MARANDA HIGH SCHOOL

Kenya Certificate Of Secondary Education

THE 2024 MOCK EXAMINATION

232/1 **PHYSICS** **PAPER 1**

June, 2024 **TIME: 2 Hrs**

MARKING GUIDE

CODE - SUBJECT
Monday, 3rd June, 2024
Afternoon
2.00-4.30pm

Instructions

(a) *Write your* ***name, admission number, date, stream and signature*** *in the spaces provided*

(b) *All answers must be written in the spaces provided in the booklet.*

(c) ***This paper consists of 10 printed pages with 15 questions. Candidates should check the question paper to ascertain that all the pages are printed as indicated.***

(d) *Candidate should answer the questions in* ***English***

FOR EXAMINERS' USE ONLY

QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
1-10	25	
11	10	
12	13	
13	07	
14	13	
15	12	
TOTAL	80	

SECTION A (25 MARKS)

Answer all questions in this section in the spaces provided:

1. **Figure 1** below shows the scale of a measuring instrument when measuring the thickness of an object.

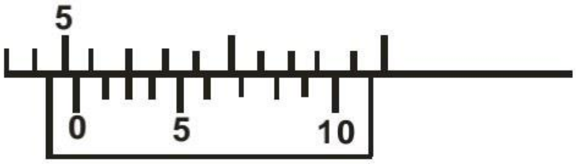


Figure 1

a) Name the instrument to which the scale belongs. (1 mark)

Vernier callipers ✓1

b) Find the reading of the instrument shown. (2 marks)

Main scale reading: 5.00cm

Vernier scale reading: 2 X 0.01 = 0.02 ✓1

5.00 +0.02 = 5.02cm ✓1

2. Two inflated balloons are at the same level while suspended from two threads a short distance apart. Some air is blown gently between the balloons in a horizontal direction. State and explain the observation made. (2 marks)

The balloons move towards each other. ✓1 Blowing air in between increases the velocity leading to decrease in pressure. Atmospheric pressure from the sides, being greater, pushes them towards each other. ✓1

3. A uniform wooden bar of length 1m and mass 500g is pivoted at 40cm mark as shown in **Figure 2.**

Calculate the value of $\mathbf{F_1}$ if the system is to be in equilibrium. (3 marks)

$F_1 d_1 = F_2 d_2$ ✓1

$0.2F_1 = (0.1 \times 5) + (0.6 \times 100)$ ✓1

$0.2F_1 = 60.5$

$F_1 = 302.5N$ ✓1

4. State **two** major defects of a simple cell. (2 marks)

Local action ✓ 1

Polarization ✓ 1

5. A mercury barometer reads 760mmHg at sea level and 700mmHg at the top of a mountain. If the density of mercury is 13,600kg/m^3 and density of air is 1.30kg/m^3, calculate the height of the mountain. (3 marks)

Difference in pressure = 760 - 700 = 60mmHg ✓ 1

$\frac{60}{1000} \times 13600 \times 10 = h \times 1.3 \times 10$ ✓ 1

$h = 627.69\text{m}$ ✓ 1

6. **Figure 3** below shows a piece of wood fitted into a copper pipe and a piece of paper wrapped tightly around the junction. Explain why the side of the paper around wood burns first when flame is applied at the junction. (2 marks)

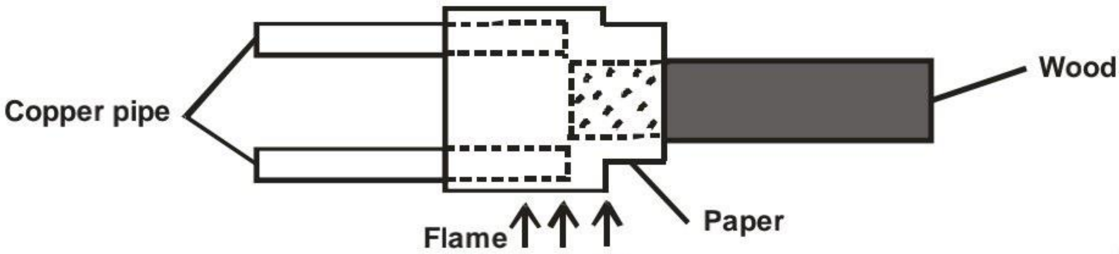


Figure 3

Wood is a poor conductor of heat ✓ 1 hence does not conduct heat away from the paper thus it gets charred. ✓ 1

7. 0.2 kg of copper at 80^{0}C is put in a well lagged brass calorimeter of mass 0.1kg containing 0.16kg of sea water at 20^{0}C. Calculate the final steady temperature of the mixture. Take specific heat capacity of

Copper = 400 Jkg^{-1}k^{-1}

Brass = 380J kg^{-1}k^{-1}

Sea water = 3900J kg^{-1}k^{-1} (3 marks)

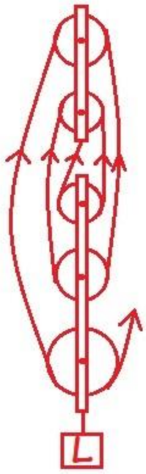
Heat lost by copper = Heat gained by brass calorimeter + Heat gained by sea water ✓ 1

$80(80 - T) = 38(T - 20) + 624(T - 20)$ ✓ 1

$6400 - 80T = 38T - 760 + 624T - 12480$

$742T = 19640$ $T = 26.47°C$ ✓ 1

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



✓[1] 6 strings with arrows

✓[1] correct arrangement of pulleys

b) Find:

(i) Velocity ratio (V.R.) (1 mark)

6 ✓[1]

(ii) An effort of 450 N is used to raise a load of 2400N. Determine:

- Mechanical advantage (M.A) (2 marks)

$M.A. = \frac{\text{load}}{\text{Effort}}$ | $= \frac{2400}{450}$ ✓[1]

$= 5.333$ ✓[1]

- Efficiency of the pulley system. (2 marks)

$\text{Efficiency} = \frac{M.A.}{V.R.} \times 100\%$

$= \frac{5.333}{6} \times 100\%$ ✓[1]

$= 88.88\%$ ✓[1]

(iii)If all the wasted energy is used to raise the lower block and the frictional force between the pulleys and moving parts is 3.6N; determine the weight of the lower block. (2 marks)

$\text{wasted effort} = \frac{11.12}{100} \times 450$

$= 50.04N$ ✓[1]

Frictional force + Wasted effort = Weight of lower block

$3.6 + 50.04 = 53.64N$ ✓[1]

(iv) If the load moved a distance of 50cm, determine the useful work done by the effort. (3 marks)

work = load X load distance ✓1

= 2400 X 0.5 ✓1

= 1200J ✓1

c) James applied a force of 400N in pushing a stationery wall. If he took one hour to push the wall, calculate the power developed. (1 mark)

$\text{Power} = \frac{\text{work done}}{\text{time}}$

$= \frac{400 \times 0}{3600}$

= 0 J ✓1

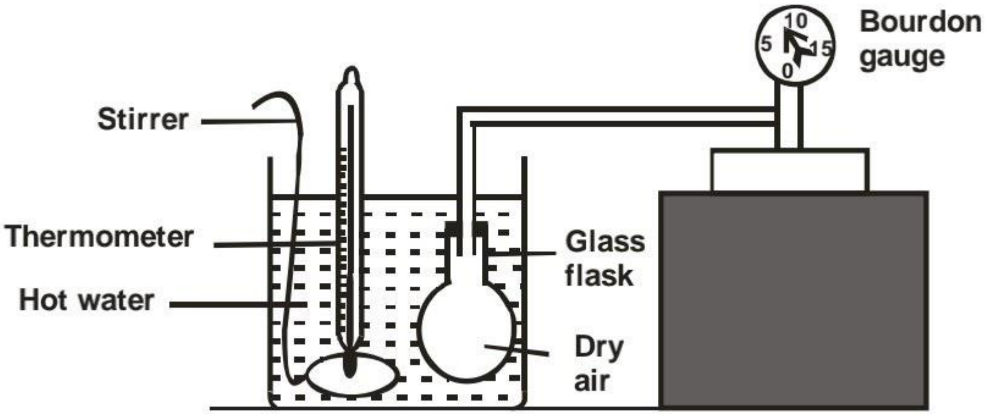
13. a) State the pressure law; (1 mark)

The pressure of a fixed mass of a gas is directly proportional to its absolute temperature, provided the volume is kept constant. ✓1

b) Explain how a gas exerts pressure. (2 marks)

When a gas is heated it expands, ✓1 increasing the number of collisions per unit area which in turn raises the pressure. ✓1

c) The figure below shows a set up used to verify pressure law.



i) State two measurements that may be taken in the experiment. (2 marks)

-Pressure gauge reading ✓ 1

-Thermometer reading ✓ 1

ii) Explain how the measurements in (i) above may be used to verify pressure law. (2 marks)

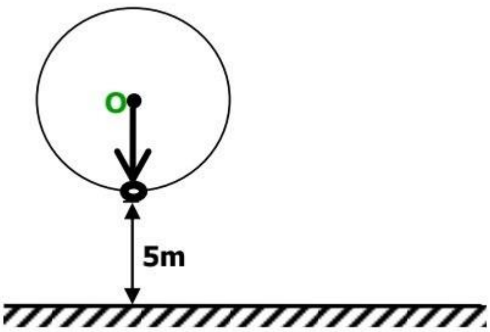
-Collect various values of pressure under different temperatures ✓ 1

-Plot a graph of pressure against temperature and study the graph ✓ 1

14. (a) A body moving in a circular path at constant speed is said to be accelerating. Explain (1 mark)

This is due to instantaneous change in velocity as a result of change in direction. ✓ 1

(b) The diagram 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 position A and at a speed of $30ms^{-1}$. Point **A** is 5m above the ground.



Calculate;

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

$S = \frac{1}{2}gt^2$ ✓ 1

$5 = \frac{1}{2} \times 10t^2$ ✓ 1

$t = 1s$ ✓ 1

ii)The horizontal distance the mass travels before it strikes the ground. (2 marks)

$R = ut$

$= 30 \times 1$ ✓1

$= 30m$ ✓1

iii) The vertical velocity with which the mass strikes the ground. (3 marks)

$v = u + gt$ ✓1

but $u = 0$

$v = gt$

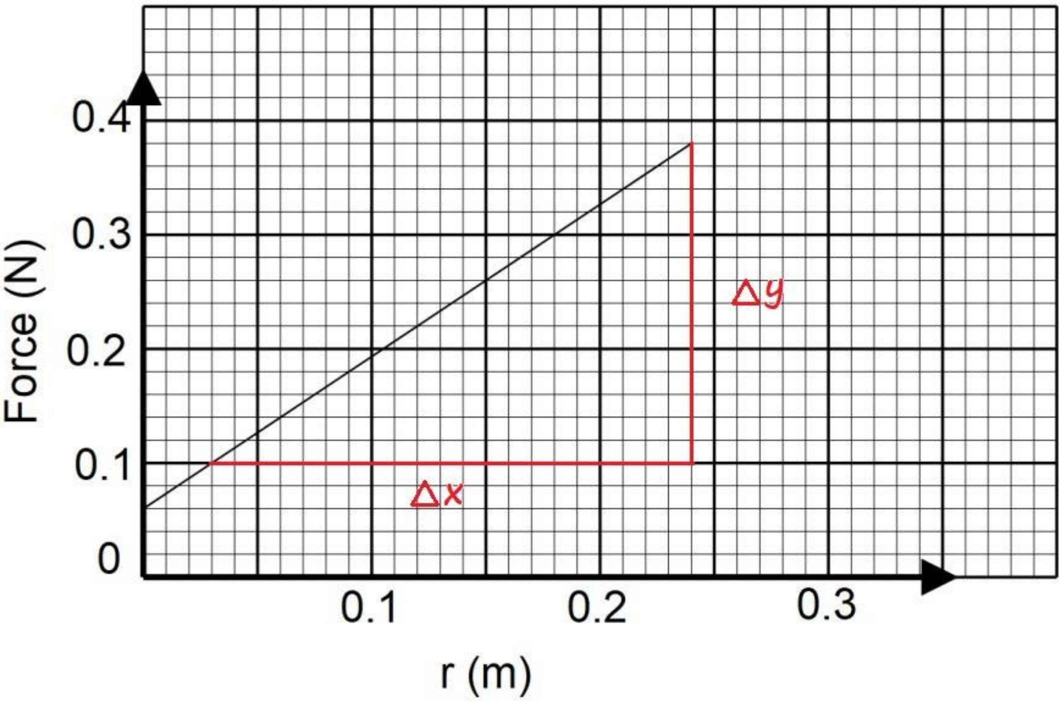
$= 10 \times 1$ ✓1

$v = 10 m/s$ ✓1

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

Δy

Δx



From the graph, determine the angular velocity, w of the body given that m = 100g and $\mathbf{F = mw^2r + c}$ where c is a constant. (4 marks)

$F = m\omega^2 r + C$

$y = mx + c$

✓1

gradient $= m\omega^2$

gradient $= \dfrac{\Delta y}{\Delta x}$

$\dfrac{0.38 - 0.1}{0.24 - 0.03}$ ✓1

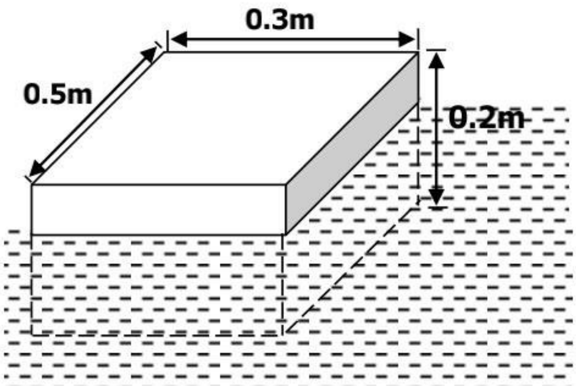
$\dfrac{0.28}{0.21}$ ✓1

$= 1.333$

$\omega = \dfrac{1.333}{0.1}$

$= 13.33 rad/s$ ✓1

15. The diagram in fig below shows a block of wood floating to a depth of 0.18m in water. (Density of water = 1000Kg/m^3)



a) Determine;

(i) Mass of the wood. (3 marks)

Volume of water displaced = 0.5 X 0.3 X 0.18

= 0.027m^3 ✓1

mass of water = density water X volume ✓1

= 1000 X 0.027

= 27kg ✓1

(ii) The density of the wood. (2 marks)

volume of wood = 0.5 X 0.3 X 0.2

= 0.03m^3

density = $\frac{27}{0.03}$ ✓1

density = 900kg/m^3 ✓1

iii) Determine the number of frogs each of mass 500g which will make the block of wood to be just submerged if they sit on the block. (5 marks)

Total mass of frogs = 30 - 27 = 3kg ✓1

number of frogs = $\frac{3000}{500}$ ✓1

= 6 frogs ✓1