FORM FOUR CLUSTER KCSE MODEL10

PHYSICS PAPER 1 QUESTIONS

SECTION A (25 Marks)

1. 1000cm3 of water is mixed with 2000cm3 of a saturated salt solution. Determine the density of the mixture. (Take density of water =1gcm3, density of saturated salt solution = 1.2gcm-3).

2. What is surface tension?

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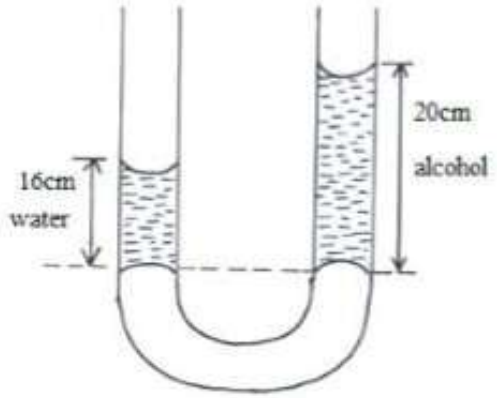
3. The figure below shows a U- tube manometer.



   Determine the density of alcohol.

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4. Define diffusion and explain how it is affected by heating.

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5. Give TWO reasons why mercury is preferred to water for use in thermometers.
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6. State ONE factor that affects conduction of heat through solids.

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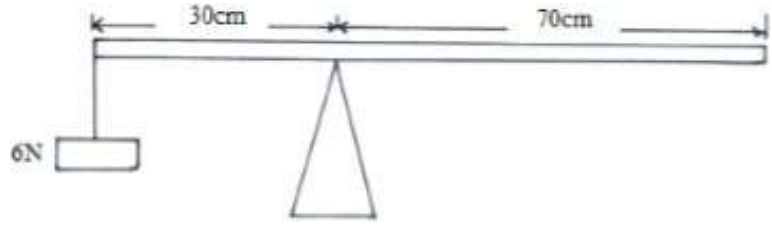
7. The system below is in equilibrium.



Determine the weight of the bar.

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8. Sketch in the space below a velocity – time graph for a body moving from rest with uniform acceleration.

9. Give ONE difference between boiling and evaporation.

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10. . State Bernoulli's principle.

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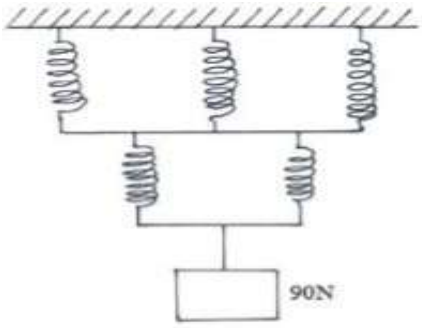
11. The spiral springs shown in the figure below are identical. Each spring has a spring constant k=300N/m



Determine the total extension caused by the 90N weight. (ignore the weight of the springs and connecting rods). .....
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12. A bullet of mass 0.9g travelling at 300m/s is stopped by a concrete wall. Calculate the amount of heat energy transferred to the wall.
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13. . Explain how the position of the centre of gravity of a body changes when the body is slightly tilted. .....
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SECTION B (55 Marks)

14. a) State Newton's first law of motion. (1mark)

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b) A trolley is moving at a uniform speed along a track. A piece of plasticine is dropped on the trolley and sticks on it.

Explain the subsequent motion of the trolley. (2marks)

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c)

i) A body is initially in motion. Describe the motion of the body if no external force acts on it. (1mark) .....
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ii) A car of mass 800kg is initially moving at 25m/s. Calculate the force needed to bring the car to rest over a distance of 20m. (4marks)
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d) Two trolleys of mass 2kg and 1.5kg are travelling at 0.25m/s and 0.4m/s respectively.

The two trolleys stick together after collision.

i) Calculate the common velocity of the trolleys. (3marks)

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ii) In which direction do the trolleys move after collision? (1mark)

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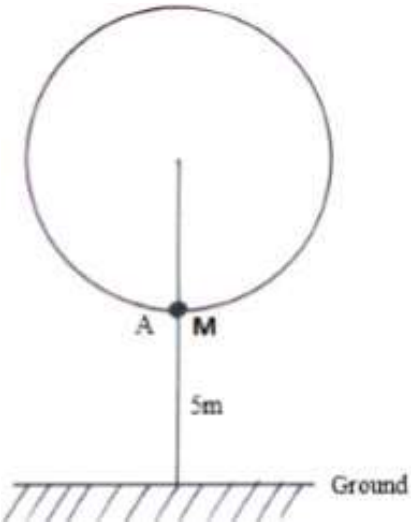
15. a) Define the term centripetal force. (1mark)

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 30m/s. Point A is 5m above the ground.

i) Show on the diagram the path of the mass from A until it strikes the ground. (1mark)

ii) Calculate:

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

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II. The horizontal distance the mass travels before it strikes the ground. (3marks)
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III. The vertical velocity with which the mass strikes the ground. (3marks)

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c) A body of mass 0.5kg is attached to the end of a string of length 50cm and whirled in a horizontal circle. If the tension in the string is 81N, determine the velocity of the body. (3marks)
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16. . a) State Archimedes principle. (1mark)
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b) A rectangular block of cross-sectional area 0.08m2 is immersed in a liquid of density 1200kgm-3. The top and the lower surfaces are 20cm and 80cm below the surface of the liquid respectively.

i) What is the downward force on the top surface of the block? (3marks)
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ii) Calculate the upthrust on the block. (3marks)

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c) A wooden block of mass 400kg is floating with 20% of its volume above the water level.

Determine:

i) The force needed to submerge it completely. (3marks)

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ii) The density of the wood. (Density of water is 1000kgm-3) (2marks)
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17. . a) Define the term specific latent heat of vaporization of a substance. (1mark)
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b) In an experiment to determine the specific latent heat of vaporization of water, steam at 100^0C was passed into water at 24^0C contained in a well-lagged copper calorimeter.

The following measurements were made,

Mass of calorimeters = 50g

Initial mass of water =70g

Final mass of calorimeter +water +condensed steam =125g

Final temperature of mixture =50^0C.

(Take specific heat capacity of water = 4200Jkg-1K-1 and specific heat capacity of copper =490JKg-1K-1) I) Determine the:

i) Mass of condensed steam (2marks)
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ii) Heat gained by the calorimeter and water (2marks)
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II) Given that Lv is the specific latent heat of vaporization of steam,

i) Write an expression for the heat given out by steam. (2marks)

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ii) Determine the value of Lv. (3marks)
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18. a) On a certain day when the temperature is 37^0C, the pressure in an open gas jar is 740mmHg. The jar is then sealed and cooled to a temperature of 17^0C. Calculate the final pressure (4marks)

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b) A syringe contains 60.0ml of air at 740mmHg pressure and 200C.What would be the temperature at which the syringe would contain 30.0ml at a pressure of 370mmHg assuming no air leaks in or out of the syringe? (3marks)

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