

FORM FOUR CLUSTER KCSE MODEL 7

PHYSICS PAPER 1 QUESTIONS

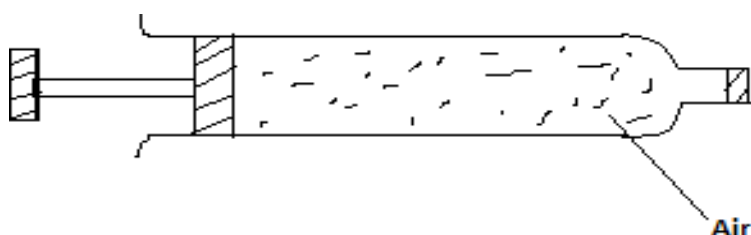
SECTION A (25 Marks)

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

1. State the reason why energy must be supplied to ice if it has to change to water.

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2. The figure below shows a syringe containing air. The end of the syringe has been sealed.

The volume of the air is 150cm^3 at pressure of 100KNM^{-2}

Use the information above to answer questions 2 and 3.

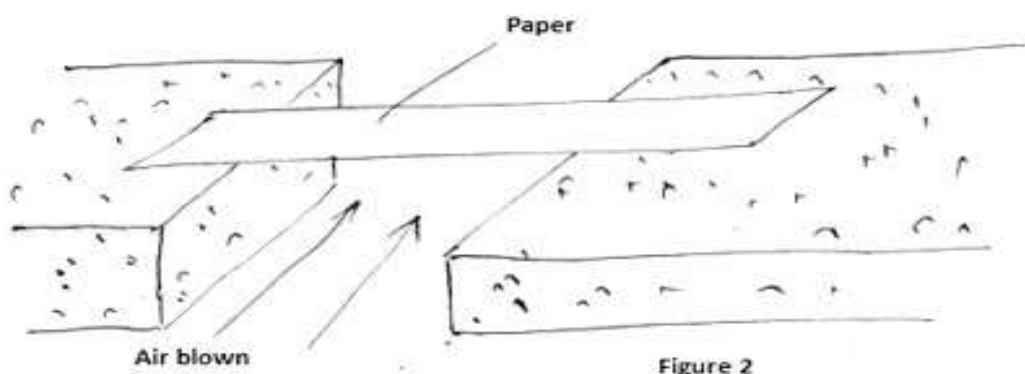
In terms of the movement of molecules, explain how the air exerts pressure on the inside of the syringe.

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3. A force is applied to the piston. This compress the air to 120cm^3 . The temperature of the air remains constant. Determine the pressure of the air.

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4. A student placed a thin strip of paper between two wooden blocks so that the paper is horizontal as shown in figure 2.



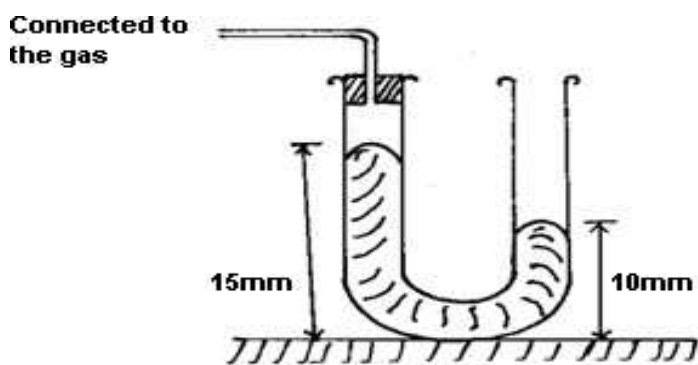
The student blew air under the paper. State and explain what happened.

5. State two factors one may consider in making a helical spring which is stronger.

6. State the energy transfer which occurs when a ball is thrown vertically upwards.

7. A student of mass 50 kg jumps out of a rowing boat of mass 300 kg on to the river bank, with a horizontal velocity of 3 m/s. Determine the velocity of the boat with which it begins to move backwards

8. A mercury manometer is connected to a gas supply as shown in figure 3.



Determine the pressure of the gas given that atmospheric pressure = 103360pa and density of mercury = 13600kgm⁻³.

9. A force of 20N pulls a block of mass 2 kg along a horizontal bench and is opposed by a constant force of 12N as shown below in figure 4. Determine the acceleration of the block

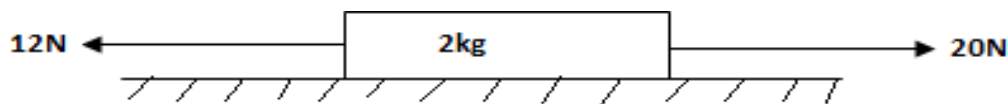
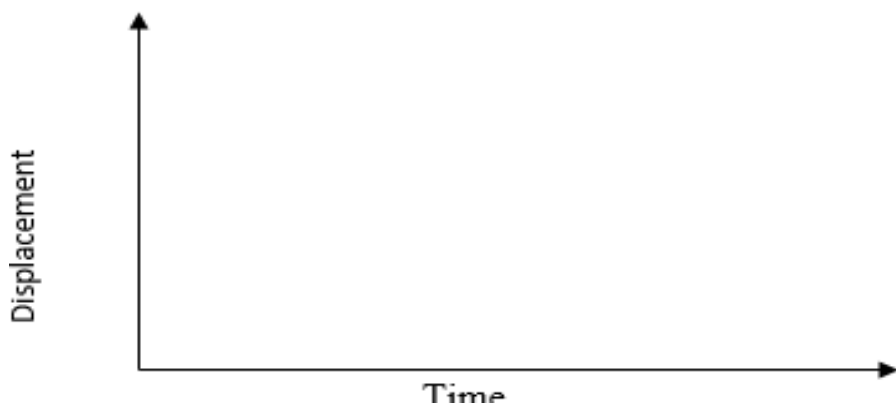


Figure 4

10. When equal masses of water and paraffin are supplied with heat at same rate, the temperature of the paraffin rises faster than of water. Explain this observation.

11. On the axis provided sketch a displacement time graph for a freely falling body in air. Assume the air resistance is zero



12. Which of the two soda's placed as shown in figure 5 is more stable. Give a reason for your answer

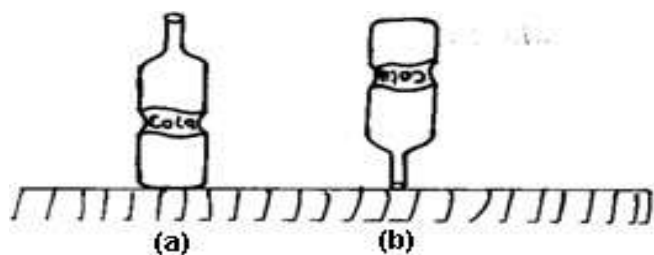


Figure 5

13. Use the information given below to answer question 13 and 14. Each spring of the system in figure 6 has a spring constant of 2.0 N/cm. The springs are used to support 15N in the middle of the springs.

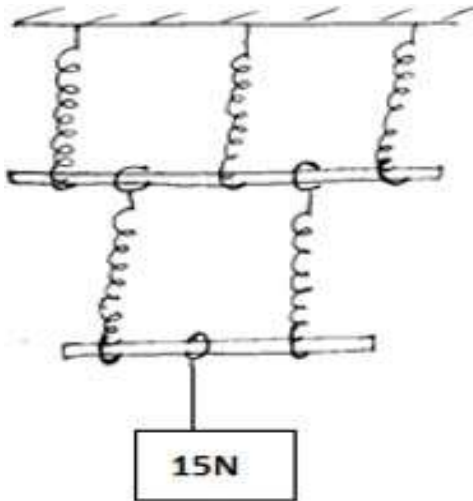


Figure 6

Determine the effective spring constant of the system.

14. Determine the total extension of the system of the springs

SECTION B (55 Marks)

15. . Figure 7 below shows one methods of measuring the specific latent heat of fusion of ice. Two funnels A and B contain crushed ice at 00c. The mass of melted ice from each funnel is measured after 12 minutes. The joule meter measures the energy supplied to the immersion heater.

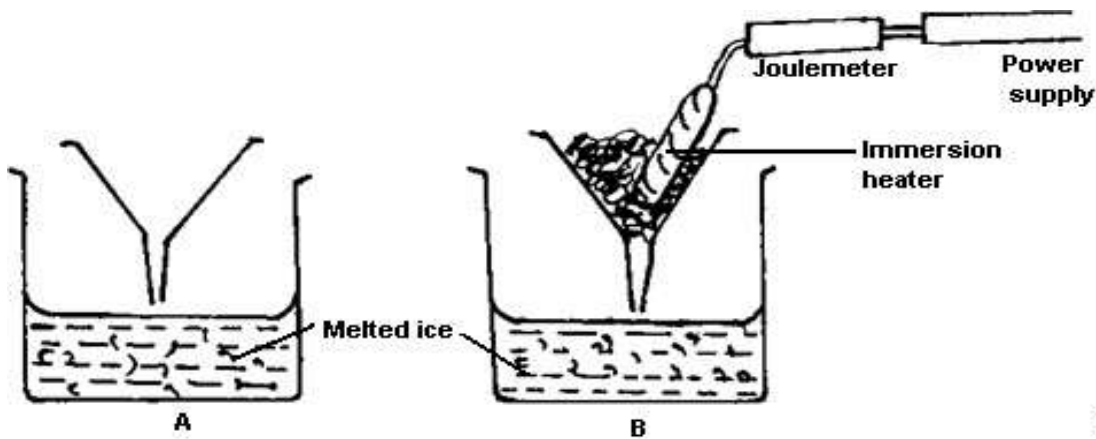


Figure 7

(a). State the reason for the setting up funnel A.

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(b). The measurements taken are listed below: Mass of melted ice collected from funnel A = 24g.

Mass of melted ice from funnel B = 63g Joule meter reading = 17160J.

Use these measurements to answer the questions that follow.

(i). Calculate the mass of ice that melted due to the heat supplied by the heater.

(ii). Determine the specific latent heat of ice.

(iii). The measurements obtained in this experiment give a value for specific latent heat which is higher than the accepted value. Give a reason for this

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(c). A bottle of milk keeps fresh when it stands in water in a porous pot in drought. Explain this observation.

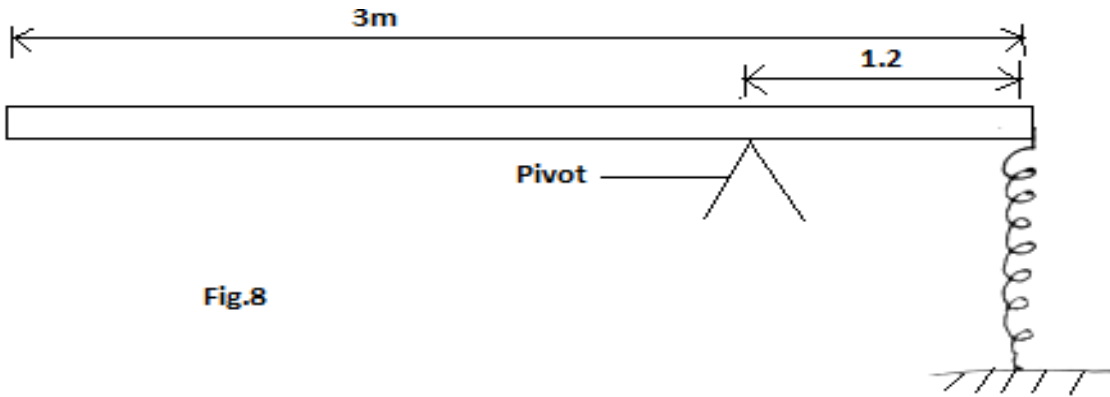
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16. (a). A light helical spring obeying Hooke's law was attached to a fixed support. When a 5N load was hung on it; the length of the spring was 160 mm. When a 10N load was hang on it the length became 200mm. Determine

(I). The length of the spring with no load.

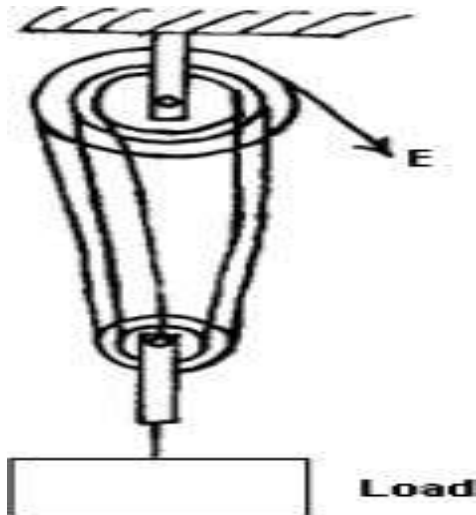
(II). The length of the spring with 8 N

(b). The spring above was used to balance the piece of wood of uniform thickness as shown in figure 8.



If the spring is 300mm long Determine (i). The tension in the spring.
(ii). Determine the weight of the wood.

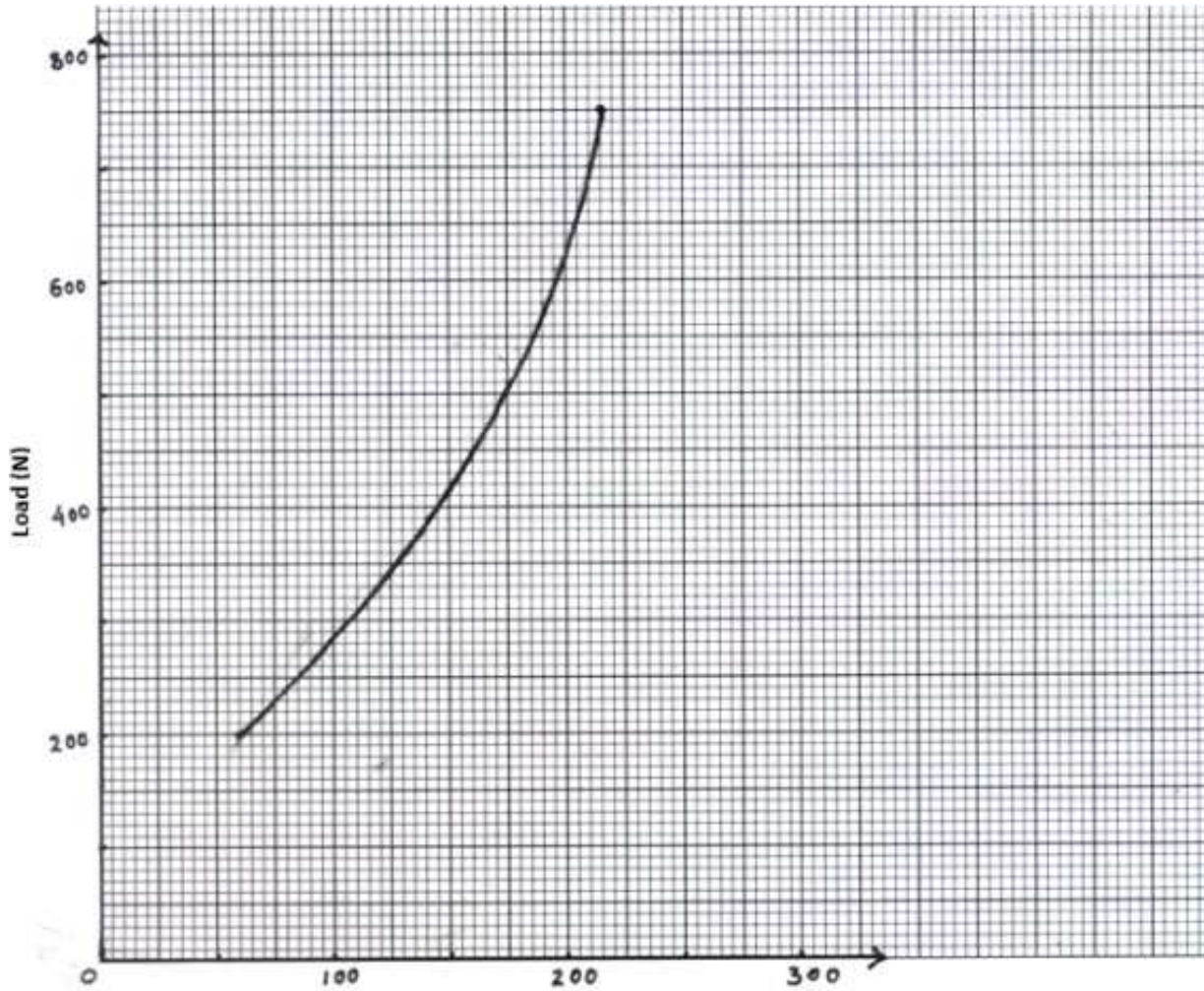
17. Figure 9 below shows a single string pulley system with an effort, E, raising a load.



(a). Determine the V.R of the system.

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From the experimental results using the pulley system in figure 9 a graph of load against effort was plotted as shown below. Use the graph to answer questions that follows.



(b).(i). Determine the minimum effort needed to raise a load of 535N.

(ii). Calculate the efficiency of the machine when the load is raised.

c). Explain why the efficiency of the machine is not 100%

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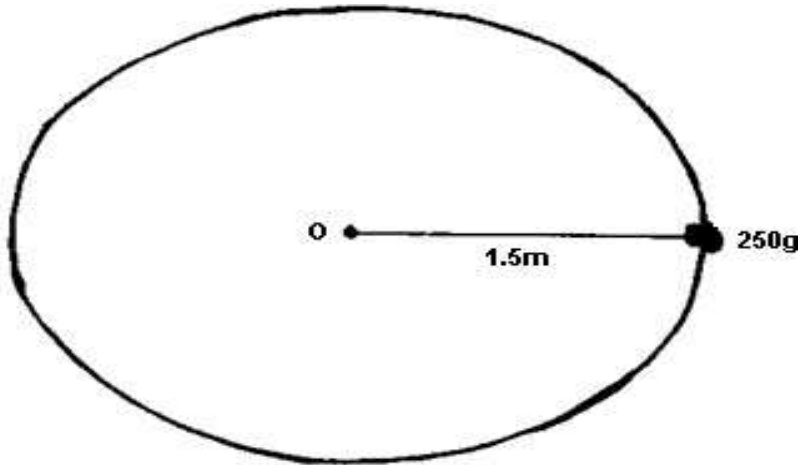
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(d). Calculate the maximum mechanical advantage from the graph.

18. A stone of mass 250g held by a sling of length 1.5 is whirled at a constant speed making revolutions per second. In a horizontal plane from the top of a building

Figure 10



- (a). Determine its angular displacement in a quarter of revolution.
- (b). Calculate the angular velocity.
- (c). Determine the centripetal force that keeps the body on the path.
- (d). The string snapped and the stone hit the ground 50m away from the building.
- (i). Determine the time taken to reach the ground.
- (ii). Determine the height of the building.
19. (a). Draw a clearly-labeled diagram of a common hydrometer to measure densities of liquids between 1000kgm^{-3} and 1350kgm^{-3} .
- (b). You are given a wooden rod of uniform cross-section weighted at end, water of density 1000kgm^{-3} and paraffin of density 800kgm^{-3} .
- (i). Describe briefly how you would use the rod to find densities of liquids by a method which does not involve any calculation.
- (ii). Explain why the end of the rod should be weighted.
- c). A block of wood of volume 200 cm^3 floats with three-quarters of its volume under water.
- Determine
- (i). The upthrust of water on the block.
- (ii). Density of wood.
- (iii). The force required to submerge the block completely.