Name ..... Index No. .....

232/1
PHYSICS
Paper 1
July/August 2013
Time : 2 Hours

Candidate's signature .....

Date .....

MERU COUNTY FORM 4 JOINT EVALUATION -2013

Kenya Certificate of Secondary Education

PHYSICS
Paper 1
July/August 2013
Time: 2 Hours

INSTRUCTION TO ALL CANDIDATES

1. Write your name and index number in the spaces provided above
2. Sign and write date of examination in the spaces provided above.
3. Answer ALL the questions in the spaces provided in the question paper.
4. All working MUST be clearly shown.
5. Non-programmable silent electronic calculators and KNEC mathematical tables may be used.
6. Candidates should check the question paper to ascertain that no questions are missing.

For Examiners Use Only

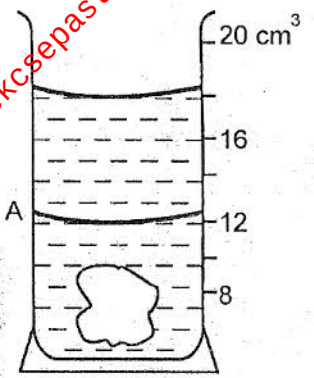
QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
1-14	25	
15	12	
16	12	
17	12	
18	12	
19	7	
TOTAL	80	

This paper consist of 12 printed pages. Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing

SECTION A (25 MARKS)

1. Figure 1 shows a measuring cylinder which contains water initially at level A. A solid of mass 14g is immersed in the water. The level rises to B. Determine the density of the solid to 2.d.p. **(2mks)**

Fig 1



2. Name two forces that determine the shape of liquid droplet on a solid surface. **(2mks)**

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3. State two properties of a liquid that can be used as a brake fluid. **(2mks)**

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4. A bottle of perfume is opened in one corner of a room in which the windows and doors are closed to stop drought. The scent slowly spreads to all parts of the room Explain why the scent spreads slowly even though the molecules are moving fast. **(1mark)**

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5. Figire 2 shows an inverted round bottomed flask with a capillary tube immersed in water.

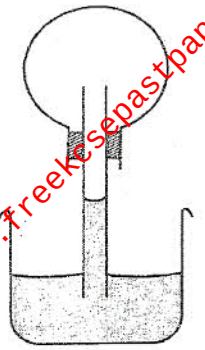

Fig 2

State what happens when the temperature of the flask was lowered below the initial temperature. **(1mks)**

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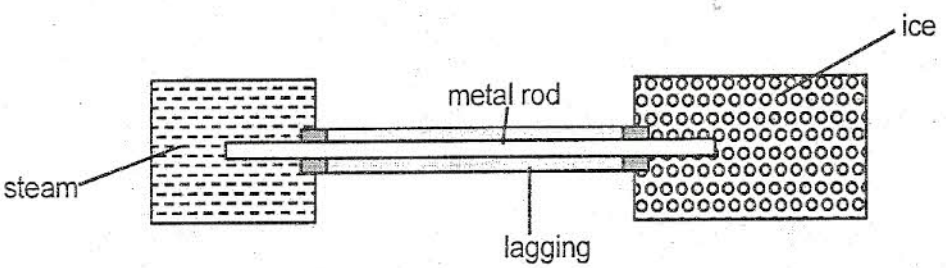
6. In figure 3 below, one end of a metal rod is placed in steam and the other end in melting ice. The length of the rod in between is lagged.

Fig 3



State two factors that determine the rate at which ice melts. **(2mks)**

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7. A student used vernier callipers to measure the diameter of the test tube. He read it to be 1.76cm. Determine the actual diameter of the test tube if the vernier callipers had a negative error of 0.09. **(1mk)**

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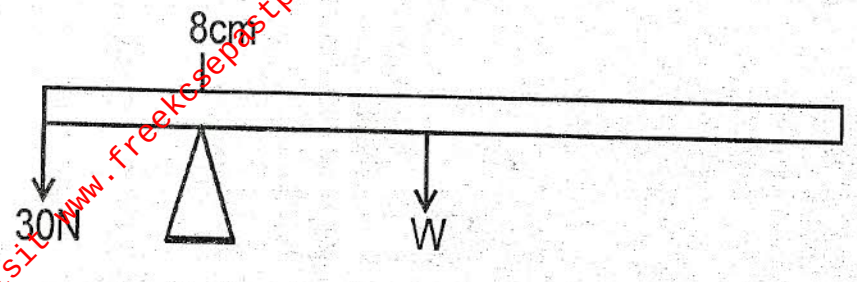
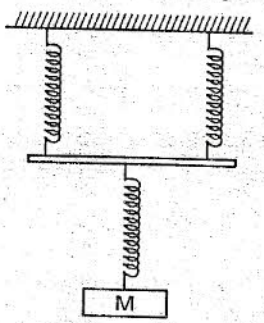
8. Figure 4 below shows a uniform half mete which is balanced by a weight of 30N at one end. If the pivot is placed 8cm from the same end, Calculate the weight of the rod. **(3mks)**

Fig 4



9. A spring has a spring constant of 4N/M. Three such identical springs are arranged as shown in figure 5 below.

Fig 5



Determine the weight of mass m if the extension produced is 37.5mm. **(2mks)**

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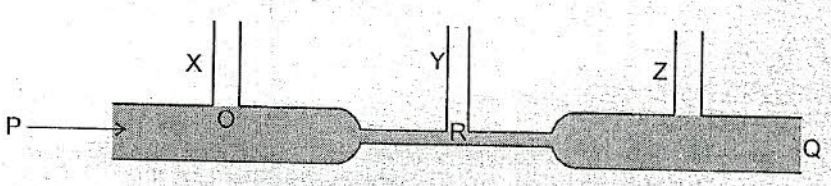
10. Figure 6 below shows a horizontal glass tube PQ with tubes X, Y and Z fittled to it. Water is allowed to flow through it steadily from P to Q without turbulence.

Fig 6



i) Compare the velocity of water at O and R. **(1 mark)**

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ii) What is the relationship between pressure of water and its velocity at any point along the tube PQ?**(1mk)**

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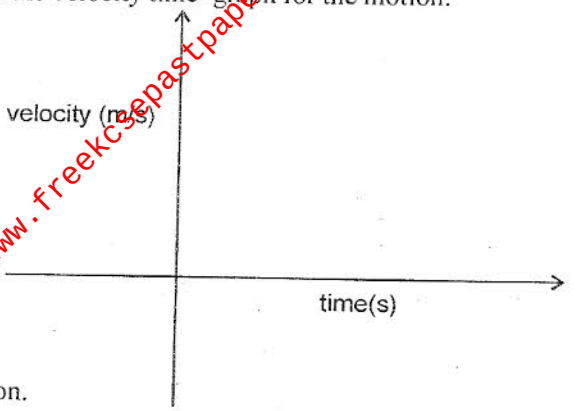
11. A ball is thrown vertically upwards from the ground. It rises up to the highest point and then returns to the ground. On the axis provided below sketch the velocity time- graph for the motion. **(2mks)**

Fig 6



12. State Newtons second law of motion. **(1mk)**

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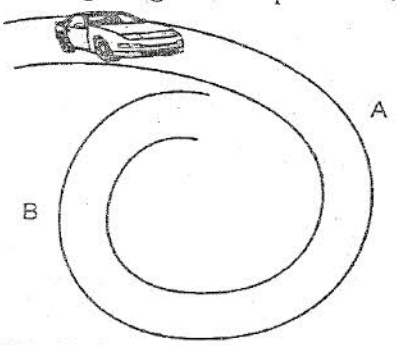
13. Figure 7 below shows a car of mass M moving along a curved part of a road with constant speed.

Fig 7



Explain why the car is more likely to skid at B than A, if the same speed is maintained. **(2mks)**

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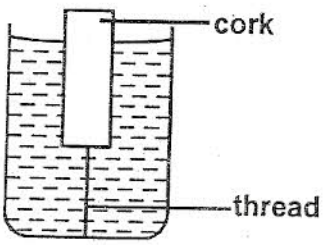
14. Figure 8 below shows a cork floating in water and held to the bottom of the beaker by a thin thread.

Fig 8



Name two forces acting on the cork. **(2mks)**

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SECTION B (55 MARKS)

15a) i) A bullet is fired from a gun at a velocity of 15ms^{-1}. It strikes a tree perpendicularly and penetrates deep. If it stops as it emerges through the other side of the tree. Calculate the average retardation, if the tree is 1.8m thick. **(3mks)**

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ii) Calculate the time taken for the bullet to emerge. **(3mks)**

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bi) Define momentum of a body. **(1mk)**

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ii) A lorry of mass 20 tonnes travelling at 20ms^{-1} collides with a pickup of mass 3 tonnes travelling at 30ms^{-1} in the opposite direction. The two stick together and move in one direction calculate the speed of the two vehicles after the collision. **(3mks)**

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iii) A footballer kicks a ball of mass 0.6 kg initially at rest using a force of 720N. If the foot was in contact with the ball for 0.1 seconds what was the take-off speed of the ball? **(2mks)**

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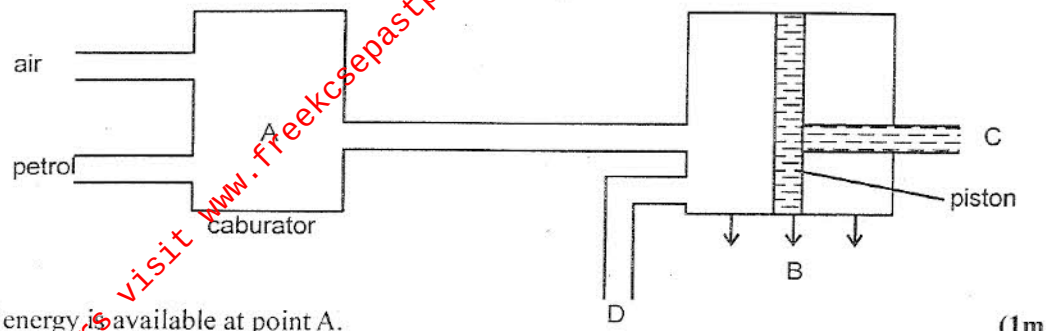
16a) Differentiate between work and energy. **(1mk)**

b) The figure below shows a section of an internal combustion engine.

Fig 8



i) What kind of energy is available at point A. **(1mk)**

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ii) Name any other two forms of energy that are outcomes of the explosion. **(2mks)**

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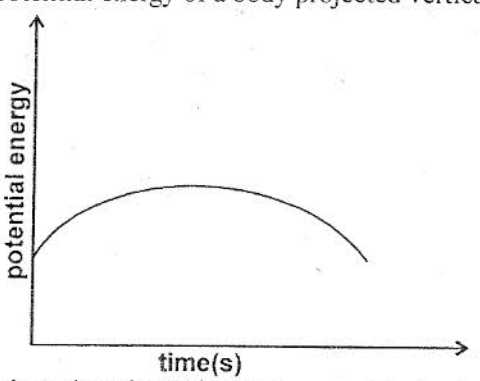
c) Figure 9 below shows how the potential energy of a body projected vertically upwards varies with time.

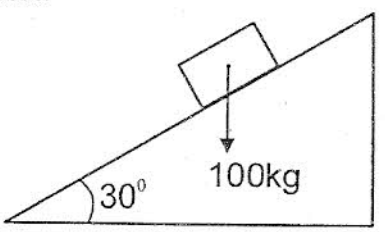
Fig 9



On the same axes sketch the graph to show how kinetic energy of the body varies with time. **(1mk)**

d) A man uses the inclined plane shown in figure 10 below to lift a load of mass 100kg through a vertical distance of 8m. The inclined plane has an efficiency of 80%.

Fig 10



i) Calculate the velocity ratio of the machine. **(2mks)**

ii) Calculate the effort needed to move the load up the inclined plane. (3mks)

ii) Calculate the work done against friction in raising the load through 8m. (3mks)

3a) Define the term specific heat capacity. (1mk)

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b) You are provided with a well lagged colorimeter half filled with water of known mass, a stirrer, a piece of metal, a thermometer, some water in a beaker, a balance and a source heat.

i) Describe an experiment that can be used to determine the specific heat capacity c of the metal . Assume that the calorimeter has neglegible heat capacity. (2mks)

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ii) State the measurement required in the experiment and show how they would be used to obtain C. (4mks)

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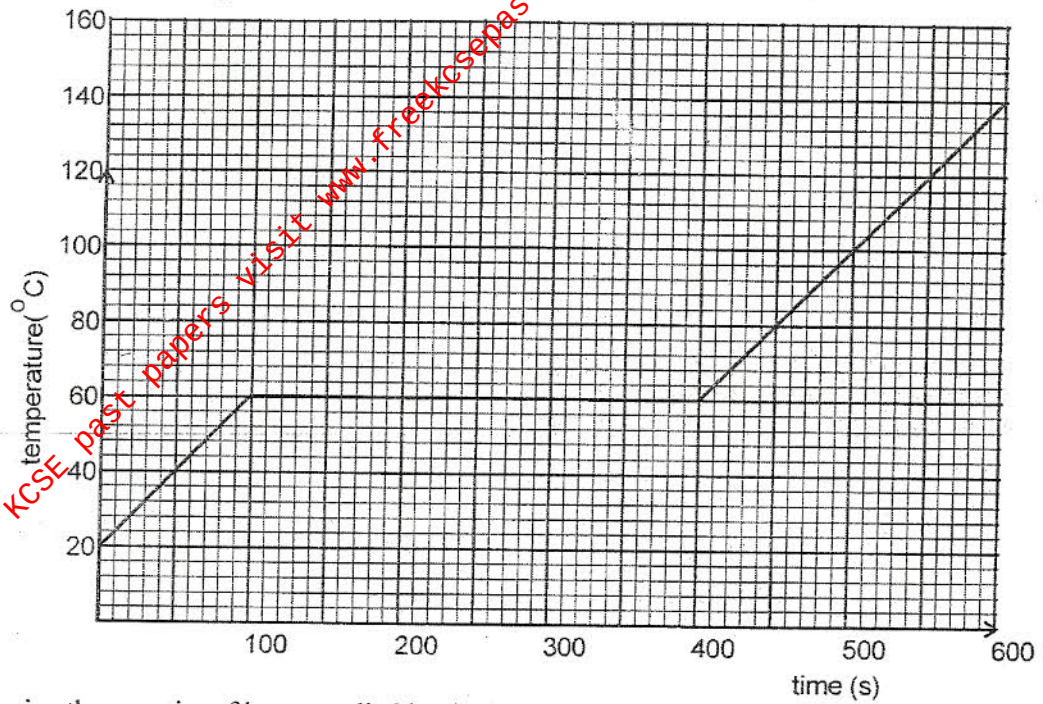
c) 100g of a solid x was heated in a container by an electric heater rated 50w for sometime. The graph below shows the variation of the temperature of the solid with time



i) Determine the quantity of heat supplied by the heater from the time the solid starts to melt to the time it has all melted. **(2mks)**

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ii) Determine the specific latent heat of fusion of solid x assuming the container absorbs negligible amount of heat. **(2mks)**

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d) Given that the liquid formed after solid X has melted boils at 140°, show by extrapolating the graph how the temperature varies with time, upto the time the liquid has boiled for some time. **(1mk)**

18a)i)Figure 11 below shows two masses 0.1 kg and 0.2kg connected by a string through a hole on a smooth horizontal surface.

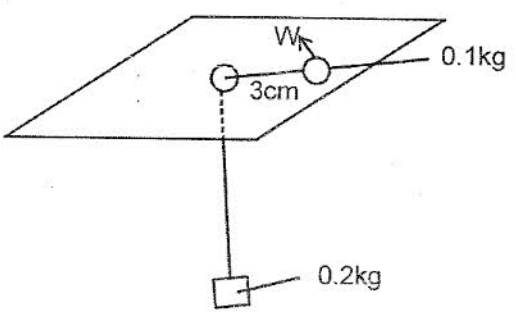

Fig 11

The 0.1 kg mass rotates in an horizontal circle of radius 3cm. Calculate the angular velocity when the system is at equilibrium. **(3mks)**

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ii) A glass block of mass 100g is placed on a turntable which is rotating at a constant angular velocity of 7.07 rad s^{-1}. If the friction between the glass block and the turn table is 0.4N determine the force required to hold the glass block at a distance of 12cm from the centre of the table. **(2mks)**

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iii) State with a reason whether or not a 200 g glass block placed at 8cm from the centre will slide. **(1mk)**

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b) Figure 12 and 13 below show the scale reading before and after an object was completely immersed in a liquid.

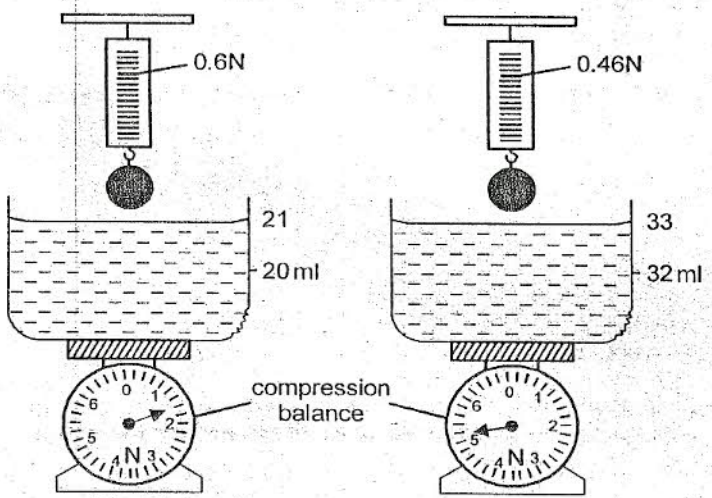

Fig 12 **Fig 13**

Find the density of

i) The solid **(2mks)**

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iii) The liquid **(2mks)**

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iii) The reading on the compression balance when the object is fully immersed. (2mks)

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19. Figure 14 below shows an apparatus that a student used to investigate the relationship between the temperature and pressure of a fixed mass of gas at a constant volume.

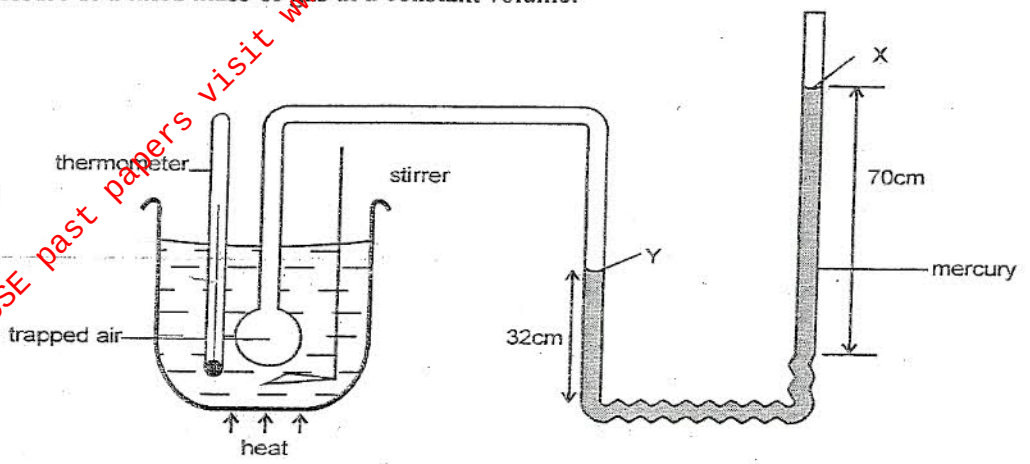

Fig 14

a) Explain how the student should ensure that all the air trapped has the same temperature as that indicated by the thermometer. (2mks)

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b) Explain why it is necessary to ensure that before taking any reading on pressure mercury level should be at the level marked y. (1mk)

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c) State the law the student is investigating. (1mk)

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d) If x and y were at the same level at a temperature of 27°c, Determine the final temperature when y is at a height 32 and x at a height 70cm mark as shown. Take atmospheric pressure = 76cmHg. (3mks)

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