**NAME:……..…… ADM NO……..… CLASS:…….**

**SCHOOL: ……..…….…… CANDIDATES SIGNATURE: ……..DATE:……**

**FORM 4**
**232/1**
**PHYSICS**
**TIME: 2 HOURS**

# LAIKIPIA EAST TERM 2 2022 FORM 4 EVALUATION EXAM

***Kenya Certificate of Secondary Education – K.C.S.E***

## PHYSICS PAPER 1 2022

## INSTRUCTIONS TO CANDIDATES

1) *Write your name and your admission number in the spaces provided above.*
2) *Write the date and your signature.*
3) *This paper consists of two sections; **A** and **B***
4) *Answer **all** questions in section **A** and **B** in the spaces provided.*
5) *All working **must** be clearly shown in the spaces provided in this booklet.*
6) *Non programmable silent electronic calculators may be used.*
7) *This paper consists of **12 printed pages**. Candidates should check to ensure that all pages are printed as indicated and no questions are missing.*
8) *Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing.*
9) *Candidates should answer the questions in English.*

## FOR EXAMINER'S USE ONLY

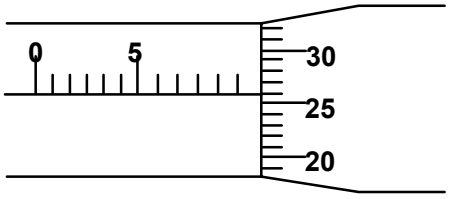
| Section | Question | Maximum Score | Student's score |
|---|---|---|---|
| **A** | 1 – 12 | 25 | |
| **B** | 13 | 08 | |
| | 14 | 10 | |
| | 15 | 11 | |
| | 16 | 08 | |
| | 17 | 10 | |
| | 18 | 08 | |
| | **Total Score** | **80** | |

***Turn Over***

## SECTION A (25 MARKS)

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

**1.** The micrometer screw gauge in figure 1 above has a zero error of -0.12mm.




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

.....

b) Determine the real reading of the instrument. **(2 marks)**

.....

.....

.....

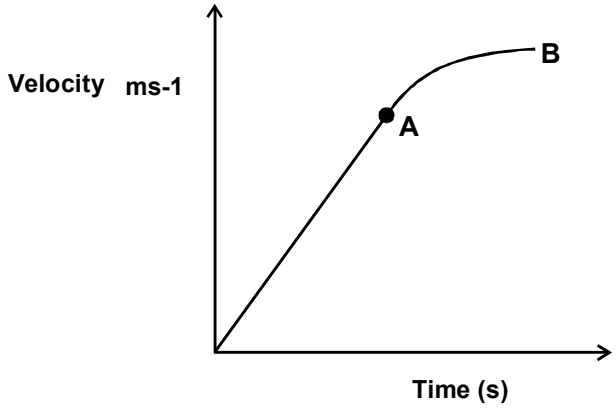
**2.** Explain why a hollow glass sphere just floats on cold water but sinks when the water is heated. **(2 marks)**

.....

.....

.....

**3.** Figure 2 below shows a velocity-time graph of a body.



Describe the motion of the body between A and B. **(1 mark)**

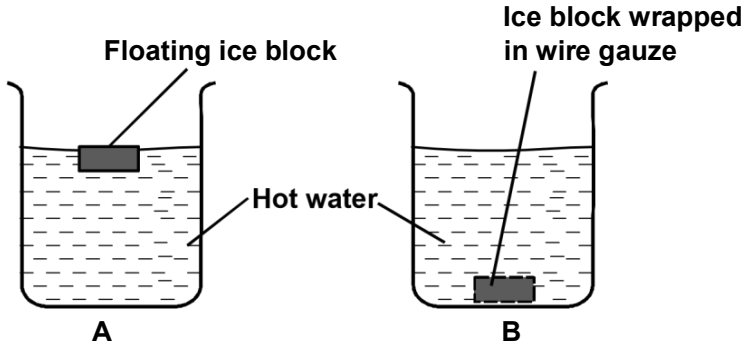
.....

.....

**4.** State why a pin floating on water sinks when a detergent is added. **(1 mark)**

.....

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



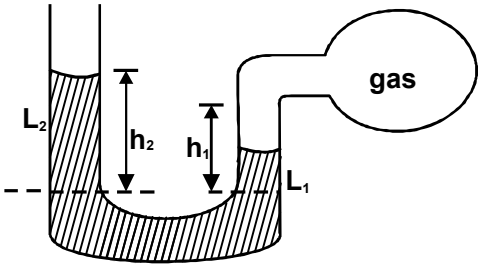

State with reason which water cools faster, assuming that the wire gauge absorbs negligible heat.
**(2 marks)**

.....

.....

.....

**6.** Figure 4 shows a U-tube connected to gas supply containing liquids $L_1$ and $L_2$ of densities $1.8gcm^{-3}$ and $0.8gcm^{-3}$ respectively in equilibrium




Given that $h_1 = 8cm$, $h_2 = 10cm$ and atmospheric pressure is $1.02 \times 10^5$ p.a. Determine the gas pressure. **(3 marks)**

.....

.....

.....

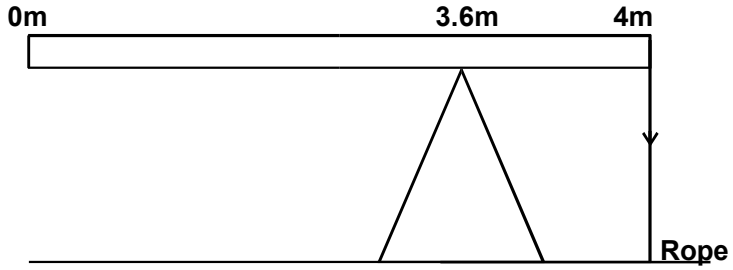
.....

**7.** Smokes was trapped in a smoke cell and viewed through a lens. State the change in movement of the smoke particles when the temperature of the room was lowered. **(1 mark)**

.....

.....

**8.** The figure 5 below shows a uniform rod of length 4m and mass 4kg pivoted at 3.6m mark. The rod is held horizontally with vertical rope at 4m mark as shown.



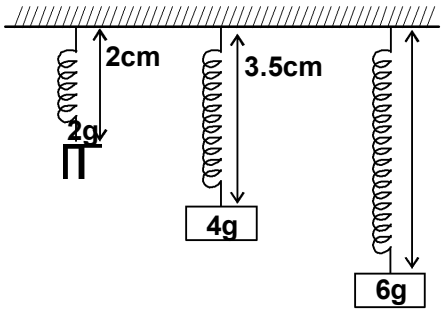

Calculate the tension T in the rope (g = 10N/kg). **(3 marks)**

.....

.....

.....

**9.** The figure 6 below shows three identical springs which obey Hooke's law. Determine the value of *x*. (2 marks)




.....

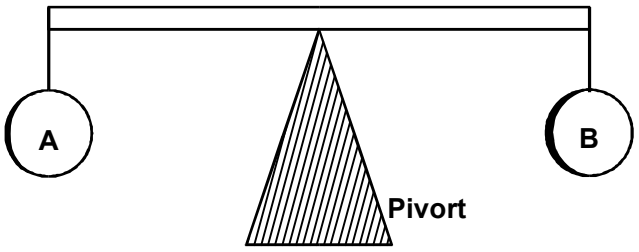
.....

**10.** Explain why a pail of water can be swing in a vertical circle without the water pouring. **(1 mark)**

.....

.....

**11.** Figure 7 below shows two balloons containing two different gases suspended on a rod. The set-up is in equilibrium.




When the set-up is moved in hot sun and system tips to the right. a) Compare expansivity of the gases A and B. **(1 mark)**

.....

.....

b) Explain your answer to (a) above. **(2 marks)**

.....

.....

.....

**12.** Water flows through a tube of length 60cm and cross sectional are a5cm$^2$ in 0.05 minutes. Calculate rate of flow in m$^3$/s. **(3 marks)**

.....

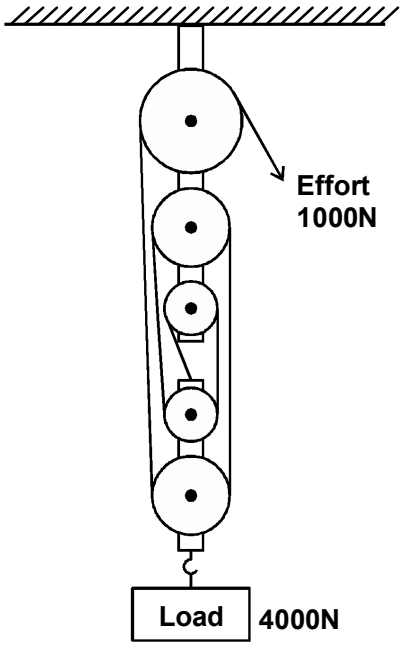
.....

.....

## SECTION B (55 MARKS)

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

**13.** Claire performed an experiment using a pulley system as shown in the figure 8.




a) What is the velocity ratio (V.R) of the system? (1 mark)

.....

b) Determine the Mechanical Advantage of the system. (2 marks)

.....

.....

.....

c) Calculate the efficiency of the system. (2 marks)

.....

.....

d) State one reason why efficiency in such machines is never 100%. (1 mark)

.....

.....

e) If the load moves a distance of 5cm, find the work done on the load. (2 marks)

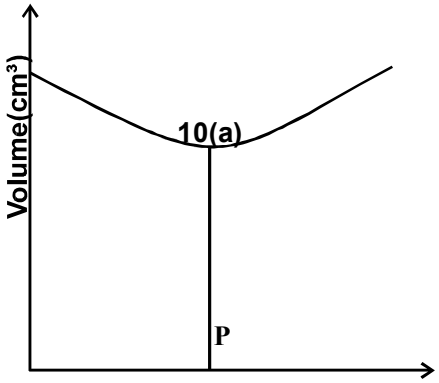
.....

.....

**14.** a) Apart from the definitions, distinguish between temperature and heat. (1 mark)

.....

b) Figure 9(a) below shows variation of volume of water and temperature as water is heated from 0° C to 40°C.

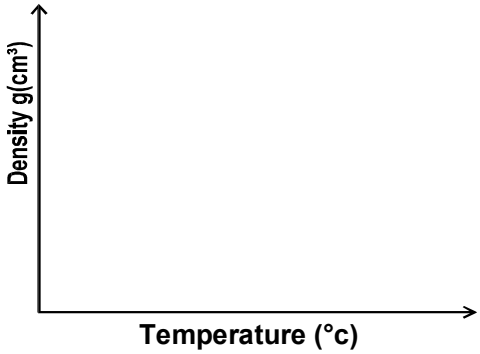



i) State the value of P. (1 mark)

.....

.....

ii) In figure 9(b) below, sketch the graph of density of water against temperature upto 10°C. (1 mark)




iii) A heater rated 300W was used to heat the water from 0°C to 40°C. If the heating took 5 minutes.

Determine:

I. the heat supplied by the heater. (2 marks)

.....

.....

II. The heat capacity of the water. (3 marks)

.....

.....

III. The mass of the water (specific heat capacity of water is $4.2KJkg^{-1}k^{-1}$) (2 marks)

.....

.....

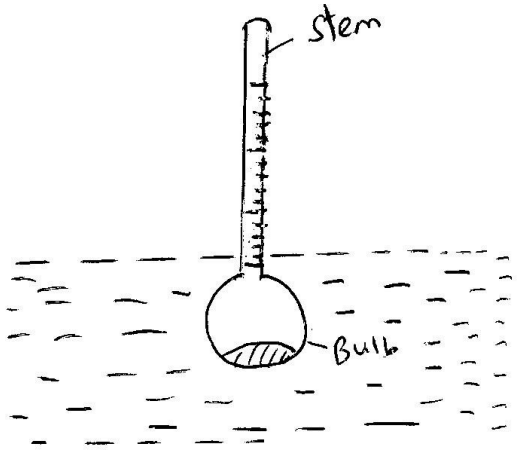
.....

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

.....

.....

b) The densities of liquids may be measured using hydrometers. The hydrometer in the figure 10 consists of weighted bulb on a thin stem.




The hydrometer is designed to measure densities between $1.00g/cm^3$ to $1.10g/cm^3$.

i) The hydrometer has a mass of 165g and the stem has a uniform cross section are of $0.75cm^2$. Calculate

I. The change in submerged volume of the hydrometer when is placed in a liquid of density 1.0g/ $m^3$ and then he liquid of density 1.1g/$cm^3$ (3 marks)

.....

.....

.....

II. The length on the stem between 1.00g/$cm^3$ and 1.10g/$cm^3$ mark. (3 marks)

.....

.....

III. State one way of improving the sensitivity of the hydrometer. (1 mark)

.....

.....

c) When a body of mass 450g is completely immersed in a liquid, the upthrust on the body is 1.6N. Find the weight of the body in the liquid. (3 marks)

.....

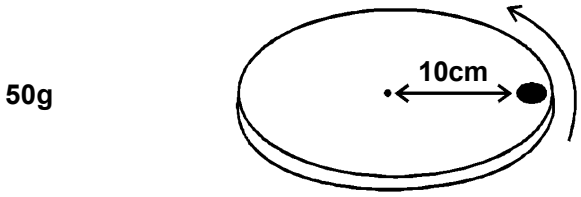
.....

.....

**16.** a) State what provide centripetal force for an electron moving round the nucleus. (1 mark)

.....

b) Figure 11 below shows a turn table on which a mass of 50g is placed 10cm from the centre.




Frictional force between the 50g mass and the turn table is 0.4N. When the turntable is made to rotate with angular velocity on ω $rads^{-1}$ the mass must starts to slide off.

i) Determine the:

I. angular velocity ω. (3 marks)

.....

.....

.....

II. time taken to make one complete revolution. (3 marks)

.....

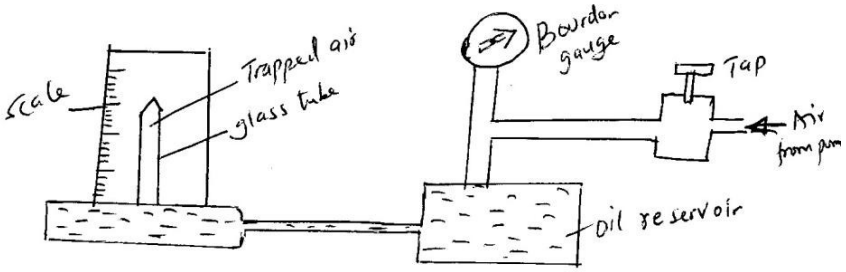
.....

.....

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

.....

**17.** a) The diagram below shows a set up that can be used to verity Boyles law.




i) State the measurement that should be taken in this experiment. (1 mark)

.....

.....

ii) Explain how the measurements taken would be used to verify Boyle's law. (3 marks)

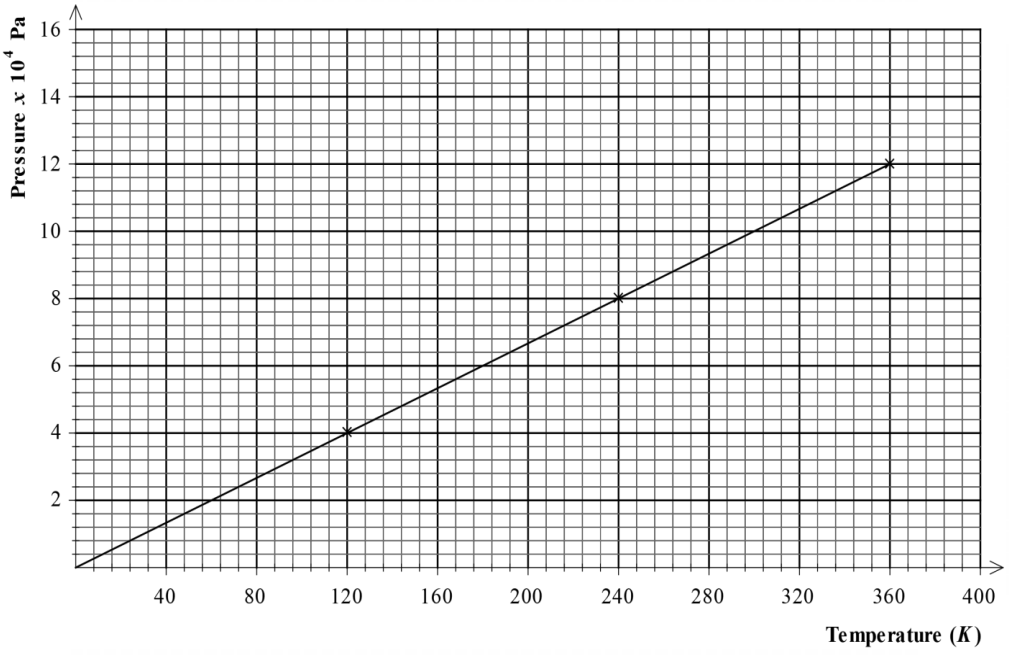
.....

.....

.....

..... .....

b) The graph below shows the relationship between pressure and temperature for a fixed mass of an ideal gas at constant volume




Given that the relationship between P and T is in the form P = KT + C where K and C are constants.

i) Determine from the graph the value of K. (1 mark)

.....

.....

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

.....

.....

iii) Determine from the graph the pressure of the gas when the temperature is 47°C. (1 mark)

.....

.....

c) A fixed mass of a gas of pressure 4.0 atmospheres and volume 2.5 litres is at a temperature of 27°C. Its heated to a temperature of 117°C while being allowed to expand freely at constant pressure. Determine its new volume. (3 marks)

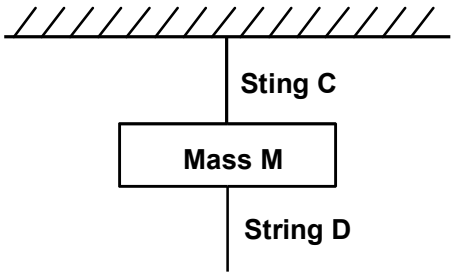
.....

.....

.....

.....

**18a)** The figure below shows identical strings C and D attached to a large mass M. String C is fixed on a clamp.




State the reason why string D snaps when its free end is suddenly pulled downwards. (1 mark)

.....

**b)** A lorry of mass 10,000 kg moving with a speed of 72km/h hits a stationary car of mass 4000kg merging together.

i) State the name of the collisions above. (1 mark)

.....

ii) Calculate the common velocity after collision. (3 marks)

.....

.....

.....

iii) After such a collision state and explain what happens to the kinetic energy of the bodies above.

(1 mark)

.....

**c)** A boy of mass 50.0kg stands on a weighing balance in a lift which is accelerating upwards at 2.0m/s². Determine the reading on the weighing balance. (2 marks)

.....

.....

.....