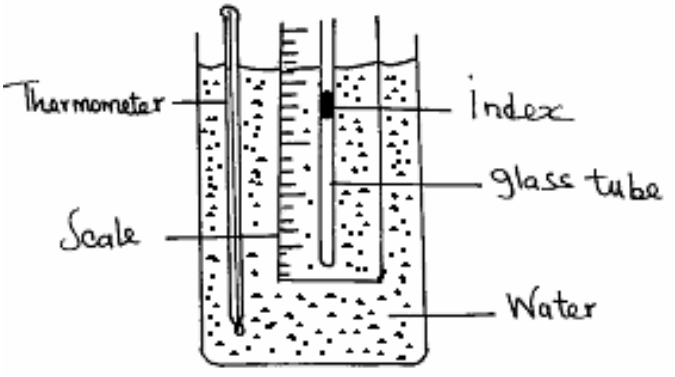
(ii) How much potential energy does the load gain. **(1mk)**

(iii) How much work is done by the effort? **(1mk)**

(iv) What is the efficiency of these pulleys? **(2mks)**

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

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



(i) State **one** missing item in the set-up. **(1mk)**

(ii) Name **two** measurements to be taken in this experiment. **(2mks)**

(iii) Explain how the measurements stated above may be used to investigate Charles Law. **(4mks)**

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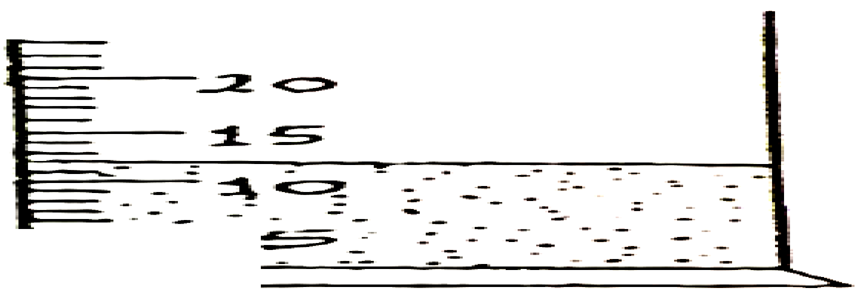
K.C.S.E BLUEPRINT PREDICTION

QUESTION PAPER NO: 5

PHYSICS
PAPER 1
(THEORY)
TIME: 2 HOURS

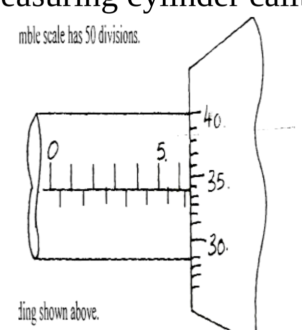
SECTION A (25 MARKS)

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



State the reading shown above. **(2mks)**

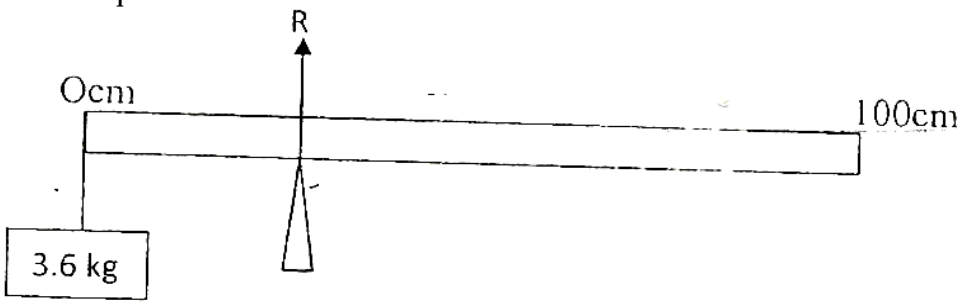
2. The figure below shows water placed in a measuring cylinder calibrated in cm^3



An object of mass 50.1g and density 16.7 g/cm^3 is lowered gently in the water. Indicate on the diagram the new level. **(1mk)**

3. An object is attached to a spring balance and its weight determined in air. It is then gently lowered into a liquid in a beaker. State what will happen to the reading. **(1mk)**

4. The figure below shows a uniform meter rule pivoted at the 23cm mark with a mass of 3.6kg hanging at 0cm mark the system is in equilibrium.



Determine,

i) The weight of the rule **(2mks)**

ii) The normal reaction force R at the rule **(1mk)**

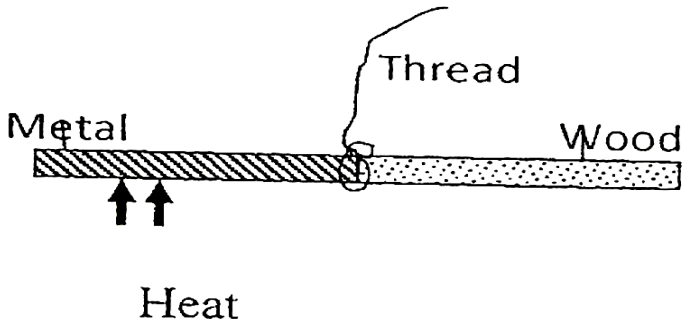
5. When a mercury in a glass thermometer is used to measure the temperature of hot water, it is observed that the mercury level first drops before beginning to rise. Explain **(2mks)**

6. A trolley of mass 0.5kg moving with a velocity of 1.2m/s collides with a second trolley of mass 1.5kg moving in the direction with a velocity of 0.2m/s. If the Collins is inelastic, determine the velocity of the trolleys after collision. **(3mks)**

7. A block of copper of mass 2kg and specific heat capacity 400 J/kg K initially at 81^0C is immersed in water at 20^0C. If the final temperature is 21^0C, determine the mass of water. **(3mks)**

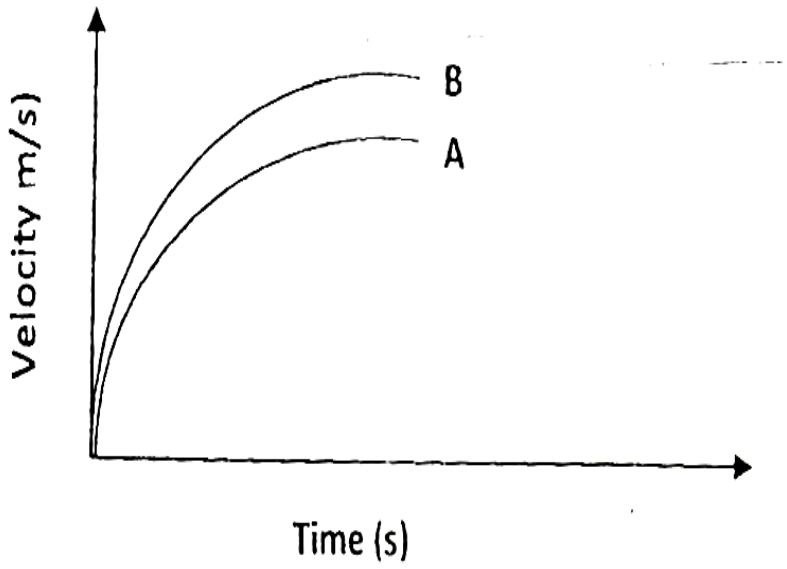
8. When a body of mass 0.25kg is acted on by a force, its velocity changes from 5m/s to 7.5m/s, determine the work done by the force. **(3mks)**

9. The following figure shows a rod made of wood on one end and metal on the other end suspended freely with a piece of thread so that it is in equilibrium.



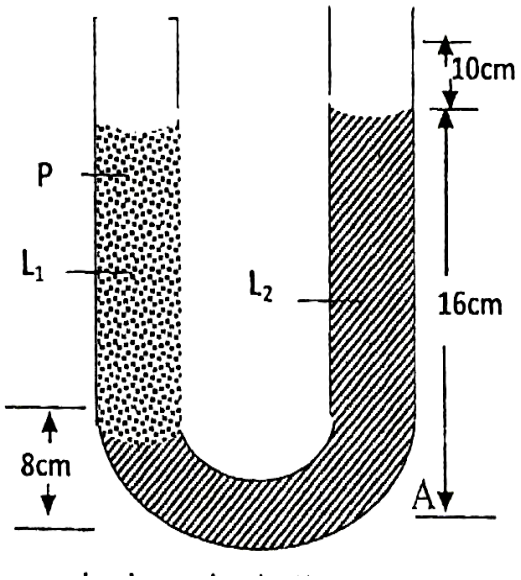
The side made of metal is now heated with a Bunsen flame. State with a reason, the side to which the rod is likely to tilt. **(2mks)**

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



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

11. A u-tube vertically holds two liquids L_1 and L_2 as shown in the figure below.

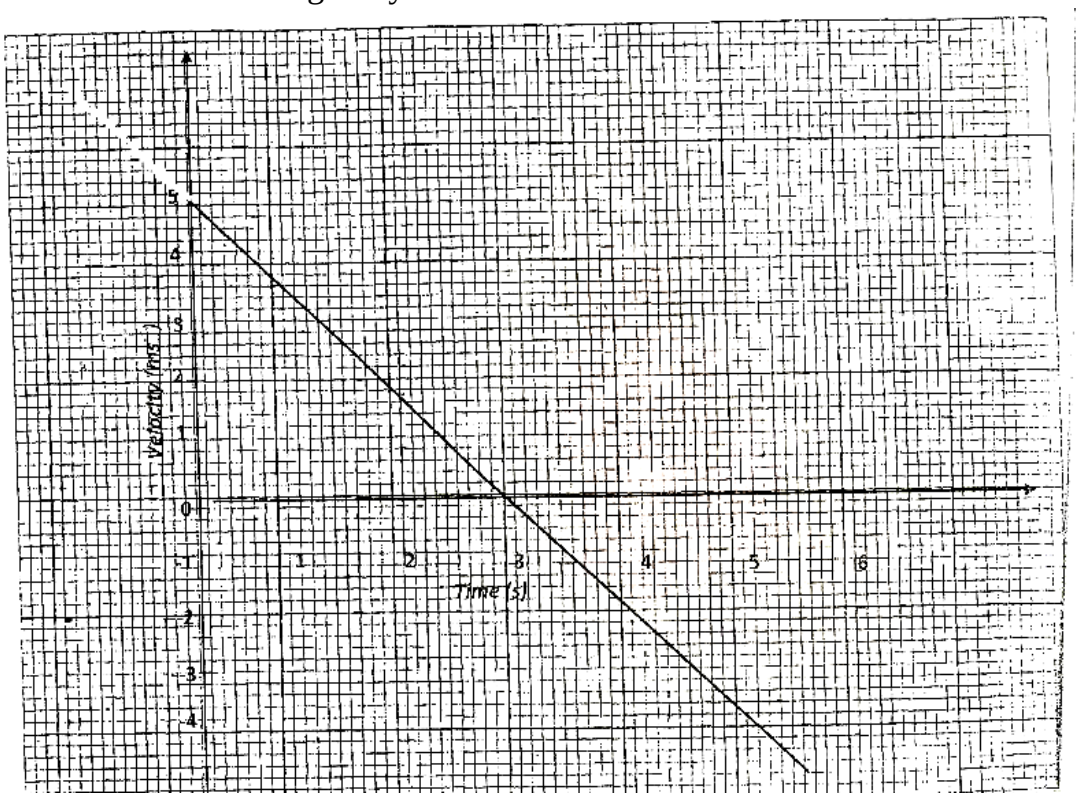


(a) Mark accurately the point in liquid L_2 that is at the same pressure as point P **(1mk)**

(b) If the atmospheric pressure is 103000N/m^2 and the density of liquid L_2 is 103kg/m^3 determine the pressure acting at point A. **(3mks)**

SECTION B (55 MARKS)

12.(a) The velocity-time graph in the figure below illustrates the motion of a ball which has been projected vertically upwards from the surface of the moon. The weight of the object on earth's surface is 20N, when the acceleration due to gravity is $10ms^{-2}$.



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

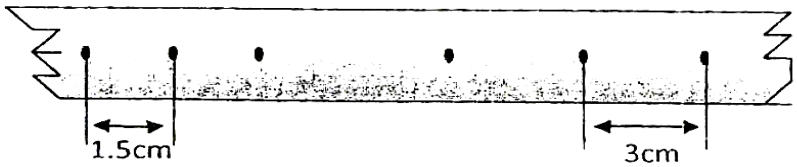
(ii) Determine the acceleration of free fall on the moon showing clearly your work **(1mk)**

(iii) Determine the total distance traveled by the ball in 1.0 sec **(2mks)**

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

(v) If the ball was projected vertically upwards on the earth with the same velocity. What difference would you expect to observe in the velocity-time graph above? Illustrate with a sketch on the same axis. **(1mk)**

(b) The figure below represents part of a tape pulled through the ticker-timer of frequency 50Hz moving down an inclined plane.



If the trolley was allowed to move down the inclined plane for 4 seconds. Calculate the distance it covers. **(3mks)**

13.a) State two differences between boiling and evaporation. **(2mks)**

(b) 200g of a solid was uniformly heated by a 0.2kw heater for sometime. The graph in the figure below shows how the temperature of the solid changed with time.

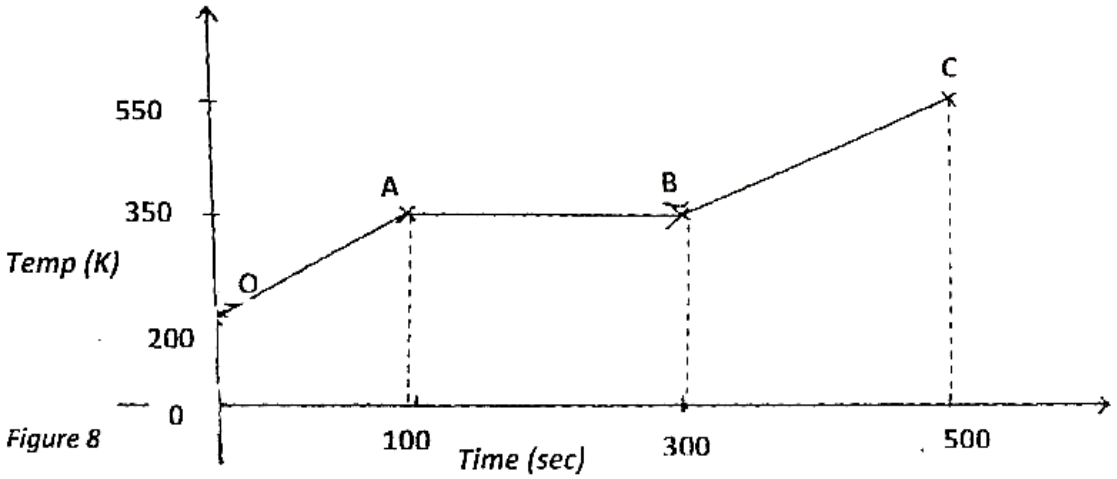


Figure 8

(i) Explain what is happening between OA and AB. **(2mks)**

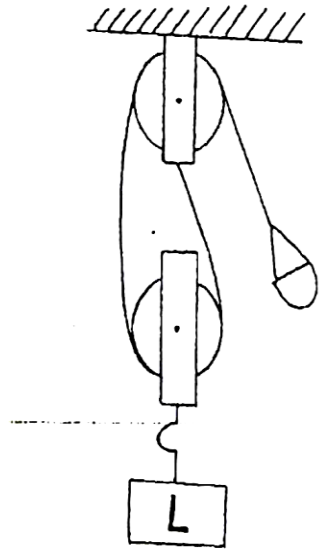
(ii) Calculate the specific heat capacity of the solid. **(3mks)**

(iii) Calculate the specific latent heat of fusion **k** of the solid. **(3mks)**

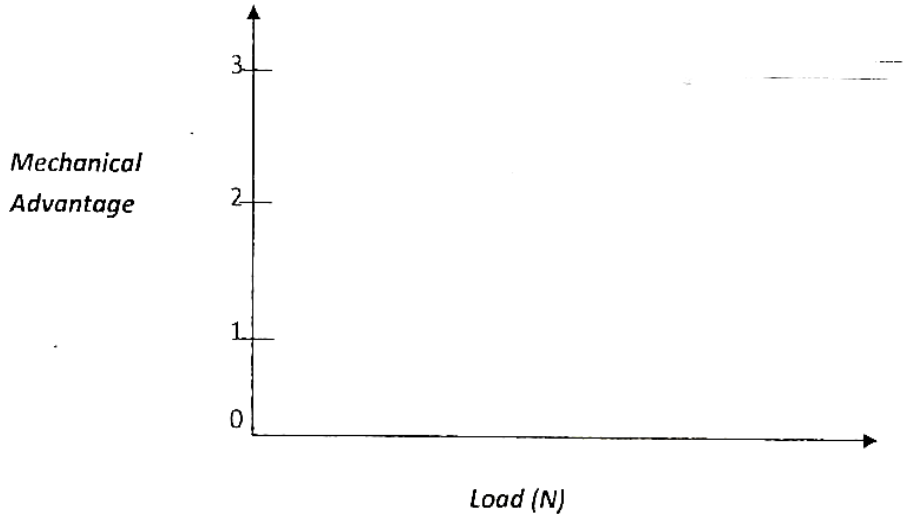
14.(a) (i) Define the term velocity ratio (V.R) **(1mk)**

(ii) Name one machine that has a velocity ratio of less than one (V.R < 1) **(1mk)**

(b) The figure below shows a set-up used to find the mechanical advantage of a pulley system\



On the axes provided sketch a graph of mechanical advantage (M.A) against load (L) (2 marks)



(c) A hydraulic machine is used to raise a load of 100kg at a constant velocity through a light of 2.5m. The radius of the effort piston is 1.4cm while that of the load piston is 7.0cm. given that the machine is 80% efficient, calculate: -

(i) The effort needed **(3mks)**

(ii) The energy wasted when using the machine **(3mks)**

15.a) Define pressure and state its S.I Units. **(2mks)**

b) State Pascal's principal. **(1mk)**

c) In construction of a mercury barometer care is taken to make sure it has no gas in the space above mercury.

i) How would you test whether there is gas above? **(1mk)**

ii) State the problem caused by the presence of gas in the barometer. **(1mk)**

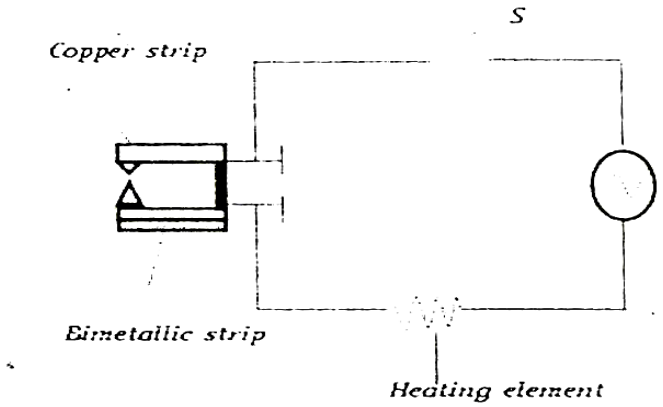
d) Find the total pressure experienced by a diver 8 meters below the sea surface.

Take; Atmospheric pressure = 103 360N/m^2. Density of sea water 1030kg/m^3 **(3mks)**

e) i) The air pressure at the base of a mountain is 75.0cm of mercury while at the top it is 60.0cm of mercury. Given that the average density of air is 1.25kgm^{-3} and the density of mercury is 13600 km^{-3}, calculate the height of the mountain.

ii) State factors that affect pressure due to liquid column. **(2mks)**

16.a)The figure below shows a circuit diagram for a device for controlling the temperature in a room.



i) Explain the purpose of the bimetallic strip. **(2mks)**

ii) Describe how the circuit controls the temperature when the switch is closed. **(2mks)**

b)(i) Explain why bodies in circular motion undergo acceleration even when their speed is constant. **(1mk)**

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

a. Its angular velocity **(2mks)**

b. Its periodic time. **(2mks)**

(iii) A stone of mass 40g is tied to the end of a string 50cm long and whirled in a vertical circle at 2rev/s. Calculate the maximum tension in the string. **(3mks)**

NAME: ……..……..……..……..

SCHOOL: ……..……..……

INDEX NO: ……..…..……..… CANDIDATE'S SIGNATURE: ……..……...

DATE: ……..……

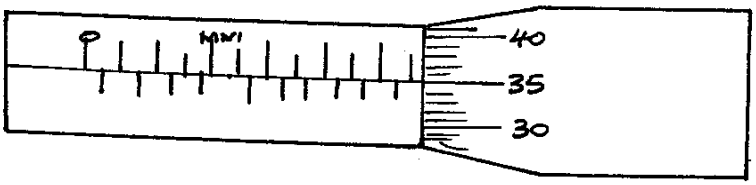
K.C.S.E BLUEPRINT PREDICTION

QUESTION PAPER NO: 6

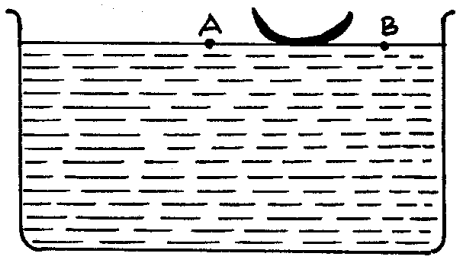
PHYSICS
PAPER 1
(THEORY)
TIME: 2 HOURS

Section A (25 marks)

1. Figure 1 shows a scale of part of a micro meter screw gauge . If the instrument has a zero error of -0.08mm, determine the correct reading . **(2mks)**



2.Figure 2 shows a toy boat on the surface of water



It is observed that when a few crystals of common salt are added to water at point B, the toy boat moves towards point A. Explain this observation. **(2mks)**

3. In an experiment to determine the density of sea water a student mixed $18cm^3$ of fresh water of density $1g/cm^3$ with $22cm^3$ of sea water. The density of the resulting mixture was $1.011g/cm^3$, determine the density of sea water **(3mks)**

4.Sketch on the axis, a graph of mass per unit volume of water against temperature from 0^0C to 10^0C. **(2mks)**

5. A student dropped a drop of oil and water respectively on a clean glass surface as shown in figure 3

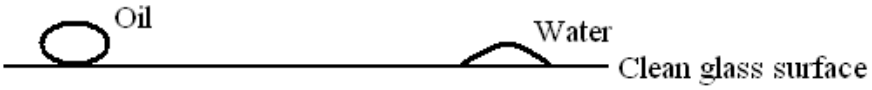
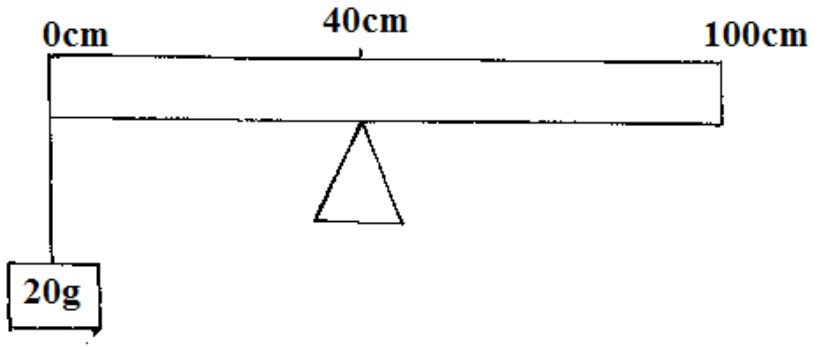


Figure 3

Explain the difference in the shapes formed on the surface of glass **(2mks)**

6. Figure below shows a uniform metre rule pivote at the 40cm mark. The meter rule balances horizontally when a mass of 20g is hung at the zero (0) cm mark

Figure 4.



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

7. Racing cars are built low and have wide small radial tyres. Explain **(2mks)**

8. Figure 5 shows a pith ball at the bottom of a bottle container and air blown over the mouth of the container.

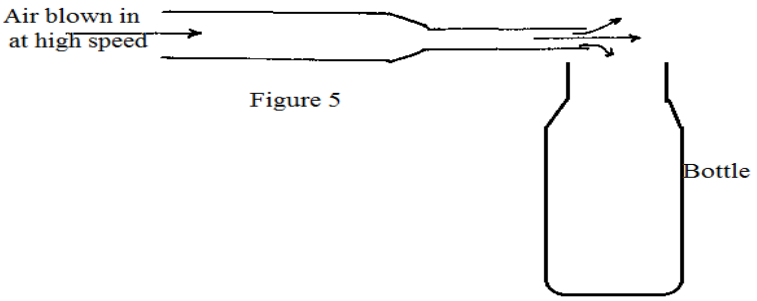


Figure 5

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

9. Explain how heat loss by the modes of heat transfer is minimized in a thermos flask **(2mks)**

10. Sketch a graph of force against extension for a spring obeying Hook's law **(1mk)**

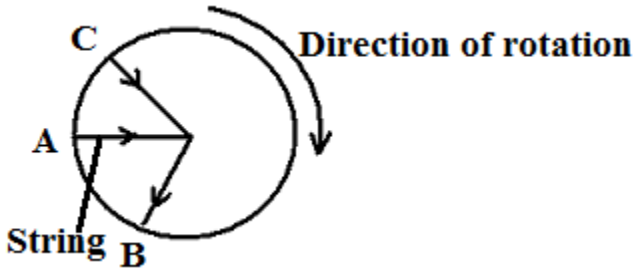
11. State the accuracy level of vernier callipers. **(1mk)**

12. State the reason why a sharp pin penetrates easily on a soft cardboard than a blunt pin. **(1mk)**

13. On the space provided, sketch a velocity time graph for a body thrown vertically upwards with an initial velocity of 20m/s attaining a maximum height after 3 seconds and returning to the same point. **(1mk)**

SECTION B (55 MARKS)

14.(a) Figure 6 shows a stone whirled in a horizontal circle.



Indicate on the diagram the direction of the stone, if the string snaps at point B **(1mk)**

(b)A van mass 500kg moves round a circular track of radius 50m with a linear speed of 10m/s.

Determine;

(i) The angular velocity of the van. **(3mks)**

(ii) The centripetal acceleration of the van . **(3mks)**

(iii) The centripetal force of the van **(3mks)**

15.(a) Explain why a nail rubbed with oil penetrates timber easily when hammered than a dry nail. **(2mks)**

(b) A ball of mass 2kg falls from a height of 30m . Calculate;

(i) The velocity of the ball just before impact on the ground. **(3mks)**

(ii) Gravitational potential energy of the ball. **(3mks)**

(iii) The velocity with which it leaves the ground, if the ball bounces to a height of 15m. **(3mks)**

(iv) Explain why the ball does not reach the initial height after the bounce. **(2mks)**

16(a) Why does a scald from steam cause more harm than one from boiling water? **(1mk)**

(b) In an experiment to determine the specific latent heat of ice, 25g of dry ice at 0^0C is melted up in 0.25kg of water at 20^0C in a copper calorimeter of mass 0.10kg. The final temperature of mixture falls to 11^0C . Calculate;

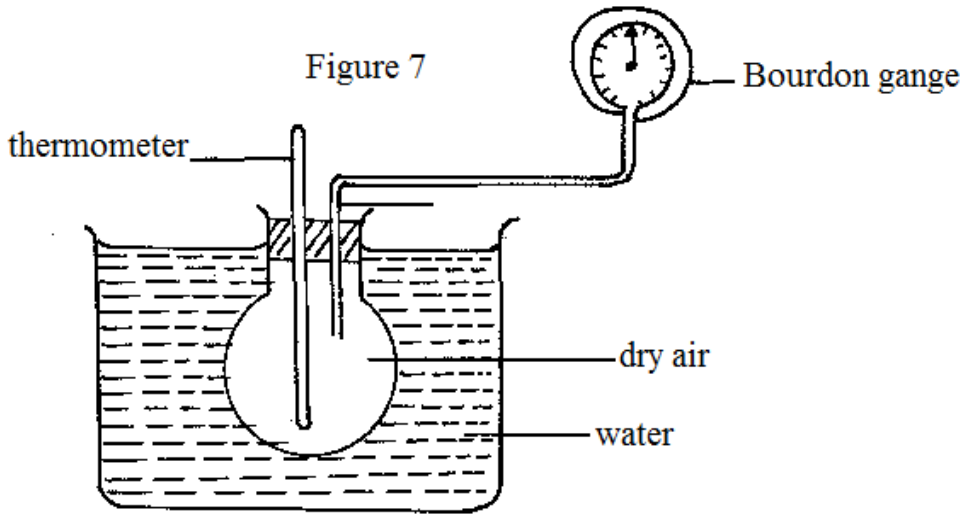
(i) Heat lost by calorimeter **(3mks)**

(ii) Heat lost by water **(3mks)**

(iii) Specific latent heat of fussion of ice **(4mks)**

17.(a) Figure 7 shows a set up of the apparatus to verify pressure law.

Figure 7



(i) State the measurements that should be taken in the experiment **(2mks)**

(ii) What are the precautions that should be taken during the experiment. **(3mks)**

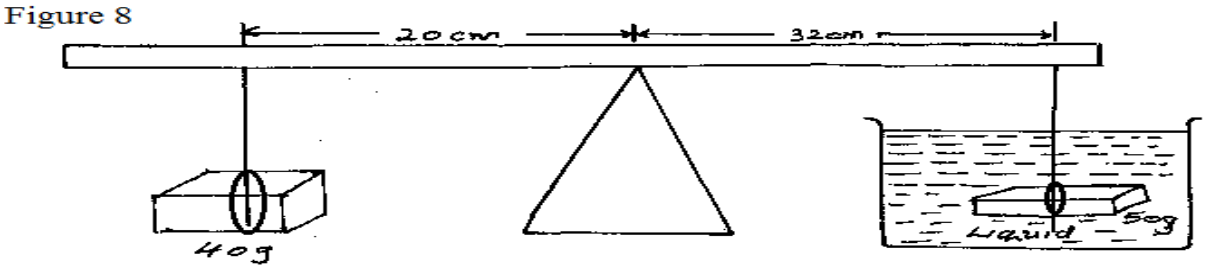
(b) Explain, in terms of kinetic theory, how an increase in temperature of gas at constant volume result to an increase in pressure **(2mks)**

(c) Determine the temperature to which $200cm^3$ of a gas at 27^0C must be heated at constant pressure in order to raise its volume to $250cm^3$. **(3mks)**

18.(a) A submarine is designed to float or sink below the surface of water . Explain how a submarine is made to sink. **(2mks)**

(b) Figure 8 shows a block of mass 50g and density $2000kg/m^3$ submerged in a certain liquid and suspended from a uniform horizontal beam by means of a string. A mass of 40g is suspended from the other end of the beam to put the system in equilibrium.

Figure 8



(i) Determine the up thrust force acting on the block. **(3mks)**

(ii) Calculate the density of the liquid. **(3mks)**

(iii) Calculate the new balance point of the 50g mass(the 40g mass remain fixed) If the liquid was replaced with one whose density is $1500Kg/m^3$ **(3mks)**

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SCHOOL: ……..……

INDEX NO: ……..…..……..… CANDIDATE'S SIGNATURE: ……..…….....

DATE: ……..……

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QUESTION PAPER NO: 7

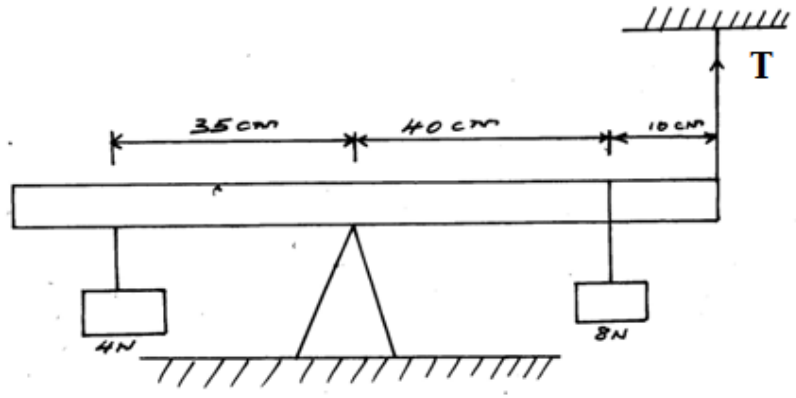
PHYSICS
PAPER 1
(THEORY)
TIME: 2 HOURS

SECTION A (25MKS)

1. Draw a vernier scale to show a reading of 3.14cm. **(lmk)**

2. A solid weighs 16.5N on the surface of a planet. The force of gravity on the planet is I .7Nkg^{-}.
Determine the mass of the solid. **(2mks)**

3. The figure below (figure 1) shows a uniform metal rod balanced at its centre by different forces.



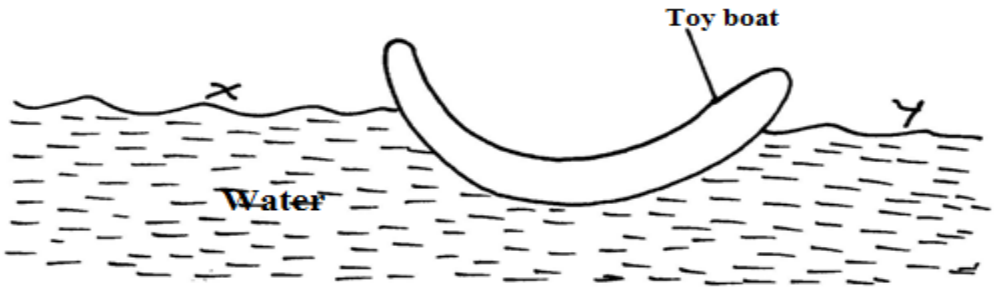
Determine the value of T. **(3mks)**

4. An object of weight 40N attached at the end of a spring balance causes an extension of 0.5cm on the Spring.

(a) Determine the force per unit length. **(2mks)**

(b) Calculate the energy stored in the spring. **(2mks)**

5. Figure 2 shows a small toy boat floating on water in a basin X and Y are two points near the toy.



When a hot metal rod is dipped into the water at point X the toy is observed to move towards Y. Explain this observation. **(2mks)**

6. Two identical tubes, A and B, held horizontally contain air and water respectively. A small quantity of coloured water is introduced at one end of A while at the same time, a small quantity of coloured water is introduced at one end of B. State with reasons the tube in which the colour will reach the other end faster. **(2mks)**

7. Analo kicks a ball mass 0.6kg initially at rest using a force of 720N. If the foot was in contact with the ball for 0.1 seconds, what was the take off speed of the ball? **(2mks)**

8.a) A car starting from rest accelerates uniformly for 5 minutes to reach $30ms^{-}$. It continues at this speed for the next 20 minutes and then decelerates uniformly to come to a stop in 10 minutes. Sketch a velocity time(s) graph for the above motion. **(1mk)**

(b) Determine the distance travelled when the car was decelerating. **(2mks)**

9. Give two reasons why the efficiency of a pulley system is always less than 100% . **(2mks)**

10. Mechanics is one of the branches of physics. State what it deals with. **(1mk)**

11. A faulty thermometer reads 22°c when dipped in to pure melting ice and 97°c when in steam. Find the thermometer reading when in a liquid at 60°c . **(3mks)**

SECTION B (55MKS)

12.a) An object is released to fall vertically from a height of 100m. At the same time, another object is projected vertically upwards with a velocity of $40ms^{-1}$.

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

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

b) A stone is projected horizontally at a speed of 40m from a cliff 60m high. Calculate the time it takes to strike the ground. **(2mks)**

c) A string of negligible mass has a bucket tied at its 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 **(1mk)**

ii) Angular acceleration **(2mks)**

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

(iv) The linear velocity **(lmk)**

13.a) Define the term efficiency of a machine. **(lmk)**

b) Figure 3 shows a drum of mass 90kg being rolled up a plane inclined at 25° with the horizontal. The force F applied is 420N and the distance moved by the drum along the plane is 5.2m.

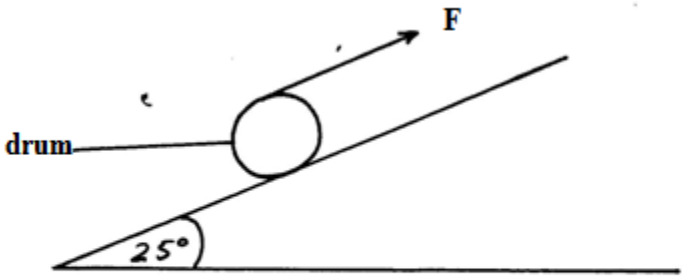


Figure 3

(a) Determine:

(i) The work done by the effort **(3mks)**

(ii) The work done in raising the drum. **(3mks)**

(iii) The efficiency of the inclined plane**.** **(2mks)**

14.a) Define specific latent heat of fusion of a substance**.** **(lmk)**

b) Water of mass 200g at a temperature of 60°c is put in a well lagged copper calorimeter of mass 80g. A piece of ice at 00 and mass 20g is placed in the calorimeter and the mixture stirred gently until all the ice melts. The final temperature x, of the mixture is then measured.

Take lf=334000Jkg^{-1}, s.h.c (water = 4200Jkg-lk-l and s.h.c for copper =900Jkg^{-}1 k-1.

Determine:

(i) The heat observed by the melting ice at 0°**.** **(2mks)**

ii) The heat absorbed by the melted ice (water) to raise the temperature to x. (answer may be given in terms of x.) **(2mks)**

iii)The heat lost by the warm water and the calorimeter. (answer may be given in terms of x). (answer may be given in terms of x). **(2mks)**

iv) the final temperature x of the mixture. **(4mks)**

v) State any assumption you made in (iv) above. **(lmk)**

15.a) State what is meant by an ideal gas.

b. The pressure acting on a gas in a container was changed steadily while the temperature of the gas was maintained constant. The value of volume V of the gas was measured for various values of pressure P and the reciprocal of volume $\frac{1}{v}$.

(i) suggest two ways on how temperature of the gas could be kept constant. **(2mks)**

(ii) Given that the relation between the pressure P and the volume V of the gas is given by PV=K, where K is a constant, use of the graph to determine the value of K. **(4mks)**

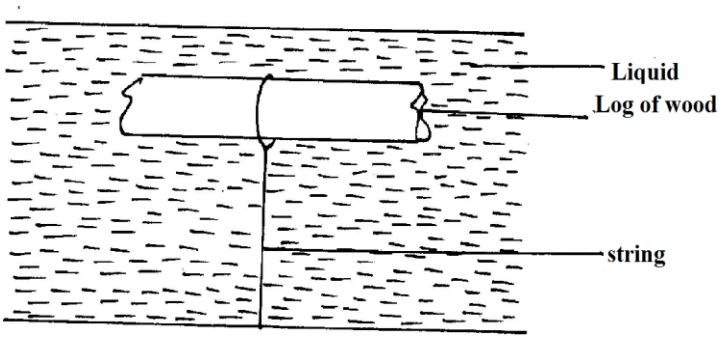
(iii) What physical quantity does K represent? **(1mk)**

(iv) State one precaution you would take when performing such an experiment. **(1mk)**

(c) $0.02m^3$ of gas at 27°c is heated at pressure until the volume is $0.03m^3$. Calculate the final temperature of the gas in ^{0}c. **(2mks)**

16.a) **Figure 4** below shows a log of wood of mass 20kg submerged in a liquid of density $1gcm^{-3}$ and held in position by a string fixed to the bottom of a pond. Given that the density of wood is 800kgm-3 determine:

(i) The volume of the log **(3mks)**



(ii) The up thrust on the log **(2mks)**

(iii) Tension in the string **(2mks)**

c) Figure5 (drawn to scale) shows a section of a tape after passing through a ticker time operated at a frequency of 50HZ-. The tape is attached to a trolley moving in the direction shown.

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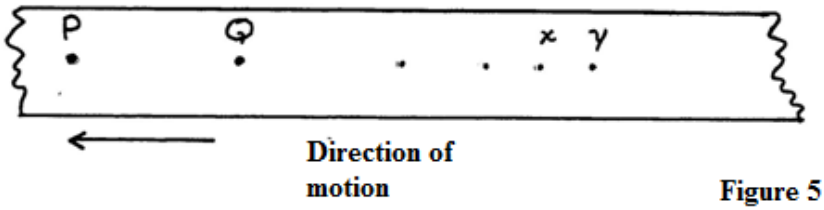


Figure 5

Determine the velocity between P and Q. **(3mks)**

NAME: ……..……..……..……..

SCHOOL: ……..……..……

INDEX NO: ……..…..……..… CANDIDATE'S SIGNATURE: ……..……...

DATE: ……..……

K.C.S.E BLUEPRINT PREDICTION
QUESTION PAPER NO: 8

PHYSICS
PAPER 1
(THEORY)
TIME: 2 HOURS

SECTION A (25 marks)

1. The water level in a burette is 30.6cm³, 50 drops of water each of volume 0.2cm³ are added to the water in the burette. What is the final reading of the burette. **(2mks)**

2. Figure 1 shows a graph showing the behaviour of a helical spring.

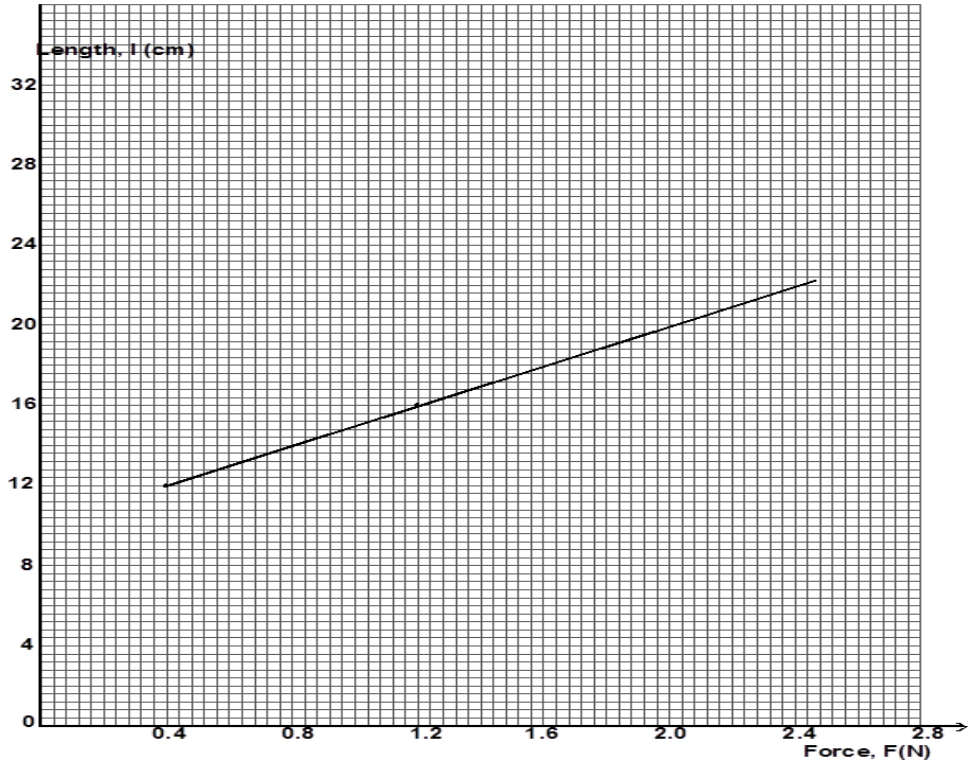


Fig 1

Determine the spring constant in SI units. **(3mks)**

3.Two forces are acting on a body as shown in figure 2.

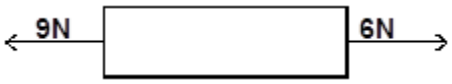
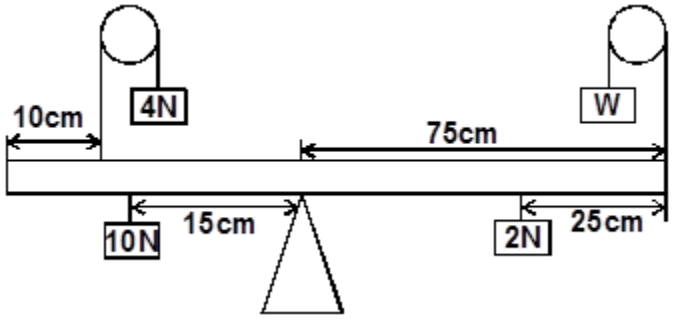


Fig 2

By use of a vector, draw the body and show the resultant force. **(1mk)**

4. Two identical beakers A and B containing equal volumes of water are placed on a bench. The water in A is cold while in B is warm. Identical pieces of potassium permanganate are placed gently at the bottom of each beaker inside the water. It is observed that the spread of colour in B is faster than in A. Explain this observation. **(2mks)**

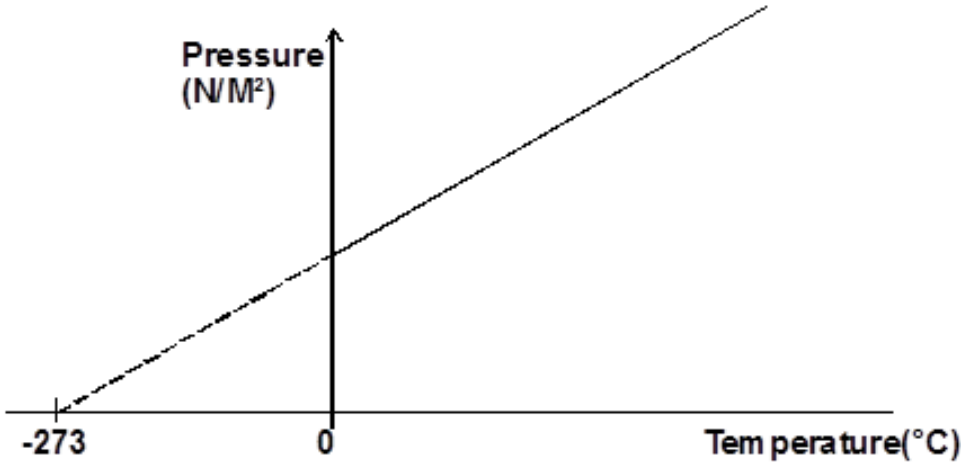
5. Figure below shows a uniform bar of weight 5N and length 1.1m pivoted at a point and in equilibrium under the action of the forces shown.



Determine the value of weight W. **(3mks)**

6. State the contribution physics has made to the entertainment industry. **(1mk)**

7.State one limitation of the micrometer screw gauge. **(1mk)**



8. State the law represented in figure above. **(1mk)**

9.Alcohol was placed in a flask fitted with an air tight cork as shown in figure 5.

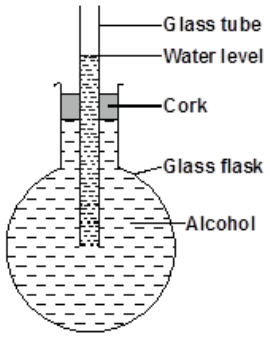


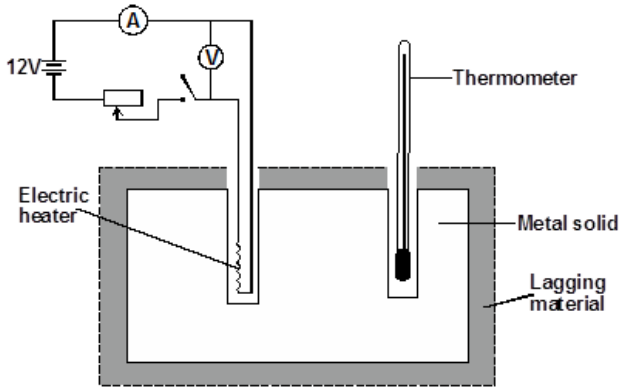
Fig 5

State and explain what would be observed if the flask was cooled. **(3mks)**

10.A boy poured some boiling water into a plastic can and placed an air-tight cork on its open end. He then ran some cold water on it for about 20 seconds after which he shook the can vigorously. State and explain what he observed. **(3mks)**

11. Water flows along a horizontal pipe of cross-sectional area 30cm². The speed of the water is 4m/s but it reaches 7.5m/s in a constriction in the pipe. Calculate the area of the constriction in m² **(3mks)**

1**2.**The arrangement in figure below was used to determine the specific heat capacity of the metal.



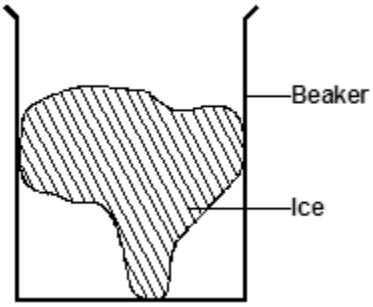
State the precautions that need to be taken. **(2mks)**

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

SECTION B : (55 marks)

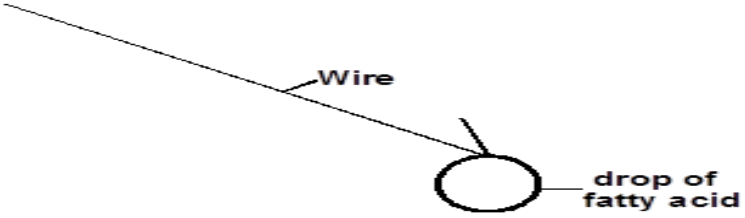
14.a) **i)**State two conditions necessary for equilibrium of a body acted upon by a number of forces. **(2mks)**

ii) Figure below shows beaker containing a block of ice.



State and explain the change in stability when the ice melts. **(3mks)**

b) Figure below shows a drop of fatty acid on a wire of diameter 1.4mm



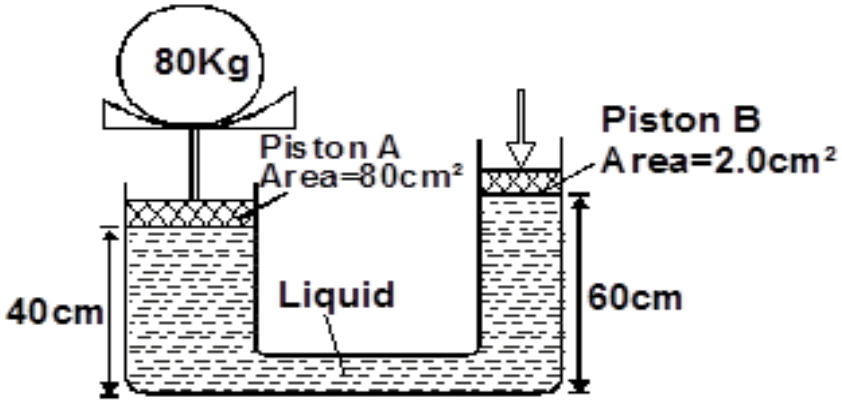
When the drop of the fatty acid was placed on clean water surface it formed a circular patch of diameter 91cm.

i) Estimate the length of the molecule of the fatty acid. **(3mks)**

ii) State the assumption made in part (i) above. **(1mk)**

15. a) State the principle of transmission of pressure in liquids. **(1mk)**

b) A mass of 80kg is being lifted by a force F applied on the other piston of the machine as shown in figure below



Determine the value of F needed to just lift the 80kg mass given the density of the liquid is 1.2g/cm³.

(4mks)

c) Give one reason why a lift pump raises water to heights less than 10m. **(1mk)**

d) In an experiment, it was observed that soapy water placed on a wet smooth surface displaced the particles of non-soapy water. Sate and explain this observation. **(2mks)**

16.a) A block of metal of mass 250g 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 was found to be 40°C. Determine; ($C_w = 4200Jk^{-1}$)

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

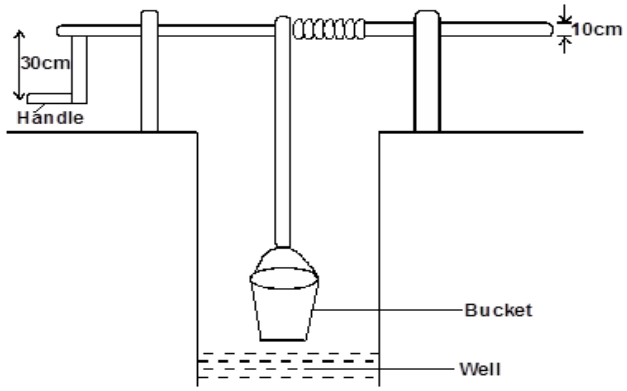
ii) Heat gained by water. **(2mks)**

iii) Heat lost by the block. **(2mks)**

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

b) Hot milk in a bottle cools faster when wrapped in a wet cloth than when the bottle is immersed in cold water in a bucket. Explain. **(2mks)**

17.a) The machine represented in the diagram can be used to lift water from a well.

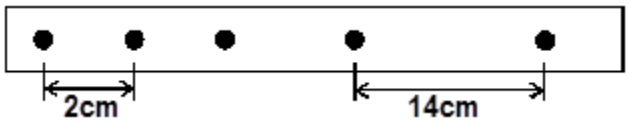


A force of 50N applied on the handle lifts water of weight 180N

i) Calculate the efficiency of the machine. **(4mks)**

ii) Give a reason why the efficiency is less than 100%. **(1mk)**

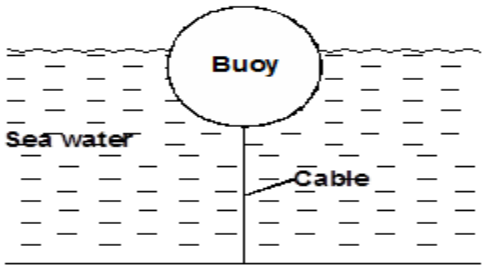
b) The five-tick tape shown below was produced by a ticker timer connected to mains supply of 50Hz when a force pulls the trolley.



Determine the acceleration of the trolley. **(4mks)**

18.a)i) State Archimede's principle. **(1mk)**

ii) Figure below shows a buoy, M, of volume 120 litres and mass 60kg. It is held in position in sea water of density 1.04g/cm³ by a light cable fixed to the bottom so that ¾ of the volume of the buoy is below the surface of the sea water.



Determine the tension T in the cable. **(4mks)**

b)i) During cold season boys looking after cattle lit a fire in a Kimbo tin and whirl it round vertically without its contents falling out. Explain. **(1mk)**

ii)A particle is moving in a circular path of radius 0.4m with velocity of 7.5m/s. Determine its angular velocity. **(3mks)**

19.a) State a condition which should be attained by a body in a viscous fluid to have terminal velocity. **(1mk)**

ii) A block of metal having a mass of 30kg requires a horizontal force of 100N to move it with uniform velocity along a horizontal surface. Calculate the co-efficient of friction. **(3mks)**

b)i) State Charles' law. **(1mk)**

ii) Give **three** reasons why gas laws do not hold at low temperatures. **(3mks)**

c) Distinguish between elastic and inelastic collisions. **(1mk)**

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K.C.S.E BLUEPRINT PREDICTION
QUESTION PAPER NO: 9

PHYSICS
PAPER 1
(THEORY)
TIME: 2 HOURS

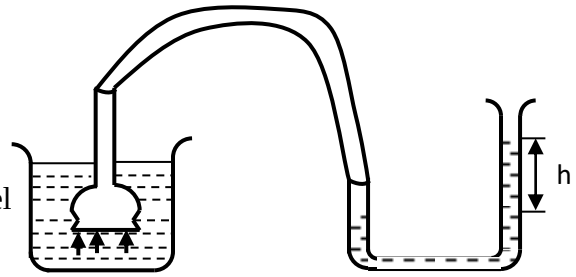
SECTION A (25 MARKS)

1. State the reading in seconds indicated on the digital stopwatch shown in the figure below. **(2mks)**

2. An aircraft 250m from the ground, travelling horizontally at 450m/s releases a parcel. Calculate the horizontally distance covered by the parcel from the point of release
(Take g = 10m/s^2 and ignore air resistance) **(3mks)**

3. State one factor that would increase the surface tension of pure water in a beaker of water. **(3mks)**

4. The diagram below shows a set up used by a student to show variation of pressure in a liquid. State and explain the effect on the height, h, when the thistle funnel used moved towards the surface of the liquid. **(2mks)**

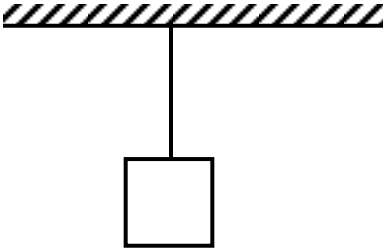


5. A body of mass 3kg moving with a velocity of 4m/s collides head on with a stationary body of mass 1.5kg and imparts to it a velocity of 3.2m/s. Calculate the velocity of the 3kg body after collision. **(2mks)**

6. A footballer kicks a ball of mass 0.6kg initially at rest using a force 960N. If the foot was in contact with the ball for 0.1 seconds, determine the take off speed of the ball. **(2mks)**

7. The relative density of a solid is 2.4. Determine the upthrust it experiences when floating on water if the weight is 200N in air. **(2mks)**

8. State and indicate two forces that come into play when a body is suspended by a string in air. **(2mks)**



9. A turntable of a record player makes 90 revolutions per minute. Calculate its angular velocity in radians per seconds. **(2mks)**

10. A man uses a pulley of velocity ratio 4 to lift a load. Determine the mechanical advantage of the system given that the efficiency of the system is 75%. **(2mks)**

11. A 50W heating coil is totally immersed in 200g of water contained in an insulated flask of negligible heat capacity. The initial temperature of the water in the flask is 25^0C. Determine how long it takes for the water to boil at 100^0C when the heater is switched on.

(Take specific heat capacity of water = 4200 $JKg^{-1}K^{-1}$) **(2mks)**

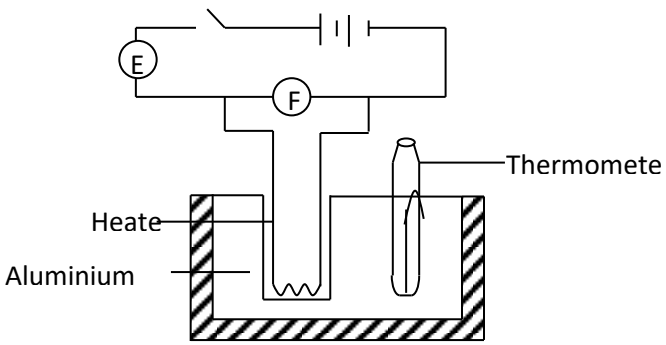
12. A gas occupies a volume of 4 litres when its temperature is 20^0C. Calculate the new volume of the gas if its temperature is raised to 90^0C at a constant pressure. **(2mks)**

13. A car goes round a flat circular bend whose radius is 100m at a constant speed of 30m/s. Give a reason why the driver of the car has to move through the same bend at a lower speed during a rainy day.**(1mk)**

SECTION B (55 MARKS)

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

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



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

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

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

Voltmeter reading = 24V

Ammeter reading = 2.0A

Mass of the block = 1.02kg

Initial temperature of block = 25^0C

Final temperature of block = 41^0C

Time for heating = 300 seconds

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

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

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

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

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

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

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

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

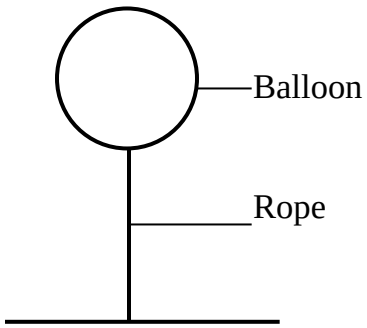
16. (a) State the law of floatation **(1mk)**

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

(i) Weight of the rod. **(3mks)**

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

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



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

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

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

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

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

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

(b) A firm container of volume $300cm^3$ is filled by a gas at a pressure of 2 atmospheres and a temperature of 30^0C. If the gas is cooled to 2.3 atmospheres, calculate its temperature. **(3mks)**

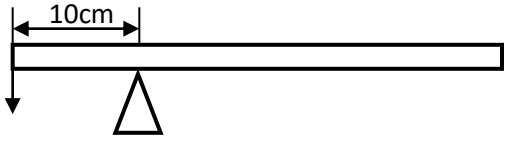
(c) (i) Define the term angular velocity **(1mk)**

(ii) A particle on a wheel is to be released to fly away when the wheel revolves at a rate of 4 revolution per second. If the wheel has a radius of 1.5m, determine the (I) angular velocity of the wheel. **(2mks)**

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

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

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



Determine the weight of the rod. **(2mks)**

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

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

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

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SCHOOL: …………………………………………………………………………………………

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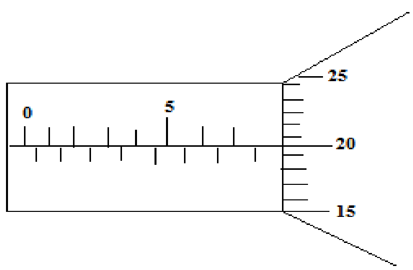
K.C.S.E BLUEPRINT PREDICTION

QUESTION PAPER NO: 10

PHYSICS
PAPER 1
(THEORY)
TIME: 2 HOURS

SECTION A (25 MARKS)

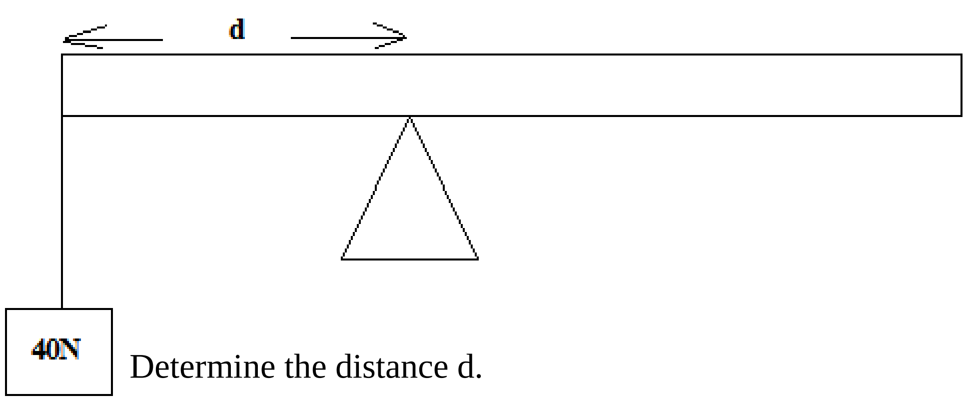
1. The figure below shows a micrometer screw gauge. What is the reading shown on the figure. **(2mks)**



2. State pressure law. **(1mk)**

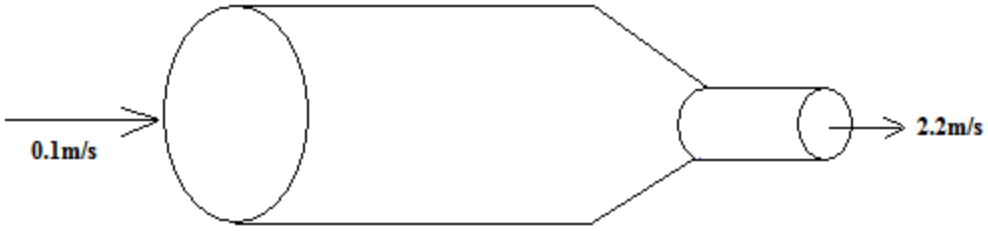
3. State two factors that affect stability of a body. **(2mks)**

4. The diagram below shows a uniform wooden plank of length 4m and weight 10N. The plank is held at equilibrium by a weight of 40N placed at one end as shown below.



Determine the distance d. **(3mks)**

5. Figure below shows a non-viscous fluid that is not compressible moving through a pipe of varied cross-sectional area.



If the area of the narrow region is $0.05m^2$, calculate diameter of the wider region. **(3mks)**

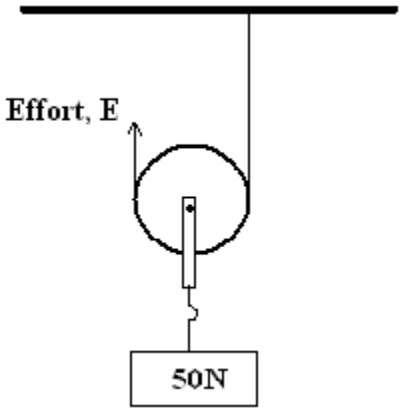
6. State one use of thermal expansion. **(1mk)**

7. State two factors that affect melting point of a substance. **(2mks)**

8. A body is projected vertically upwards from the top of a building. If it lands on the base of the building. Sketch the velocity-time graph for motion. **(2mks)**

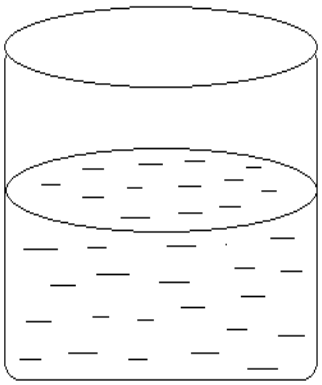
9. State a reason why transfer by radiation is faster than by conduction. **(1mk)**

10. The pulley system in the figure below supports a load of 50N.



Given that the efficiency of the system is 80% calculate the effort, E. **(3mks)**

11.The figure below shows a glass container with cross-section area of $50cm^2$.



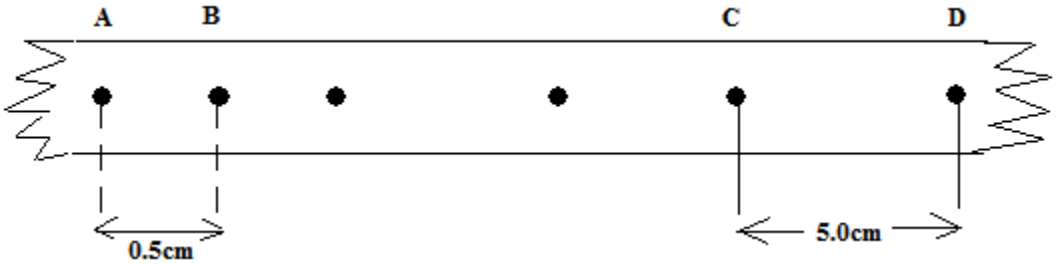
When a wooden block of mass 120g is immersed into the water it floats while fully submerged and the water level rises by 4cm, determine the density of the water. **(3mks)**

12. Define the term momentum. **(1mk)**

13. What is a pitch of a screw. **(1mk)**

SECTION B

14. The figure below shows the motion of a trolley on ticker timer. The ticker has a frequency of 100Hz.

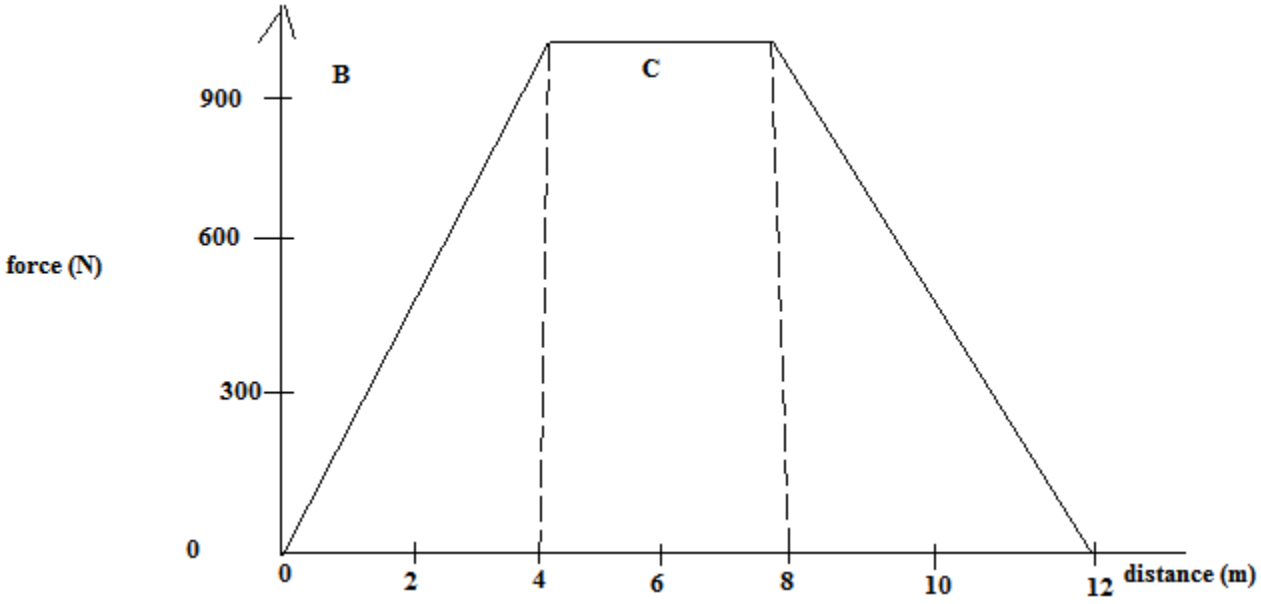


a)i) Calculate the initial velocity between A and B. **(3mks)**

ii) Calculate the final velocity between C and D. **(3mks)**

iii) Calculate the acceleration of the trolley during the motion. **(3mks)**

b) Figure below shows a force-distance graph for a car being towed on a level ground.

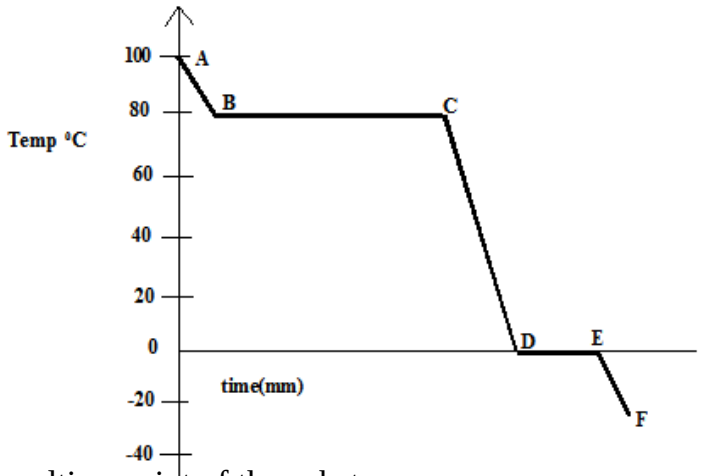


i) Calculate the total work done. **(3mks)**

ii) If the velocity just before reaching point C is 0.6m/s. Calculate the power developed by the engine at this point. **(2mks)**

15.a) A metal ball of mass 100g is dipped into boiling water at 100^0C and then placed in a calorimeter containing 80g of water at 20^0C. After stirring, the temperature of the mixture stabilizes at 23.4^0C. Ignoring the heat gained by the calorimeter, determine the specific heat capacity of the metal. (Specific heat capacity of water = 4200j/Kg K). **(4mks)**

b)The cooling curve below is for a pure substance.



i)What is the melting point of the substance. **(1mk)**

ii) State two factors that affect boiling point of a substance.

iii) At what part of the curve is the substance.

Solid only?
Liquid only?
Solid and Liquid? **(3mks)**

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

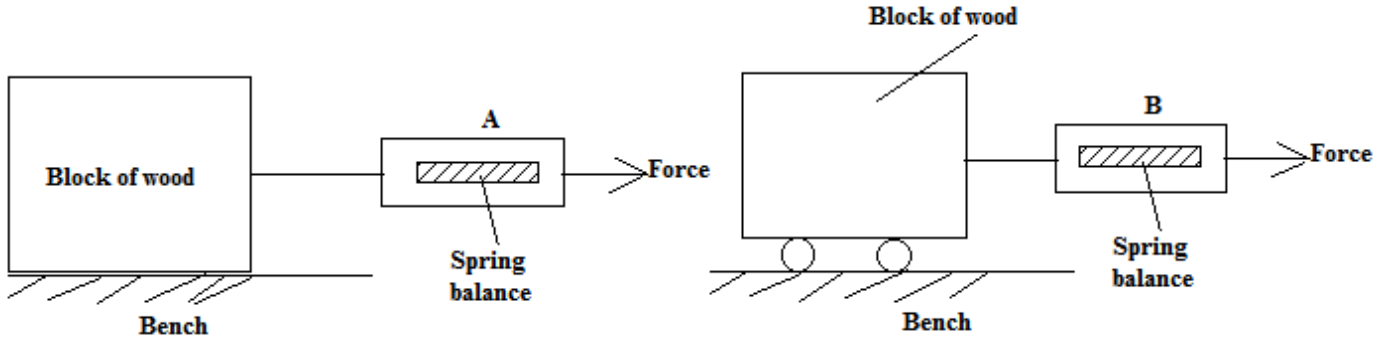
b)The legal speed limit on motorways is approximately 30m/s. In an incident on a motorway, a car of mass 900kg leaves a skid mark 75m long when stopping. The maximum deceleration of the car when skidding is approximately $10m/s^2$.

i) Show that before the incidence, the car must have been travelling above the legal speed limit. **(3mks)**

ii) Calculate for this skid, the maximum average braking force between each of the four tyres and the road. **(3mks)**

iii) When the motorway is wet, the braking force provided by each wheel is reduced to 50% of the calculated in (ii) above. What is the effect of this reduced breaking force on stopping distance, explain your answer. Assume that the speed of the car before breaking is the same in both cases. **(2mks)**

c) A student carried out an experiment to measure static friction using identical wooden blocks arranged as shown in the figure.

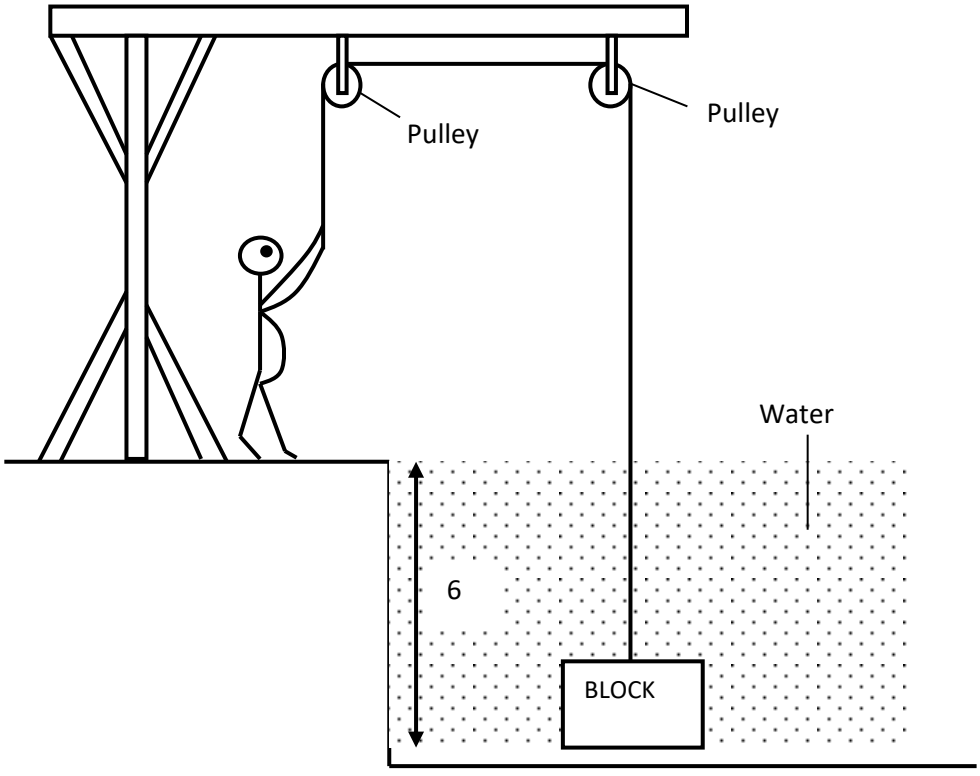


State and explain which spring balance will indicate a smaller reading when the block just starts to move.

(2mks)

17.a) Give a reason why people experience nose bleeding when they climb tall mountains. **(1mk)**

b) The diagram shows a person raising a concrete block from a river bed by using two pulleys.

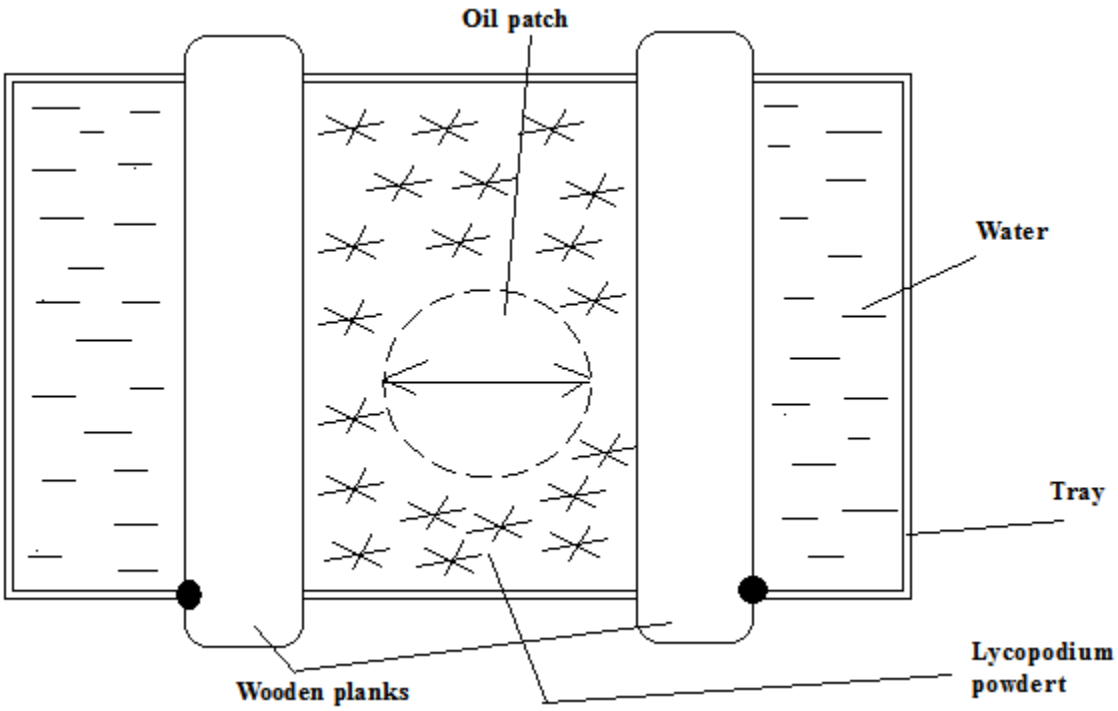


As shown in the diagram, the top of the block is 6.0m below the water surface. The density of water is 1000kg/m^3 and the acceleration of free fall is 10m/s^2. Calculate the water pressure acting on the top of the block. **(3mks)**

c) The block is raised through water. At one part, the water pressure acting on the top of the block 4.5×10^4 pa. The area of the top of the block is $0.015m^2$. Calculate the downward force exerted by the water on top of the block. **(3mks)**

d) When the block is clear of the water, it is raised a further 4.0m. The weight of the block is 550N. Calculate the work on the block as it is raised the 4.0m through air. **(3mks)**

18. The figure below shows part of an experiment set up to estimate the diameter of an oil molecule.



i) Describe how the oil patch is formed. **(2mks)**

ii) What is the role of the Lycopodiumpowder. **(1mk)**

b) An oil drop of average diameter 0.7mm spreads out into a roughly circular patch of diameter 73.5cm on the surface of water in a trough.

i) Calculate volume of the drop in mm^3. Take ($\pi = {}^{22}/_{7}$) **(3mks)**

ii) Calculate the area of the patch in mm^3. **(2mks)**

iii) Calculate the thickness of the oil molecule and express your answer in standard form. **(2mks)**

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