232/1 - PHYSICS -Paper 1

(THEORY) – 2 hours

Name:……Index Number:…….....

School: ……. Date…….

MUMIAS WEST SUB-COUNTY JOINT EVALUATION

TERM 1 JUNE 2022

Instructions to candidates

(a) Write your name, index number in the spaces provided above. (b)

Sign and write the date of the examination in the spaces provided (c) This paper consists of **TWO** Sections: **A** and **B**.

(d) Answer **ALL** the questions in section **A** and **B** in the spaces provided.

(e) All working **MUST** be clearly shown.

(f) KNEC mathematical tables and silent non programmable electronic calculators may be used.

(g) **This paper consists of 13 printed pages (h) Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing (i) Candidates should answer the questions in English**

FOR EXAMINER'S USE ONLY

Section	Question	Maximum Score	Candidate's Score
A	1 – 11	25	
B	12	13	
	13	10	
	14	12	
	15	12	
	16	09	
	Total Score	80	

SECTION A (25 MARKS)

1. Determine the reading of the vernier callipers shown in the **figure 1.**

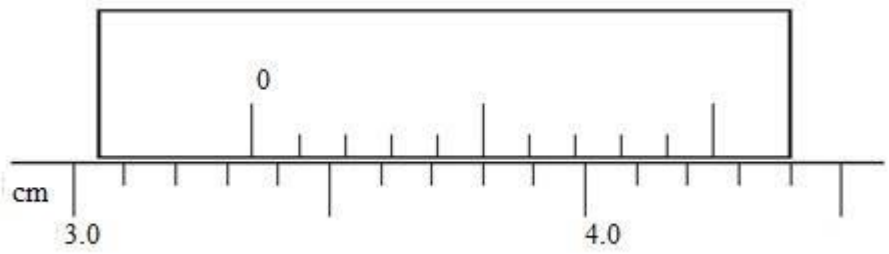

Fig. 1

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2. **Figure 2** shows the apparatus a student uses to investigate the extension of a spring.

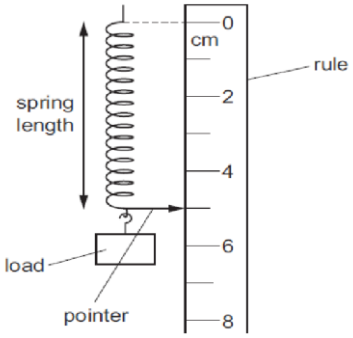

Fig. 2

The initial pointer position was at the 2cm mark, when a load of 4N is applied the pointer position is as shown. Find the spring constant of the material of the spring (2mks)

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3. Give a reason why water wets glass. (1mk)

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4. **Figure 3** shows a simple mercury barometer.

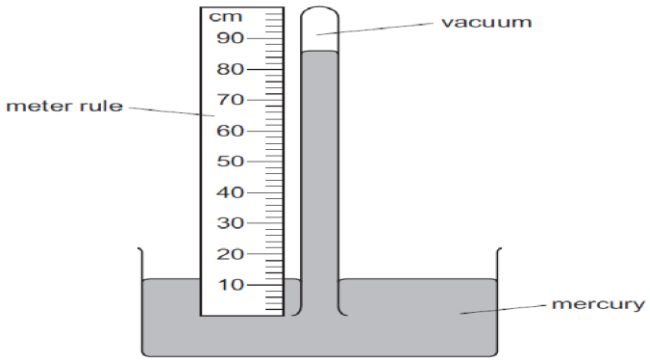

Fig. 3

(i) Determine the value of the atmospheric pressure in pascals.

Take density of mercury =13.6g/cm^3 (2mks)

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ii) State the reason why mercury is preferred to water as a barometric liquid (1mk)

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5. The diagram in **figure 4** shows the cross-section of a vacuum flask containing a hot liquid in a cold room. X and Y are points on the inside surfaces of the walls of the flask.

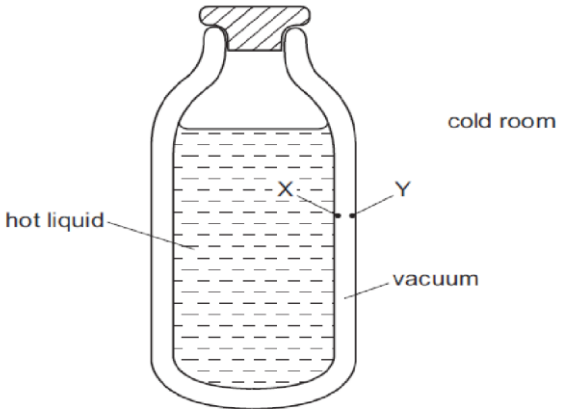

Fig. 4

Explain how heat transfer is minimized by the points X and Y (2mk)

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6. A stopwatch is used to time a runner in a race. **Figures 5 and 6** show the stopwatch at the start and at the end of a lap of the race in seconds.

start of lap fig. 5

end of lap fig.6

Determine the time runner took to finish the lap of the race. (1mk)

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7. **Figure 7** shows a system at equilibrium and pivoted at its geometric center two with identical solids.

Study it and answer the questions that follow:

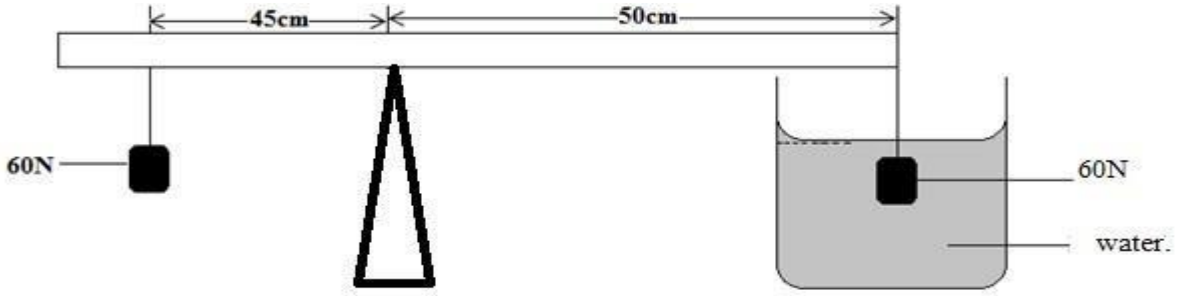

Fig.7

Determine the relative density of solids. (3mks)

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8. 2 kg of iron at 80^{o}C is placed in a copper can, mass 0.5kg, containing 1kg of water at 20^{o}C. After stirring, the temperature of the mixture is 30^{o}C. Find the specific heat capacity of iron.(Take specific heat capacity of water to be 4200 $Jkg^{-1}K^{-1}$and Copper 400 Jkg^{-1}). (3mks.)

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9. Explain why a hole in a ship near the bottom is more dangerous than one nearer the surface. (1mk.)

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10. A student inverted a rounded flask with a glass tube and inserted it into water as shown in **figure 8.0** below;

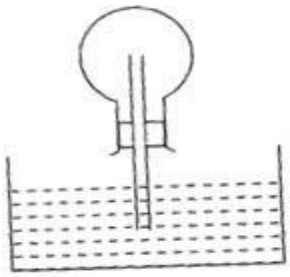

Fig. 8

(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. (2mks)

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Explain what happens in the glass tube when the student stops rubbing and lets the flask to cool.(1mk

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11.) The handle of a screw jack shown in **figure 9** is 35cm long and the pitch of the screw is 0.5cm.

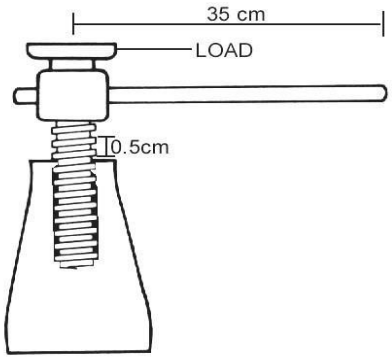

fig. 9

(i) Determine is the velocity ratio of the system. (2mks.)

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(ii) Work out the force that must be applied at the end of the handle when lifting a load of 2,000N if the efficiency of the jack is 40%. (3mks)

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SECTION B (55 MARKS)

12. (a)The mass of a lift cage with its passenger is 500kg and the acceleration of free fall, g, is $10m/s^2$.

The lift starting from rest moves upwards as follows:

Accelerating uniformly at $1m/s^2$ for 5s; then travels at a constant speed for the next 10s and finally decelerates uniformly, coming to a stop after a further 5s.

(i)Draw the lift indicating the forces acting on the passenger. (2mks)

(ii) Sketch the velocity-time graph of this motion. (2mks.)

(iii) Determine is the total distance this lift ascends during the 20s. (2mks.)

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(iii) State what the passenger experiences as the lift accelerates upwards. (1mk.)

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Determine for the entire motion:

a) the potential energy. (2mks)

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b) the kinetic energy gained of the lift. (2mks)

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(c) the power developed by the lift during the of the motion. (2mks)

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13a) State Archimedes principle (1mk)

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b) A solid displaces 8.5 cm^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 0.8 gcm^3 .

Determine:

The upthrust on the solid when floating. (3mk)

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i) The density of liquid. (3mk)

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iii) The upthrust on the solid when fully submerged (3mk)

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14. (a) Write the statement of the law that relates the volume of a gas to its temperature. (1mk)

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15. b) State two assumptions made for ideal gases. (2mks.)

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16. b) **Figure 10** shows an experiment set-up that may be used to investigate one of the gas laws. The glass tube has a uniform bore and it is graduated in millimetres.

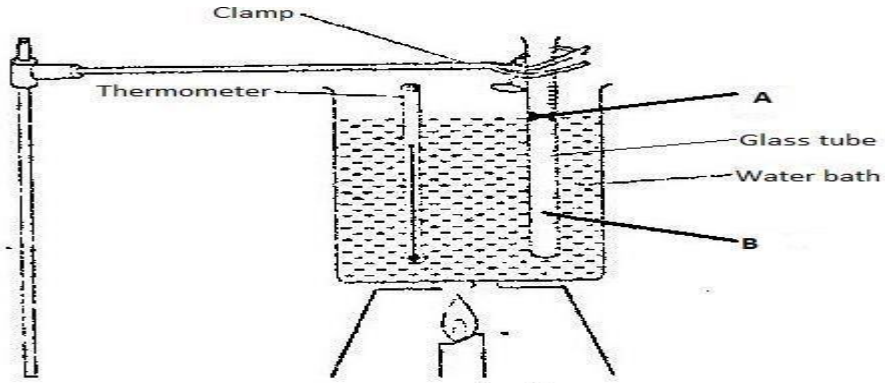

fig. 10

(i) Name the parts labelled A : ..... (1mk)

Describe how the set-up would be used to verify the law under investigation. (4mks)

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iii) Sketch a suitable graph for the expected results for an ideal gas. (2mks)

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iv) A mass of oxygen gas occupies a volume of 1200 cm^3 at 273^0C and a pressure of 1.2 atmospheres. It is compressed until its volume is 600 cm^3 and its pressure is 3.0 atmospheres. Determine the temperature of the gas after compression. (2mks)

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16. a) Distinguish between latent heat of fusion and specific latent of fusion. (1mark)

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b) **Figure 11** 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.

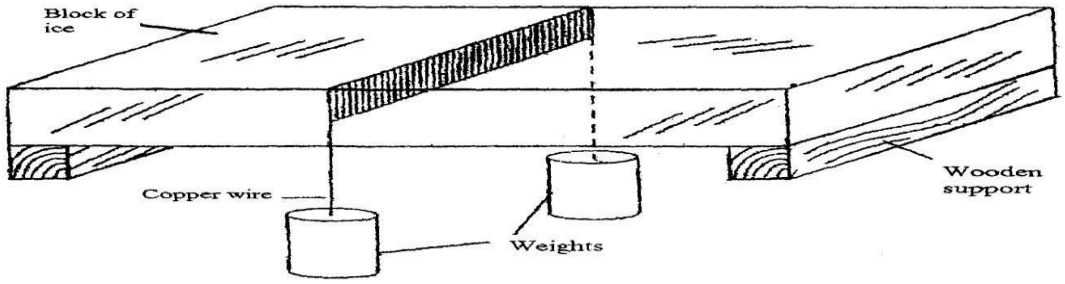

Fig. 11

(i) Explain this observation, (3mks)

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(ii)State and explain the effect of replacing the copper wire with a cotton thread. (2mks)

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(c**) Figure 12**. shows one method of measuring the specific latent heat of fusion of ice. Two funnels A and B, contain crushed ice at 0°C.

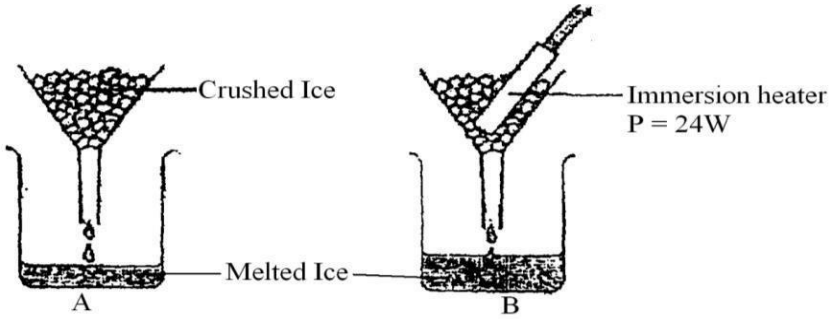

Fig. 12

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) Give the reason for setting up experiment A (1mk)

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(ii) Determine the:

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

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

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III. specific latent heat of fusion of ice. (2mks)

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17. **Figure 13** below shows a mass of 500g moving in a vertical circle having a radius of 35cm at a constant velocity. It makes 2 revolutions in one second.

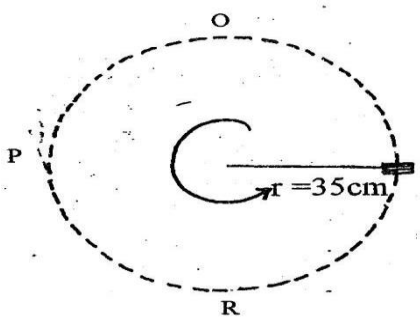

Fig. 13

a) Indicate on the diagram the direction of centripetal force. (1mk)

b) Determine:

I) the linear velocity of the mass. (3mks)

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II) the centripetal acceleration of the object (2mks)

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III) centripetal force. (3mks)

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