

# FORM FOUR CLUSTER KCSE MODEL2

## PHYSICS PAPER 1 QUESTIONS

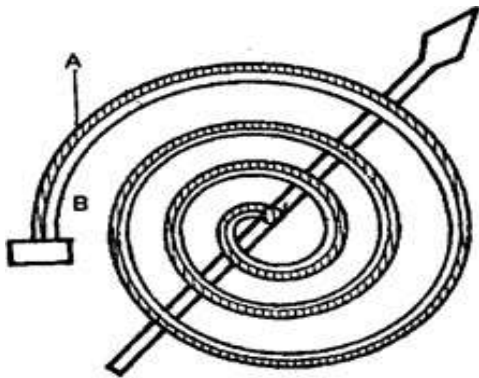
### SECTION A (25 Marks)

1. An object is observed to weigh more when immersed in water than when immersed in glycerine.

What is the cause for this observation?

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2. The figure below shows a bimetallic thermometer made from material A and material B.



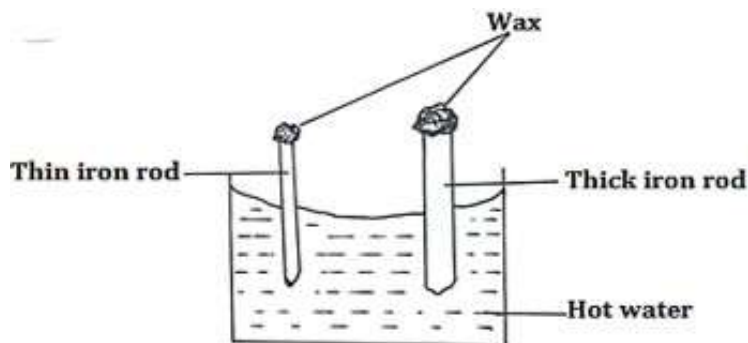
Explain how a rise in temperature causes the pointer to move in a clockwise direction.

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3. State two ways of increasing pressure in solids.

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4. The figure below shows an experiment carried out by Form I students.



The students dipped two rods of the same length but different thickness into hot water at the same time.

State and explain the observation made after about 10 minutes.

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5. Explain why a person moving along a slippery ground will need a walking stick and the legs a stride. ....

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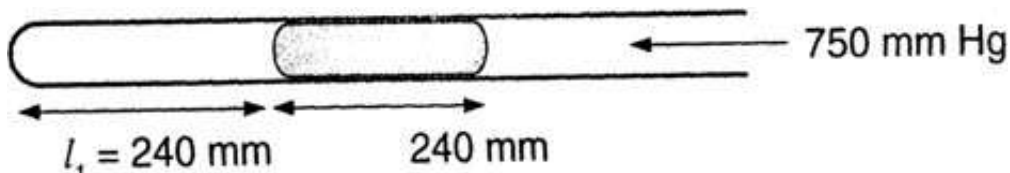
6. An object is released to fall through air from some height. Apart from gravity, state two other factors that determine its velocity of fall.

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7. a) State any one characteristics of a real gas. (1mark)

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b) Air is trapped inside a glass tube by a thread of mercury 240mm long. When the tube is held horizontally the length of the air column is 240mm.



Assuming that the atmospheric pressure is 750mmHg and the temperature is constant; calculate the length of the air column when the tube is vertical with open end down. (3marks)

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8. State the principle of moments.

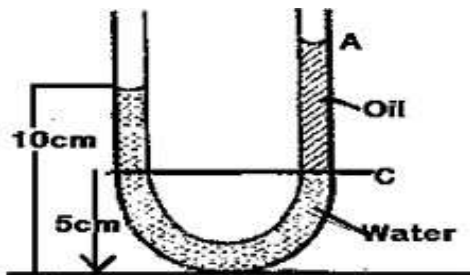
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9. An electric kettle with shiny outer surface is more efficient than one with a dull outer surface, give a reason for this. ....

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10. The level of water in a burette is  $25\text{cm}^3$ . If 50 drops of average volume  $0.04\text{cm}^3$  are run out of burette, what would be the new level?

11. The diagram shows a U tube containing water and oil of lighter density in equilibrium.



Determine the height of the oil column AC. (density of water =  $1\text{g/cm}^3$  and that of oil =  $0.6\text{g/cm}^3$ )  
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12. Explain why an aeroplanes may take off much earlier when moving against the wind.  
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13. State two ways in which the centripetal force on a body of mass M can be decreased.  
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**SECTION B (55 Marks)**

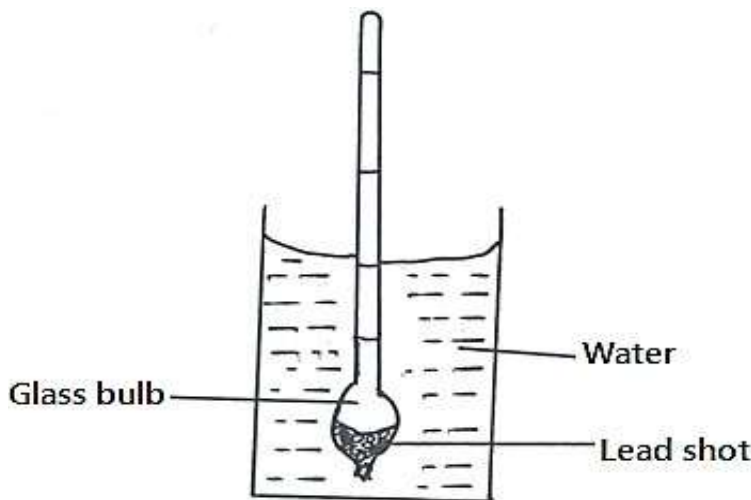
14. a) What is meant by the term work as used in physics. (1mark)  
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- b) A man uses an inclined plane to lift a 100kg load through a vertical height of 2m. The inclined plane makes an angle of  $30^\circ$  with the horizontal. If the efficiency of the inclined plane is 75%.
- i) Calculate the velocity ratio. (2marks)  
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- ii) Mechanical advantage. (2marks)  
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- iii) Effort needed to move the load up the inclined plane at constant velocity. (2marks)  
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- iv) Work done input in raising the load through 2m. (3marks)  
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15. a) Use kinetic theory of matter to differentiate between solids and liquids. (2marks)  
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- b) An oil drop at room temperature is placed on the surface of water in a trough. The drop spreads to form a circular patch of area  $154\text{cm}^2$ . 50 such drops occupy a volume of  $0.1\text{cm}^3$ .
- i) Determine volume of one oil drop. (1mark)  
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- ii) Use the above information to estimate the size of an oil molecule. (3marks)  
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- iii) Give one reason why the value obtained in (ii) above is put in an estimate. (1mark)

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iv) If the temperature of the oil drop is raised above room temperature, and then placed on the water surface, state and explain what is likely to be observed in terms of the size of patch formed. (temperature of water is the same as that of oil). (2marks)

v) State one application of the oil drop experiment. (1mark)

16. a) State the law of floatation. (1mark)

b) The figure below shows a hydrometer with a thin stem floating in water in a beaker.

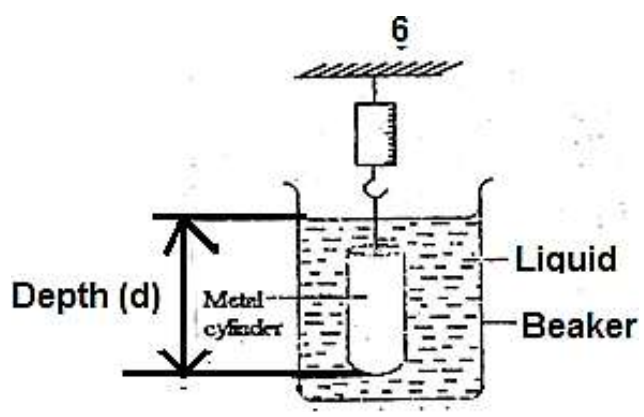


i) State the purpose of the lead shots in the bulb. (1mark)

ii) Why is the stem thin? (1mark)

iii) State with a reason what is observed on the hydrometer, when the temperature of water is raised. (2marks)

c) An experiment was performed as below. The cylindrical solid was lowered and the upthrust acting on it recorded against the depth (d) to which the solid had been immersed.



The upthrust was calculated from the spring balance and it was found to be 0.5N when the cylinder was fully submerged in a liquid of density  $0.8\text{g/cm}^3$ . Determine:

i) Volume of the metal cylinder. (3marks)

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ii) Mass of the liquid displaced by the cylinder. (3marks)

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iii) On the axis below, sketch a graph of variation of upthrust against depth (d) of the solid as it is immersed. (1mark)



17. a) Define the term heat capacity. (1mark)

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b) A beaker contains 0.4kg of water at  $18^\circ\text{C}$ . 0.03kg of ice at  $0^\circ\text{C}$  is added to the water which is stirred until all the ice melts. (take s.h.c of water as  $4200\text{Jkg}^{-1}$  and Lf of ice  $33400\text{Jkg}^{-1}$ )

i) How much heat is needed to melt the ice? (2marks)

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ii) Determine temperature of the mixture. (4marks)

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iii) What assumption have you made? (1mark)

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c) i) Define boiling point of a liquid. (1mark)

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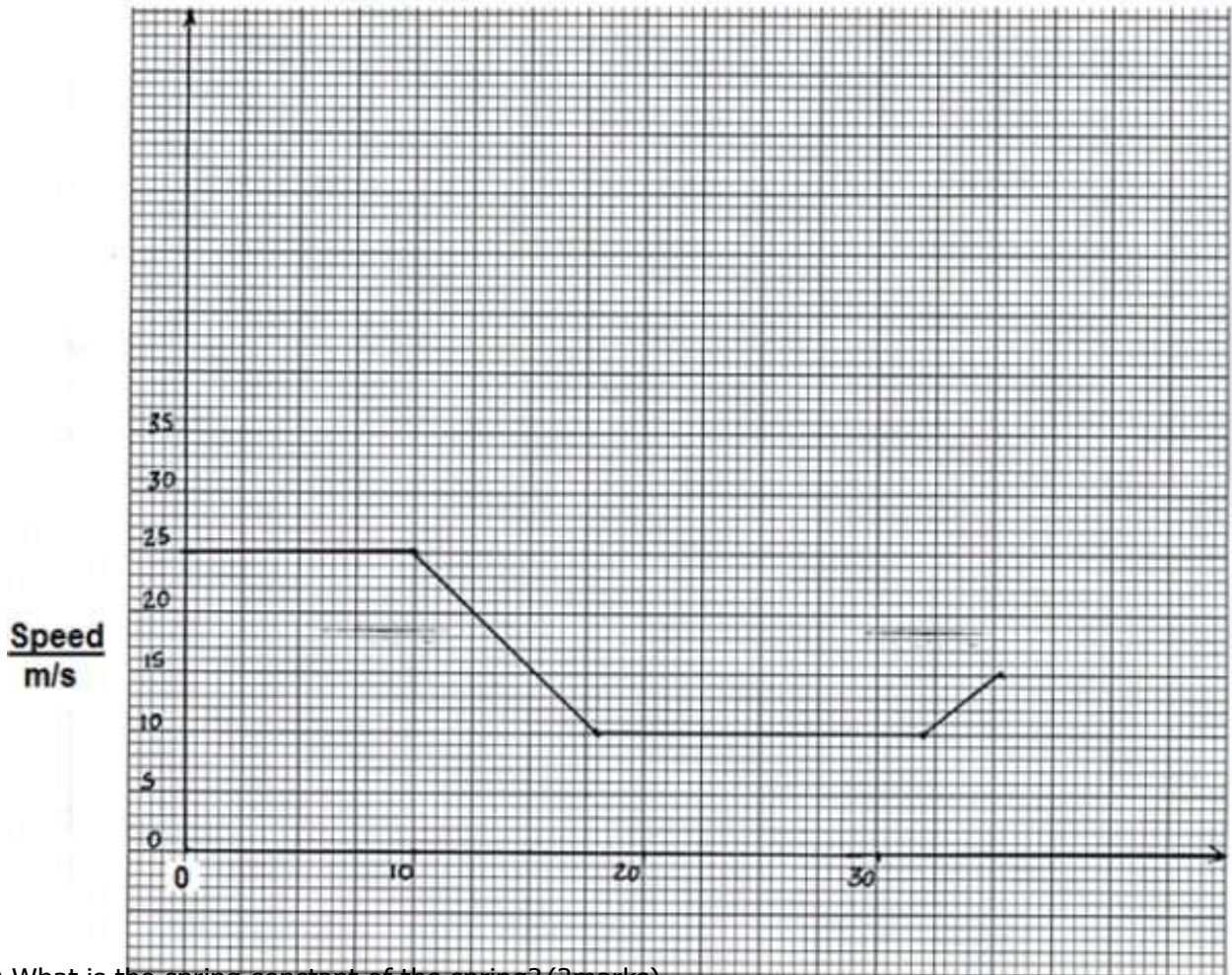
ii) State two ways of lowering the boiling point of a substance. (2marks)

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18. a) State Hooke's Law (1mark)

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b) The diagram below shows a graph of force against extension for a certain spring.



i) What is the spring constant of the spring? (2marks)

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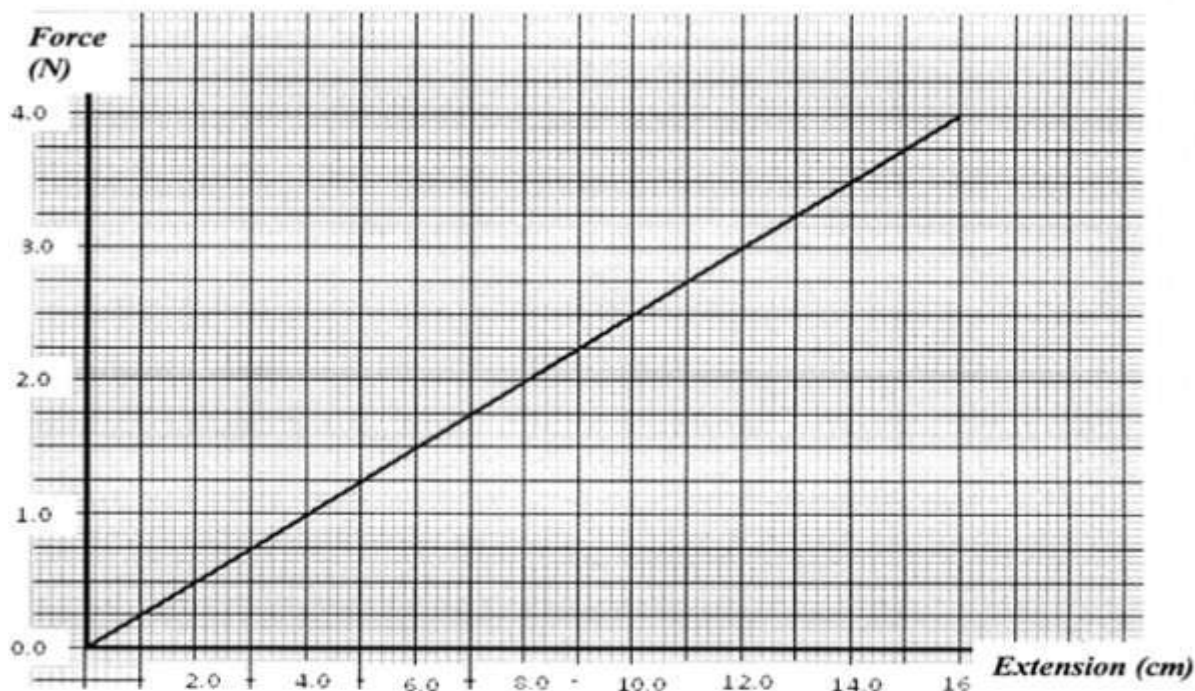
ii) Determine combined spring constant when two such springs placed side by side to stretch by 10cm? (2marks)

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iii) Sketch on the same axis the line for combined spring constant. (1mark)

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c) The Figure below shows the motion of a train over a section of track which includes a sharp bend.



a) The section of the track with the sharp bend, has a maximum speed restriction. The train decelerates approaching the bend so that at the start of the bend it has just reached the maximum speed allowed. The train is driven around the bend at the maximum speed allowed and accelerates immediately on leaving the bend. Calculate the length of the bend? (3marks)

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b) To slow down to go round the bend. Calculate the deceleration. (3marks)

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