NAME…………………………………………………………………….. **Index No………………./…….**

School……………………………………… …………… **Candidates Signature……………**

Date…………………………

232/1

Paper 1

TERM 1 2016

2 Hours

Kenya Certificate of Secondary Education (K.C.S.E)

232/1

Paper 1

TERM 1 2016

2 Hours

INSTRUCTIONS

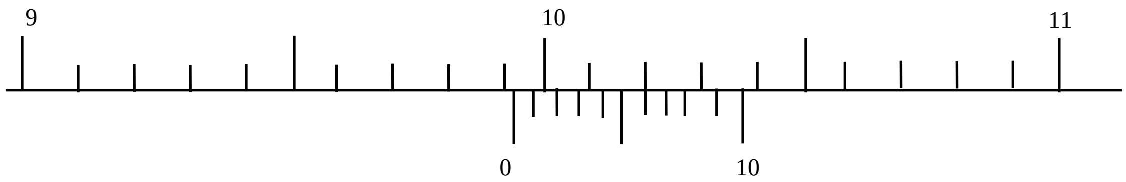
- This paper consists of two sections A and B
- Answer all the questions from both sections in the spaces provided.
- All working must be clearly shown and numerical answers must be expressed in decimal form
- Electronic calculators or mathematical tables may be used.

SECTION A (25MKS)

ATTEMT ALL QUESTIONS IN THIS SECTION IN THE SPACE PROVIDED.

1 The figure I below shows the reading of a vernier calipers used to get the diameter of a cylindrical tin.

Fig 1.

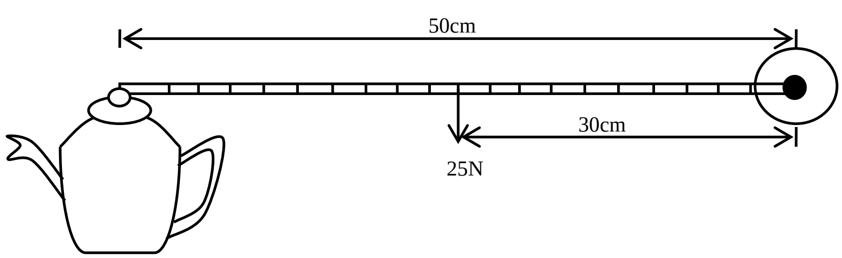


If the vernier caliper had a negative error of 0.02cm what is the actual diameter of the tin (2mks)

2 Sweating is an important activity of the body. explain how it helps to regulate body temperature (2mks)

3 Water is heated in an air tight kittle whose hid has an are of $10cm^2$. The lid just opens when a force of 25N is applied at the position shown in fig 2. Calculate the pressure of steam in the kettle (3mks)

Fig 2



4. Fig 3 shows a hot water bath with metal rods inserted through one of its sides. Some wax is fixed at the end of each rod. use this information to answer questions 4(a) and 4(b)

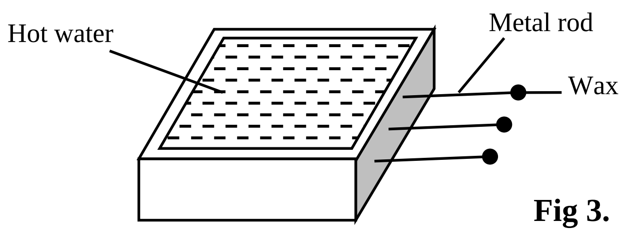


Fig 3.

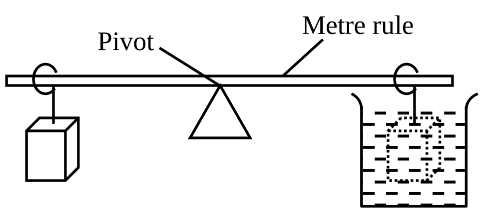
(a) What property of metals could be tested using this set-up (1mk)

(b) besides the length of the rods that is kept constant, what else should be kept constant when comparing the property for different metal rods (1mk)

5 The stability of an object can be increased by increasing the base area and lowering its centre of gravity. state one way of lowering its centre of gravity (1mk)

6 The system in fig. 4 is in equilibrium.

Fig 4



When the temperature of the water is raised the system is observed to tilt to the right, state the reason for this observation. (2mks)

7 Water at 24^0C falls through a height 72m to the bottom of a dam. Calculate the temperature of water at the bottom of the dam assuming all the stored energy is converted to heat. (take specific heat capacity of water as 4200 $kg^{-1}\ k^{-1}$) (3mks)

8 Two stones of equal mass are hung as shown below one hangs from an inextensible thread while the other hangs from an inextensible thread tied to a light spring as shown below. When the two masses are raised to the same height and suddenly dropped thread A breaks while B does not. Explain (1mk)

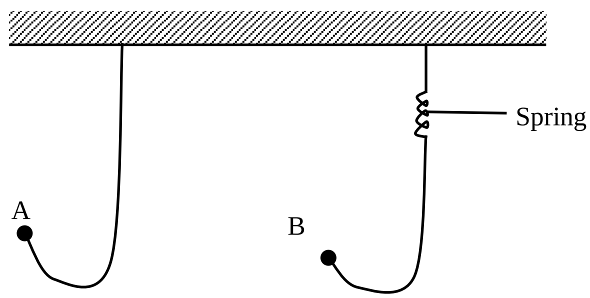


Fig 5

9 Fig 6 shows dots which were made by a ticker timer on a tape attached to a trolley

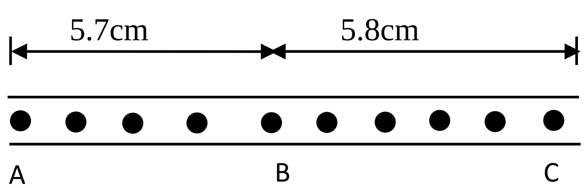


Fig 6

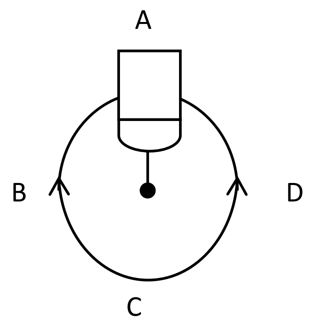
If the frequency used was 50Hz, determine;

(a) The velocities between AB and BC (2mks)

(b) The deceleration of the trolley (2mks)

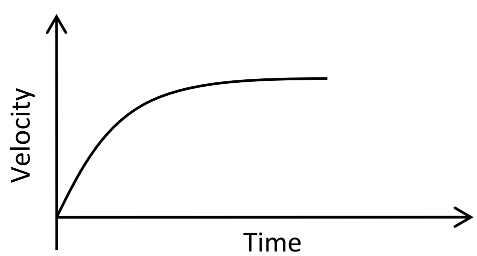
10 Figure 7 below shows a pail of water being swung in a vertical circle.

Fig 7



Explain why the water does not pour out at position A shown above (1mk)

11 Figure 8 shows the velocity – time graph for a small metal sphere falling through a viscous fluid



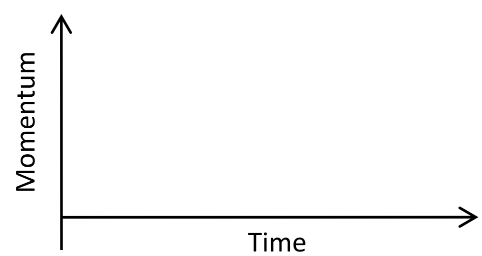


Fig 8

On the axes provided sketch the graph of momentum against time for the same mass (1mk)

12 Figure 9 shows a stream of air being blown directly on to the surface of a light sheet of paper.

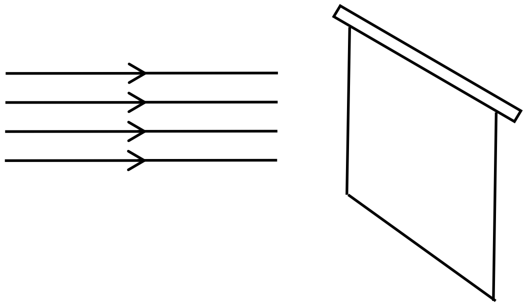
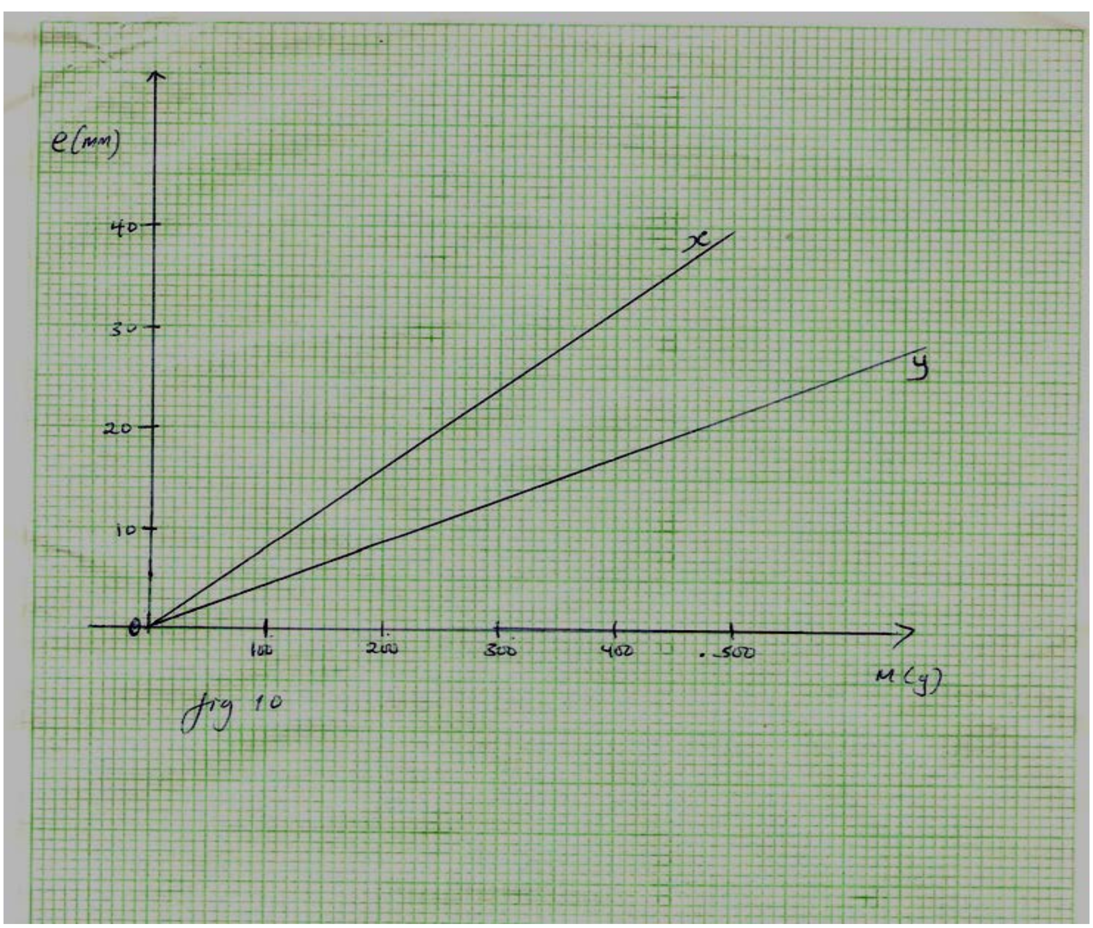


Fig 9

(a) Show on a diagram the shape of the paper (1mks)

(b) Account for the observation made in (a) above (1mk)

13 The graph in fig 10 represents the relations between extension e and mass M added on two springs X and Y. (fig 10 on the graph).



Given that the two springs are made of same material, give a reason why the graphs are different. (1mk)

15 State the Pascals Principle of transmission of pressure in liquids. (1 mk)

SECTION B (55 MARKS)

Attempt all questions

15 Explain the meaning of centripetal force (1 mark)

(b) Figure 11 shows a toy car moving in a circular rail in a vertical plane. The mass of the toy car is 300g and the radius of the rail is 2m.

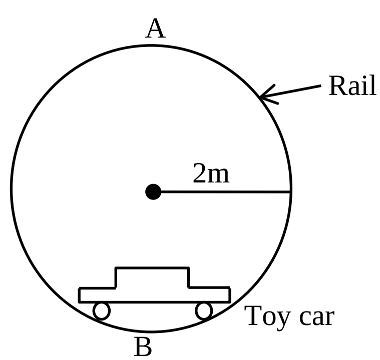


Fig 11

Determine

i) Minimum velocity at which the toy passes point A (3mks)

ii) If the toy was tied by a string at the centre of the rail path, following the same circular path when whirled at which position (A or B) would the string experience maximum tension. Explain your answer.

iii) If the toy moves with a velocity of 5m/s as it passes point B, find the angular velocity at this point. (2mks).

(c) State one application of uniform circular motion (1 mk).

16 A student used the set up in the figure below to investigate the variation of the volume of trapped mass of air with pressure at constant temperature.

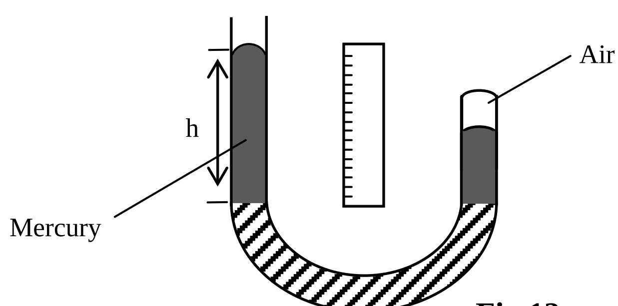


Fig 12

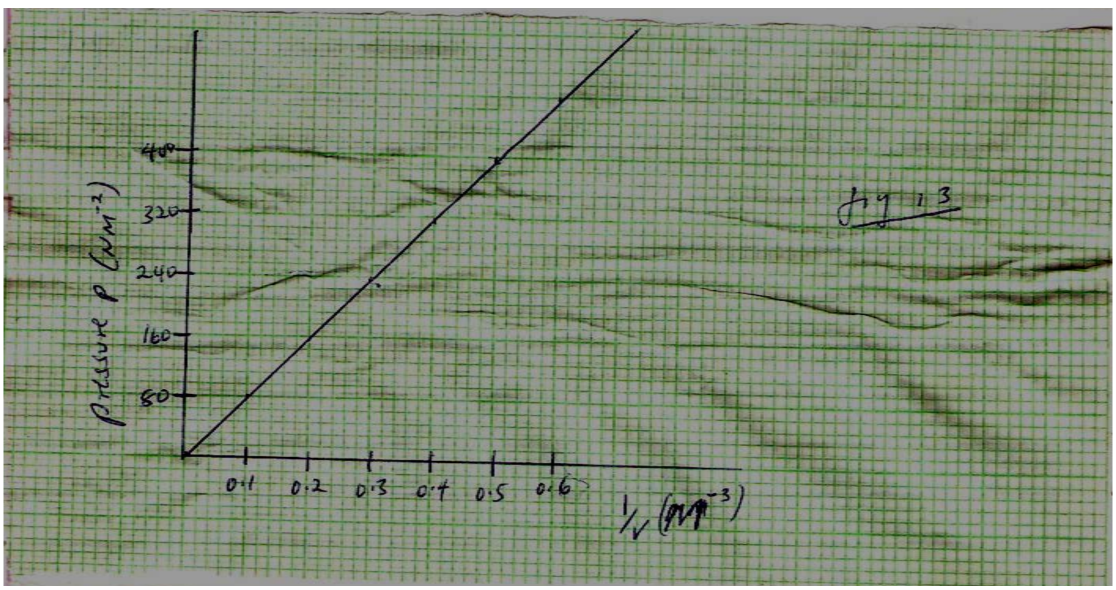
By raising the open end of the tube, the student measured the corresponding values of the length L, of the air column and the excess pressure.

(a) In determining the volume of the air the student measured the length L of the air column.

i) What is the relationship between L and V (1mk).

ii) State the assumption made. (1 mk)

(b) The pressure acting on a gas in a container was changed steadily while the temperature of the gas was maintained constant. The volume V of the gas was measured for various values of pressure. The graph below shows the relation between P and 1/V.



i) Suggest how temperature of the gas could be kept constant. (1mk)

ii) Given that the relation between P and V of the gas PV = K, use the graph to determine the value of K. (3 mks).

iii) What physical quantity does K represent. (1 mk).

iv) From the graph, find the value of V when P = 240Nm^{-2} (2mks)

(c) A gas occupies a volume of 400 litres at temperature 37^0C and normal atmospheric temperature. determine the new volume of the gas if it is heated at constant pressure to a temperature of 67^0C. (3mks).

17 State Newtons second law of motion. (1mk).

ii) A matatu starts from rest and accelerates to cover a distance of 49m in 7 seconds. Determine

(a) Its acceleration (3mks).

(b) Its velocity after 7 seconds (2mks).

(c) Distinguish between perfectly elastic and perfectly inelastic collisions (2mks)

(d) A bullet of mass 10.0g is fired at close range into a block of mass 4.99 kg suspended from a rigid support by a string. It becomes embedded in the blocks as illustrated in figure 14 below. The block rises to a height 2.50 cm before coming to rest.

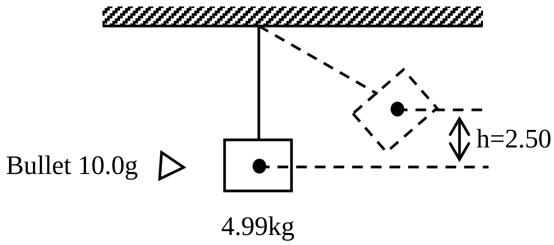


Fig 14

(e) Assuming no energy losses:
Determine

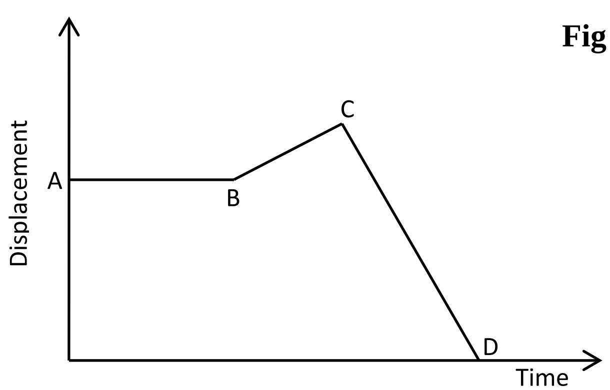
i) The maximum potential energy gained by the system. (2mks)

ii) The velocity of the system at lowest position. (2mks)

iii) The initial velocity of the bullet. (2 mks).

18 The figure below shows the displacement time graph of the motion of a particle.

Fig 15



State the nature of the motion of the particle between.

i) A and B (1mk)

ii) B and C (1mk)

iii) C and D (1mk)

(b) A ball is thrown horizontally from the top of a vertical tower and strikes the ground at a point 50m from the bottom of the tower. Given that the height of the tower is 45m. determine the;

i) Time taken by the ball to hit the ground (3mks).

ii) Initial horizontal velocity of the ball (2mks)

iii) Vertical velocity of the ball, just before striking the ground. [(Take acceleration due to gravity (g) as $10m/s^2$ (2 mks)].

19(a) Define velocity ratio of a machine (1mk).

(b) A block and tackle system of V.R = 3 is used to lift a load of 1500N. An effort of 800N is used to move the load a distance of 12m.

Sketch a possible arrangement of the pulleys showing how the rope is wound. (2mks)

(c) Fig 16 shows a screw jack with a lever arm 14cm and a pitch of 0.5cm. the efficiency of the machine is 60%.

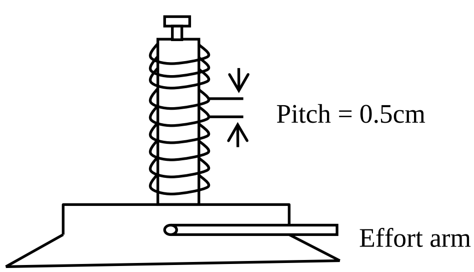


Fig 16

Calculate

i) Velocity ratio (3mks)

ii) Mechanical advantage (2mks)

iii) The effort used to lift a load of 12000N (2mks)