

PHYSICS PAPER 1

EXPECTED QUESTIONS IN KCSE

**Comprises 6 KCSE prediction set exams
(Class of KCSE March 2022).**

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Educators via the contacts above.**

PREDICTION 1

Name Index No.....

Candidate's Signature: ADM.NO.....

Date:

.....

232/1

PHYSICS

FORM 4 2021

Paper 1

2Hours

INSTRUCTION TO CANDIDATES

- Write your name, index number and school in the spaces provided.
- This paper consists of TWO sections: A and B
- Answer ALL questions in section I and II in the spaces provided.
- ALL workings MUST be clearly shown.
- Mathematical tables and electronic calculators may be used.

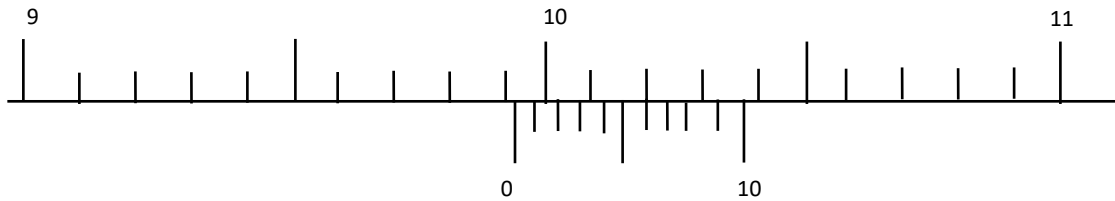
For examiner's use only.

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

SECTION A 25 MARKS

Answer all questions in this section

1. The figure I below shows the reading of a vernier calipers used to get the diameter of a cylindrical tin.



If the vernier caliper had a negative error of 0.02 cm, what is the actual diameter of the tin?
(2 marks)

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- 2 .A body is projected vertically upwards from the top of a building. Assuming that it lands at the base of the building. Sketch the velocity time graph of the motion.
(2marks)

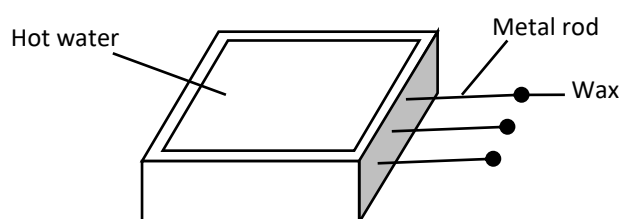
- 3 The stability of a body can be increased by increasing the base area and lowering its centre of gravity. State how the position centre of gravity can be lowered.
(1mark)

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

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5. The figure below shows a hot water bath with metal rods inserted through one of its sides. Some wax is fixed at the end of each rod.



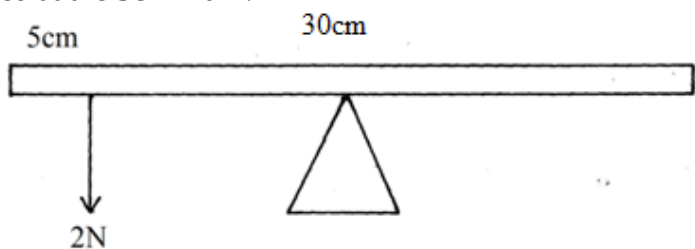
(a) What property of metals could be tested using this set-up? (1 mark)

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(b) besides the length of the rods that is kept constant, what else should be kept constant when comparing the property for different metal rods (1 mark)

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6.The figure below shows a uniform meter rule pivoted at 30cm mark. It is balanced by a weight of 2N suspended at the 5cm mark.



Determine the weight of the meter rule. (2 marks)

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7. using the idea of particles, explain why the pressure inside the tyre is increased when it is pumped up ...
 .(2marks)

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8. A trolley of mass 0.5kg moving with a velocity of 1.2ms⁻¹ collides inelastically with a second trolley of mass 1.5kg moving in the same direction with a velocity of 0.2ms⁻¹.
 (a) What is an inelastic collision?
 (1mark)

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(b) Determine the velocity of the trolleys after collision.
 (3marks)

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9 Ventilations in a house are normally placed high on a wall near the ceiling. Explain.
(1mark)

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10. State the reason why mercury is preferred as a barometric liquid and not water. (1mark)

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11.The figure below shows a small toy boat floating in water in a basin. **P** and **Q** are two points near the toy.



Drops of Soap solution was added at point Q.

a) State what was observed

(1 mark)

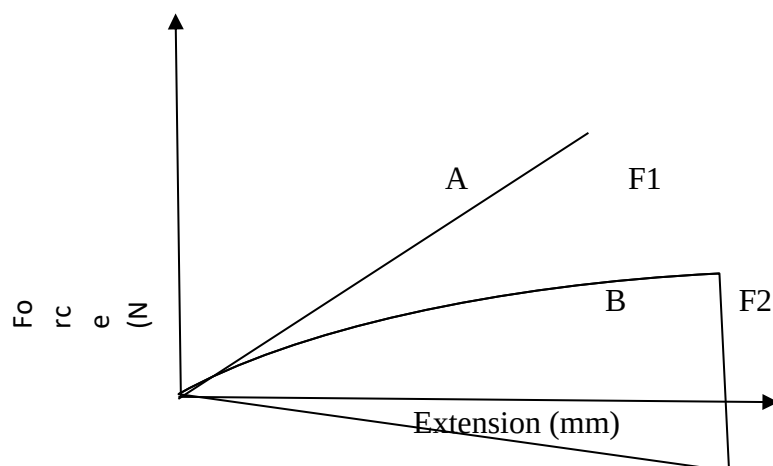
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b) Explain the observation
(marks)

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12.(a) Figure 10 below shows two graphs for two different springs A and B



F_1 and F_2 are points at which the springs break determine and explain which of the two springs

(i) Obeys Hooke's law

(1 mark)

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(ii) Is stronger

(1 mark)

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13. When a drop of olive oil of known volume is dropped on the surface of water in a large trough it spread out to form a large circular patch. State one assumption made when the size of the molecule of olive oil is estimated .

(1mark)

SECTION B (55 MARKS)

Answer all questions in the spaces provided.

- 14 (a) Define the term velocity ratio as used in machines
(1mark)

- (b) Figure 6 shows a block and tackle pulley system lifting a load of 500N

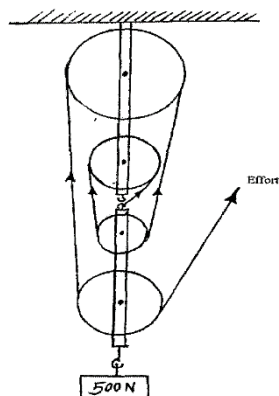


Fig 6

- (i) Determine the velocity ratio of the machine
(1mark)

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- (ii) If an effort of 120N is required to lift the load using the machines determine the efficiency of the pulley system
(3marks)

- (iii) In the space provided below, sketch a graph of efficiency against load for the system.
(2marks)

- 15.(a) State the law of flotation.

(1 mark)

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

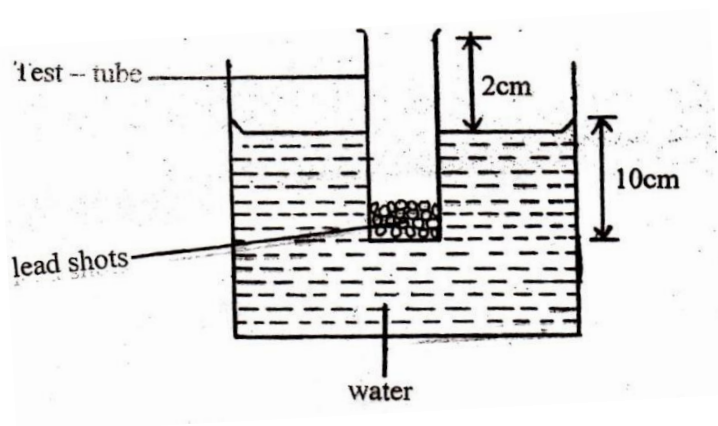
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(c) A simple hydrometer is set up with a test –tube of mass 10g and length 12cm with a flat base and partially filled with lead shots. The test – tube has a uniform cross – sectional area of 2.0cm^2 and 10cm of its length is under water as shown in the figure below.



(i) Determine the mass of lead shots in the test – tube (Take density of water = 1000kgm^{-3}) (3 marks)

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(ii) Calculate the mass of the lead shots to be added if the test – tube has to displace an equal volume of a liquid of density 1.25gcm^{-3} . (3 marks)

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(d) What is the function of the lead shots? (1 mark)

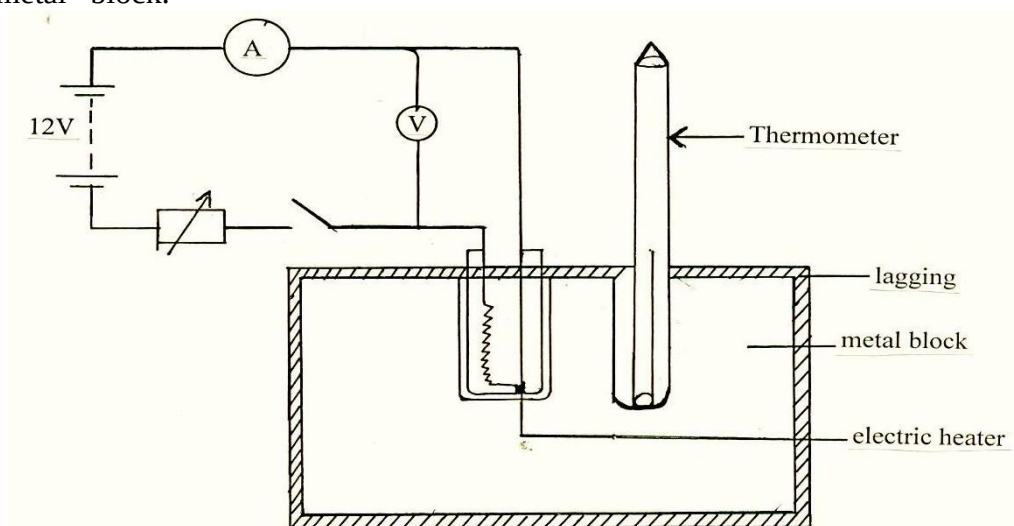
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16. The figure below shows a set up that can be used to determine the specific heat capacity of a metal block.



(i) State the measurement that should be taken in the experiment to determine specific heat capacity of the metal block. (3marks)

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(ii) Show how the measurement above can be used to determine the specific heat capacity of the metal block.

(2marks)

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(iii) State the function of the following in the set up

(I) Lagging

(1mark)

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(II) Drops of oil in the holes containing thermometer and the electric heater (1mark)

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(b) A copper can together with stirrer of total heat capacity 600J/K contains 200g of water at 15°C . Dry steam at 100°C is passed through the water while stirring until it reaches a final temperature of 55°C . Calculate the mass of the steam condensed. Take specific heat of capacity of water as 4200J/Kg/k and specific latent heat of steam as $2,260,000\text{J/kg}$

(5marks)

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17.(a) A car is negotiating unbanked circular track. What provides the centripetal force of the car. (2marks)

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(b) Given that the car above has a mass of 1000kg and the circular path has a radius of 25m. Determine the maximum speed with which the motorist can travel so as not to skid if the frictional force between the tyres and the road is 6500N.
(3marks)

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(c) A 200g mass tied to a string is being whirled in a vertical circle of radius 32cm with uniform speed,

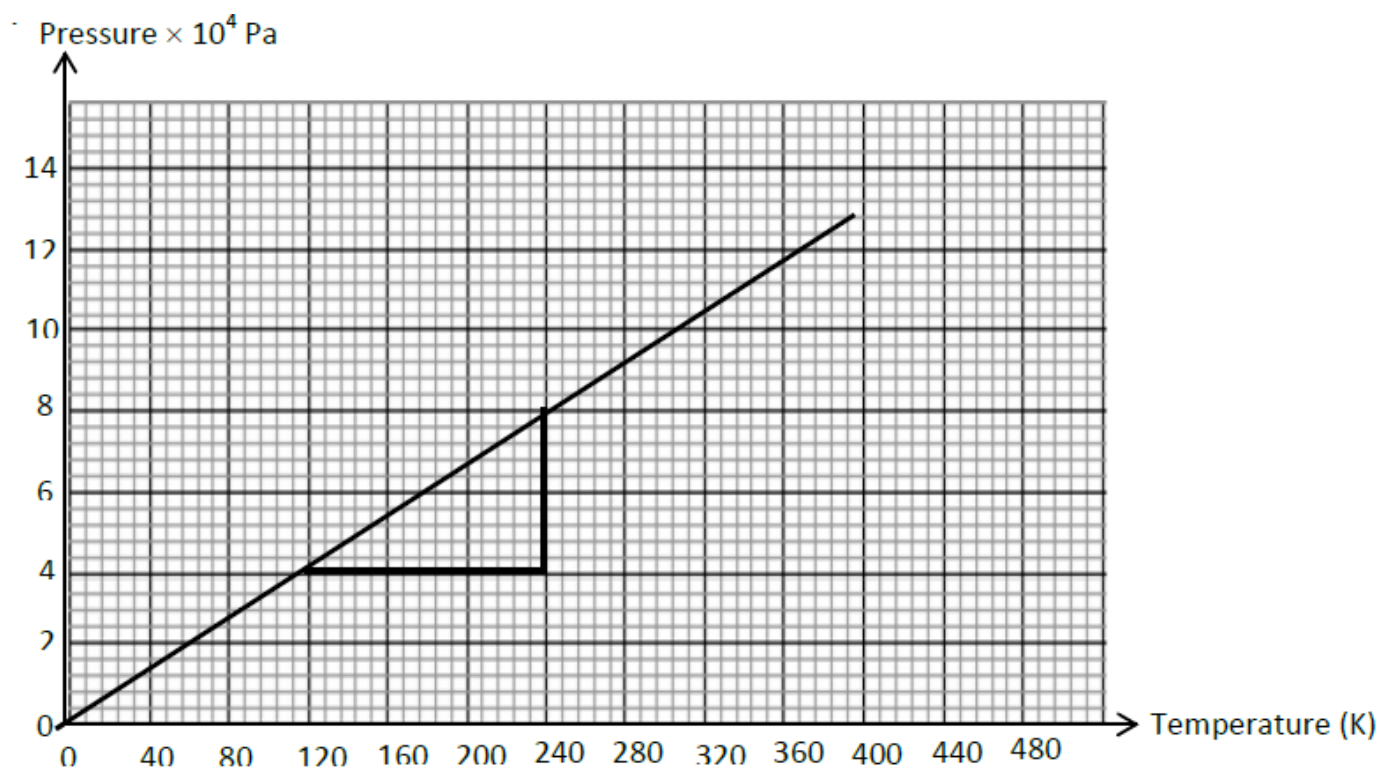
At the lowest position the tension in the string is 10.5N.: Determine -

(i) The speed of the mass

(3marks)

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18. The graph below shows the relationship between the pressure and temperature for a fixed mass of an ideal gas at constant Volume



Given that the relationship between the pressure P and temperature T in Kelvin is in the form $P = kT + C$ where k and C are constants.

- (i) Determine from the graph the values of k and C . (2marks)

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- (ii) Why would it be impossible for the pressure of the gas to be reduced to zero in practice? (1mark)

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- (iii) A gas is put into a container of fixed volume at a pressure of $2.1 \times 10^5 \text{ Pa}$ and temperature of 50°C . The gas is then heated to a temperature of 400°C . Determine the new value of pressure. (3marks)

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PREDICTION 2

NAME: CLASS:.....ADM NO:.....

SIGNATURE:.....INDEX NO:.....

DATE.....

232/1
Physics
Paper 1

Kenya Certificate of Secondary Education (KCSE)
Physics Paper 1

Instructions to candidates

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

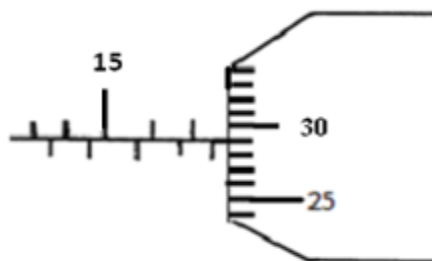
For Examiner use only

SECTION	QUESTION	MAX MARKS	CANDIDATE'S SCORE
A	1 – 11	25	
B	12	08	
	13	07	
	14	10	
	15	06	
	16	09	
	17	07	
	18	08	
TOTAL		80	

This paper consists of 14 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

Section A (25Marks)

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



2. Apart from friction, name another factor that reduces efficiency in machines. (1 mark)
3. Diffusion in gases is faster than in liquids; state two reasons why this is so. (2 marks)
4. A tube of radius 9 mm has a constriction of diameter 10mm. Water flows in the tube at 3ms^{-1} . Determine the velocity of water in the constriction. (3 marks)

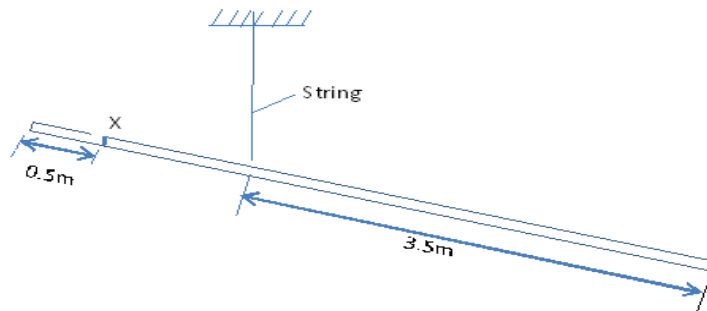
5. (a) A student obtained ice at 0°C from a refrigerator and placed it in a beaker on a bench. After 4 minutes, the temperature rose to 4°C . State the changes that would be observed in the water in terms of;

(i) density (1 mark)

(ii) mass (1 mark)

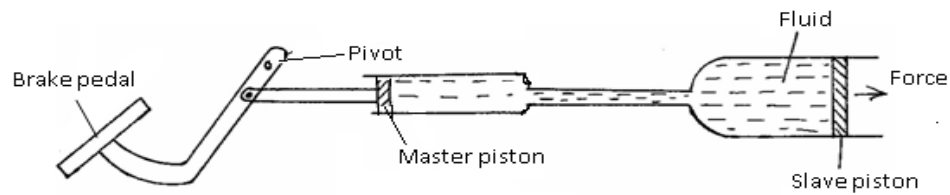
(ii) volume (1 mark)

6. The diagram below shows a uniform 5m long metal rod of mass 800g. It is suspended by a string tied at a point 3.5m from one end. Determine the load which should be hung at point X to keep the plank horizontal. (3 marks)



7. Explain why ice skaters use sharp-edged shoes to slide on ice (2 marks)

8. The diagram below shows a braking system.



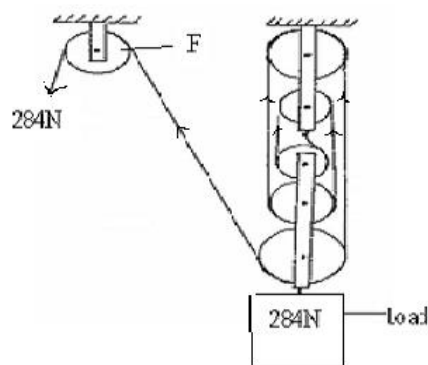
Why is the master piston, made smaller than the slave piston?

(1 mark)

9. A faulty thermometer reads 2°C when dipped in ice at 0°C and 95°C when dipped in steam at 100°C . What would this thermometer read if placed in water at room temperature at 18°C ?

(3 marks)

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



- (a) Determine the efficiency of the machine. (3 marks)

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

Section B (55 Marks)

12. A bullet of mass 24g travelling in a horizontal path with a velocity of 450ms^{-1} strikes a wooden block of wood of mass 976g resting on a rough horizontal surface. After impact, the bullet and the block move together for a distance of 7.5m before coming rest.

- (a) Name the type of collision which takes place above (1 mark)

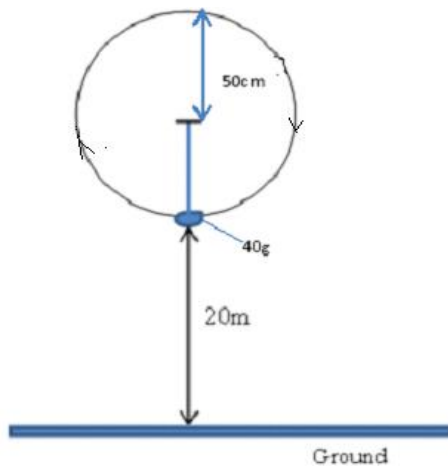
- (b) What's the velocity of the two bodies when they start sliding (2marks)

- (c) Calculate the force which brings the two bodies to rest (3 marks)

- (d) Determine the coefficient of friction between the block and the surface during this motion.
(2 marks)

13 (a) Give reason why a body moving in a circular path with constant speed is said to be accelerating.
(1mk)

(b) A stone of mass 40g is tied to the end of a string 50cm long such that it is 20m above the ground at its lowest level as shown in the diagram below. It is whirled in a vertical circle at 2rev/s .



- (i) If the string breaks at its lowest level as shown, what is the velocity with which it travels?
(2 mark)

Calculate the maximum tension in the string.

(3mks)

(ii) Calculate the maximum tension in the string.

(2 mks)

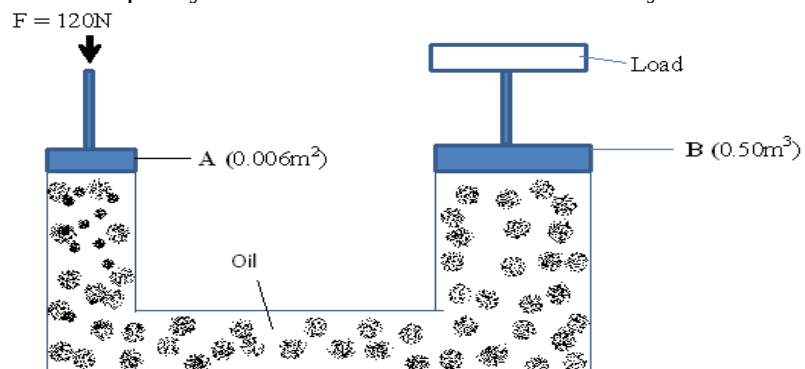
(d) Determine the maximum horizontal distance it travels from the breaking point

(2 marks)

14 (a) Give reason why ink is most likely to ooze out of a pen when one is up in an airplane.

(1mark)

(b) The figure below is a simple hydraulic machine used to raise heavy loads.



Calculate;

(i) The pressure exerted on the oil by the force applied at A (2marks)

(ii) The load raised at B (2marks)

(iii) Give two properties which make the oil suitable for use in this machine (2marks)

(c) The height of a mountain is 1360m. The barometer reading at the base of the mountain is 74cmHg. Given that the densities of mercury and air are $13,600\text{Kg m}^{-3}$ and 1.25Kg m^{-3} respectively, determine the barometer reading at the top of the mountain. (3 marks)

15 (a) State Hooke's Law (1mark)

(b) The diagram below shows a graph of force against extension for a certain spring.



(i) What is the spring constant of the spring? (2 marks)

(ii) What force would cause two such springs placed side by side to stretch by 10cm (3 marks)

16. (a) What is meant by specific latent heat of fusion of a substance? (1mk)

(b) 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
- mass of water + calorimeter = 145g
- Final mass of calorimeter + water + condensed steam = 156g
- Final temperature of the mixture = 48°C

[Specific heat capacity of water = $4200\text{JKg}^{-1}\text{K}^{-1}$ and specific heat capacity of copper = $390\text{JKg}^{-1}\text{K}^{-1}$]

Determine the;

(i) mass of condensed steam. (1mk)

(ii) The heat gained by the water and calorimeter if the initial temperature of the calorimeter and water is 20°C . (3mks)

(iii) Given that L_v is the specific latent heat of vaporization of steam, write an expression for the heat given out by steam. (1mark)

(iv) Determine the value of L_v above (2mks)

(v) State the assumption made in the above experiment (1 mark)

17. A cork of volume 100cm^3 is floating on water. If the density of the cork is 0.25 gcm^{-3} and that of water is 1 gcm^{-3} ;

(a) Calculate the mass of the cork (2 marks)

(b) Hence, find the upthrust force on the cork (2 marks)

(c) What minimum force is required to immerse the cork completely (2 marks)

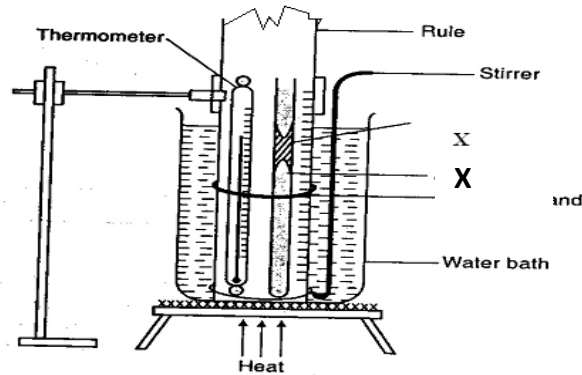
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(d) What is the effect on the upthrust force in a liquid when the temperature of the liquid is reduced? (1mark)

18. (a) State Pressure Law

(1mark)

(b) The following diagram shows a set up of apparatus used to verify Charles Law.



(i) Give the name of part labelled X

(1 mark)

(ii) What is the function of the part named in (i) above?

(1 mark)

(iii) Briefly explain how the set up above is used to verify Charles Law

(3 marks)

(c) A certain mass of hydrogen gas occupies a volume of 1.6m^3 at a pressure of $1.5 \times 10^5\text{Pa}$ and a temperature of 12°C . Determine the volume when the temperature is 0°C at a pressure of $1.0 \times 10^3\text{Pa}$.
(2 marks)

PREDICTION 3

NAME: INDEX.NO:

SCHOOL: CANDIDATES SIGN:

DATE:

232/1
PHYSICS
PAPER 1

KCSE PREDICTION 3

KENYA CERTIFICATE OF SECONDARY EDUCATION (KCSE)

TIME: 2 HOURS.

Instructions to candidates

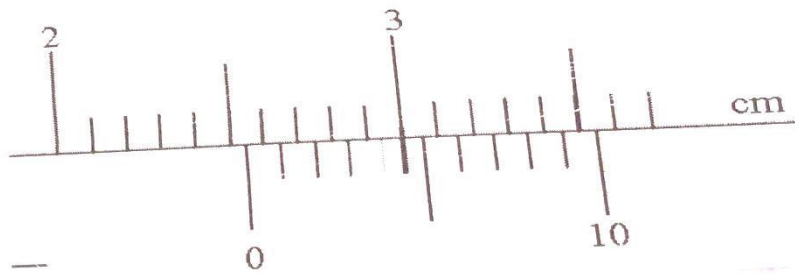
1. Write your name, index number and school in the spaces provided above.
2. Sign and write the date of examination in the spaces provided above.
3. This paper consist of **TWO** sections; **A** and **B**.
4. Answer **ALL** the questions in section **A** and **B** in the spaces provided.
5. **ALL** working **MUST** be clearly shown.

FOR EXAMINERS USE ONLY

MAXIMUM SCORE	80 MARKS
CANDIDATE'S SCORE	

SECTION A – 25 MARKS (ANSWER ALL THE QUESTIONS)

1. The vernier calipers in the figure below has a zero error of -0.05cm .

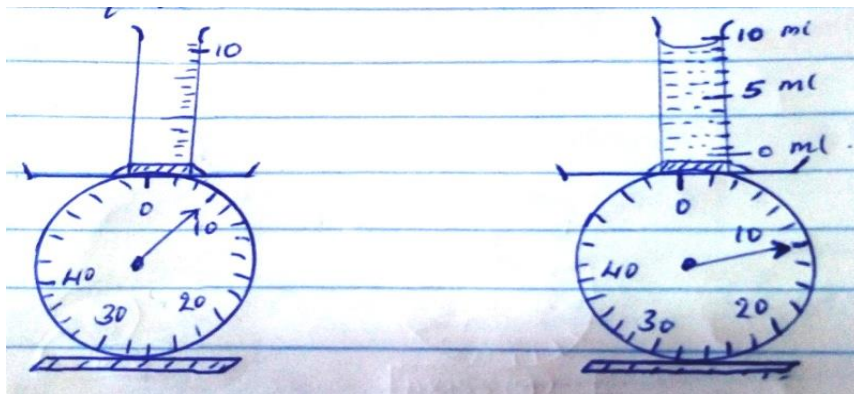


State the actual reading of the measuring instrument

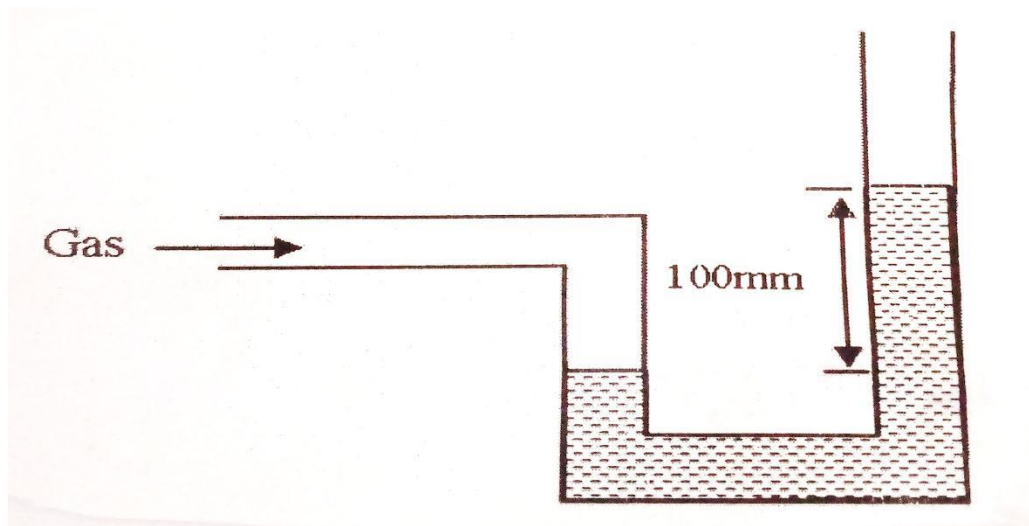
(2 marks)

2. Fig. 1(a) and (b) shows a set – up to determine the density of a liquid.

Determining the density of the liquid. (3mks)



3. The figure below shows an open-ended monometer with water connected to a gas supply



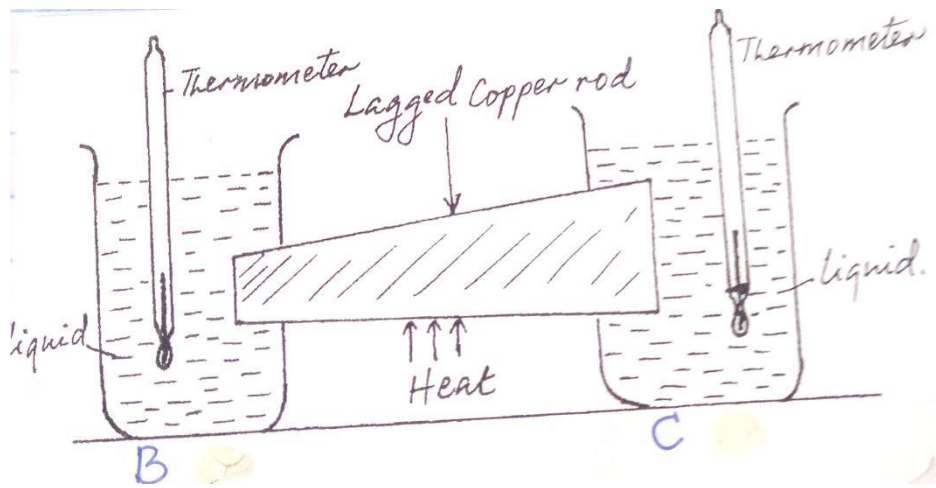
If a mercury barometer reads 760mm, calculate the pressure of gas (give your answer in N/m^3).

(Density water = 1g/cm^3 , density of mercury = 13.6 g/cm^3) (3 marks)

4. An object weighs 49N on earth where gravitational acceleration is 9.8N/Kg and 40.5N on another planet. Determine the gravitational acceleration on the planet (2 marks)

5. A measuring cylinder contains 20cm^3 of water. 10cm^3 of salt is added and stirred. Explain why the new volume is not 30cm^3 (2 marks)

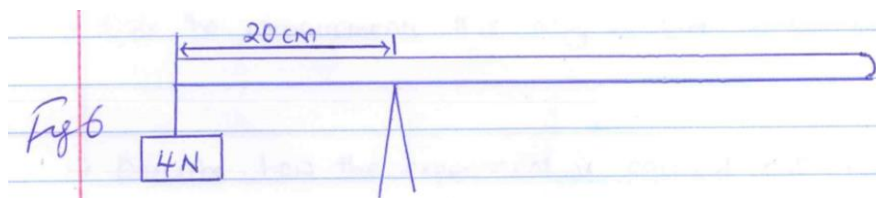
6. The figure below shows samples of same liquid B and C being heated through a well-lagged copper rod of non-uniform thickness. A thermometer is placed on each sample for some time.



If the rod is heated at the middle, state and explain which of thermometers records a higher temperature (2 marks)

7. Give one reason why boiling water cannot be used to sterilize a clinical thermometer (1mark)

8. The figure 6 below shows a uniform 50cm rod. It is balanced horizontally by a load of 4N on one end. Calculate the weight of the rod (2mks)

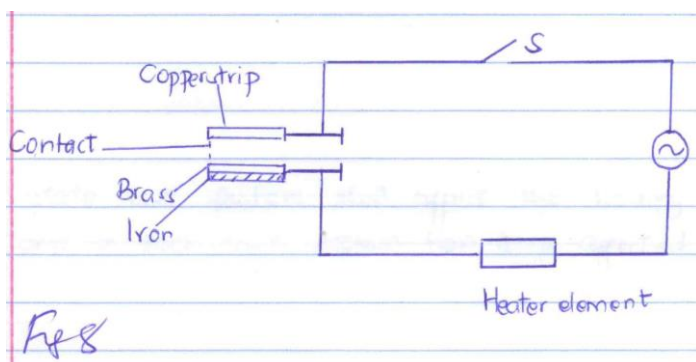


9. Explain why a car feels lighter as it travel at a higher velocity. (2mks)

10. Pure water at 0°C is heated up to 10°C . Sketch the graph of volume against temperature on the axes given below 2mks)



11. The figure 8 below shows a circuit diagram for a device for controlling the temperature in a room.



- i) Explain the purpose of the metallic strip 2mks)
- ii) Describe how the circuit controls the temperature when the switch S is closed 2mks)

SECTION B – 55 MARKS (ANSWER ALL THE QUESTIONS)

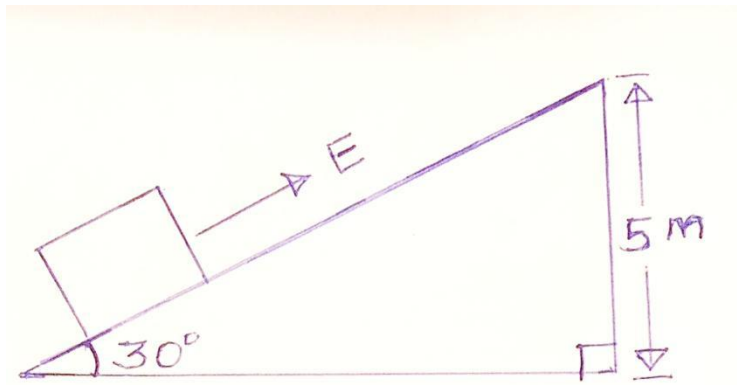
12. (a) Define the term velocity ratio of a machine

(1 mark)

(b) A man pushes a load of mass 80kg up an inclined plane through a vertical height of 5m as shown below. The inclined plane makes an angle of 30° to the horizontal (take g to be 10m/s^2)

(i) Determine the velocity ratio of the inclined plane.

(2 marks)



(ii) If the efficiency of the plane is 75% determine:

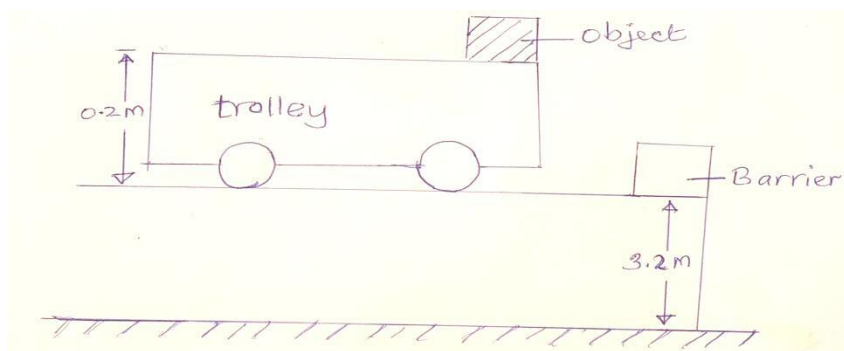
(I) The mechanical advantage

(2 marks)

(II) The effort E , needed to pull the load up the plane.

(2 marks)

(c) A trolley of height 0.2m moving on a horizontal bench of height 3.2m strikes a barrier at the edge of the bench. The object on top of the trolley flies off on impact and lands on the ground 2.5m from the edge of the bench as shown below. Use this information to answer the questions that follow:



(i) Give a reason why the object on the trolley flies off on impact (2 marks)

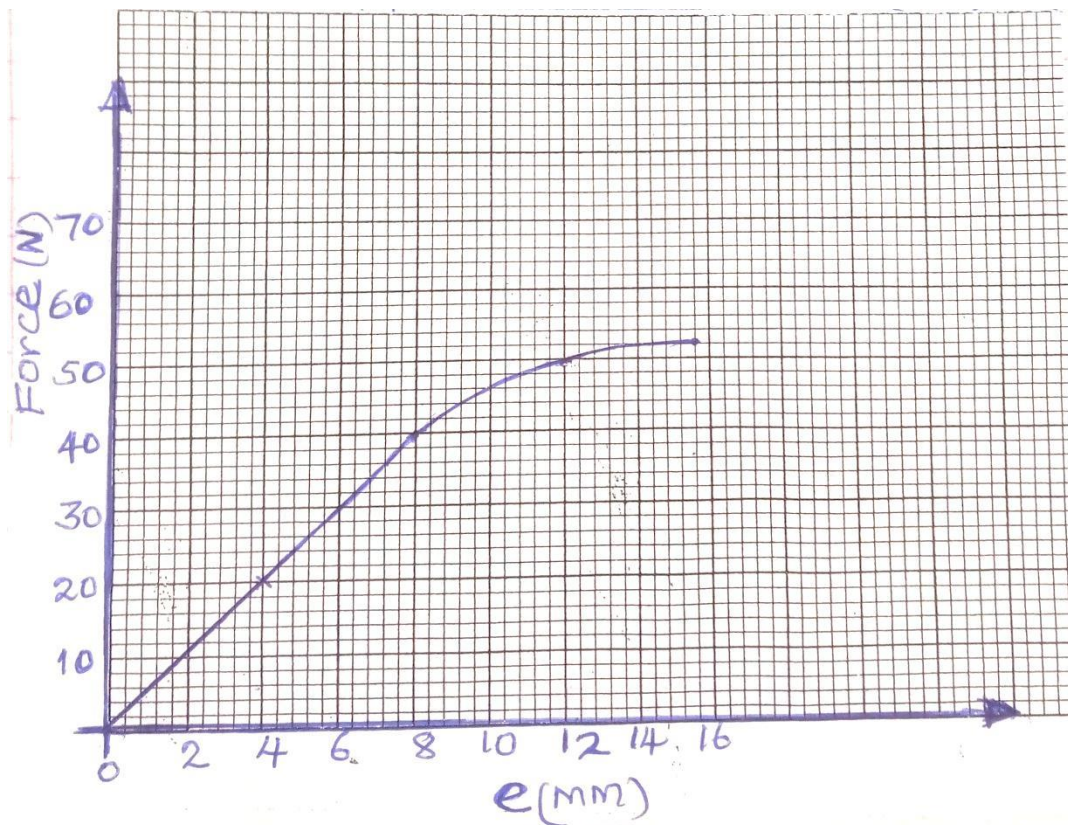
(ii) Determine the time taken by the object to land on the ground (2 marks)

13. (a) state Hooke's Law (1 Mark)

(b) (i) A vertical spring of unstretched length of 30cm is clamped at its upper end. When sand is placed in a pan attached to the lower end of the spring its length becomes 45cm. When 20g mass is placed on top of the sand the length increases to 55cm. Determine the mass of the sand (3 marks)

(ii) If the spring in (i) above is compressed from its original length to a length of 24cm, calculate the work done in compressing the spring. (3 marks)

(c) The graph below shows the relationship between (F) against extension (e) of a spring.



Determine the spring constant of the spring

(3 marks)

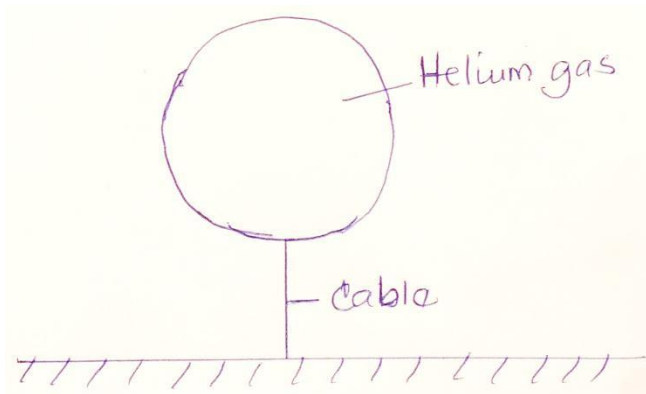
14. (a) state Archimedes Principle

(1 mark)

(b) Explain one application of Archimedes Principle in real life situation

(2 marks)

(c) The mass of the fabric of a large balloon is 500g. The balloon is inflated with 2000m^3 of helium gas. The balloon is attached to a cable tied on the ground as shown. (Density of helium and air are 0.18g/cm^3 and 1.3g/cm^3 respectively).

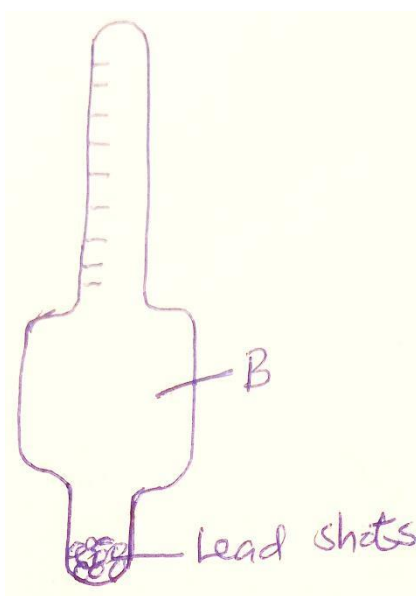


(i) State 3 forces acting on the set up. (3 marks)

(ii) Determine the tension in the cable (3 marks)

(iii) Calculate the acceleration of the balloon if the cable is cut. (2 marks)

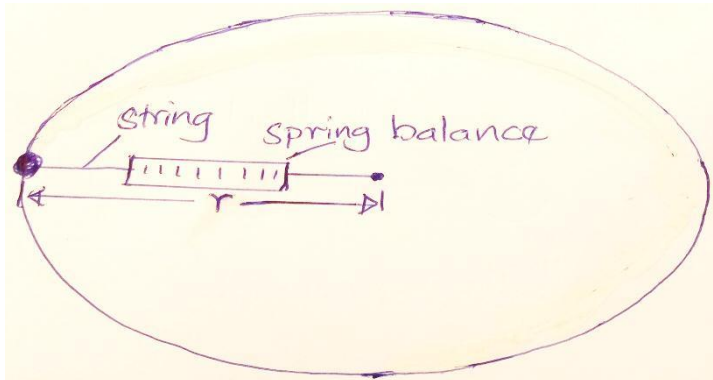
(d) The diagram below shows a hydrometer.



Why is the part marked B wider?

(1 mark)

15. The diagram below shows a spring balance tied to an object of mass M and rotated in a circular path of radius r .



- (a) (i) State the force that keeps the object moving in a circular path.

(1mark)

- (ii) The speed of the object is constant but the body is acceleration on the circular path.
Explain

(1 mark)

- (b) (i) If the object is whirled faster, what would happen to the spring balance reading?

(1 mark)

- (ii) Give a reason for your answer in b (i) above

(1mark)

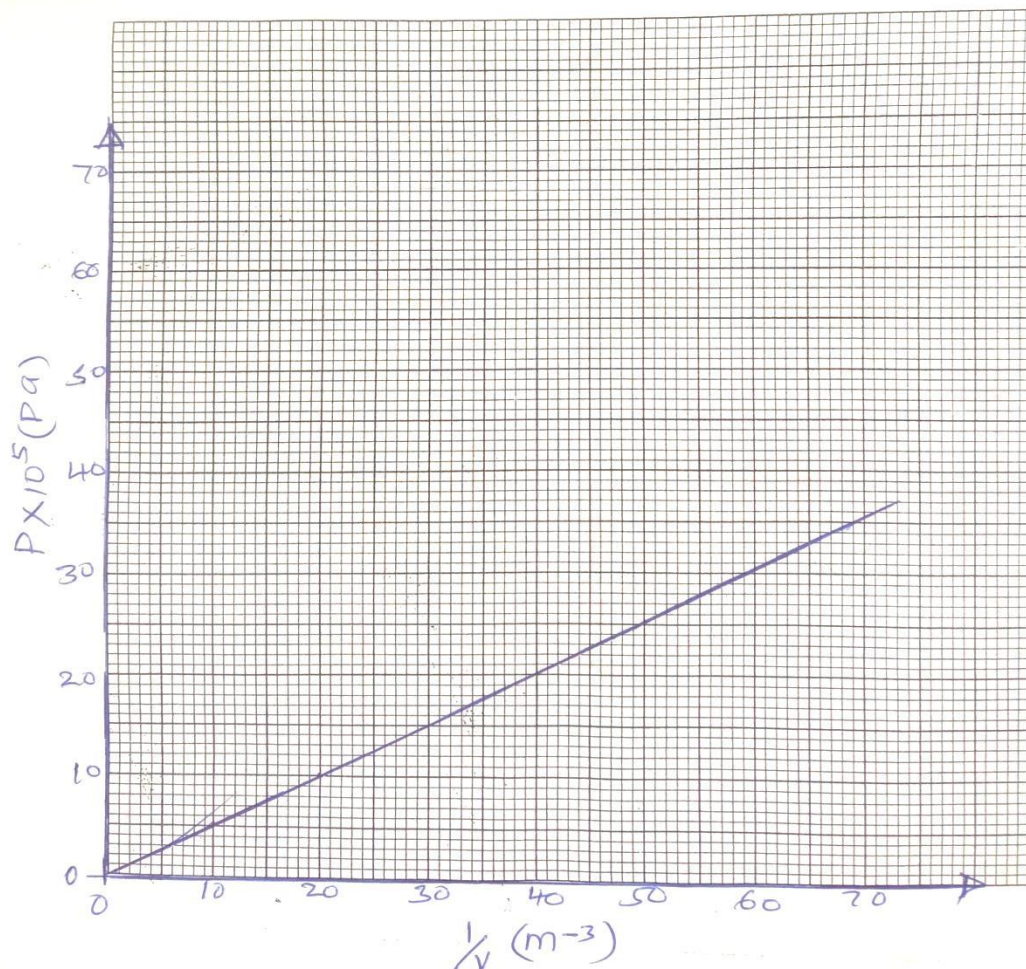
- (iii) As the object is whirled round, the sting snaps and cuts off. Describe the subsequent path of the object

(1 mark)

- (c) If the mass m of the object is 500g and radius r is 50cm. determine the velocity of the body if the spring balance reads 81N (3 marks)

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

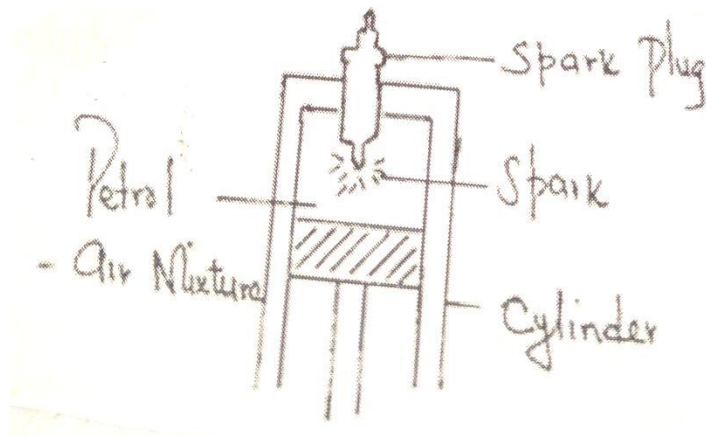
(b) The pressure P of a fixed mass of gas at constant temperature of $T = 200\text{K}$ is varied continuously and the values of corresponding volume recorded. A graph of P against $\frac{1}{V}$ is shown on the graph below.



Use the graph to:

- (i) Determine the volume of the gas when pressure reads $2.8 \times 10^5 \text{ pa}$ (2marks)

- (d) The petrol air mixture in the cylinder of a car engine is ignited when the piston is in the position shown below.



Use kinetic theory of matter to explain why the piston moves down. (3 marks)

- 17.(a) Define the term specific heat capacity. (1mk)

(b) 100g of steam of 100°C was passed into cold water at 27°C . The temperature of the mixture became 50°C . Taking specific heat capacity of water as $4200 \text{ J kg}^{-1} \text{ K}^{-1}$ and specific latent heat of vaporization of water as 2260 kJ kg^{-1} and that heat losses were negligible. Determine

- (i) quantity of heat lost by steam. (2mks)
- (ii) quantity of heat gained by water. (3mks)
- (iii) Mass of the cold water. (3mks)

PREDICTION 4

PHYSICS PAPER 1

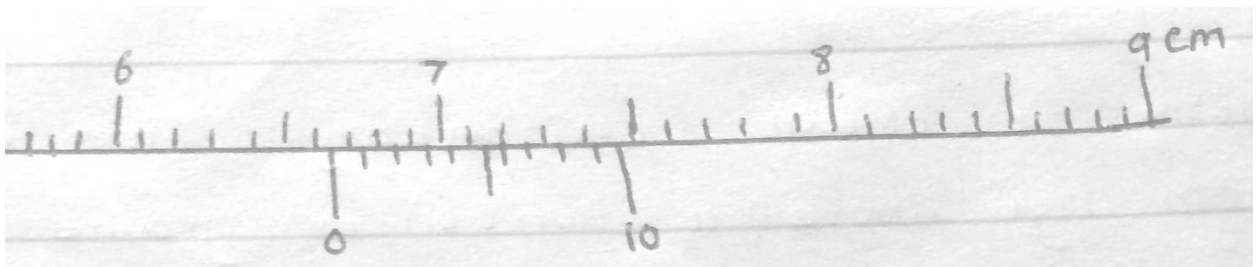
FORM 4

NAME

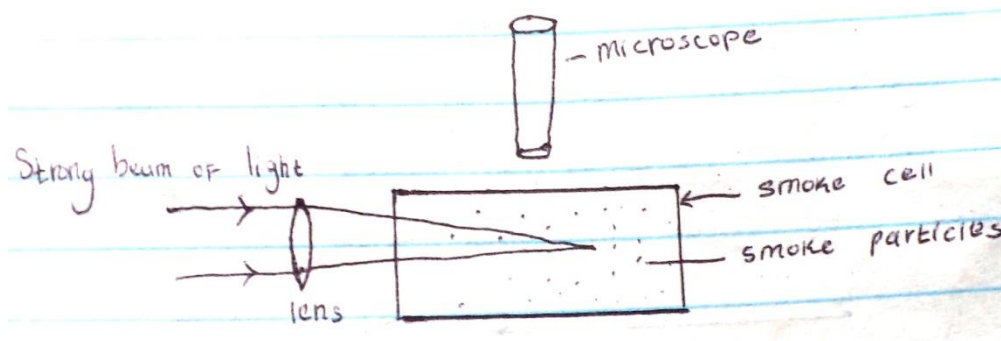
ADM

CLASS

1. What is the reading of the vernier callipers shown in the fly below if it has a positive error of 0.02cm? (3mks)



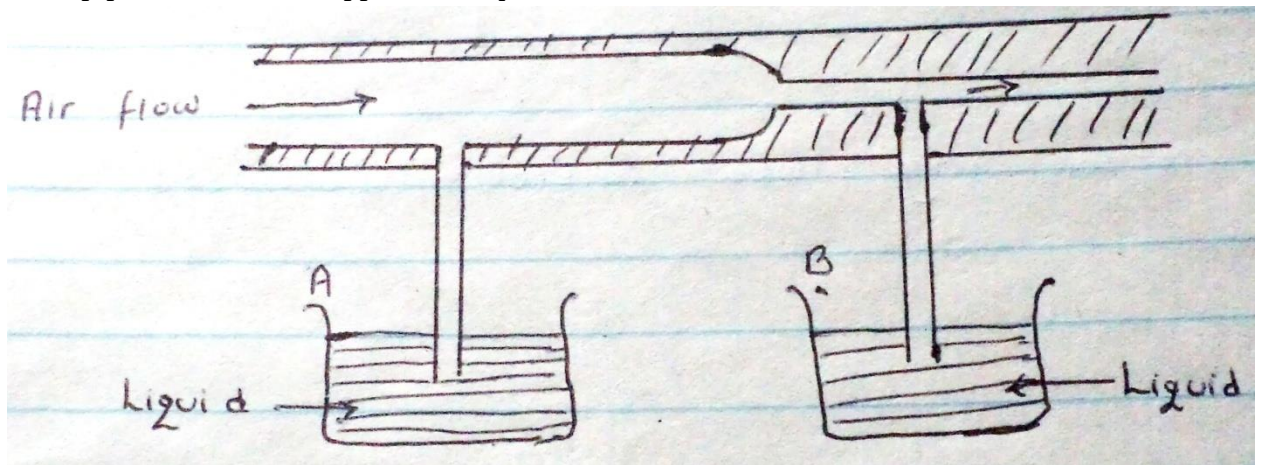
2. The figure below shows apparatus used to observe behavior of smoke particles in a smoke cell.



- a) State a reason why smoke particles are used in the experiment. (1mk)
 - b) State the observation made. (1mk)
 - c) What would happen if temperature was lowered? (1mk)
3. Explain why fish can survive under water when the surface is already frozen. (1mk)

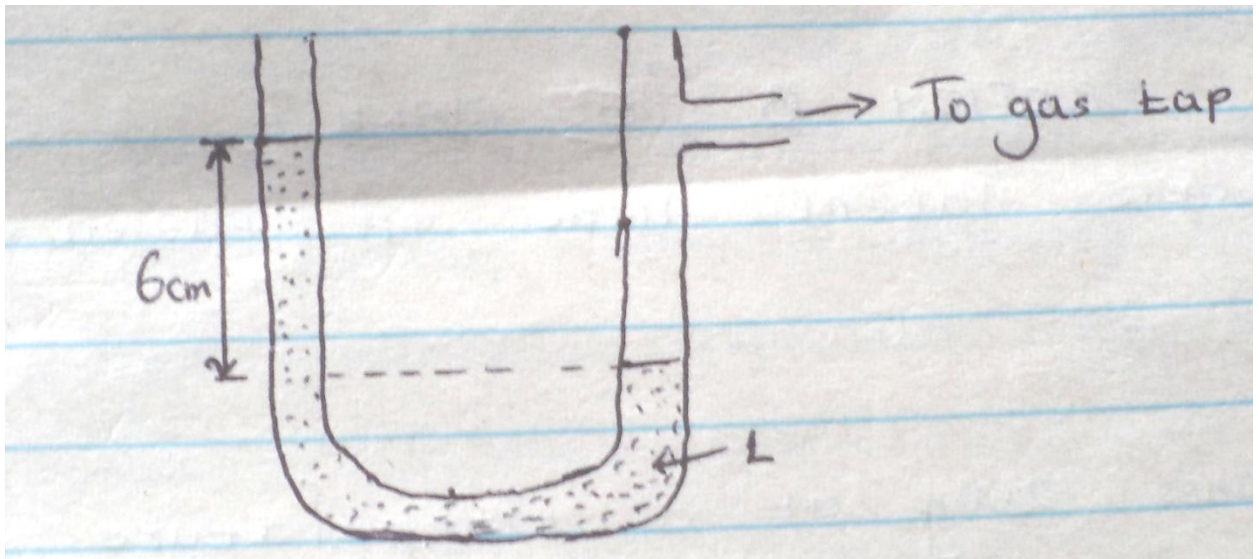
4. State one way on which the stability of the can be increased. (1mk)
5. A stone is thrown horizontally from a building that is 50m high above a horizontal ground. The stone hits the ground at a point, which is 65m from the foot of the building. Calculate the initial horizontal velocity of the stone. ($g=10\text{ms}^{-2}$) (3mks)

6. The figure below shows air flowing through a pipe of non-uniform cross-sectional area. Two pipes A and B are dipped into liquids as shown below.

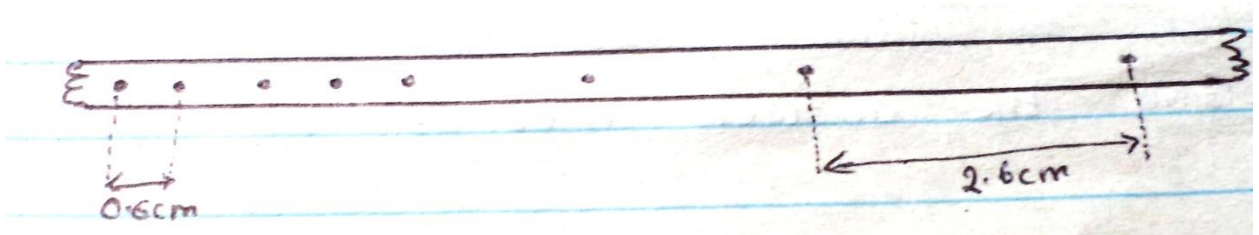


- a. Indicate the levels of the liquids in pipe A and B. (1mk)
- b. Explain your answer in (a) above. (1mk)
7. When a mercury thermometer is used to measure the temperature of hot water, it is observed that the mercury level first drops before beginning to rise. Explain (2mks)
8. Figure below shows a u-tube manometer containing a liquid L. One end connected to a gas tap.

Given that the atmosphere pressure is $1.0 \times 10^5 \text{ Pa}$, determine the pressure of the gas (density of liquid L is 900 kg/m^3 , $g = 10 \text{ N/kg}$) (2mks)



9. The figure below represents part of a tape pulled through a ticker-timer by trolley moving down an inclined plane. If the frequency of the ticker-timer is 50 Hz , calculate the acceleration of the trolley. (3mks)



10. Explain why a glass container with thick glass walls is more likely to crack than one with a thin wall when a very hot liquid is poured into it. (2mks)

11. Find the amount of work in stretching a spring constant 25N/m when its length is increased from 0.1m to 0.2m . (3mks)

SECTION B (55MARKS)

12. A) Define specific latent heat of fusion of a substance. (1mk)

b) Water of mass 200g at a temperature of 60°C is put in a well lagged copper calorimeter of mass of 80g . A piece of ice at 0°C and mass 20g is placed in the calorimeter and the mixture stirred gently until all the ice melts. The final temperatures, T of the mixture are then measured. Determine:

i) The heat absorbed by melting ice at 0°C . (2mk)

ii) The heat absorbed by melted ice (water) to rise to temperature. T (Give the answer in terms of T) (2mks)

iii) The heat lost by warm water and the calorimeter. (2mks) (Give the answer in terms of T)

iv) The heat lost by warm water and the calorimeter (2mks) (Give the answer in terms of T)

IV) The final temperature T of the mixture. (Specific latent heat of fusion of ice = $334,000 \text{ Jkg}^{-1}$, specific heat of water = 4200 Jkg^{-1} , specific heat capacity of copper = $900 \text{ Jkg}^{-1}\text{K}^{-1}$) (3mks)

13. A ball bearing x is dropped vertically downwards from the edge of the table and it takes 0.5s to hit the floor below. Another ball bearing Y leaves the edge of the table horizontally with a velocity of 5ms^{-1} find :

a) The horizontal distance travelled by Y before hitting the floor. (2mks)

b) The vertical distance of the table top above the floor level. (2mks)

c) A bullet mass of 22g travelling horizontally with a velocity of 300ms^{-1} strikes a block of wood of mass 1978g which rests on a rough horizontal surface. After impact the bullet and the block move together and come to rest when the block has travelled a distance of 5m . Calculate :

i) The velocity of bullet and wood after impact. (2mk)

ii) The force of friction between wood and surface. (2mks)

(d) A car starts from rest and accelerates uniformly at 2 m/s^2 for 5 seconds before accelerating again at 2.5 m/s^2 for 2 more seconds. The car is then brought to rest in another 2 seconds.

i) Sketch a velocity time graph for this motion. (2mks)

ii) From the graph, calculate the total distance travelled. (2mks)

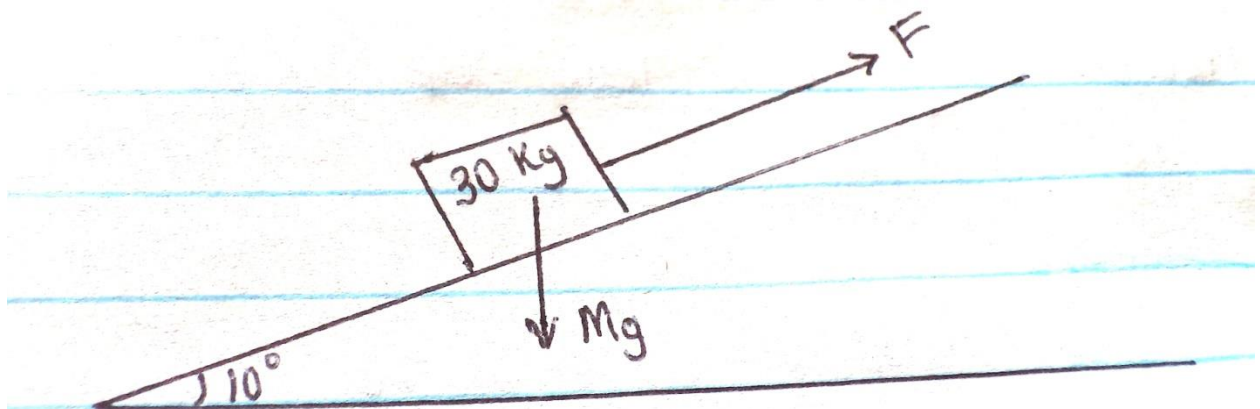
14. A) State two important factors to be considered when selecting the banking angles of a road.

b) A ball of mass 2 kg is whirled at the end of a string in a horizontal circular path at a speed of 5 m/s . If the string is 2.0 m long find,

i) Angular velocity of the stone? (3mks)

ii. The tension of the string.

15. The figure below shows a block of mass 30.0 kg being pulled up a slope by a force F at a constant speed. The friction force on the block is 200 N .



A) I) on the same figure above name and indicate the other forces acting on the block.
(2mks)

II) Determine the force acting on the block down the slopes. (2mks)

iii) Determine the value of F (2mks)

B. On reaching the top of the slopes. The block is left to run freely down the slopes.

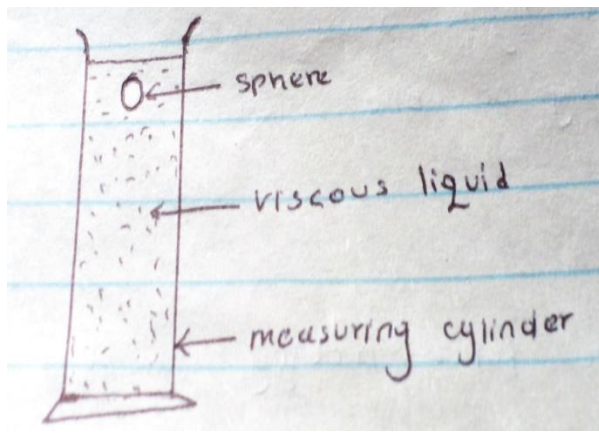
i) Which of the force previously acting on the block would then act in the opposite direction?
(1mk)

II) Determine the acceleration of the block down the slope. (2mks)

III) What is the effect of increasing the angle of the slopes on your answer in (ii) above? (1mk)

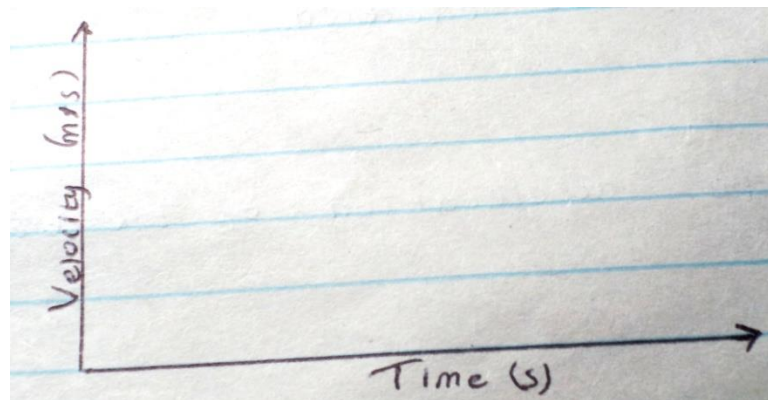
16. A) i) State Newton's second law of motion. (1mk)

ii) The figure below shows a sphere moving in a viscous liquid in a tall measuring cylinder.



Show on the diagram the force acting on the sphere. (3mks)

- iii) Sketch on the Cartesian plane below a graph of the variation of velocity with time until the ball attains terminal velocity.



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

ii. What is the absolute zero temperature? (1mk)

iii). A bicycle pump with the exit hole closed contains 80cm of air at 760 mmHg pressure and a temperature of 10c. When the air was compressed to 38cm under a pressure of 1700mmHg pressure, its temperature rises. Calculate the rise in temperature. (2mks)

PREDICTION 5

NAME: INDEX NO:

SCHOOL: Candidate's signature:

Date:

KCSE PREDICTION 5

232/1

PHYSICS

PAPER 1

TIME: 2 HRS

INSTRUCTIONS

1. Write your name and your index number in the spaces provided.
2. This paper consists of two sections, Section **A** and **B**. Answer **ALL** the questions in both section in the spaces provided in this paper.
3. **ALL** working must be clearly shown.
4. Mathematical tables and electronic calculators **may be** used.

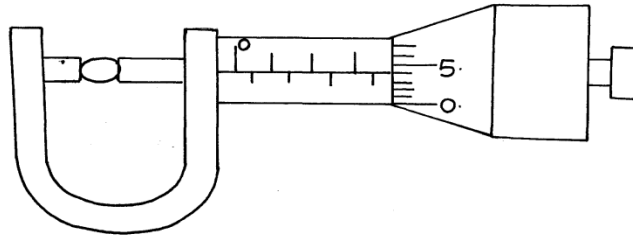
FOR EXAMINER'S USE:

SECTION	QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
A	1-12	25	
B	13	11	
	14	12	
	15	11	
	16	8	
	17	13	
	TOTAL	80	

SECTION A (25 MARKS)

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

1. Figure 1. shows a micrometer screw gauge being used to measure the diameter of a ball bearing.

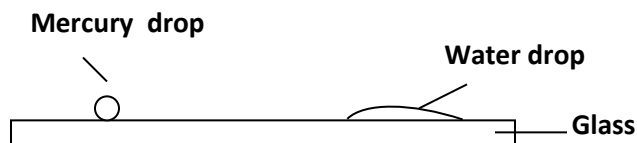


If the instrument has a negative zero error of 0.01mm, record the actual diameter of the ball bearing.
(1mk)

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2. Figure 2. shows drops of mercury and water on a glass surface,



Explain the difference in the shapes of the drops. (2mks)

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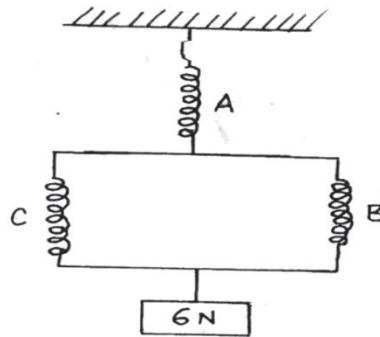
3. Explain why fish can survive under water when the surface is already frozen. (1 mk)

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4. Figure 3 shows three identical springs each of spring constant 4.5N/m and negligible weight are used to support a load as shown. Determine the total extension of the system. (2mks)



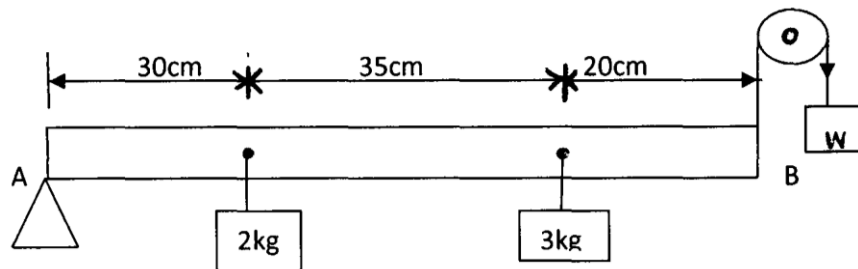
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5. Figure 4 shows a uniform rod **AB** of negligible weight pivoted at **A**.



If the system is in equilibrium, determine the weight **W** shown in the diagram. (3mks)

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

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7. The height of mercury column in a barometer density 13600kg/m^3 , at a place is 64cm. What would be the height of a column of paraffin in barometer at the same place. (Density of paraffin = $8.0 \times 10^2 \text{ kg/m}^3$). (3mks)

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8. Explain **one** advantage of mercury over alcohol as a thermometric liquid. (1mk)

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9. 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. (2mks)

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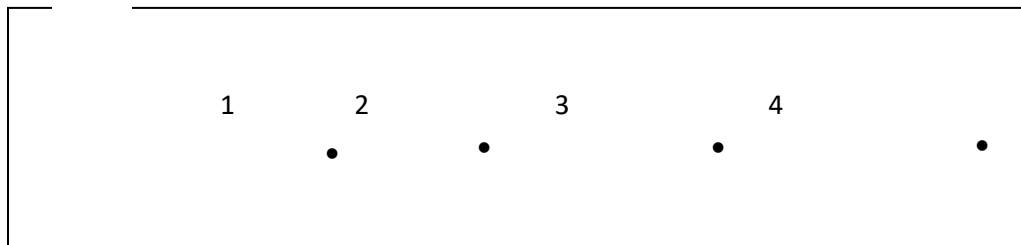
10. A car of mass 1 tone moving at a velocity of 108km/hr is brought to rest in 5 seconds. Calculate the retarding force.(2mks)

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11. Explain why a gas cylinder in a house containing cooking fire explodes.(2mks)

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12.Oil is leaking from a car as it travels along a straight road. One drop falls on the ground every fifty seconds. Figure 5 below shows the pattern of the drop on the ground.



(i) Describe the motion of the car. (1mk)

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(ii) Determine the acceleration of the car if the distance between drop 1 & 2 is 20 meters and the distance between drop 3 & 4 is 40 meters (2mks)

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SECTION B - 55 MARKS

Answer all questions in this section in the spaces provided.

13. a) State Pressure Law .

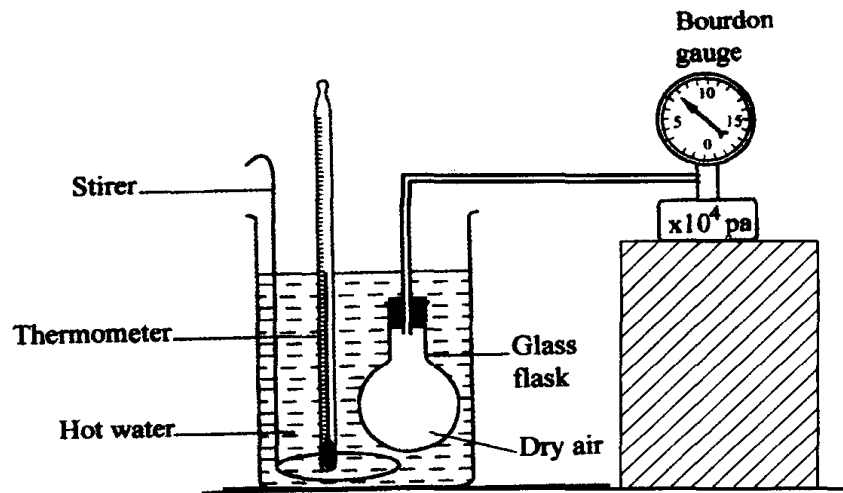
(2mk)

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b) Figure 6 shows a set up that may be used to verify Pressure law.



i) State the measurements that may be taken in the experiment.

(2mks)

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ii) Explain how the measurement in (i) above may be used to verify Pressure law .

(4mks)

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iii) A car tyre is at an air pressure of 4.0×10^5 Pa at a temperature of 27°C . While it is running the temperature rises to 75°C . What is the new pressure in the tyre?(Assume the tyre does not expand)

(3mks)

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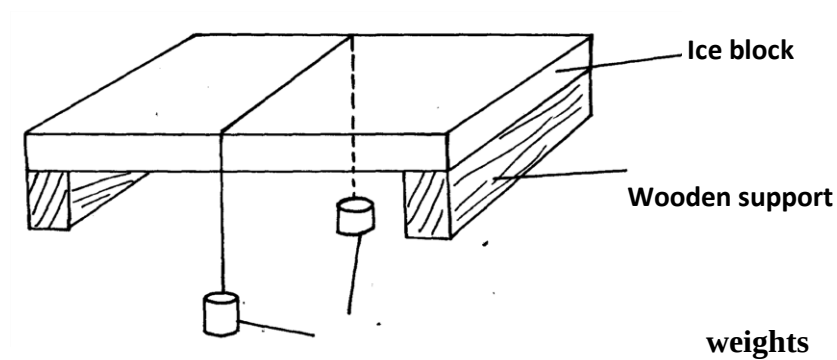
14. (a) Define specific latent heat of fusion of a substance. (1mk)

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(b) Figure 7 below shows a block of ice with two heavy weights hanging such that the copper wire connecting them passes over the block.



(i) It is observed that the wire gradually cuts through the ice block, but leaves it as one piece.
Explain (3mks)

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(ii) What change would be observed if the copper wire used in the experiment was placed by a cotton thread. (1mk)

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(c) A block of ice of mass 40g at 0°C is placed in a calorimeter containing 400g of water at 20°C. The heat absorbed by the calorimeter is negligible. The final temperature of the mixture after all the ice has melted is T. (specific latent heat of fusion of ice=340,000 J/kg, specific heat capacity of water=4200JKg⁻¹k⁻¹)

(i) Derive an expression for the heat gained by the ice as it melts to water at temperature T. (2mks)

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(ii) Derive an expression for the heat lost by the water. (1mk)

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(iii) Determine the value of T. (2mks)

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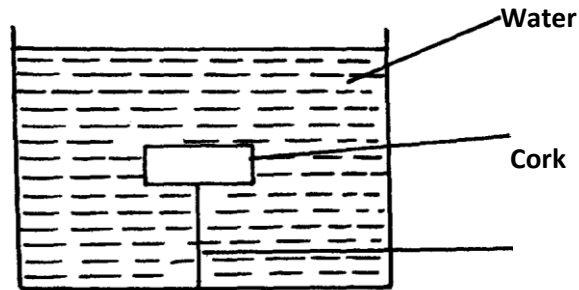
(d) State **two** differences between boiling and evaporation. (2mks)

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

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 (b) Figure 8 shows a piece of cork held with a light thread attached to the bottom of a beaker. The beaker is filled with water.



(i) Indicate and label on the diagram the forces acting on the cork. (3mks)

(ii) Write an expression showing the relationship between the forces. (1mk)

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 (c) A solid displaces 8.5cm^3 of liquid when floating on a certain liquid and 11.5 cm^3 when fully submerged in the liquid. The density of the solid is 0.8g/cm^3 . determine:

(i) Up thrust on the solid when floating. (3mks)

(ii) Density of the liquid. (3mks)

16. (a) Name a device that is used to convert sound energy to electrical energy. (1mk)

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(b) Define the term efficiency of a machine. (1mk)

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(c) A pulley system having a velocity ratio of 4 is used to raise a load of 100N through a height of 0.6m at a constant speed using an effort of 60N in a time of 15 seconds.

(i) Calculate the efficiency of the system. (2mks)

(ii) How far does the effort end move in order to raise the load by 0.6m. (2mks)

(iii) Determine the power developed by the effort. (2 mks)

17. (a) Define the following terms:

(i) Instantaneous velocity.(1mk)

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(ii) Uniform acceleration (1mk)

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(b) A car moves with a constant velocity of 15m/s for 300s and is then accelerated uniformly to a velocity of 25m/s in the next 20s. this velocity is maintained for the next 300s. the car is then brought to rest in 30s with uniform deceleration.

(i) Sketch a velocity-time graph for this journey.(2mks)

.From the graph determine;

(ii) The acceleration while the velocity is changing from 15m/s to 25m/s.(2mks)

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(iii) The total distance traveled from the time the car reached maximum velocity of the car during this period.(2mks)

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(c) A ball is thrown horizontally at $V=8\text{m/s}$ from a tower. It reaches the ground after 4s. Find:

(i) The horizontal distance d it travels before hitting the ground.(1mk)

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(ii) The height of the tower (2mks)

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(iii) The velocity on impact with the ground.(2mks)

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PREDICTION 6

NAME..... DATE

INDEX NO. SIGNATURE:.....

232/1
PHYSICS
PAPER 1
TIME: 2 HOURS.

KCSE PREDICTION 6

Kenya Certificate of Secondary Education.

232/1
PHYSICS
PAPER 1
TIME: 2HOURS.

INSTRUCTIONS TO CANDIDATES

- Write your name and your index number in the spaces provided above.
- This paper consists of **two** sections **A** and **B**
- Answer **all** questions in section **A** and **B** in the space provided
- All working **must** be shown in the spaces provided in this booklet.
- Mathematical tables and silent electronic calculators may be used
- This paper consists of 10 printed pages. Candidates should check to ensure that all pages are printed as indicated and no questions are missing

FOR OFFICIAL USE

SECTION	QUESTION	MAX. SCORE	CANDIDATE'S SCORE
A	1-12	25	
B	13	09	
	14	15	
	15	10	
	16	11	
	17	10	
TOTAL SCORE		80	

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

SECTION A 25 MARKS
ANSWER ALL QUESTIONS IN THIS SECTION

1. A micrometer screw gauge is used to measure the thickness of a stack of 10 microscope slide cover slips. The reading with the cover slips in position is as shown in figure 1.

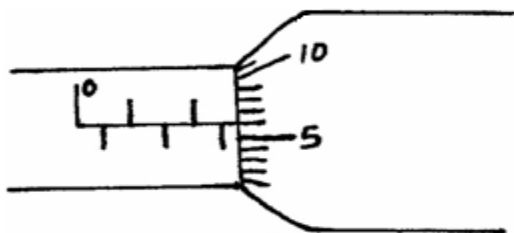


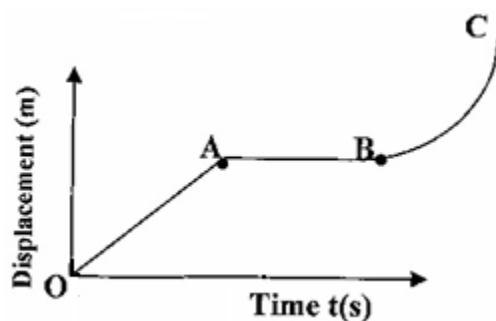
Figure 1

If the micrometer screw gauge has a negative zero error of 0.01mm, determine the thickness of each cover slip. (2mks)

2. Explain why ammonia gas released at the back of a laboratory spreads faster on a hot day than on a cold day. (1mk)
3. A piece of paper is held in front of the mouth and air blown horizontally over the paper, it is observed that the paper get lifted up. Give reason for the observation. (1mk)
4. (a) Estimate the size of an oil molecule if a drop of oil of volume $6.0 \times 10^{-10} \text{ m}^3$ forms a patch of radius 32 cm on a water surface. (2mks)
- (b) Other than oil patch being monolayer, state any **one** other assumption in the oil drop experiment. (1mk)

5. In the study of free fall, it is assumed that the force F acting on a given body of mass, m , is gravitational, given by $F = mg$. State two other forces that act on the same body. (2mks)

6. The figure below shows a displacement-time graph of the motion of a particle.



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

- i. OA
- ii. AB
- iii. BC

7. A 60 litre giant density bottle weighs 100N when empty. What will be its mass when filled with liquid W whose density is 0.72g/cm^3 ? ($g=10\text{N/kg}$) (3mks)

8. Figure 3 shows a uniform wooden plank which weighs 10N. The plank is balanced at 0.8m from one end by a mass of 2.5Kg.

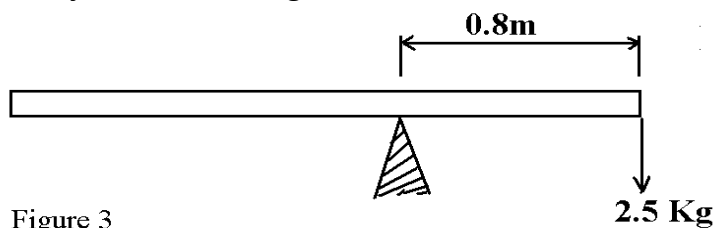
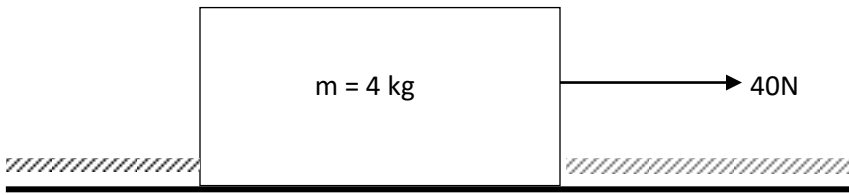


Figure 3

What is the length of the wooden plank in metres.

(2mks)

9. The figure below shows a force of 40N acting on a body of mass 4kg. The coefficient of friction between the surfaces is 0.05.



Determine the acceleration of the body.

(3mks)

10. State one factor that affects the spring constant of a spring. (1mk)
11. A girl in a school in Nakuru plans to make a barometer using a liquid of density 1.25 g cm^{-3} . If the atmospheric pressure in the school is 93750 N m^{-2} . Determine the minimum length of the tube that she will require? (3mks)
12. A form one girl observed that when mercury is put into a glass it does not wet the glass. Explain the observations made by the girl. (1mk)

SECTION B (55MARKS)
ANSWER ALL QUESTIONS IN THIS SECTION

13. (i) Define Archimedes' Principle. (1mk)
- (ii) An object weighs 1.04N in air, 0.64N when fully immersed in water and 0.72N when fully immersed in a liquid. If the density of water is 1000 kg m^{-3} , find:
- a. The density of the liquid. (2mks)
- b. Calculate the density of the metal block. (2mks)
- (iii) Calculate the upthrust on the metal and the apparent weight of the metal when completely submerged in salt solution of density 1.2g/cm^3 . (3mks)
- (iv) A block of metal of volume 80cm^3 weighs 3.80N in air. Determine its weight when fully submerged in a liquid of density 1200kgm^{-3} . (3mks)

14. The following readings were obtained in an experiment to verify Hooke's law using a spring.

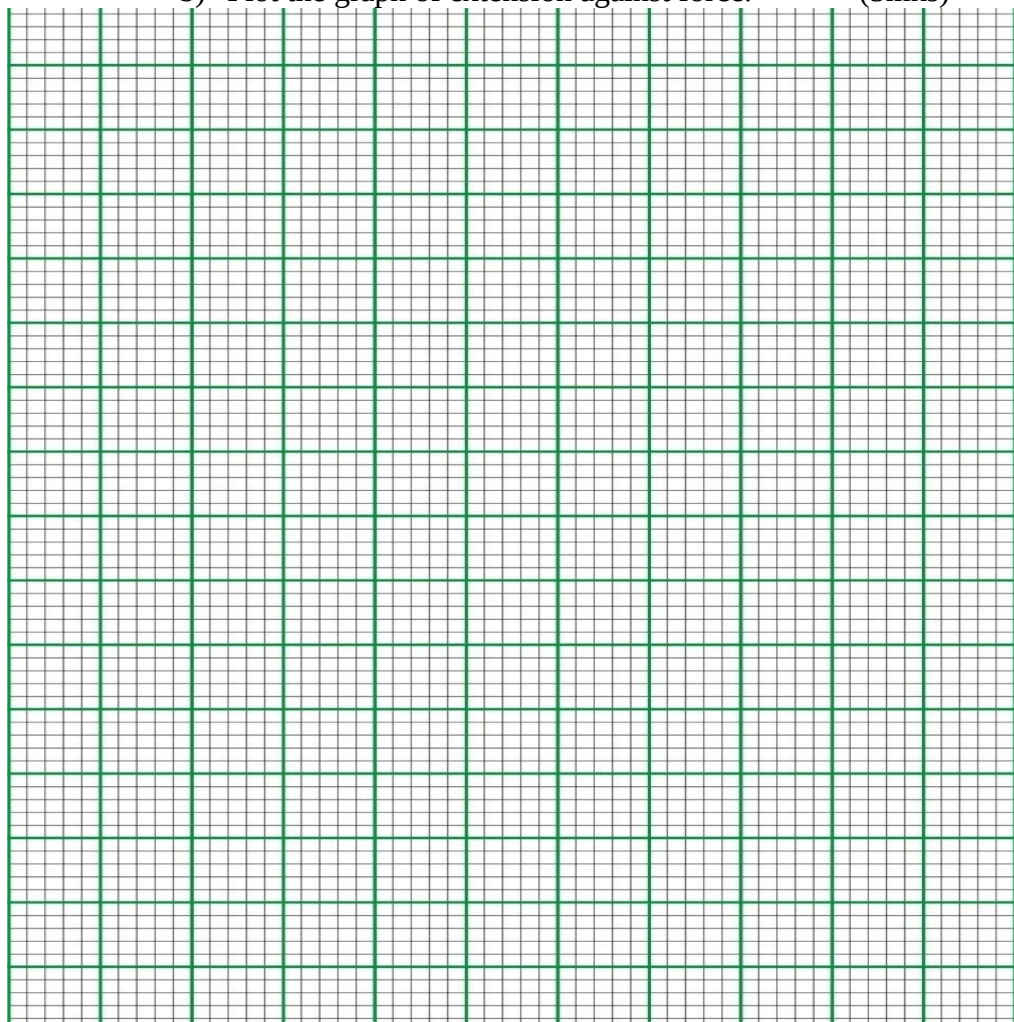
Mass (g)	0	25	50	75	100	125
Reading (cm)	10.5	11.5	12.5	13.5	14.4	16.0
Force (N)						
Extension (mm)						

a) Complete the table

(2mks)

b) Plot the graph of extension against force.

(5mks)



c) From the graph determine the:

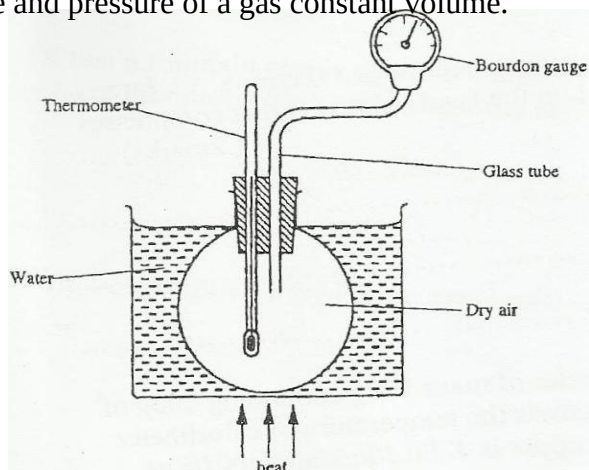
(i) Elastic limit (1mk)

(ii) Spring constant. (2mks)

15. (a) State the pressure law for an ideal gas

(1mk)

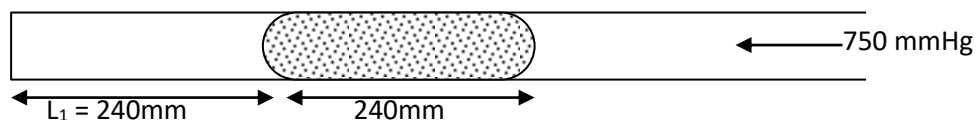
- (b) The set up shows an arrangement to determine the relationship between temperature and pressure of a gas constant volume.



Explain how the result from the experiment can be used to determine the relationship between temperature and pressure. (2mks)

- (c) A bicycle tyre is pumped to a pressure of $2.2 \times 10^5 \text{ pa}$ at 23°C . After a race the pressure is found to be $2.6 \times 10^0 \text{ pa}$. Assuming the volume of the tyre did not change, what is the temperature of the air in the tyre. (3mks)

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



Assuming that the atmospheric pressure is 750mm Hg and the temperature is constant; calculate the length of the air column when the tube is vertical with open end down. (3mks)

16. a) A body of mass 20Kg hangs 4m and swings through a vertical height of 0.9m as shown in the figure 11.

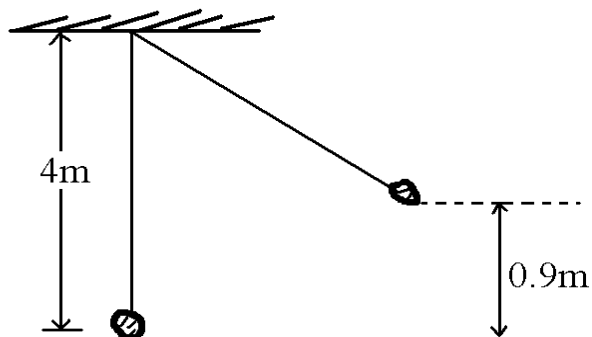


Figure 11

Determine;

- i) The potential energy at its position. (2mks)
 - ii) The speed of the body when passing through the lowest point. (2mks)
- b) A crane lifts a load of 2000Kg through a vertical distance of 3.0m in 6 seconds. Determine the;
- i) Work done by the crane. (2mks)
 - ii) Power developed by the crane. (2mks)
 - iii) Efficiency of the crane given that it is operated by an electric motor rated 12.5kW. (2mks)

17. a) Define the term 'heat capacity'. (1mk)

b) A block of metal of mass 150g at a 100°C is dropped into a well lagged calorimeter of mass 215g and specific heat capacity $400\text{Jkg}^{-1}\text{K}^{-1}$ containing 100g of water at 25°C . The temperature of the resulting mixture is 34°C . (Specific heat capacity of water = $4200\text{Jkg}^{-1}\text{K}^{-1}$). Determine;
i) Heat gained by calorimeter. (2mks)

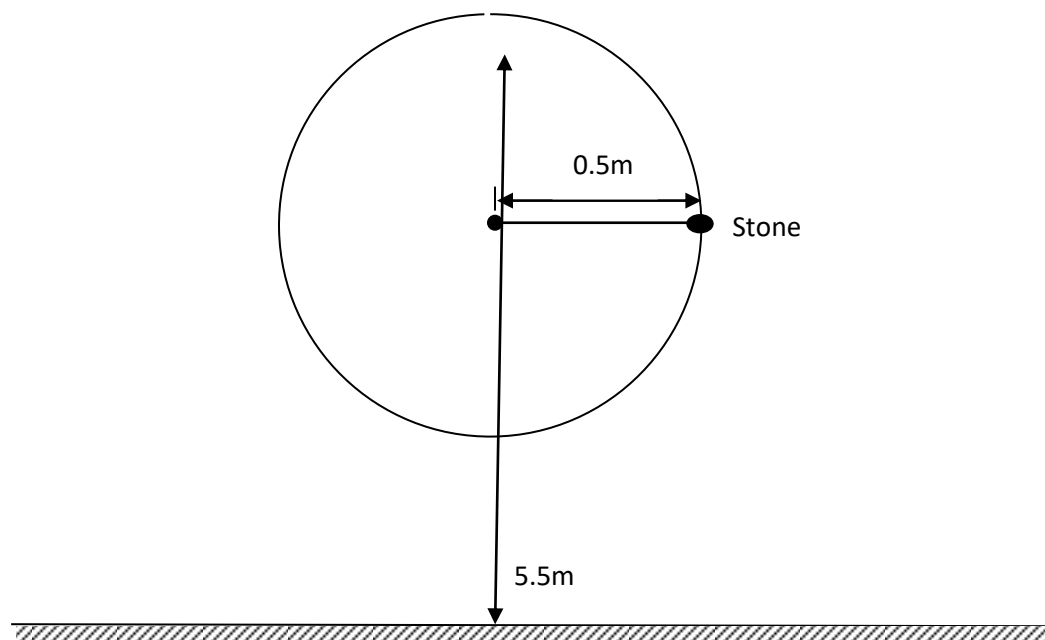
ii) Heat gained by water. (2mks)

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

18. (a) State two factors affecting centripetal force

(2mks)

(b) A stone of mass 0.5kg is attached to a string of length 0.5m which will break if the tension exceeds 20N . The stone is whirled in a vertical plane, the axis of rotation being above the ground, as shown in the Figure 10 below.



The angular velocity is gradually increased until the string breaks. At what angular velocity, ω , will the string break? (3mks)