Name: …….Class: …… Adm. No. ……

232/1
PHYSICS
THEORY
Paper 1
June 2023
Time: 2 hours

Candidate's Signature: ……...

K A S S U J O I N T E X A M I N A T I O N
JUNE 2023
Kenya Certificate of Secondary Education
PHYSICS
PAPER 1

Instructions to Candidates

- *Write your name, admission number, class and signature in the spaces provided at the top of the page. This paper consists of two sections; **A** and **B**.*
- *Answer **ALL** the questions in the spaces provided.*
- *Mathematical tables and electronic calculator may be used.*
- *All working MUST be clearly shown.*
- *This paper consists of **13** printed pages.*
- *Candidates should answer the questions in English and check to ensure that no question(s) is missing.*
- *Take:*
  Acceleration due to gravity, g=10m/s^2
  Density of fresh water=1 g/cm^3
  Density of sea water=1.2 g/cm^3

FOR EXAMINER'S USE ONLY

SECTION	QUESTIONS	MAXIMUM SCORE	CANDIDATE'S SCORE
A	1 – 13	25	
B	14	12	
	15	10	
	16	11	
	17	09	
	18	13	
	TOTAL	**80**	

SECTION A (25 MARKS)

Attempt all the questions in the spaces provided.

1. A vernier calliper has a zero error of 0.10 cm. Sketch the reading of the vernier calliper when used to measure the size of a test tube of internal diameter 2.60 cm. (1 mark)

2. An empty density bottle weighs 25g when empty and 70g when full of fresh water. Determine the volume of the density bottle. (2 marks)

.....

.....

.....

.....

.....

.....

3. The **figure 1** below shows a flask filled with coloured water. The flask is fitted with a cork through which a tube is inserted. The flask is placed in crushed ice and allowed to cool.

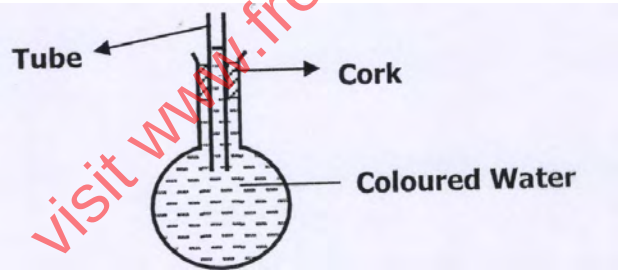


Figure 1

State and explain the observation made. (2 marks)

.....

.....

.....

.....

.....

.....

.....

4. The **figure 2** below shows a straw with a hole in use to suck milk from a glass container.

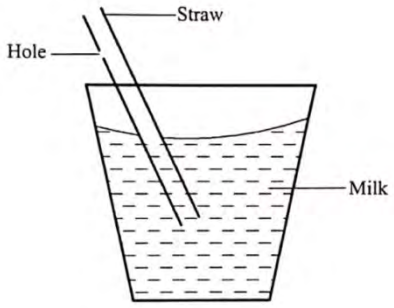


Figure 2

State and explain the observation made upon sucking. (2 marks)

.....

.....

.....

.....

.....

.....

.....

5. Two samples of bromine vapour are allowed to diffuse separately under different conditions, one in a vacuum and the other in air. It was observed that bromine diffused faster in vacuum than in air. Explain this observation. (1 mark)

.....

.....

.....

6. The **figure 3** below shows a graph of two containers having hot water and allowed to cool after sometime.

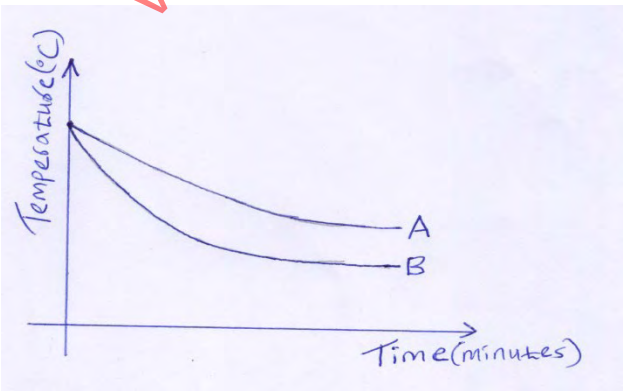


Figure 3

Graph A represents temperature in container A and B temperature in container B. With reason identify the graph that represents a container with dull surface. (2 marks)

.....

.....

.....

7. A student wanted to determine the mass of a stone using set up in **figure 4** below.

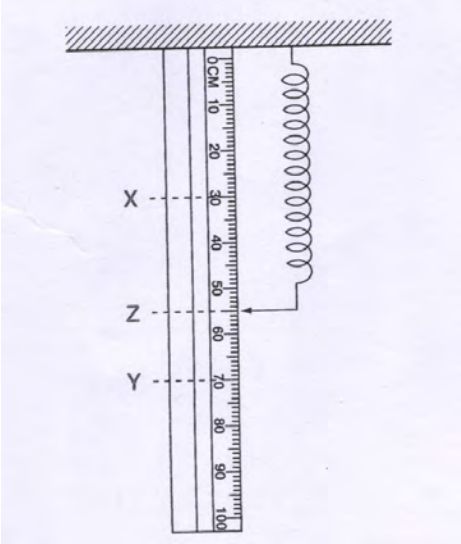


Figure 4

Initially, the pointer was at X. On hanging 200g mass on the spring, the pointer moved to point Y. When he replaced the 200g mass with the stone, the pointer moved to point Z. Given that the elastic limit of the spring was not exceeded, determine the mass of the stone.

(3 marks)

.....

.....

.....

.....

.....

.....

.....

8. It is dangerous to stand near the edge of a platform in a railway station when a train passes without stopping. Explain. (1 mark)

.....

.....

.....

.....

.....

.....

9. Sketch a velocity – time graph for a body projected vertically upwards until it falls back to its point of projection. (2 marks)

10. **Figure 5** below shows a uniform metre rule balanced on a knife edge.

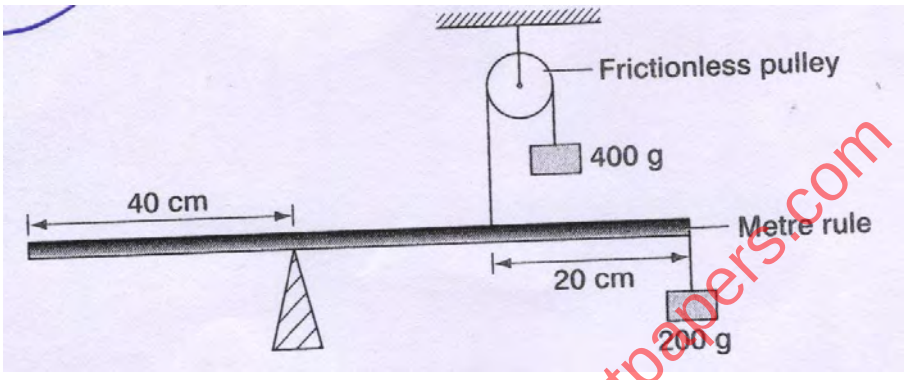


Figure 5

Determine the weight of the metre rule. (3 marks)

.....

.....

.....

.....

.....

.....

11. State the S.I unit of work done by a stone mason in lifting a stone. (1 mark)

.....

12. A certain mass of oxygen gas occupies a volume of 1.2 m^3 at a pressure of 1.4 x 10^5 Pa and temperature 15^0C. Find its volume when the temperature is 0^0c at a pressure of 1.1 x 10^5 Pa. (3 marks)

.....

.....

.....

.....

.....

.....

13. The **figure 6** below shows a block floating in a liquid.

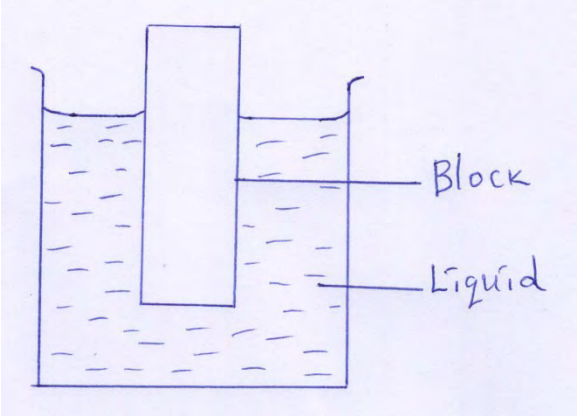


Figure 6

When the liquid B is heated, it is observed that the block sinks further. Explain this observation. (2 marks)

.....

.....

.....

.....

.....

SECTION B (55 MARKS)

14. (a) A ball is thrown horizontally from the top of a vertical tower and strikes the ground at a point 60m from the bottom of the tower. Given that the height of the tower is 50m, determine the;

(i) Time taken by the ball to hit the ground. (2 marks)

.....

.....

.....

.....

.....

(ii) Initial horizontal velocity of the ball. (2 marks)

.....

.....

.....

.....

.....

(iii) Vertical velocity of the ball just before striking the ground. (2 marks)

.....

.....

.....

.....

.....

(b) State one factor that affects centripetal force acting on a body. (1 mark)

.....

.....

.....

(c) A point on the rim of a wheel has a velocity of 5.6 m/s. If the rim has a radius of 0.4m, calculate;

(i) The angular velocity of the point. (2 marks)

.....

.....

.....

.....

.....

(ii) its centripetal acceleration. (2 marks)

.....

.....

.....

.....

.....

(d) State the reason why an object moving in a circular motion is said to be accelerating while the speed is constant. (1 mark)

.....

.....

.....

.....

.....

15. (a) A body of mass M_1 moving at velocity 'u' collides with another stationary body of mass M_2. Given that the two bodies coalesce after impact and move at a uniform velocity of V. Derive an expression for the final velocity of the bodies after the impact. (2 marks)

.....

.....

.....

.....

.....

.....

(b) Given the following apparatus.

- ✓ Empty density bottle of volume V
- ✓ Liquid x
- ✓ Beam balance

Describe briefly how you can obtain the density of liquid X. (3 marks)

.....

.....

.....

.....

(c) (i) Define terminal velocity. (1 mark)

.....

.....

.....

(ii) The **figure 7** below shows a velocity time graph for a small sphere falling through water.

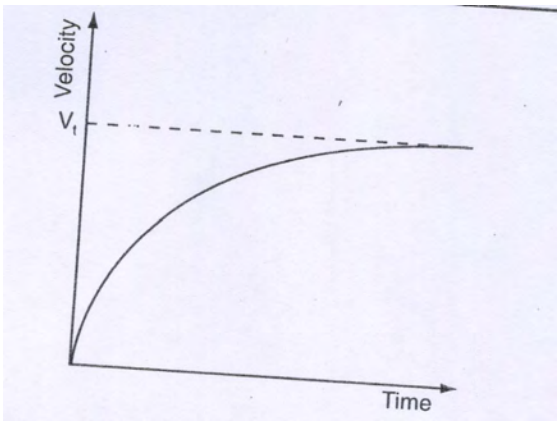


Figure 7

On the same axes sketch the graph for the sphere when allowed to fall through glycerine. (1 mark)

(iii) Explain the difference in the graphs in (ii) above. (1 mark)

.....

.....

.....

(d) A liquid flows along a horizontal pipe of cross section area 24 cm^2 with a speed of 3 m/s. The speed increases to 9 m/s where there is a constriction. Calculate the cross-section area of the constriction. (2 marks)

.....

.....

.....

.....

.....

.....

16. (a) State the meaning of 'specific latent heat of fusion". (1 mark)

.....

.....

.....

.....

(b) The **figure 8** below shows a setup of apparatus used in an experiment to determine the specific latent heat of fusion of ice.

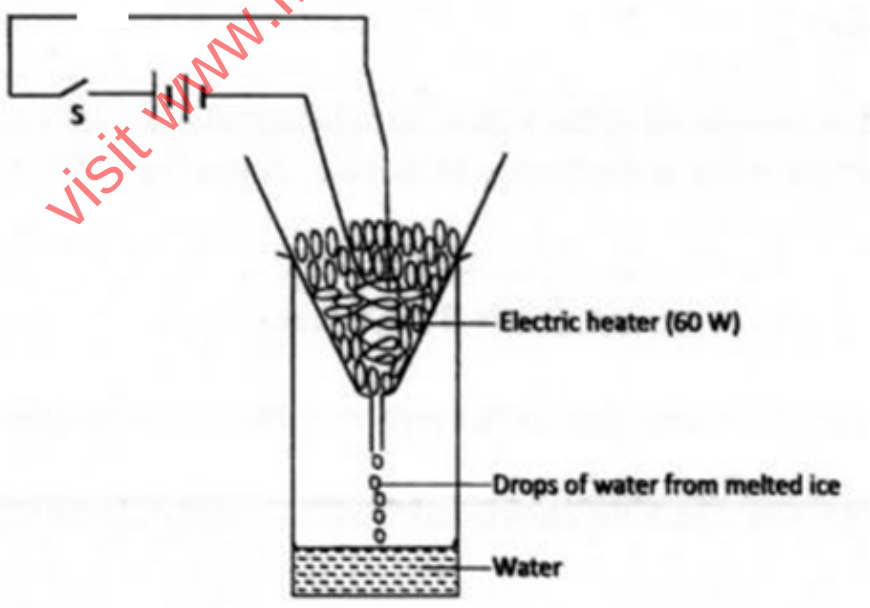


Figure 8

(i) On the diagram insert the ammeter and the voltmeter. (2 marks)

(ii) From the experiment above, give the measureable quantities required to achieve the objective. (2 marks)

.....

.....

.....

.....

(iii) The following readings were obtained after the heater was switched on for 10 minutes. (Mass of melted ice = 18g) Determine:

I. Energy supplied by the 60W heater in the 10 minutes. (2 marks)

.....

.....

.....

.....

II. Specific latent heat of fusion of ice. (3 marks)

.....

.....

.....

.....

.....

.....

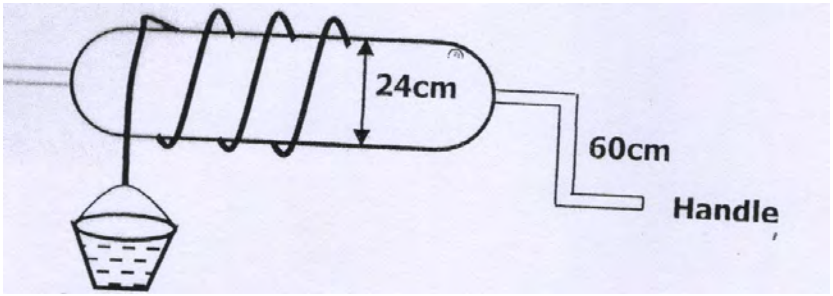
(iv) State any assumption in the experiment. (1 mark)

.....

.....

.....

17. The diagram below shows the different parts of a wheel and axle machine.



(a) (i) Indicate on the diagram the effort and load. (1 mark)

(ii) Given that the handle wheel moved through a circular path of radius R and the axle moves through a circular path of radius r. Show that the velocity ratio of a wheel and axle is given by V.R = $^{R}/_{r}$. (2 marks)

.....

.....

.....

.....

.....

(b) In a wheel and axle, the wheel's radius is 60cm, while the axle's diameter is 24cm. the effort is 1.0N and the load is 4N. Work out:

(i) The velocity ratio. (2 marks)

.....

.....

.....

.....

.....

(ii) The mechanical advantage. (2 marks)

.....

.....

.....

.....

.....

(iii) The efficiency of the system. (2 marks)

.....

.....

.....

.....

.....

18. (a) A spherical buoy of diameter 0.6m and mass 50kg is connected to a rope tied to a sea bed so that ¾ of its volume is below the surface, as shown in the **figure 9** below.

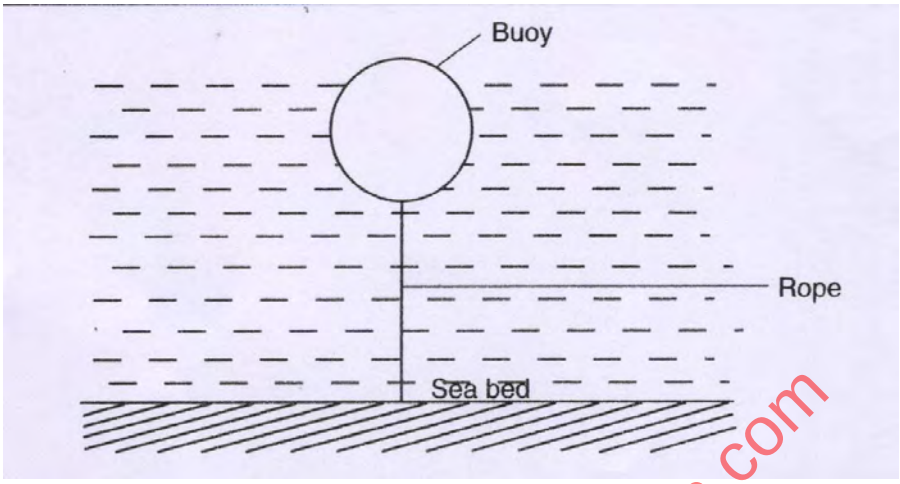


Figure 9

(i) On the diagram, indicate two forces acting on the buoy apart from weight, W. (2 marks)

(ii) Determine:

I. The weight of the buoy (1 mark)

.....

.....

.....

II. The upthrust on the buoy (2 marks)

.....

.....

.....

.....

III. The tension, T, on the rope. (2 marks)

.....

.....

.....

.....

(b) The **figure 10** below shows a simple hydrometer.

State the reason why;

i. The upper stem is made narrow (1 mark)

.....

.....

.....

ii. The lead shots are placed in the glass bulb. (1 mark)

.....

.....

.....

(c) The hydrometer above has a mass of 25g and allowed to float in oil of density $0.8g/cm^3$ with 6 cm of its stem above the oil. If the cross-sectional area of the stem is $0.5cm^2$, find the length of its stem out of freshwater, if it is transferred and made to float in freshwater. (4 marks)

.....

.....

.....

.....

.....

.....

.....

.....

.....