# K.C.S.E 1995

## PHYSICS PAPER 232/1

## QUESTIONS

1. Name the instrument that would be most suitable for measuring the thickest of one sheet of this question paper. ( 1 mk)

   Figure 1 shows a worker ready to lift a load wheelbarrow

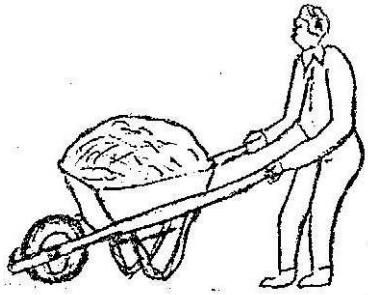

Fig 1

   Use the figure to answer questions 2 and 3

2. Indicate and label on the diagram three forces acting on the wheelbarrow when the person is just about to lift the handlebars ( 2 mks)

3. Suppose the handle bars of the wheelbarrow in question 2 were extended, which force(s) would change and how? ( 2 mks)

   Figure 2 shows a liquid being siphoned from one beaker to another. Refer to this diagram where answering questions 4, 5 and 6

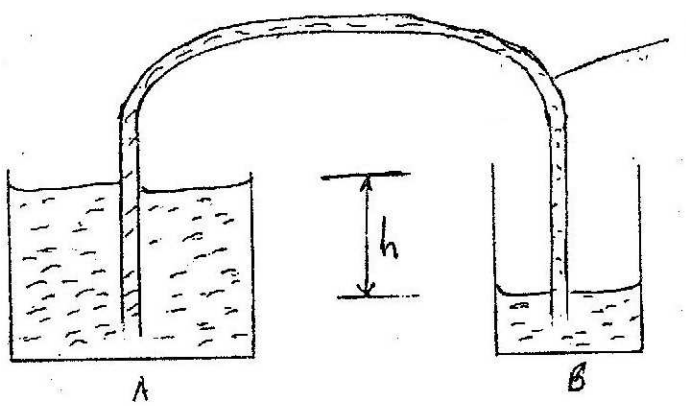


Fig 2

4. Indicate on the diagram the direction of flow of the liquid ( 1 mk)

5. Show that the force driving the liquid through the U – tube is proportional to the height, h ( 3 mks)

6. State what would happen to the flow if the system in figure 2 were put in vacuum ( 1 mk)

7. State the assumption made when calculating the size of a molecule in the thin oil film experiment ( 1mk)

8. One property of a liquid that is considered while construction a liquid – in – glass thermometer is that the liquid expands more than the glass for the same temperature change. State any other two properties of the liquids that are considered ( 2 mks)

9. What property of light is suggested by the formation of shadows? ( 1 mk)

10. In the set up shown in figure 3, water near the top of the boiling tube boils while at the bottom it remains cold.

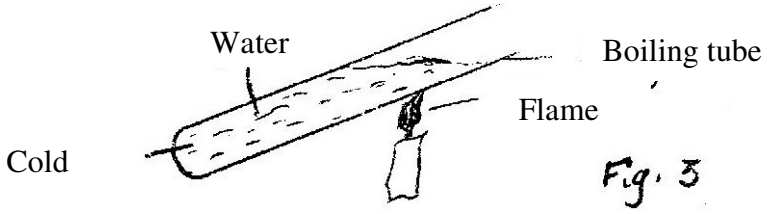

Fig. 3

Give a reason for the observation (1mk)

11. You are provided with a charged electroscope, an insulator and a conductor. Describe how you would use these apparatus to distinguish in the insulator from the conductor ( 2 mks)

12. State two advantages of an alkaline battery over a lead acid battery ( 2 mks)

13. The diagram in figure 4 shows two glass tubes of different diameters dipped in water

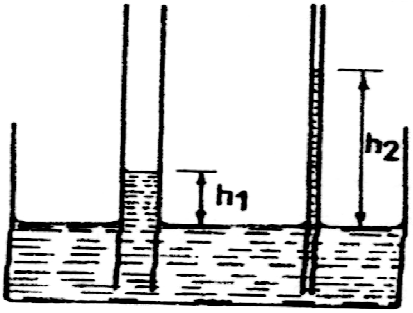

Fig. 4

Explain why $h_2$ is greater than $h_1$ ( 3 mks)

14. The force on a conductor carrying a current in a magnetic field can be varied by changing, among others, the magnitude of the current and the magnetic field strength. Name two other factors that can be changed to vary the force.
( 2 mks)

15. Give a reason why attraction in magnesium is not regarded as a reliable method of testing for polarity. ( 1 mk)

16. State two ways by which the frequency of a note produced by a given guitar wire may be increased

17. The diagram in figure 5 shows a beam negligible weight balanced by constant forces P and Q.

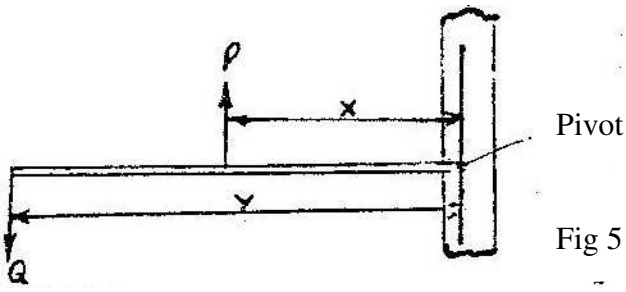


Fig 5

Derive the relationship between x and y ( 2 mks)

18. Light travels through glass of refractive index 1.5 with a speed v. Calculate the value of v ( speed of light in air = $3.0 \times 10^8$ m/s) ( 3 mks)

19. In an experiment using a ripple tank the frequency, f, of the electric pulse generator was reduced to one third of its value. How does the new wavelength compare with the initial wavelength? Explain your answer. ( 3 mks)

20. A ray of light incident on the surface of a glass prism is observed to behave as represented in the diagram in figure 6

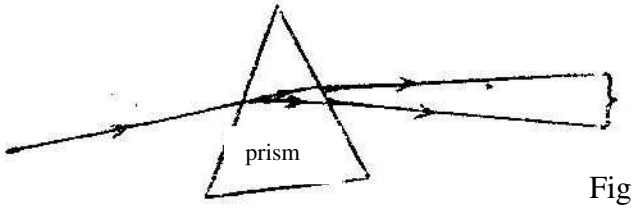


Fig 6

Explain this observation ( 3 mks)

21. State Newton's first law of motion ( 1mk)

22. Distinguish between heat capacity and specific heat capacity of a body ( 1 mk)

23. Figure 7 represents a tube through which a liquid is flowing in the flowing in the diagram shown by the arrow

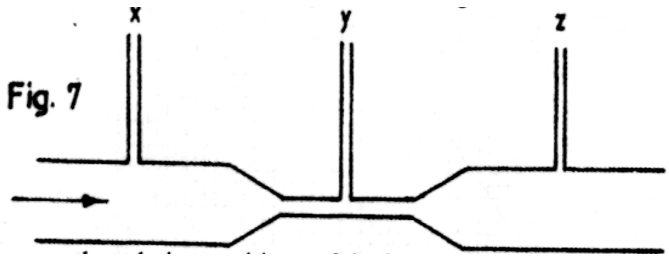

Fig. 7

Show on the diagram the relative positions of the levels of the liquid in section marked x, y and z

24. Figure 8 represents two parallel plates of a capacitor separated by a distance d. Each plate has an area of A square units

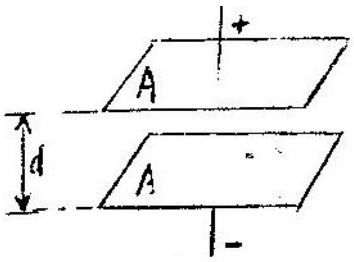

Fig 8

Suggest two adjustments that can be made so as to reduce the effective capacitance

25. Name the property of light that shows that it is a transverse wave

26. The table below shows the type of radiation, detection methods and uses of electromagnetic radiations. Complete the table.

| Type of radiation | Detector | Uses |
|---|---|---|
| Ultra violet | Photographic paper fluorescence material | ---------- |
| ---------- | Phototransistor blackened thermometer | Warmth sensation |
| Radio waves | ---------- | Communication |

27. An electron in an excited atom falls from energy levels E2 to energy level E1. Write an equation relating the energy change to the frequency f, of the radiation emitted. Explain why new symbols used. ( 2 mks)

28. Name the metal used to shields X – rays operators from the radiation. Give a reason why it is used. ( 2 mks)

In an experiment on photo- electricity using metal X, the graph shown in figure 9 was obtained. Use the graph to answer questions 29 and 30.

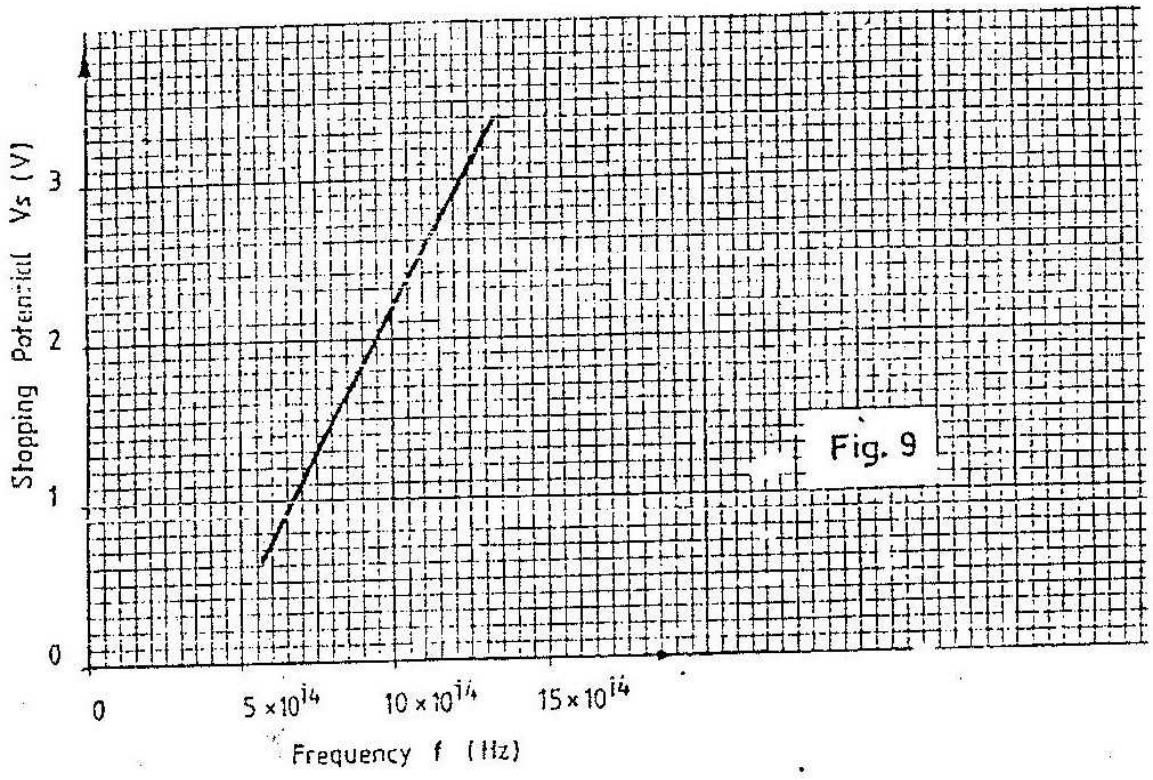

Fig. 9

29. Determine the minimum frequency $f_0$ below which no photoelectric emission occurs ( 2 mks)

30. Sketch on the same axes, a graph for a metal, Y hose work function is higher than metal X ( 1mk)

31. State a characteristic of sound, which is determined by overtone ( 1 mk)

32. A radioactive carbon 14 decay to Nitrogen by beta emission as below

$$\begin{array}{ccccc} 14 & & x & & 0 \\ C & \longrightarrow & N & + & e \\ 6 & & 7 & & y \end{array}$$

Determine the values of x and y in the equation ( 2 mks)

33. What is meant by the centre of gravity of a body? ( 1mk)

34. State two variables that must be controlled in an experiment for comparing the thermal conductivities of different metal rods of the same diameter ( 2 mks)

35. Figure 10 represent a signal being fed into a demodulator of a radio receiver. Sketch in the space provided, the output signal ( 1 mk)

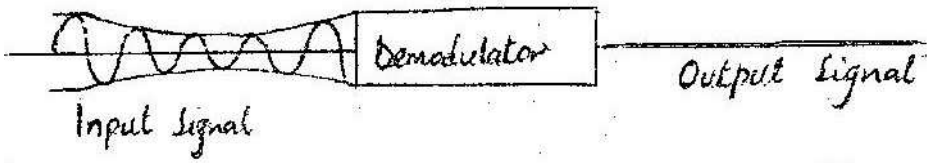


Fig. 10

36. Explain with the aid of a labeled ray diagram the wide field of view of a convex mirror ( 2 mks)

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## PHYSICS PAPER 232/1

## QUESTIONS

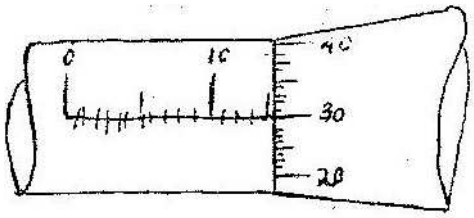
1. 

Fig. 1

The micrometer screw gauge represented by figure 1 has thimble scale of 50 divisions

What is the reading shown ( 1 mk)

2. What measurable quality is associated with colors of light? ( 1 mk)

3. State two factors that should be controlled in manufacturing a cylindrical container of uniform thickness, which should normally be in a standing position?

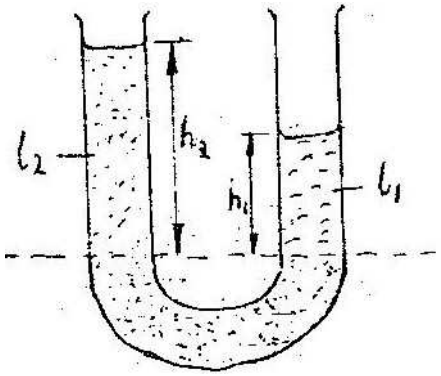
4. 

Fig. 2

Figure 2 shows a U tube containing two liquids L1 and L2 of densities 0.8 g $cm^{-3}$ and 1.8 $cm^{-3}$ respectively in equilibrium. Given that $h_2$ = 8 cm determine the value of $h_1$ (3mks)

5. A small nail may pierce an inflated car tyre and remain there without pressure reduction in the tyre. Explain this observation ( 2 mks)

6. Give a reason why a concrete beam reinforced with steel does not crack when subjected to changes in temperature ( 2 mks)

7. Give a reason why heat transfer by radiation is faster than heat transfer by conduction ( 1mk)

8. A vertical object placed on a bench is observed to have three shadows of different sharpness, in different directions. Explain this observation ( 3 mks)

9. State the law of electrostatic charges ( 1 mk)

10. The pitch of the note produced by a wire depends on the tension in the wire. State the other factor that effects the pitch ( 1 mk)

11. Name two forces that determine the shape of liquid drop on the solid surface. (2mks)

12.

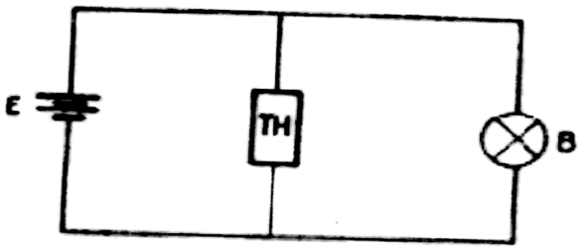



Fig. 3

Thermistor, TH, is connected in parallel with a bulb as shown in figure 3. The bulb is lit. When the thermistor is steadily heated the brightness of the bulb reduces. Explain this observation ( 3 mks)

13.


Fig. 4

Figure 4 shows tow parallel current conductors A and B placed close to each other. The direction of the current is into the plane of the paper.
On the same figure;

(i) Sketch the magnetic field pattern ( 1 mk)
(ii) Indicate the force F due to the current on each conductor ( 1 mk)

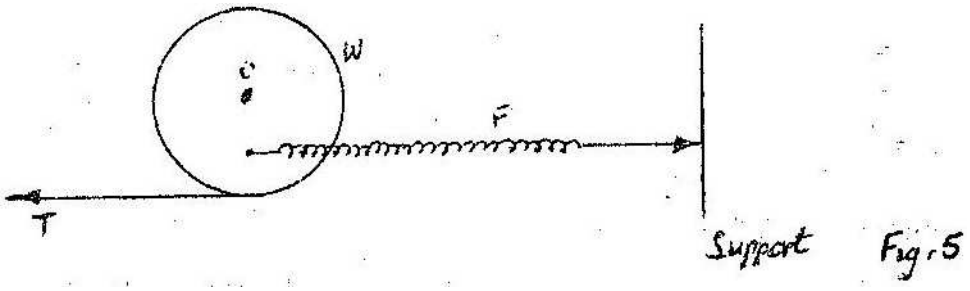


Fig. 5

Figure 5 shows a wheel W pivoted at its centre, O and held stationary by a string and a spring. The tension in the strings is T and the force on the springs is F.

**Use this information to answer 14 and 15**

14. State how the magnitudes of T and F compare. Give reasons for your answer ( 3 mks)

15. State what would happen to the wheel if the string snapped ( 1 mk)

16. Sketch in the space provided below, a labeled diagram to show how an arrangement of a single pulley may be used to provide a mechanical advantage of 2 ( 2 mks)

17. Circular water waves generated by a point sources at the centre. O of the pond are observed to have the pattern shown in figure 6

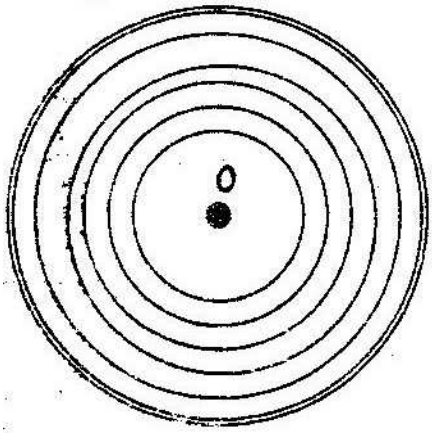


Fig. 6

Explain the pattern (2mks)

18. What characteristics of sound is applied in turning pianos? ( 1 mk)

19. In large current circuits large resistors in parallel are preferred to low resistors in series explain ( 2mks)

20. A girl heats 5 kg of water to temperature of $80^0$C. When she adds m kg of water at $15^0$ C the mixture attains temperature of $40^0$C. Determine the value of m. (ignore heat changes due to the container) ( 3 mks)

21. Equal masses of water and paraffin with specific heat capacities $C_W$ and $C_P$ respectively are heated using identical sources of heat, for the same length of time. The final temperature $\theta_P$ of paraffin was found to be greater than final temperature than of water, Show that $C_W$ is greater than $C_P$.

22. A lady holds a large concave of facal length 1 m, 80 cm from her face, state two characteristics of her image in the mirror ( 2 mks)

23. A small object lies at the bottom of a water pond at a depth of 1.2 m. Given that the refractive index of water is 1.3, determine the apparent dept of the object. (Give your answers to 1 decimal place)

24. State how the pressure in a moving fluid varies with the speed of the fluid ( 1 mk)

25. In some petrol engines where spark plugs are used, a capacitor is connected to the distributor. Suggest the function of the capacitor. ( 1 mk)

26. A house in which as cylinder containing cooking gas is kept unfortunately catches fire. The cylinder explodes. Give an explanation for the exposition (2mks)

27. Explain how a piece of a Polaroid reduces the sun's glare ( 1 mk)

28. An observer A is in a moving vehicle with a siren on while an observer B is stationary on the side of the road. State the difference between the sound heard by A and B as the vehicle approaches B at a high constant speed (2mks)

29. A solid copper sphere will sink in water while a hollow copper sphere of the same mass many float. Explain this observation ( 2 mks)

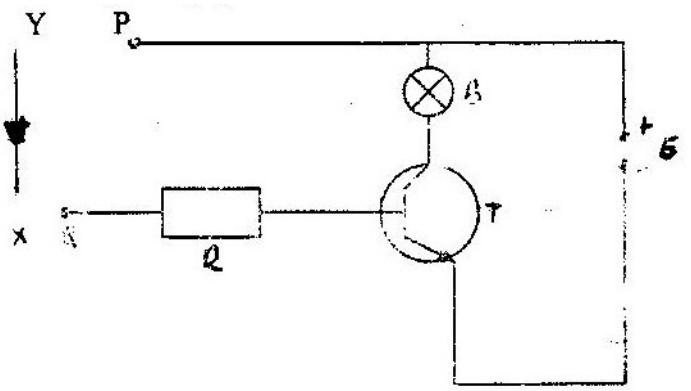
30. The moment of the weight of vertical door does not significantly affect the moment of the force required to open the door. Give a reason for this ( 1 mk)

31. What causes electromagnetic damping in a moving coil galvanometer ( 1mk)

32. The control grids in a cathode Ray Oscilloscope ( CRO) is used to control the brightness of the beam on the screen. How is this achieved? ( 2 mks)

33. $\alpha$- particles are more ionizing than $\beta$- particles. Give one reason for this ( 1 mk)

Fig .7




In the figure 7 the circuit diagram contains bulbs B, a transistor T and a resistor R. A diode D is connected between points Y and X as shown. In the set up bulb B is not lit. When the connections YP and XQ are made, B lights. Answer questions 34, 35 and 36 with reference to the figure.

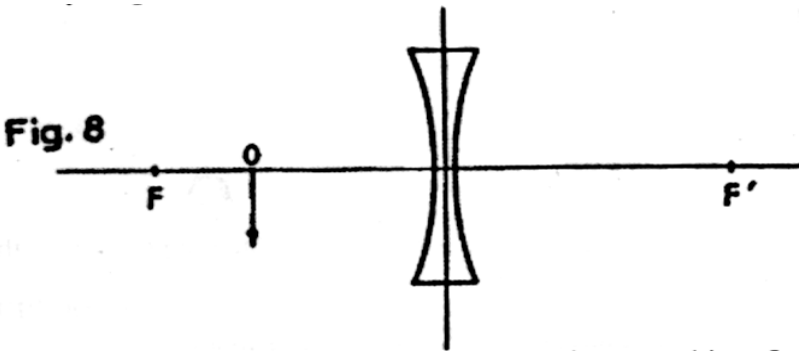
34. Name the type of transistor used in the circuit ( 1 mk)

35. Explain the observation when the connections are made ( 3 mks)

37. In the Brownian motion experiment, smoke particles are observed to move randomly. Explain how this motion is caused ( 2 mks)

38. Figure 8 shows an object O placed infront of a concave lens with principal foci F and F Construct a ray diagram to locate the position of the image ( 3 mks)

Fig. 8



# K.C.S.E 1996

## PHYSICS PAPER 232/1

## QUESTIONS

***Answer all the questions in this paper mathematical tables to be used***

*Take:* *Density of mercury = 1.36 x $10^4$*
*Speed sound = 340$ms^1$*
*Speed of light = 3.0 x $10^8$ $ms^{-1}$*
*g = 10$ms^{-2}$*

1. Figure 1 shows a measuring cylinder, which contains water initially at level A. A solid of mass 11 g is immersed in the water, the level rises to

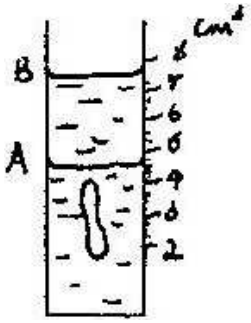



Fig 1

Determine the density of the solid. (Give your answer to 1 decimal place)

2. Figure 2 shows a rigid body acted upon by a set of forces. The magnitudes of the forces are as follow

$F_1$ = 3$N_1$, $F_2$ = 6N, $F_3$ = 3N, $F_4$ = 4 $N_1$, $F_5$ = 3N and $F_6$ = 3 N

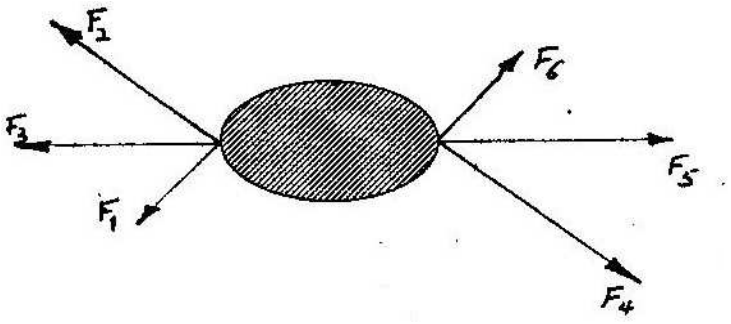



Fig 2

Identify the couple among these forces

3. Give a reason why the weight of the body varies from place to place

4. A butcher has a beam balance and masses 0.5 kg and 2kg. How would he measure 1.5 kg of meat on the balance at once?

5. The height of the mercury column in a barometer at a place is 64cm. What would be the height of a column of paraffin in barometer at the same place? (Density of paraffin = $8.0 \times 10^2$ kgm$^{-3}$)

6. The number of molecules in 18cm$^3$ of a liquid is $6 \times 10^{23}$. Assuming that the diameter of the molecules is equivalent to the side of a cube having the same volume as the molecule. Determine the diameter of the molecule.

7. Explain why a glass container with thick walls is more likely to crack than one with a thin wall when a very hot liquid is poured into them.

8. State the reason why water spilled on a glass surface wets the surface

9. Figure 3 shows two aluminium containers, A and B placed on a wooded table. A and B have equal volumes of hot water initially at the same temperature.

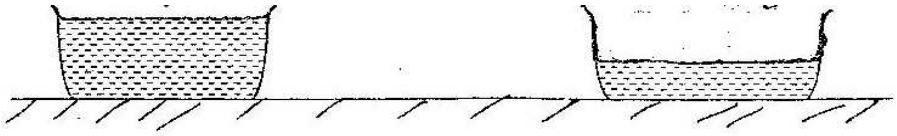
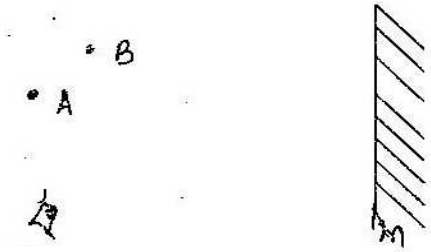


Fig.3

10. Figure 4 shows two point objects A, and B, placed in front of a mirror M




Eye

Fig 4

Sketch a ray diagram to show the positions of their images as seen by the eye.

11. Figure 5 shows two charged identical conduction spheres on insulting stands. Each cross represents a charge. The spheres are briefly brought into contact and then separated.

Fig 5

Sketch in the space provided the diagrams of the spheres showing charge distribution after separation

12. Name a device used to convert light energy directly into electrical energy

13. Figure 6 shows a beam AB supported at points A and B. A large F is applied on the beam as shown. Mark on the diagram, the position X, where a notch is likely to appear.

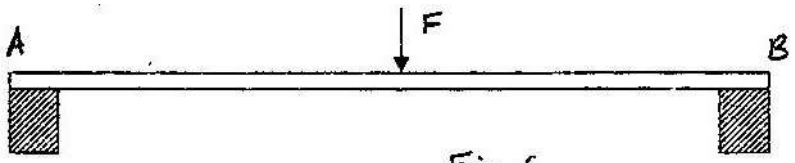



Fig. 6

14. Distinguish between soft and hard magnetic materials

15. A current of 0.5A flows in a circuit. Determine the quantity of charge that crosses a point in 4 minutes.

16. Figure 7 shows an incomplete circuit of an electromagnet. Complete the circuit between X and Y drawing the windings on the two arms of the core such that A and B are both North poles when switch S is closed. Indicate the direction of the current on the windings drawn.

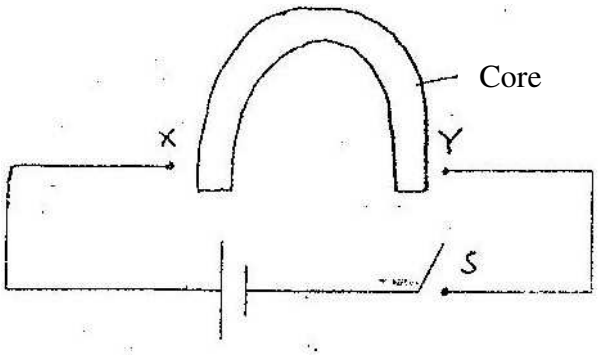



Figure 7

17. An observer watching a fireworks displays sees the light from an explosion and hears the sound 2 seconds later. How far was the explosion from the observer?

18. Water flows in a horizontal smooth pipe. State the changes that would be observed in the nature of the flow if the speed of the water is steadily increased from low to a high value

19. A transformer in a welding machine supplies 6 volts from a 240V main supply. If the current used in the welding is 30A. Determine the current in at the mains.

20. An object dropped from a height h attains a velocity of 6 $ms^{-1}$ just before hitting the ground. Find the value of h.

21. Calculate the wavelength of the KBC FM radio wave transmitted at a frequency of 95.6 Mega Hertz.

Using the information in figure 8 answer questions 22 and 23.

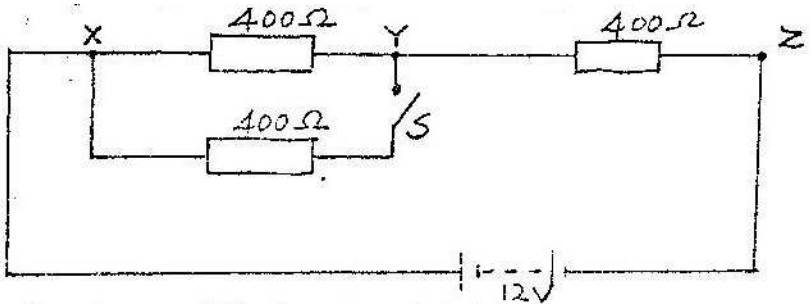



Fig. 8

22. What is the p.d across YZ when the switch S is open?

23. Determine the p.d across YZ when the switch S is closed

24. How many 1000W electric irons could be safely connected to a 240V main circuit fitted with 13A fuse?

25. Ice changes to water at $0^0$C. Equal masses of the ice and water at $0^0$C are each heated to $1^0$C. Give a reason why more heat energy is required to heat ice.

26. Figure 9 shows two parallel rays incident on a concave mirror. F is the focal point of the mirror.

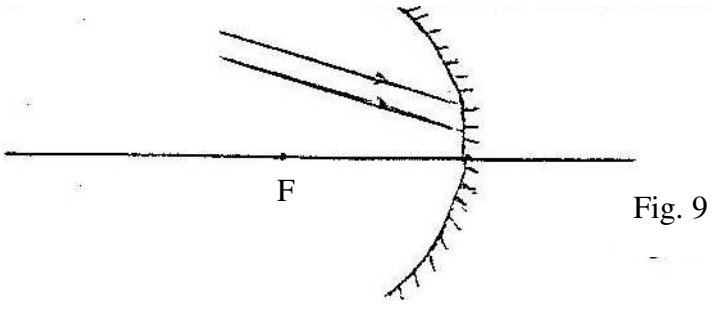



Fig. 9

Sketch on the same diagram the path of the rays after striking the mirror

27. Figure 10 shows the apparent position of a fly in air as seen by a fish in water

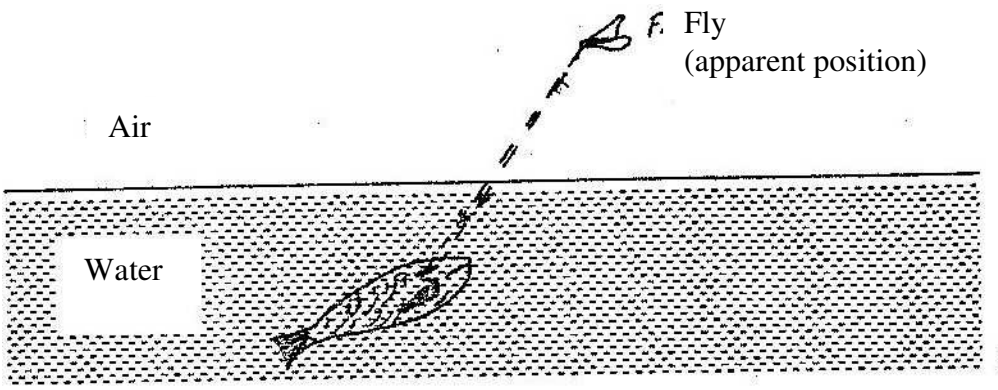



Fig 10.

Sketch on the same diagram rays to show the actual position of the fly

28. A trolley is moving at constant speed in a friction compensated track. Some plasticine is dropped on the trolley and sticks on it. State with a reason what is observed about the motion of the trolley.

29. Figure 11 shows part of a circuit containing three capacitors

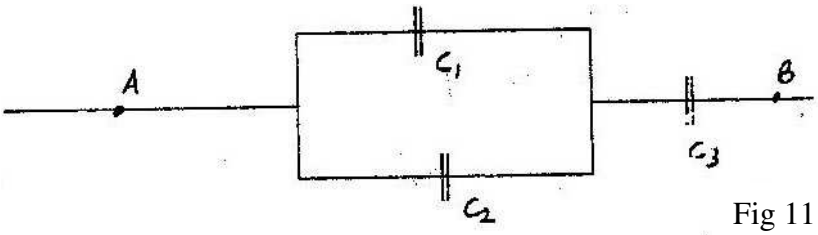



Fig 11

Write an expression for $C_T$ the effective capacitance between A and B.

30. What is the value of $-20^0$C on the absolute temperature scale?

31. Figure 12 shows an experiment arrangement. $S_1$ $S_2$ and S are narrow slit

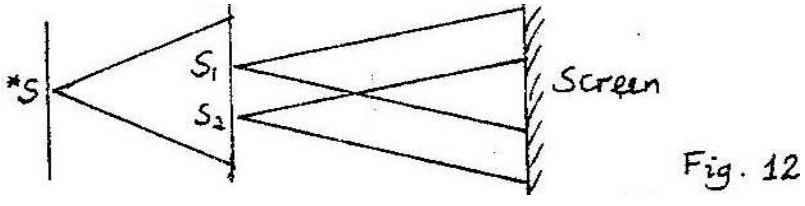



Fig. 12

State what is observed on the screen when the source is?

(a) Monochromatic (b) White light

32. Two turning forks are sounded together. What is the condition for the beats to be heard?

33. Using the components symbols shown in figure 14, sketch a series circuit diagram for a forward biased diode.

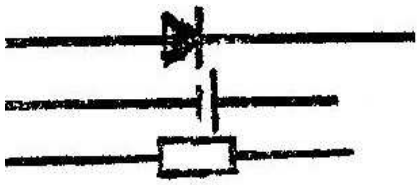


Fig 13

34. State how eddy currents are reduced in a transformer

35. A lithium atom has 3 protons in its nucleus. Complete the diagram in figure 14 by marking X in the appropriate shells show the electron distribution when the atom is not excited

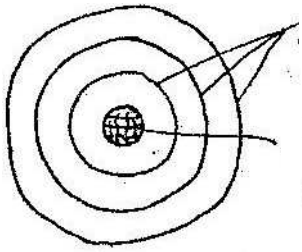



Fig 14

In a sample there are 5.12 x 1020 atoms of krypton – 92 initially. If the half of krypton; 92 is 3.0s determine the number of atoms that will have decayed after 6s.

# K.C.S.E 1998

## PHYSICS PAPER 232/1

## QUESTIONS

*Acceleration due to gravity, g, = 10 ms$^2$*

1. Figure 1 shows a fencing post whose length is being measured using a strip of a measuring tape.

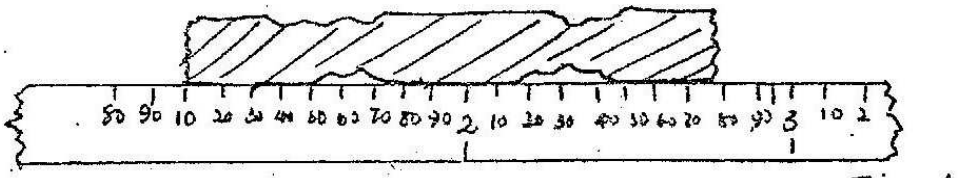


Fig. 1

Use this information to answer questions 1 and 2.

1. State the accuracy of the tape:

2. What is the length of the post?

3. A heating coil rated 1000 W takes 15 minutes to heat 20kg of a liquid from 26$^o$C of 42$^o$C. Determine the specific heat capacity of the liquid.

4. State one industrial use of X – rays

5. A metal pin was observed to float on the surface of pure water. However the pin sank when a few drops of soap solution were carefully added to the water. Explain his observation.

6. Figure 2 draw to scale shows a lens L1 placed 30cm fro an object O. The image is formed on the screen S 50cm from the lens.

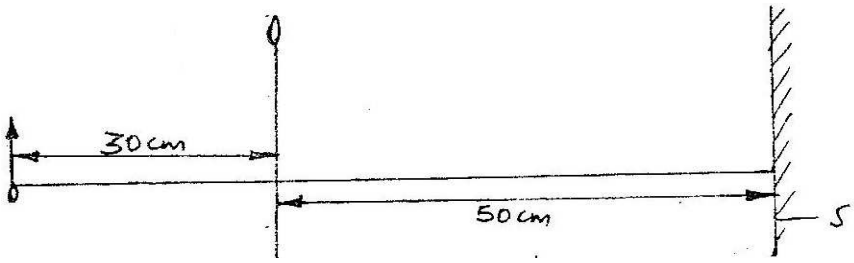



Fig. 2

7. State one advantage of fitting wide tyres on a vehicle that moves on earth roads.

8. The primary coils of a transformer has 2000 turns and carries a current of 3A. If the secondary coil is designed to carry a current of 30A, calculate the maximum number of turns in the secondary coil.

9. Water of mass 3kg at a temperature of $90^{o}C$ is allowed to cool for 10 minutes. State two factors other than humidity, that determine the final temperature.

10. A car battery requires topping up with distilled water occasionally. Explain why this is necessary and why distilled water is used.

11. The internal resistance of the cell, E in figure 3 is 0.5 ohms. Determine the ammeter reading when the switch S is closed.

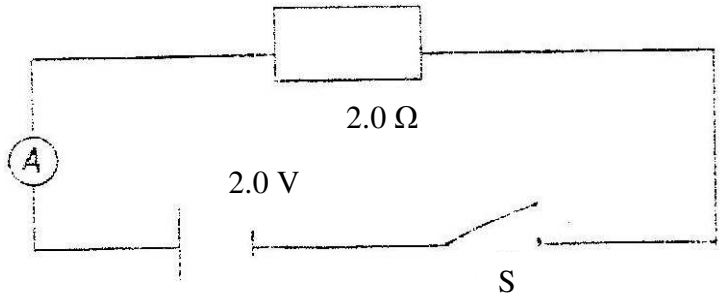



Fig 3

12. The activity of a radioactive substance, initially at 400 counts per second reduces to 50 counts per second in 72 minutes. Determine the half – life of the substance.

13. State the reason why a voltmeter of high resistance is more accurate in measuring potential differences, that one of low resistance.

14. Explain how hammering demagnetizes a magnet

15. A highly negatively charged rod is gradually brought close to the cap of a positively charged electroscope. It is observed that the leaf collapses initially and then diverges. Explain the observation.

16. In figure 4 one end of a metal rod is placed in steam and the other end in melting ice. The length of the rod in between in lagged.

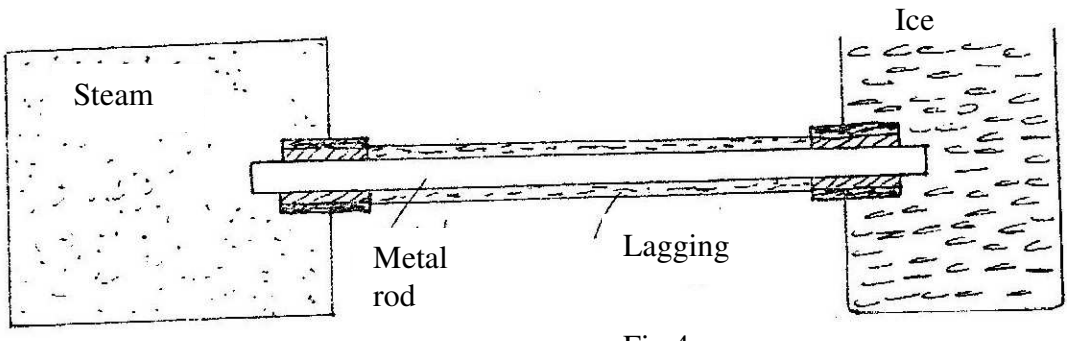



Fig 4

State two factors that determine the rate at which ice melts.

17. Calculate the length of a wire required to make a resistor of 0.5 ohms, if the receptivity of the material is $4.9 \times 10^{-7}$ Ω m and the cross sectional area is $2.0 \times 10^{-6-2}$

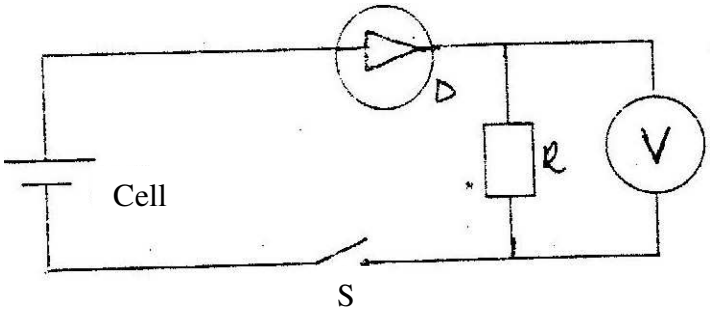
18. State the reason why the amplitude of a simple pendulum decreases with time.

19. State two differences between the cathode ray tube (CRT) of a TV and the cathode ray oscilloscope (CRO)

20. Table 1 carries information on the type of radiation, detector and use for some of the electromagnetic radiations. Fill in the blanks.

| Type of radiation | Detector | Used |
|---|---|---|
| Microwave | Microwave receiver | |
| Visible light | | Seeing / vision |

21. In the circuit in fig 5 when the switch S is closed, the voltmeter shows a reading.




When the cell terminals are reversed and the switch is closed, the voltmeter reading is zero. Explain these observations.

22. A body of mass M is allowed to slide down an inclined plane. State two factors that affect its final velocity at the bottom of the incline.

23. Cleavage in crystals is possible in certain directions only. Explain this observation.

24. John carried a uniform post of mass 20kg horizontally on his shoulder as shown in fig 6. He placed the post on his shoulder such that the centre of gravity of the pole is 1.0m behind him. He balanced the post by applying a downward force F at a point 0.5m on the part of the post in front of him.

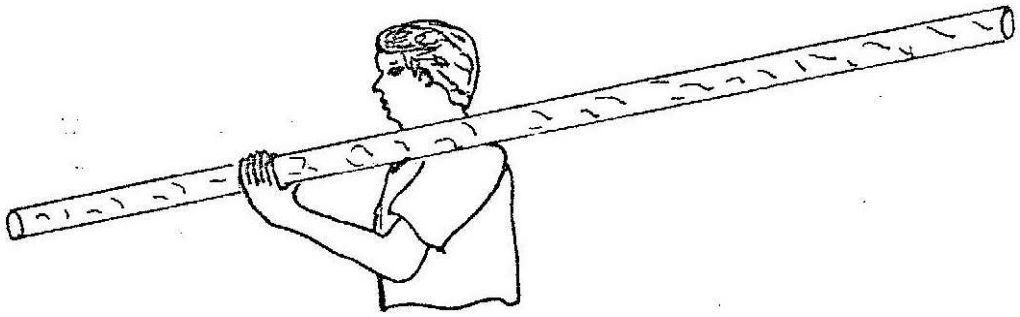


Fig 6

Determine the value of the force F.

25. Fig 7 shows a graph of pressure P, against volume, V, for a fixed mass of gas at constant temperature.

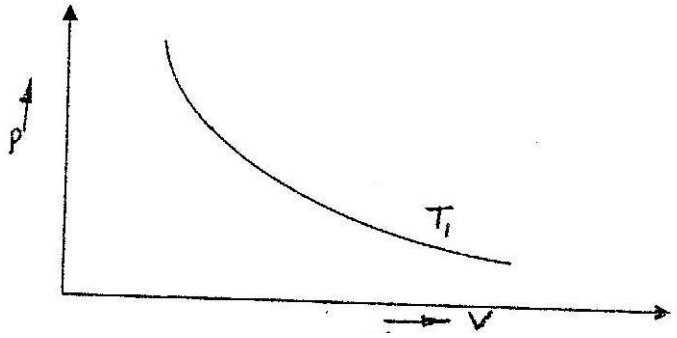



Fig 7

Sketch on the same axes a graph for the same mass of gas with a temperature $T_2$ lower than $T_1$

26. State two factors that would raise the boiling point of water to above $100^oC$

27. During total eclipse of the sun, both light and heat are observed to disappear simultaneously. Explain the observation.

28. What determines the quality of a musical note?

29. Fig. 8 shows a car of mass M moving along a curved part of the road with a constant speed.

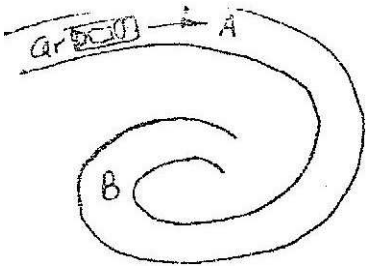



Fig 8

Explain the fact that the car is more likely to slide at B than at A if the speed is not changed.

30. Fig 9 shows a Bunsen burner.

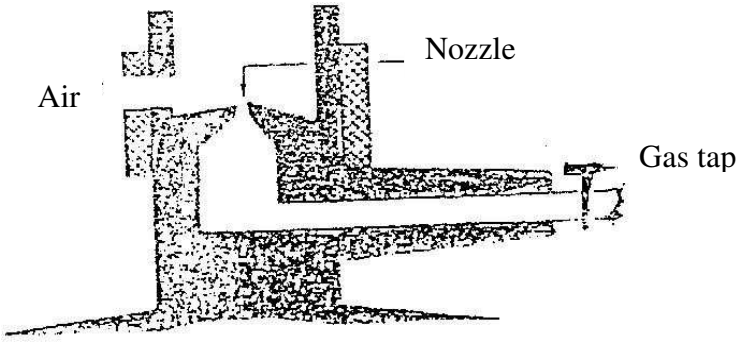



Fig 9

Use Bernoulli's principle to explain how air is drawn into the burner, when, the gas tap is opened.

31. Fig 10 shows a fire alarm circuit.

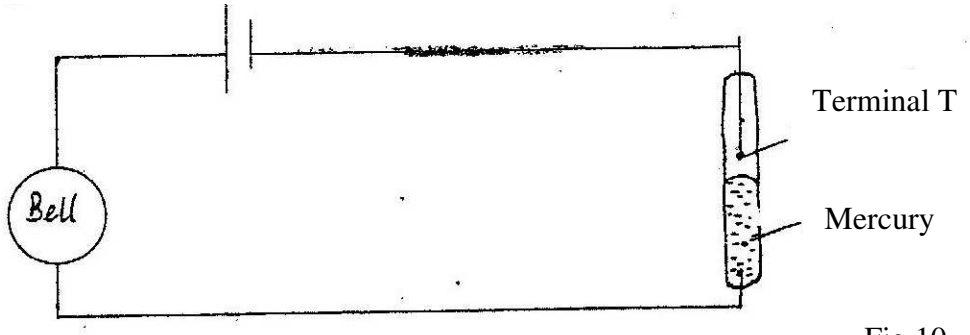



Fig 10

Explain how the alarm functions.

32. Fig 11 shows a double slit placed in front of a source, s of waves, a director D is placed beyond the slits, such that its position can be adjusted along the line XY.

Fig. 11

State with a reason, what the detector records along XY.

33. What is meant by virtual image?

34. Fig 12 shows a body of weight 50N placed on a surface which is inclined at an angle of $30^0$ to the horizontal . The body experiences a maximum frictional force of 29N with the surface.

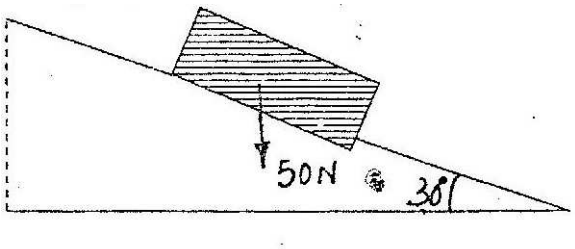


Fig 12

Determine the force required to move the body, up the inclined with constant velocity.

# K.C.S.E 1999

## PHYSICS PAPER 232/1

## QUESTIONS

1. What is the reading on the vernier calipers shown in figure 1?

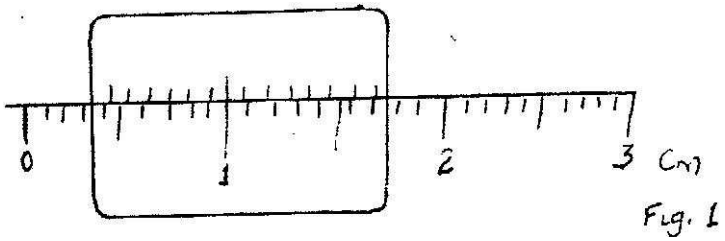



Fig. 1

2. Figure 2 shows forces f1 and F1 and F2 acting on a meter rule such that it is in equilibrium.


Fig 12

Mark on the figure a third force F3 acting on the rule such that it is in equilibrium maintained.

3. State how the position of the centre of gravity of a body in stable equilibrium changes to that in the rest position when the body is slightly tilted and then released.

4. A vacuum pump was used to pump out air from the glass tube immersed in liquids as shown in figure3.

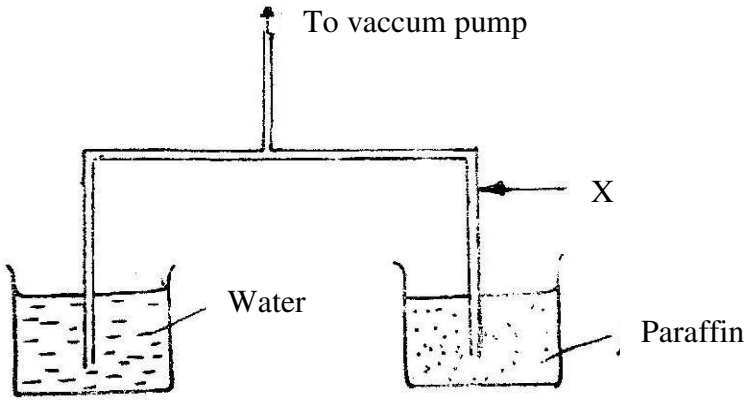



Fig 3

After sometime the level of paranum rose to position A. Mark 1, the corresponding position for the water level. Give a reason for your answer.

5. Fig. 4 shows a capillary tube placed in though of mercury.

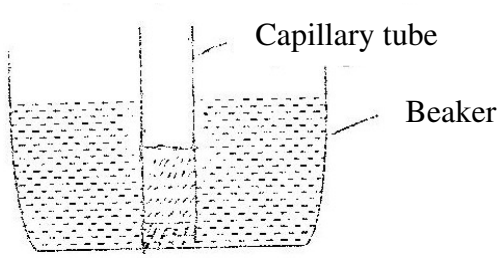



Fig 4

Give a reason why the level of mercury in the capillary tube is lower than in the beaker.

6. Figure 5 shows a bimetallic strip at room temperature. Brass expands more than invar when heated equally.

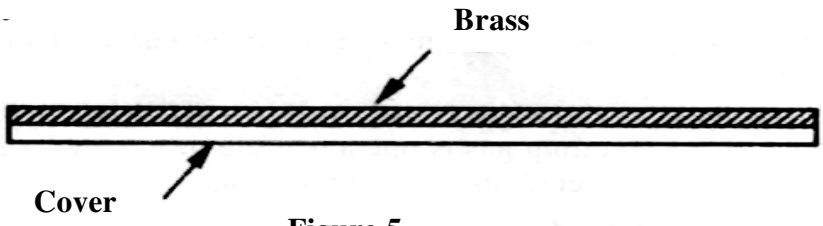


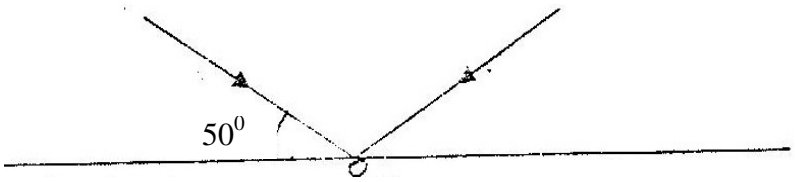

**Figure 5**

Sketch the bimetallic strip after being cooled several degrees below room temperature.

7. In an experiment to study the atoms of gold, a beam of α- particles was directed onto a thin sheet of gold. The following observations were made:

(i) Majority of the particles went straight through undeflected
(ii) A few particles deflected through varying angles up to 180.

8. Figure 6 shows a ray of light incident on plane mirror at point O.



The mirror is rotated clockwise through an angle $30^0$ about an axis perpendicular to the paper. Determine the angle through which the reflected ray rotated.

9. Figure 7 shows a sharp pin fixed on a cap of leaf electroscope. The electroscope is highly charged and then left for sometime.

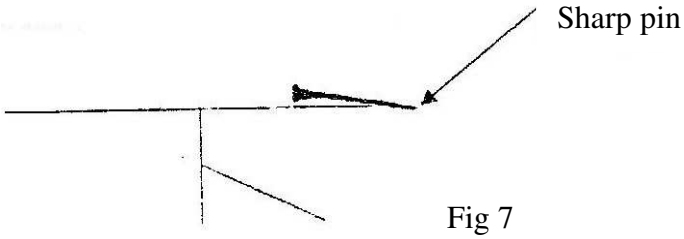



Fig 7

Explain why the leaf collapses

10. Determine the ammeter reading when a p.d of 3.0 volts is applied across Pq in figure 8.

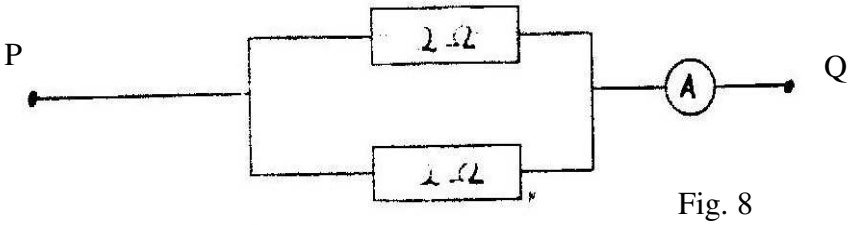



Fig. 8

11. A wire fixed at one end extends by 4mm when a load of 20N is suspended from the other end. Determine the load that would cause an extension of 1.5 mm on the wire (assume elastic limit is not exceeded)

12. How can it be shown that the strength of a magnet is concentrated at the poles?

13. Figure 9 shows a wire carrying a current whose direction is into the paper.

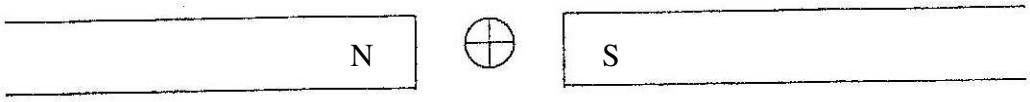



Fig. 9

The wire is placed in a magnetic field.
Indicate on the figure the direction of the force acting on the wire.

14. Determine the moment of the couple shown in figure 10.

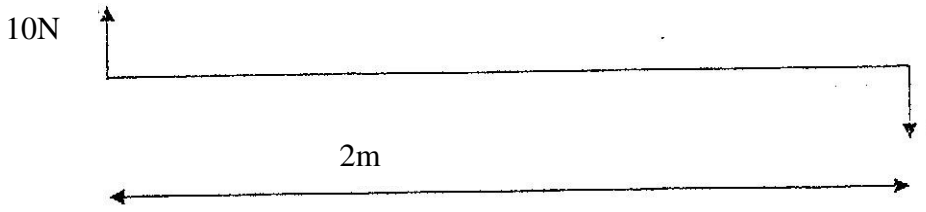
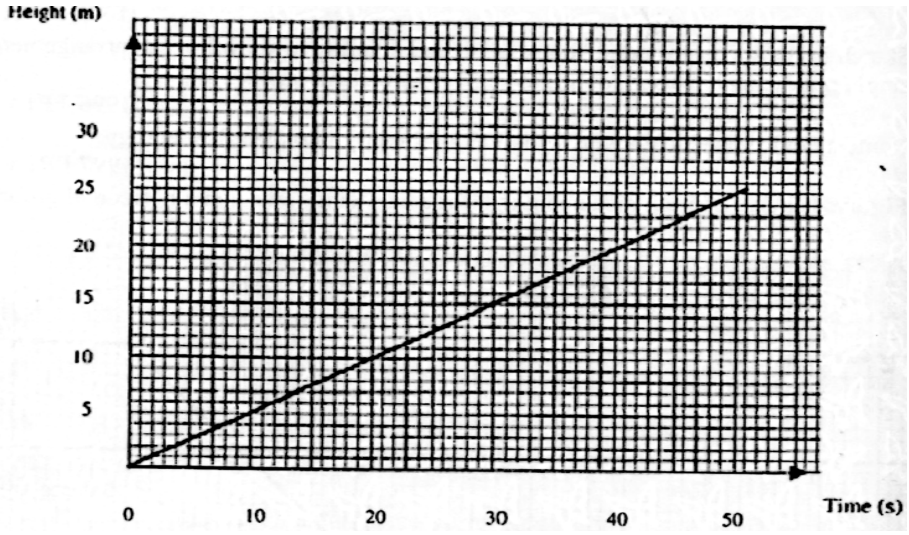



FIG 10

15. An industrial trolley of mass 20kg carrying a mass of 50kg is acted on by a constant force. The trolley moves along a horizontal smooth surface with an acceleration of 0.5ms $^{-2}$ . Determine the acceleration of the trolley after the mass falls off.

16. Figure 11 is a graph which shows how the vertical height through which a machine raises a mass 20kg varies with time.




Determine the power output of the machine after 40 seconds.

17. Figure 12 shows how displacement varies with time as a wave passes a fixed point.

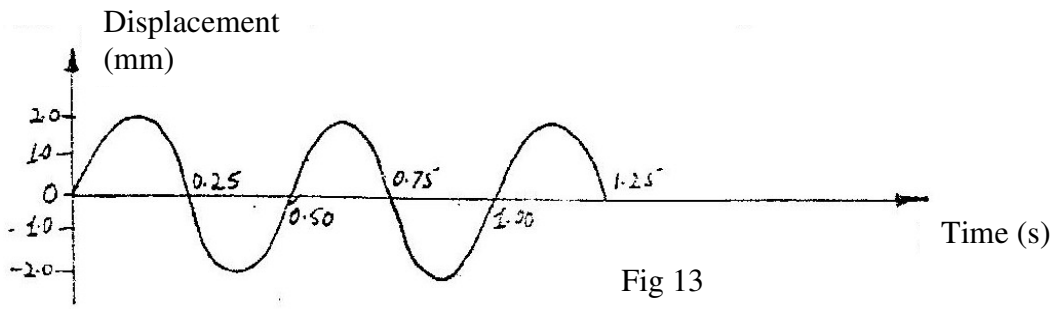



Fig 13

Determine the frequency of the waves.

18 Two tuning forks of frequencies 256Hz and 258 Hz are sounded simultaneously and then placed close to each other, calculate the beat frequency.

19. When a current of 2.0 flows in a resistor for 10 minutes, 15,000 joules of electrical energy is displaced. Determine the voltage the resistor.

20. A substance of mass 2kg and specific heat capacity 400 Jkg K initially at $81^0$C is immersed in water at $20^0$C. If the final temperature is $21^0$C. Determine the mass of water. (The specific heat capacity of water is 4200j/kgK). Give your answer to 1 decimal place.

21. A galvanometer of internal resistance 50Ω gives a full-scale deflection when a current of 10mA passes through it. Determine the value of the resistance required to convert the galvanometer to a voltmeter with full-scale deflection of 5 volts.

22. A microscope is focused on a mark on horizontal surface. A rectangular glass block 30mm thick is place on the mark. The microscope is then adjusted dd10mm upwards; to bring the mark back to focus, determine the refractive index of the glass.

23. State the energy transformation when fast moving electrons are suddenly stopped by a target in an X- ray tube.

24. A bullet is fired horizontally at a target. Neglecting air resistance give a reason why the horizontal acceleration of the bullet is zero.

25. Figure 13 shows a section of a pipe PQ. A constant pressure difference maintains a streamline flow of a liquid in the pipe.

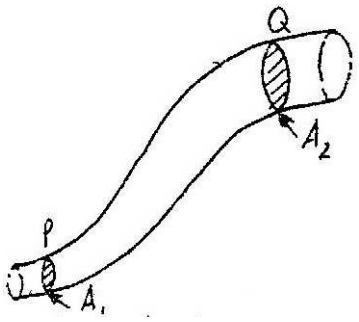



Figure 13

If the cross-sectional area $A_1$ at P is less than $A_2$ at Q, state how the liquid velocity. $V_2$ at Q compares with velocity $V_1$ at P.

26. The figure 14 is a resistor-capacitor circuit. At time t=0, the switch is closed at A for sometime, and then opened. The switch is them closed at B for sometime.

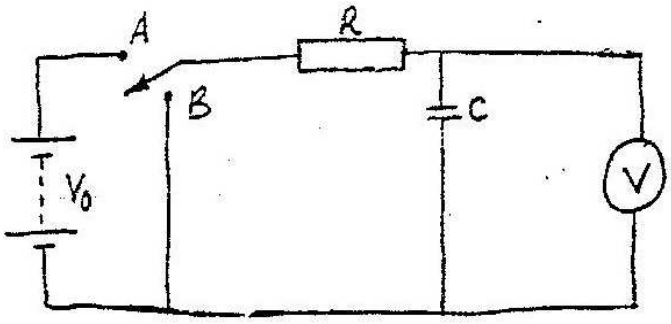
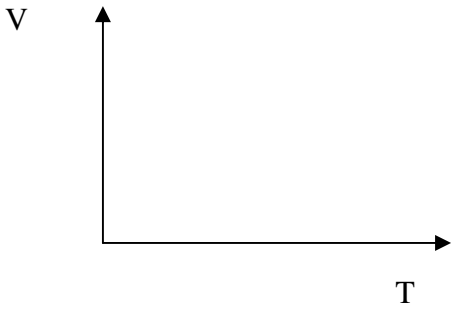



FIG 14

On the axis provided, sketch the graph of voltage V across the capacitor against time t(t1 and t2 represents times for opening at A and closing at B respectively).




27. Determine the pressure required to compress a gas in a cylinder initially at $20^0$C and at a pressure $1.03 \times 10^{-5}$ to one-eight of its original volume.

28. Arrange the following in order of increasing frequencies –Gamma radiation, radio waves, infrared, and X – rays.

29. A concrete block of volume V is totally immersed in seawater of density p. Write an expression for the up thrust on the block..

30. It is observed that when ultraviolet light is shone onto a clean zinc plate connected to the cap of negatively charged leaf electroscope, the leaf collapse. Explain this observation.

31. Figure 15 shows two masses 0.1kg and 0.2kg connected by a string through a hole on a smooth horizontal surface.

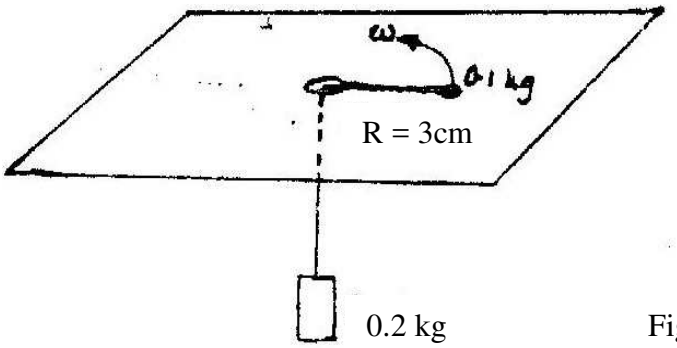



Fig 15

The 0.1kg mass rotates in a horizontal circle of radius 3cm. Calculate the angular velocity of the mass when the system is in equilibrium. Use acceleration due to gravity g= 10ms$^{-2}$

32. Sketch a diagram to show the position of an object, when a converging lens is used as an magnifying glass.

33. Figure 16 shows a wire XY at right angles to a magnetic field. XY is part of circuit containing a galvanometer.

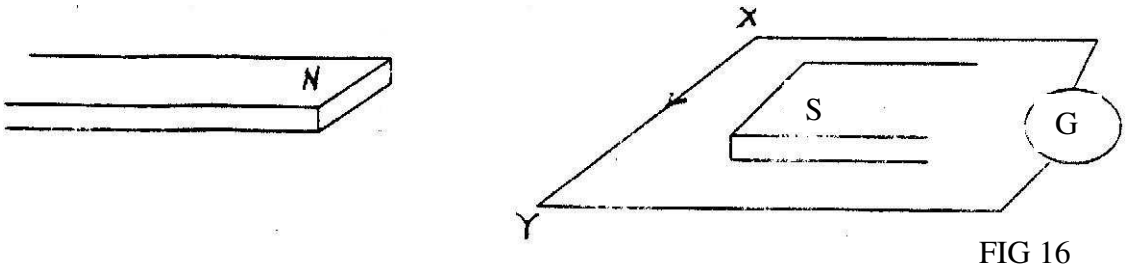



FIG 16

34. Figure 17 shows the electric wiring of an electric heater A, B, C are the main wires.

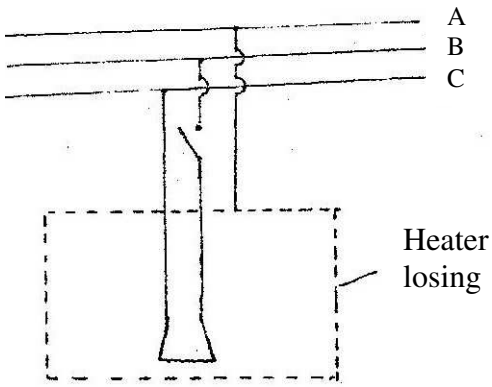



Fig 17

Identify A, B, and C.

35. A radioactive nuclide of atomic number z emits a beta particle and gamma rays. State the atomic number of the new nuclide.

# K.C.S.E 2000

## PHYSICS PAPER 232/1

## QUESTIONS

1. Fig 1 shows part of a measuring cylinder calibrated in $cm^3$ containing water whose level is indicated. Some 3.0cm of is added into the cylinder. Indicate on the diagram the new level of water.

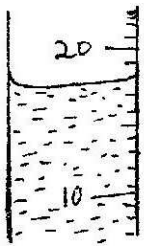



Fig 1

2. A bag of sugar is found to have the same weight on planet earth as an identical bag of dry sawdust on planet Jupiter. Explain why the masses of the two bags must be different.

3. Fig. 2 shows a beaker placed on a bench. of ice is placed in the beaker as shown.

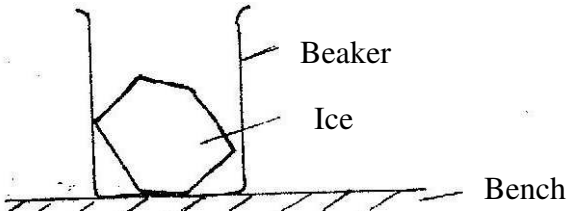



Fig. 2

State and explain the change in the stability of the beaker when the ice melts.

4. A positively charged rod is brought near the cap of a leaf electroscope. The cap is the earthed momentarily by touching with the finger. Finally the rod is withdrawn. The electroscope is found to be negatively charged. Explain how this charge is acquired.

5. Fig. 3 shows a device for closing a steam outlet.

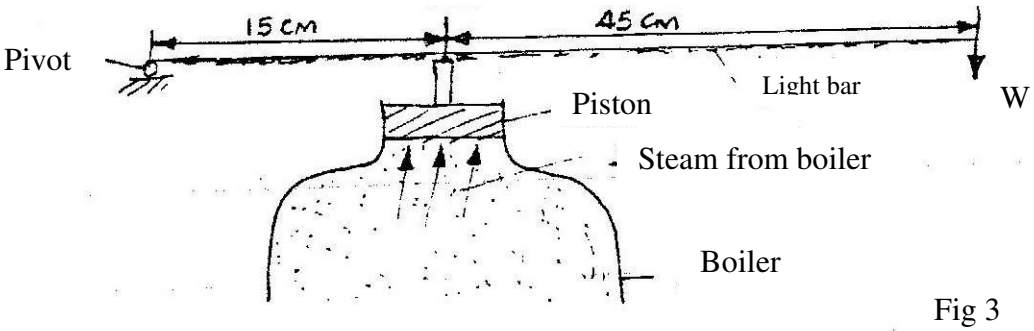



Fig 3

The area of the position is $4.0 \times 10^{-4}$ $m^2$ and the pressure of the steam in the boiler is $2.0 \times 10^5$ $Nm^3$. Determine the weight W that will just hold the bar in the horizontal position shown.

6. State the reason why gases are easily compressible while liquids are solids are not?

7. Fig. 4 shows a bimetallic thermometer.

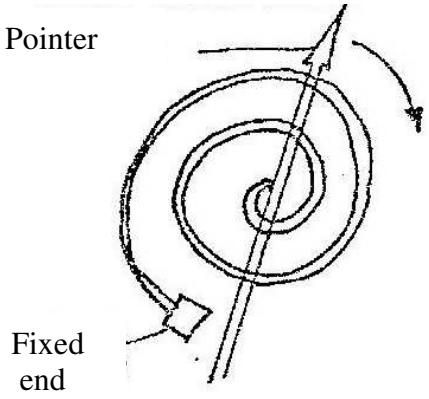



Fig 4.

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

8. A wooden bench and a metal bench are both left in the sun for along time. Explain why the metal bench feels hotter to touch.

9. Fig. 5 shows an object O placed infront of a plane mirror.

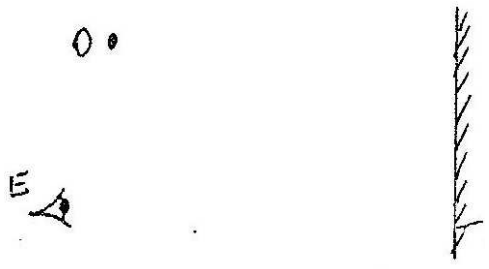



fig. 5

On the same diagram draw rays to locate the position of the image I, as seen from the eye E.

10. State one advantage of an alkaline accumulator over a lead – acid accumulator.

11. The structure in fig. 6 is in equilibrium. Identify the struts and the ties in the structure.

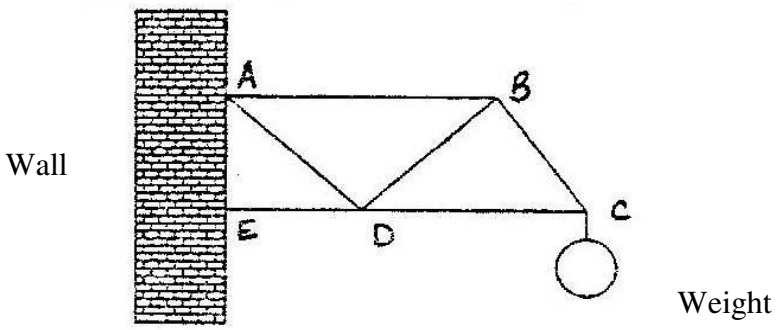



Fig 6

12. Fig. 7 shows how magnets are stored in pairs with keepers at the ends

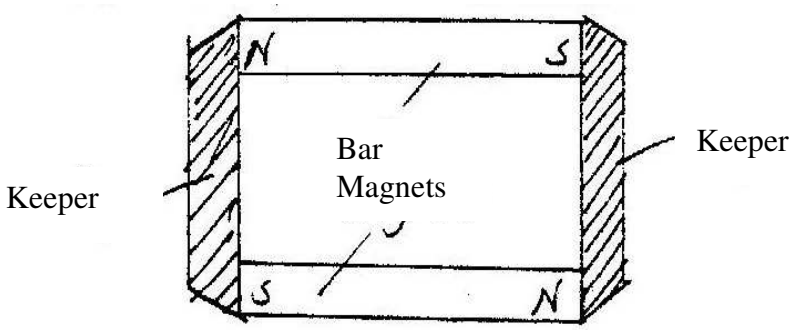



Fig 7

Explain how this method of storing helps in retaining magnetism longer.

13. In fig 8 the arrow indicates the directions of the current in the conductor.

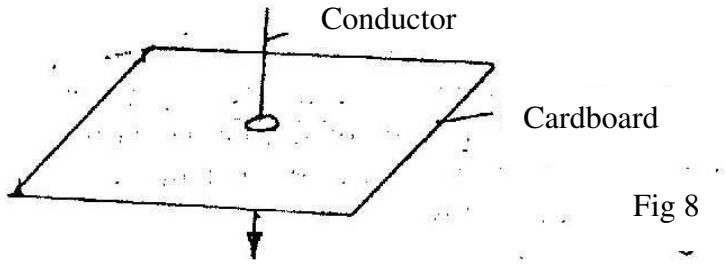



Fig 8

Sketch on the diagram the magnetic field pattern due to the current.

14. In fig 9 the couple represented by forces F1 is acting on light uniform bar.

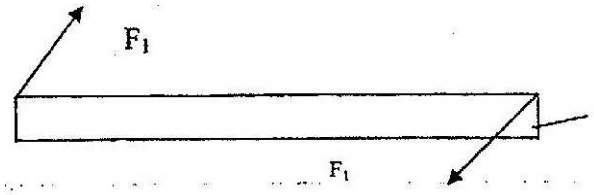



Fig 19

Sketch on the figure a couple represented by forces F2 such that the bar is in equilibrium. And the forces F2 have minimum magnitude.

15. Fig 10 shows a pulley system being used to raise a load. Use the information given in the figure to answer the questions 15 and 16.

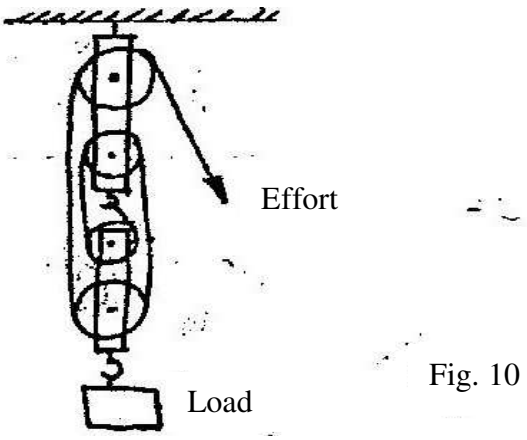



Fig. 10

Determine the velocity ratio (VR) of the system.

16. If a load on 100N is raised by applying an effort of 28N, determine the efficiency of the system.

17. Give one example of a longitudinal wave.

18. In fig. 11 ammeters have negligible resistance and the cells are all identical.

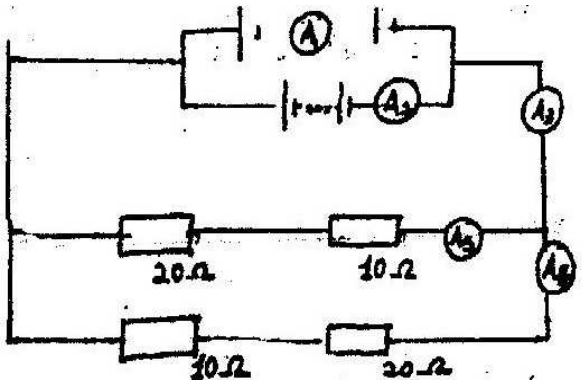


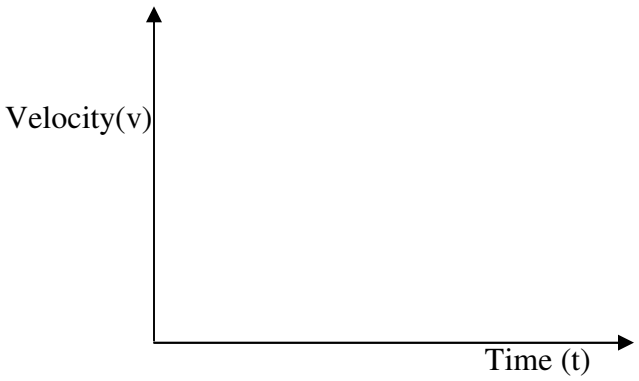

Fig 11

Show that all the ammeters A1, A2, and A5 have the same reading.

Let A's represent current thought the ammeters using the Kirchoffs law.

19. An electric bulb rated, 40W is operating on 240V mains. Determine the resistance of its filament.

20. A body initially resting on horizontal surface is accelerated by a constant force. It passes over a small region where it experiences a force of friction equal to the accelerating force before returning to the frictionless horizontal surface. On the axes provided, sketch the velocity time graph for the motion of the body.

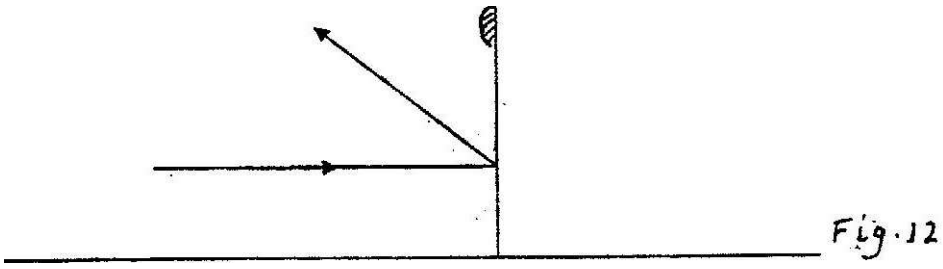



21. A wire is stretched between two fixed points such that when it is plucked, it produces sound. Explain why the pitch of the sound produced may become lower when the temperature of the surrounding rises.

22. Two identical blocks of copper are taken from the same furnace. One block is dropped into a well - lagged calorimeter containing 200g of methylated spirit. Both water and spirit were initially at the same temperature. After being given time to stabilize the temperature, it was found that more spirit than water had evaporated.

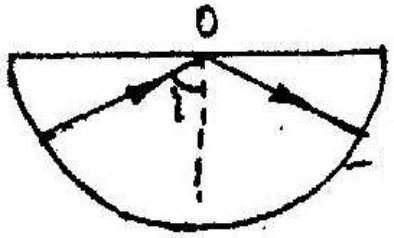
State two factors that could have caused this difference.

23. Fig. 12 shows a ray of light incident on a convex mirror.




Using a suitable construction on the same diagram determine the radius of curvature of the mirror.

24. Fig 13. Shows a semicircular glass block placed on a bench. A ray of light is incident at point O as shown. The angle of incidence, I , is just greater than the critical angle of glass.




A drop of water is now placed on the bench so as to make contact with the glass at point O. Sketch on the same figure the path followed by the ray after placing the drop of water.

25. A student holds a sheet of paper at one end so that it hangs in the position A shown in fig. 14

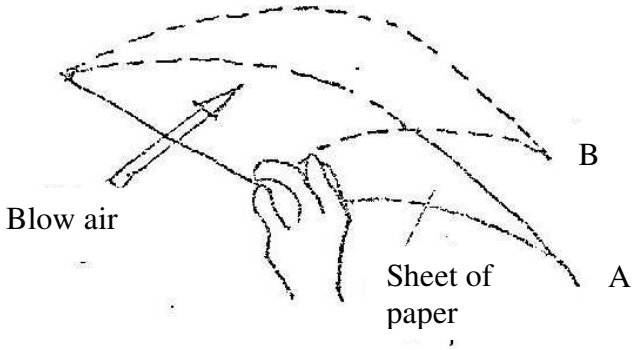
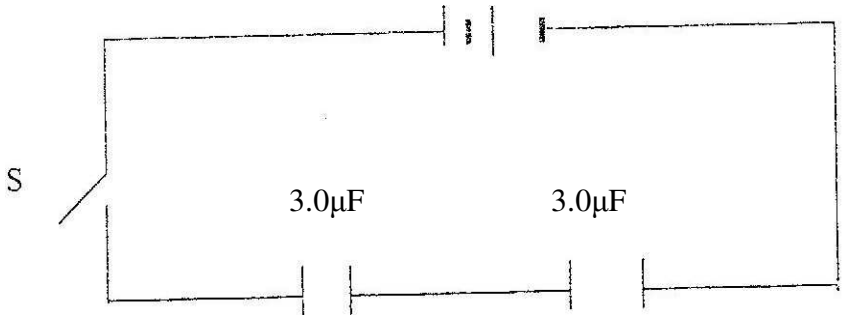


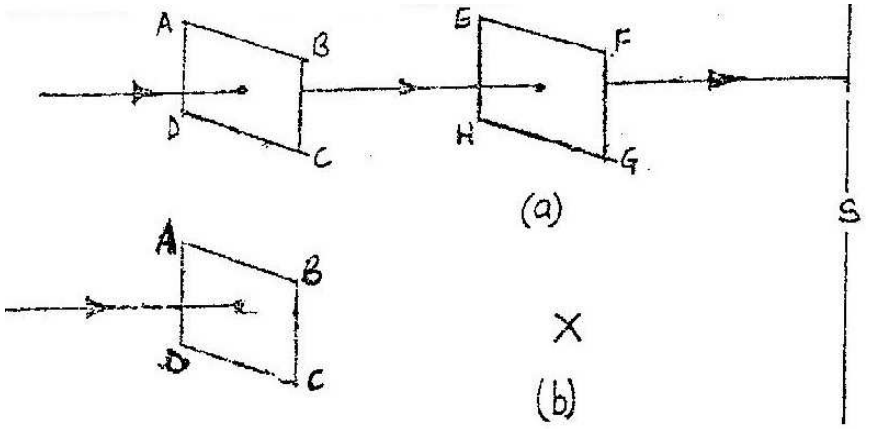

Fig 14

Explain why the paper rises to the position B when the student blows air in the direction shown by the arrow.

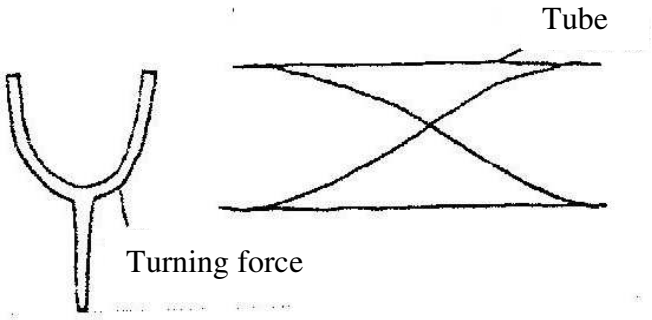
26. Fig. 15 shows a battery of emf 3.0 V connected in series with two capacitors.




27. In fig 16.(a) the Polaroids ABCD and EFGH are oriented such that maximum light reaches the screen S. Sketch at X on Fig. 16 (b) the orientation of EFGH such that no light reaches S.




28. Fig 17 (a) shows the wave pattern at resonance in an open tube when a turning fork of frequency $f_o$ is sounded near one end of the tube.




Sketch in fig 17(b) the pattern of the wave at resonance when a fork of frequency $3f_o$ is sounded near one end of an identical tube.

29. State two uses of microwaves.

30. In fig. 18 ultra – violet (u,v) light falls on a zinc plate placed on a charged leaf electroscope. It is observed that the leaf collapses.

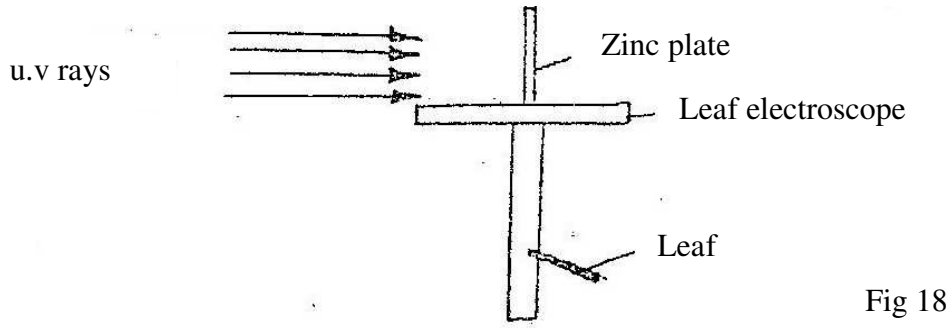



Fig 18

Explain how this observation may be used to determine the type of charge on the electroscope (2 mks)

31. Fig (19) drawn to scale) shows the image, I, formed by a diverging lens. F is principal focus of the lens.

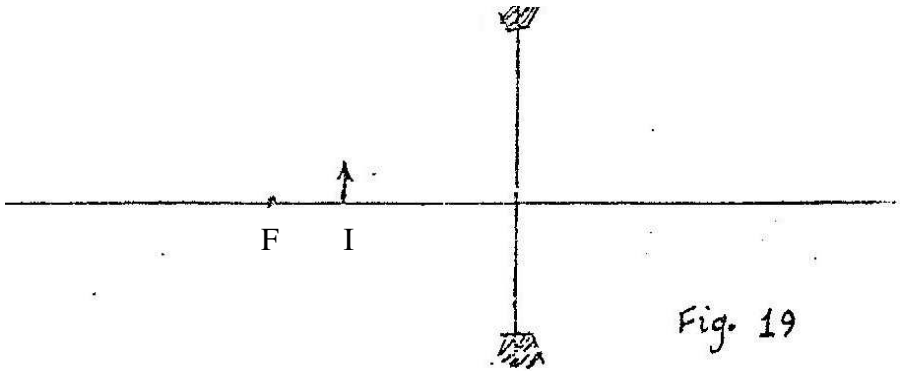



Fig. 19

By drawing the appropriate rays on the same diagram, locate the position of the object. An armature composed of turns of insulated copper wire would on laminated soft –iron core is rotated in a magnetic field to generate an e.m.f. Use this information to answer questions 31 and 32.

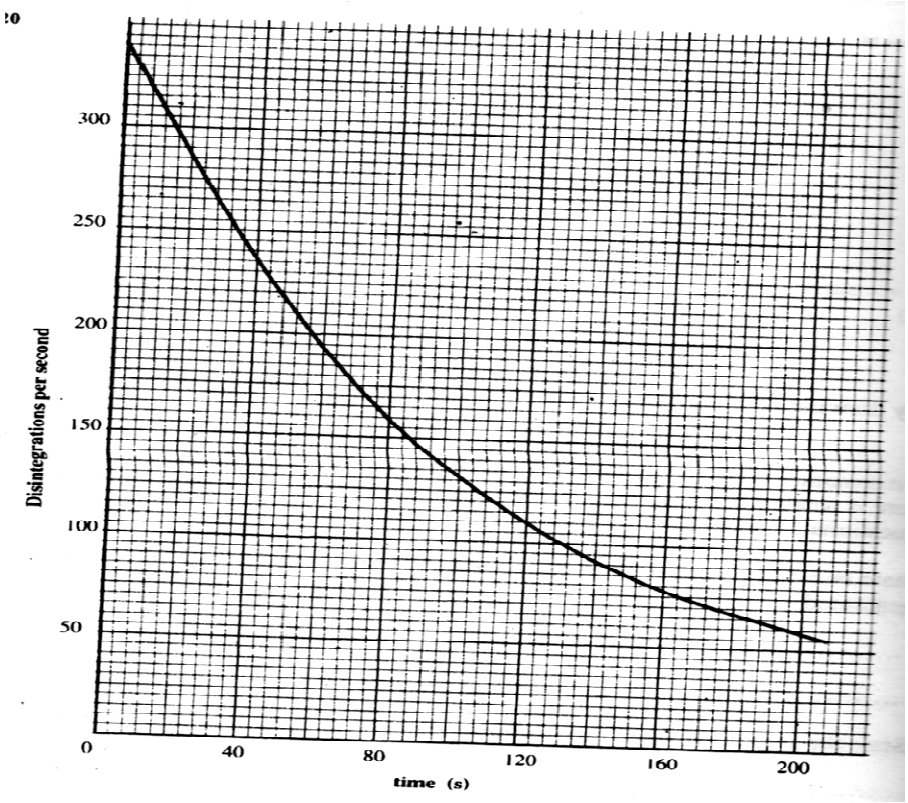
32. State tow factors other than the speed of rotation that affect the molecule of the e.m.f generated.

33. State the reason why soft iron is laminated.

34. An atom changes from an excited state to an unexcited state releasing energy. State one factor that affects the frequency of the radiation released.

35. State and explain the effect of increasing the E.H.T in an x-ray tube on the X-rays produced.

36. The graph in Fig 20 shows the disintegration per second versus time in seconds, s for a sample of radioactive material; determine the half – life of the sample.



# K.C.S.E 2001

## PHYSICS PAPER 232/1

## QUESTIONS

1. Fig. 1 shows a burette partly filed with a liquid. The burette was initially full to the mark O. If the quantity of the liquid removed has a mass of 22g, determine the density of the liquid.

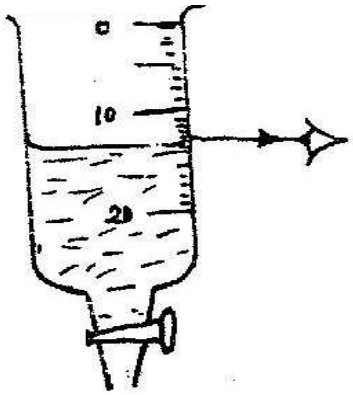



Fig. 1

2. Fig 2 shows a uniform bar in equilibrium.

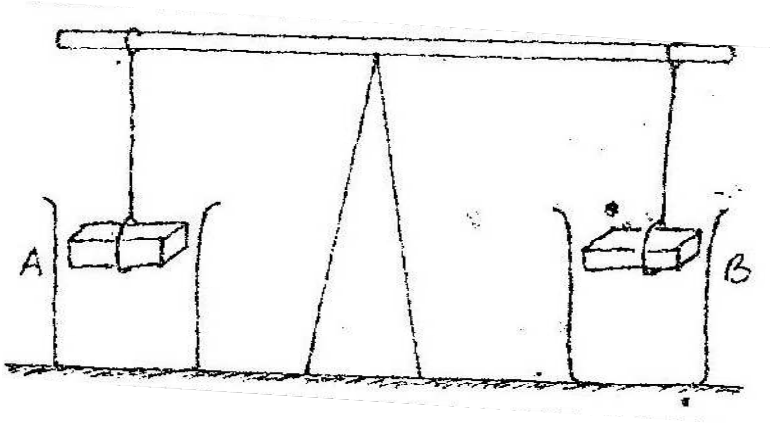



Figure 2

When water is added into the beakers A and B until the weights are submerged, it is observed that the bar tips towards B. Explain this observation.

3. Fig 3 shows two identical hollow spheres. Spheres A is completely filled with the liquid while B is partly filled with identical liquid.


FIG 3

When the two spheres are rolled gently on a horizontal surface. It is observed that the sphere B stops earlier that the sphere A. Explain this observation.

4. State the reason why it may not be possible to suck liquid into your mouth using drinking straw on the surface of the moon.

5. Fig. 4 (i) shows a beaker filled with water. Some potassium permanganate was gently introduced at the bottom of the beaker at the position shown.

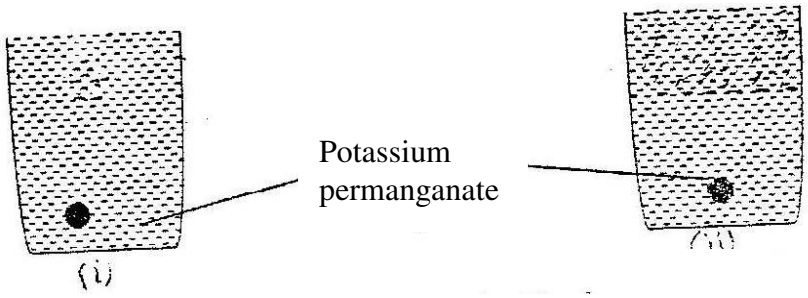
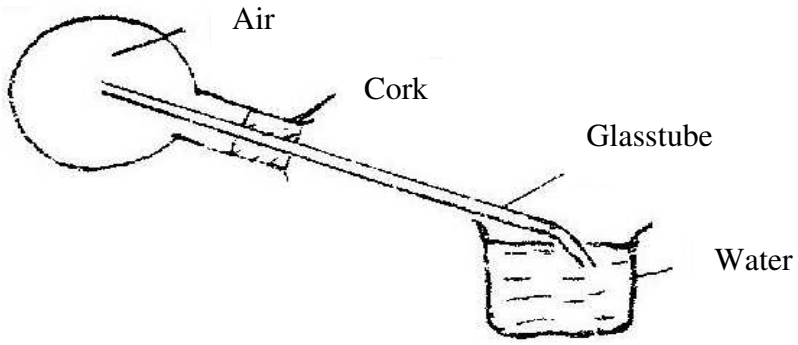



Fig 4

Fig. 4(ii) shows the appearance of the liquid after about 30 minutes.
Explain how this appearance was caused.

Fig. 5 shows a flask fitted with a glass tube dipped into a beaker containing water at room temperature. The cork fixing the glass tube to the flask is airtight.




Use the information and the figure to answer questions 6 and 7.

6. State what is observed when ice- cold water is poured on the flask.

7. Give a reason for the observation in question 6.

8. Fig. 6 shows an object O being viewed using tow inclined mirrors $M_1$ and $M_2$. Complete the diagram by sketching rays to show the position of the image as seen by the eye E.

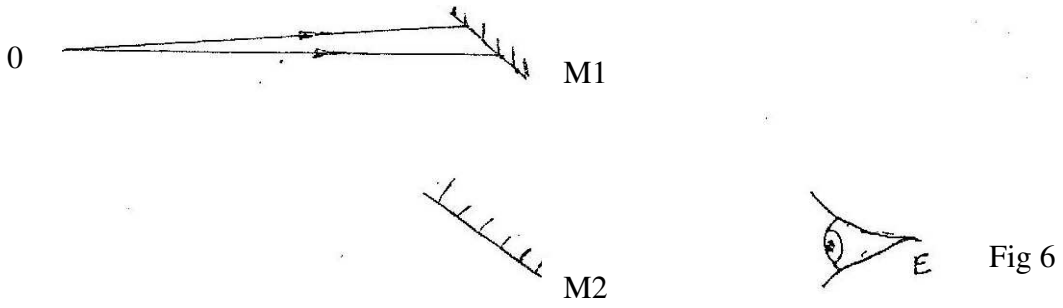



Fig 6

9 Fig. 7 shows "windmill" which when connected to the dome of a positively charged Van de Graff generator is observed to rotate as indicated. A, B, C and D are sharp points
Figure 7.

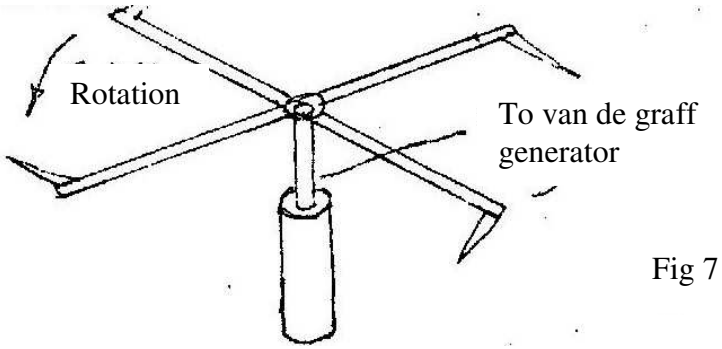



Fig 7

Explain how this rotation is caused.

10. Explain how polarization reduces current in simple cell.

11. Fig 8 shows a soft-iron ring placed between the poles of a magnet. On the same diagram sketch the magnetic field pattern.

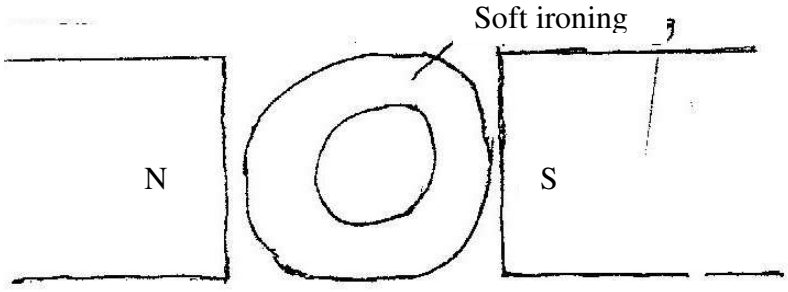



Fig 8

12. Fig. 9 shows a uniform light bar one meter in length in equilibrium under the action of forces F1 F2 F3 and F4. All the forces are in the same plane. Use the information on the figure to answer questions 12 and 13.

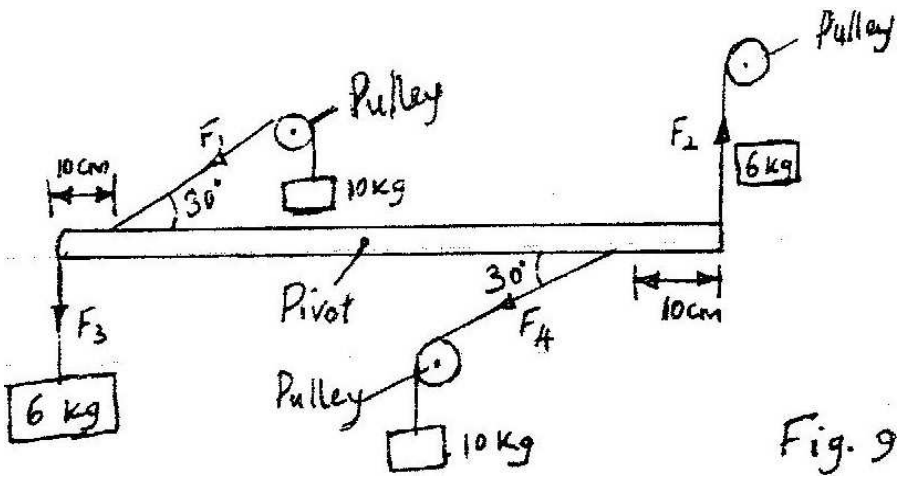


Fig. 9

Name one set of forces on the figure that constitutes a couple.

13. Determine the moment of the couple named in question 12.

14. A bullet moving at a velocity of 300ms$^{-1}$ hits a tree trunk of diameter 50cm. It emerges from the opposite side with a velocity of 150ms$^{-1}$. Determine the average deceleration of the bullet in the trunk.

15. A certain machine raises 2.0 tonnes of water through 22 metres.It the efficiency of the machine is 80%, how much work is done on the machine.(Acceleration due to gravity g = 10ms$^{-2}$)

16. Fig 10. Shows water waves incident on a shallow region of the shape shown with dotted line.

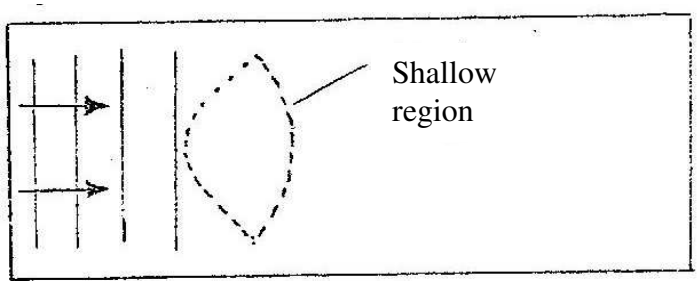


Fig 10.

On the same diagram, sketch the wave pattern in and beyond the shallow region.

17. The ammeter in the circuit in Fig. 11 has negligible resistance. When the switch S is closed, the ammeter reads 0.01A. Determine the internal resistance of the battery.

18. An electric heater rated 240V ; 300w is to be connected to a 240V mains supply, through a 10A fuse. Determine whether the fuse is suitable or not.

19. Fig 12 shows tow identical containers A and B into which a copper rod is fitted. The containers are well lagged.

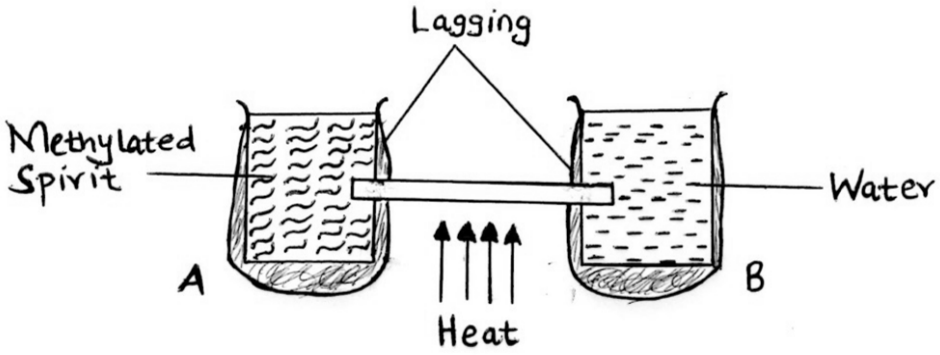



**Figure 12**

The liquids in the containers were initially at the same temperature if the heat is a applied continuously at the position shown, state with reason for the container through which the loss of heat is likely to be higher.

20. Fig. 13 shows a point object O placed in front of a concave mirror. Draw appropriate rays to locate the image of the object.

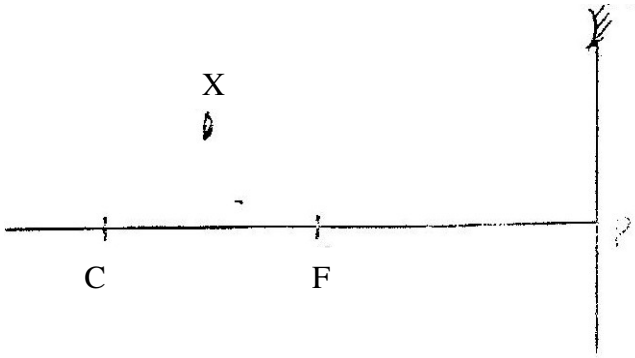



Figure 13.

21. Fig. 15 14 shows a ray of light incident on a glass prism.

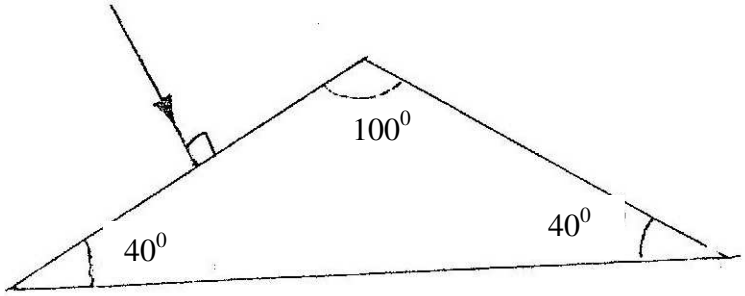



Fig 15

If the critical angle of the glass is 39o sketch on the same diagram the path of the ray until it emerges from the prism.

22. Fig. 15 shows a tall jar containing two fluids A and B. The viscosity of A is higher than that of B. A solid sphere is released at the top of the jar and falls through the fluids.

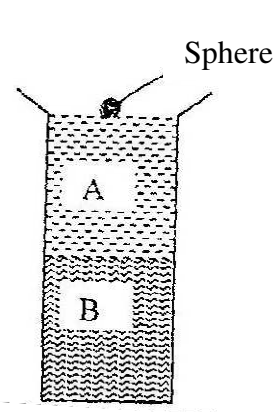
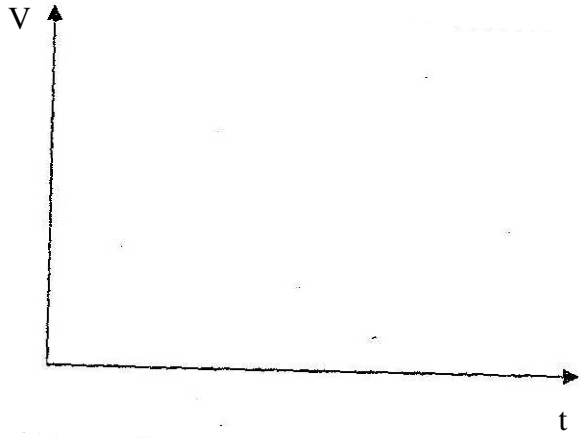



Fig 15




On the axes provided, sketch the velocity – time graph for the motion of the spheres through the fluids.

23. Fig. 16 shows a non – viscous fluid flowing through a pipe a long which vertical tubes A, B and C have been fitted.

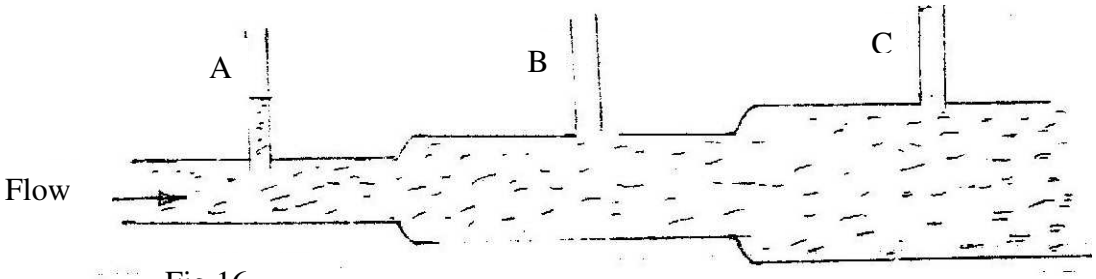
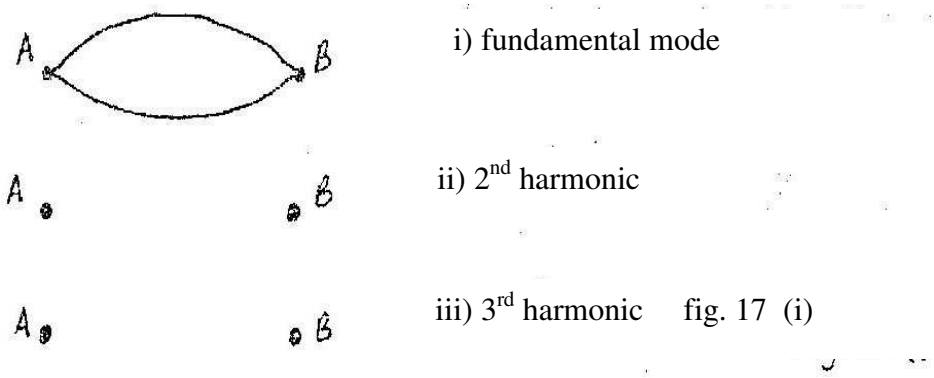



Fig 16

Complete the diagram by indicating the possible levels of the fluid in tubes B and C.

24. Two identical containers A and B are placed on a bench. Container A is filled with oxygen gas and container B with hydrogen gas such that the two gases have equal masses. If the containers are maintained at the same temperature state with reason the container in which the pressure is higher.

25. Fig. 17(i) shows a stretched string AB vibrating in its fundamental mode.
Figure 17(I)




i) fundamental mode

ii) 2nd harmonic

iii) 3rd harmonic fig. 17 (i)

Sketch in fig 17. (ii) and (ii) the 2nd and 3rd harmonic of the string respectively.

26. Fig. 18 shows the wave patterns produced in one second when two tuning forks were sounded together.

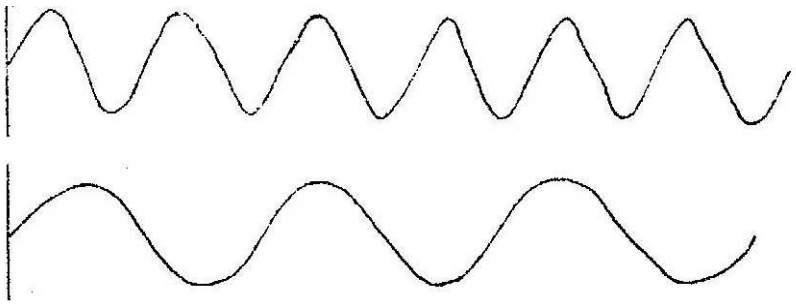


Fig 18

Determine the beat frequency.

27. State the reason why radio waves signals are easier to receive than TV (television) signals in a place surrounded by hills.

28. Fig. 19 shows two spheres made of wax each of mass 0.10kg held in a liquid by strings A and B.

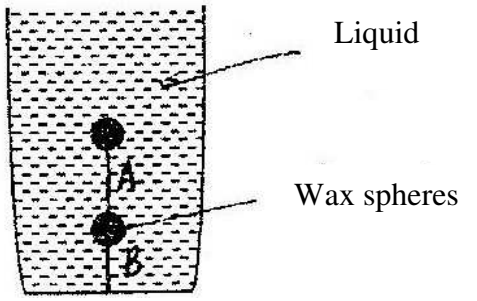



Fig. 19

If the upthrust on each sphere is 1.05N, determine the tension in each string.
(acceleration due to gravity g = 10ms$^{-2}$)

29. Fig. 20 shows a ball being whirled in a vertical plane.

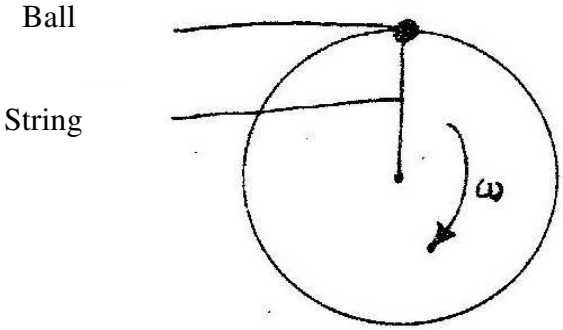



Fig 20

Sketch on the same figure the path followed by the ball if the string cuts when the ball is at the position shown in the figure.

30. Fig 21 shows a converging lens whose local point F is marked.

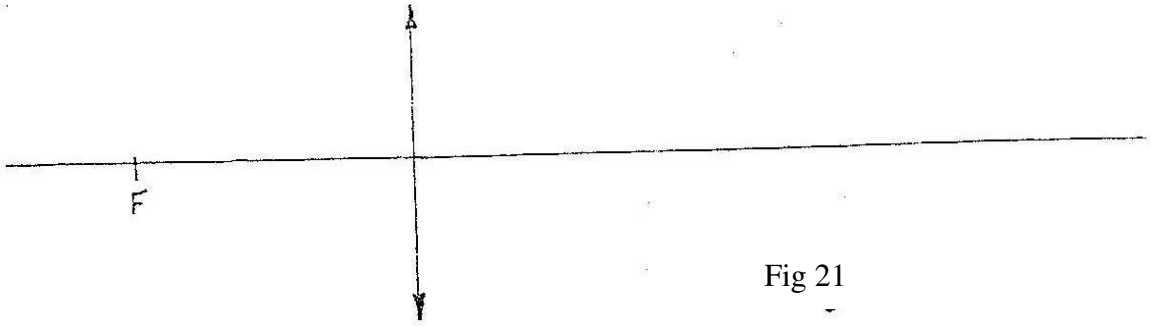
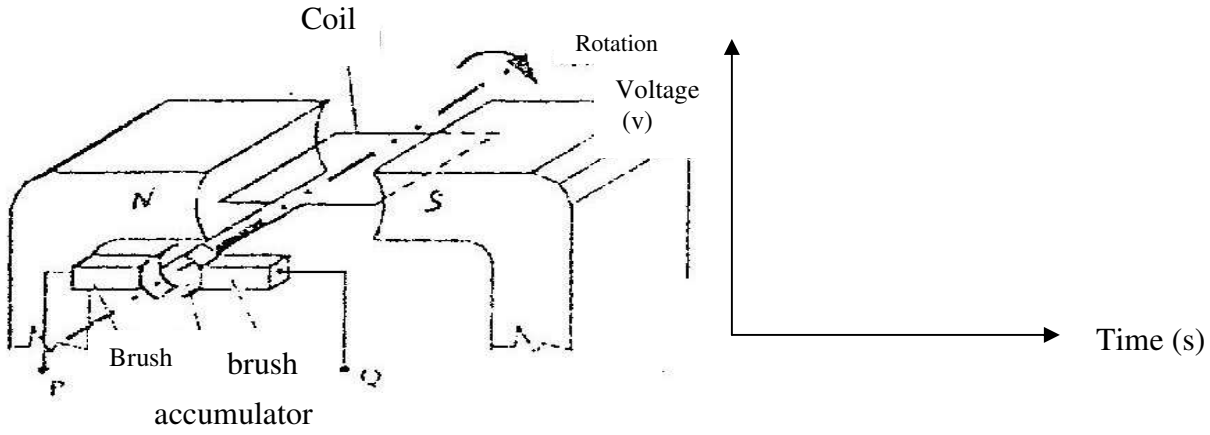



Fig 21

An object is placed in front of the lens such that the lens forms a real magnified image. Sketch on the same diagram array diagram to represent this.

31. Fig. 22 shows an electric generator. The points P and Q are connected to a cathode ray oscilloscope (CRO).




Sketch on the axes provided the graph of the voltage output as seen on the CRO
Given that when t = 0 the coil is at the position shown in the figure.

32. A 60W bulb is used continuously for 36 hours. Determine the energy consumed.
Give your answer in kilowatt hour (kWh).

33. State the factor that determines the hardness of the X – rays produced in an X – ray tube.

34. The following reaction is part of a radioactive series:

$$\begin{matrix}120\\83\end{matrix}\!\!\times\!\!\begin{matrix}Y\\\ \end{matrix} \longrightarrow \begin{matrix}210\\4\end{matrix} \longrightarrow \begin{matrix}c\\b\end{matrix}$$

Identify the radiation r and determine the values of b and c.

# K.C.S.E 2002

## PHYSICS PAPER 232/1

## QUESTIONS

1. Fig one shows a micrometer crew gauge being used to measure the diameter of a metal rod. The thimble scale has 50 divisions

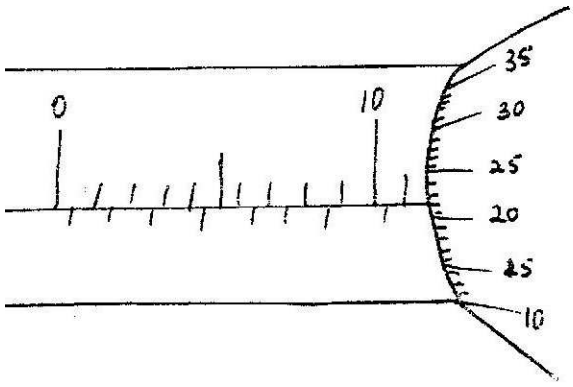



Fig. 1

What is the reading shown?

2. Fig. 2 represents a rock balanced at point O.G is the center of gravity of the rock. Use this information to answer questions 2 and 3.

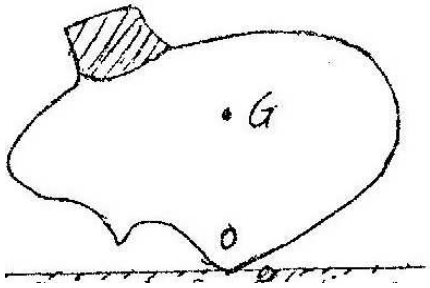



Fig 2

Draw and label on the figure, the forces acting on the rock.

3. If the portion of the rock represented by the shaded part is chopped off explain why the rock may topple to the right.

4. A current of 0.70 A flows through a wire when a p.d of 0.35 V id applied at the ends of the wire. If the wire is 0.5m long and has a cross section area of $8.0 \times 10^{-3}$ $m^{-2}$, determine its resistivity.

5. The total weight of a car with passengers is 25,000N. The area of contact of each of the four tyres with the ground is 0.025m2. Determine the minimum car tyre pressure.

6. When an inflated balloon is placed at equal in a refrigerator it is noted that its volume reduces. Use the kinetic theory of gases to explain this observation.

7. An electric heater is placed at equal distances from two similar metal cans A and B filled with water at room temperature. The outer surface of can is shiny while that of can B is dull black. State with reasons which can will be at a higher temperature after the heater is switched on for some time.

8. Fig. 3 shows two rays of A and B entering a semi – circular glass block which has a critical angle of $42^{o}$. The rays are incident at an air – glass boundary at point O.

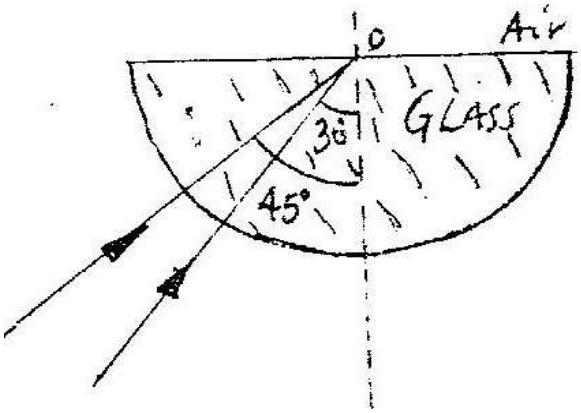



Fig. 3

Complete the path of the two rays from point O. label A' and B' the corresponding rays.

9. Fig. 4 shows electrical circuit. When the switch is closed the ammeter reading is 0.3 A.

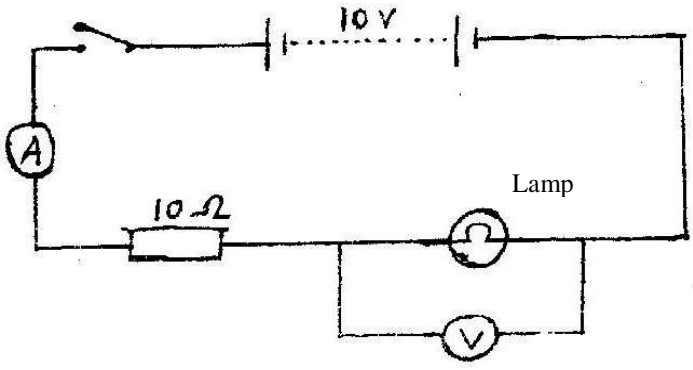



Fig 4

Determine the voltmeter reading.

10. Fig. 5 shows a wire A and a spring B made of the same material. The thickness of the wire is the same in the both cases. Masses are added on each at the same intervals and the extension noted each time.

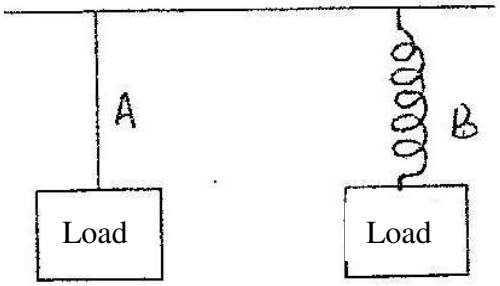
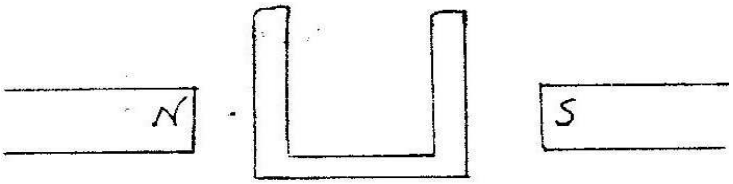



Fig 5

On the same axes provided, sketch the graphs of extension against load for each. (hookers law is obeyed.)


11. Fig. 6 shows a soft iron placed between poles of two magnets.
Figure 6




Sketch the magnetic field pattern.

12. Fig. 7 shows a non – uniform log of mass 100kg balanced on the pivot by a 2kg mass placed as shown.

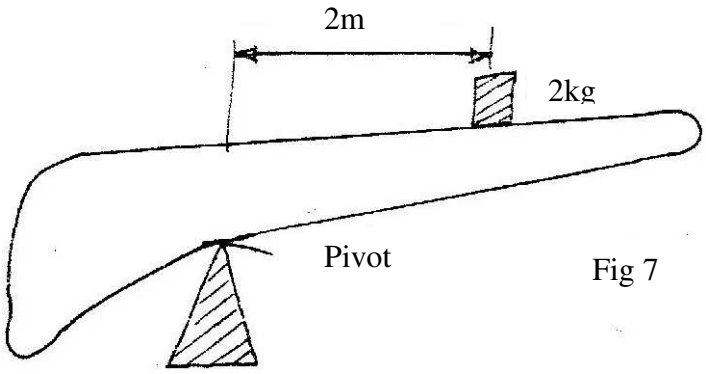



Fig 7

Determine the distance of the center of gravity of the log from the pivot.

13. Fig. 8 shows two parallel thick copper conductors connected to a D.C. power supply. A rider made from a thin copper wire is placed on the conductors.

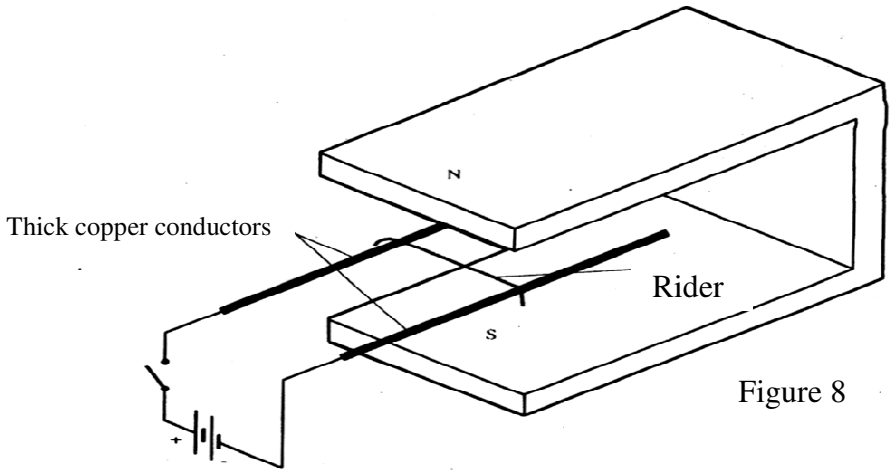
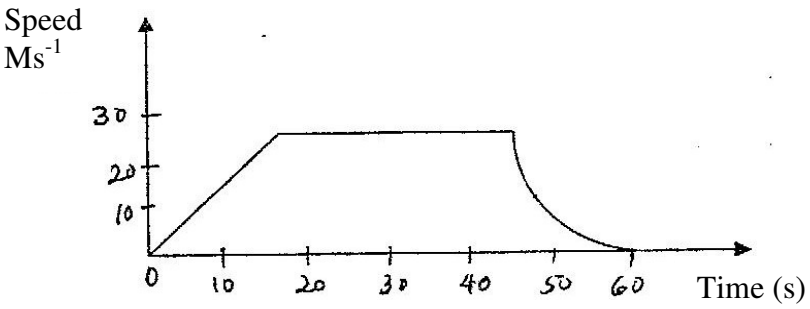



Figure 8

State and explain what is observed on the rider when the switch is closed.

14. Fig. 9 shows a speed – time graph for the journey of a motorcar.




Determine the distance the car travels in the first 40 seconds.

15. Fig. 10 shows how the potential energy, (P.E) of a ball thrown vertically upwards, varies with height.

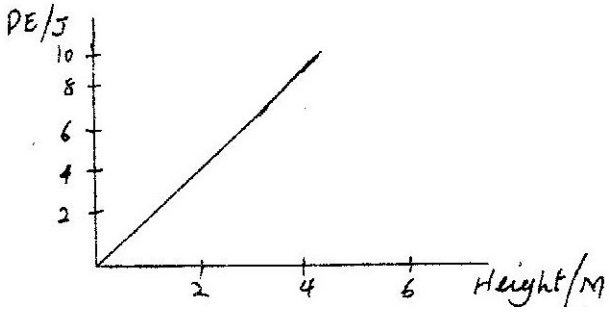



Fig. 10

On the same axes, plot a graph of the kinetic energy of the ball.

16. The chart below shows an arrangement of different parts of the electromagnetic spectrum.

| | | | | | |
|---|---|---|---|---|---|
| RADIO | INFRARED | VISIBLE | A | X - RAYS | GAMMA RAYS |

Name the radiation represented by A.

17. Name two factors other than tension, which determine the frequency of sound form stretched wire at room temperature.

18. An electric bulb with a filament of resistance 480Ω is connected to a 240V mains supply. Determine the energy dissipated in 2 minutes

19. An immersion heater rated 90W is placed is a liquid of mass 2kg. When the heater is switched on for 15 minutes the temperature of the liquid rises form 20°C to 30°C .Determine the specific heat capacity of the liquid. (Assume no heat losses)

20. A high jumper usually lands on thick soft mattress. Explain how the mattress helps in reducing the force of impact.

21. Fig. 11 shows part of the circuit containing tow capacitors of 2μF and 3μF respectively.

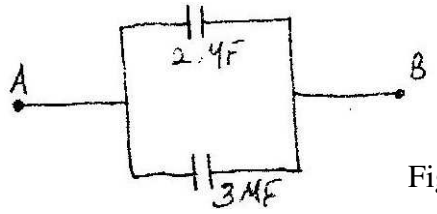



Fig 11

Determine the p.d across AB given that the total charge in the capacitors is $1x10^{-4}$ Coulombs.

22. On the axes provided sketch the P-V graph for a gas obeying Boyle's law.

23. Fig. 12 shows water waves incident on an aperture AB.

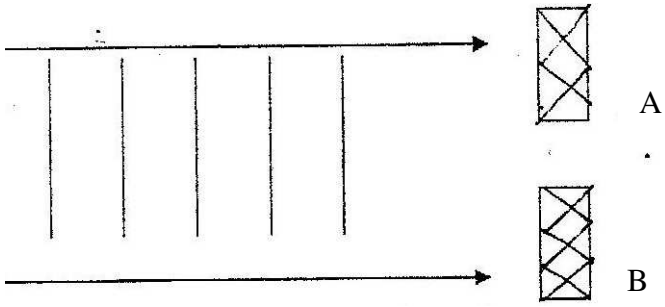



Fig 12

On the same diagram, sketch the waves after going through the aperture.

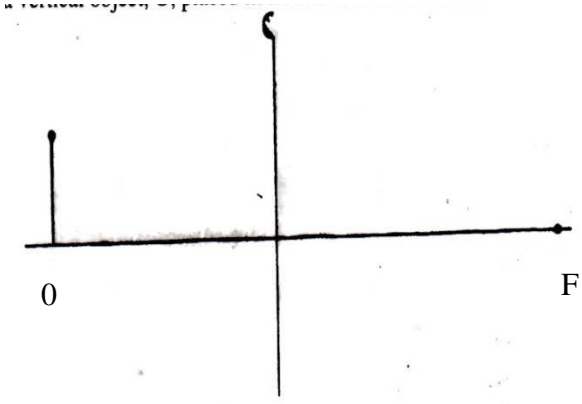
24. The audible frequency range for a certain person is 30 Hz and 16,500 Hz. Determine the largest wavelength of sound in air the person can detect. (Speed of sound in air = 330m/s)

25. A block of glass of mass 250g floats in mercury. What volume of glass lies under the surface of the mercury? (Density of mercury is 13.6 x 103 $kgm^{-3}$).

26. A small object moving in a horizontal circle of radius 0.2m makes 8 revolutions per second.
Determine its centripetal acceleration.

27. Cobalt 60 is a radio isotope that has a half – life of 5.25 years. What fraction of the original atoms in a sample will remain after 21 years?

28. Fig. 13 represents an object O placed 10cm in front of a diverging lens is the focal point of the lens.




Draw rays to locate the position of the image. Determine the image distance.

29. The circuit figure 14 represents a simple radio receiver.

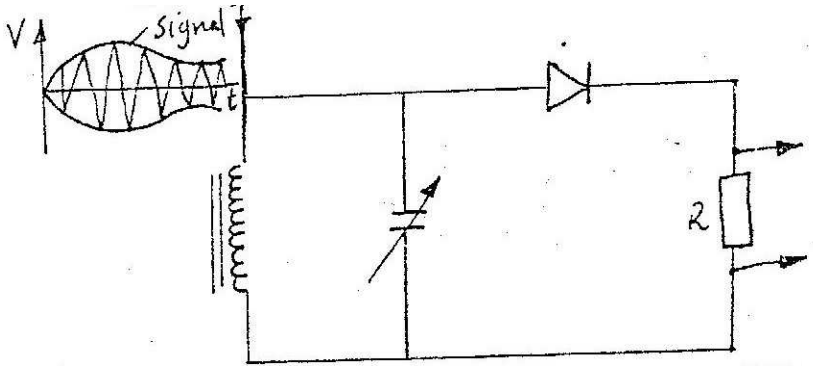



Fig 14

On the axes provided, sketch the waveform observed on the CRO for the signal shown.


30. The following table shows electrical appliances to be used in a house. The electrical rating for each appliance is shown. The following fuses are available, 5A, 15A, 30A and 45A.

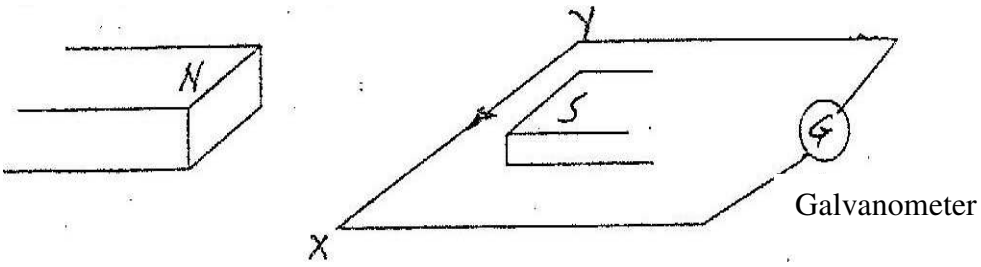
| Appliances | Voltage (V) | Power (W) |
|---|---|---|
| T.V | 250 | 300 |
| Iron box | 250 | 750 |
| Electrical kettle | 250 | 2,000 |

Determine which one of the fuses is suitable for the house.

31. A nucleus is represents by 10742x. State the number of neutrons in the nucleus.

32. State the property of X-rays, which makes it possible to detect cracks in bones.

33. Fig. 15 shows a wire XY placed in a magnetic field.




State the direction in which the wire must be moved for the current to move in the direction shown.

34. Light of a certain wavelength strikes the surface of a metal. State what determines the maximum kinetic energy of the electron emitted.

# K.C.S.E 2003

## PHYSICS PAPER 232/1

## QUESTIONS

1. Figure 1 shows a measuring cylinder containing some liquid

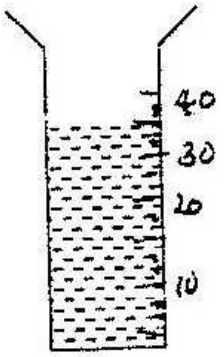



Fig 1

Figure 1

Another 5cm$^3$ of the liquid is added into the cylinder. Indicate on the diagram the new level of the liquid.

2. Two identical spring balances R and S each weighing 0.5N are arranged as shown in Figure 2.

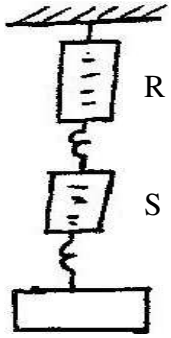
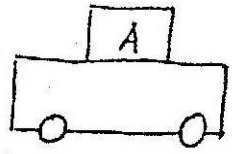


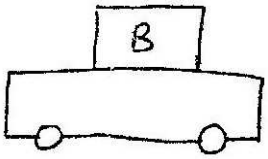

Figure 2

What is the reading on balance R?

3. Figure 3 shows two identical trolleys with loads A and B. The loads are identical in shape and size.




(i)




(ii)

Figure 3
Given that the density of A is greater than that of B, explain why the trolley in figure 3(ii) is more suitable.

4. The reading on a mercury barometer at a place in 700mm. What is the pressure at the place $Nm^{-2}$ (Density of mercury is $1.36 \times 10^4$ $kgm^{-3}$)

5. Explain the cause of random motion of smoke particles as observed in Brownian motion experiment using a smoke cell.

6. In the set up shown in Figure 4, it is observed that the level of the water initially drops before starting to rise.

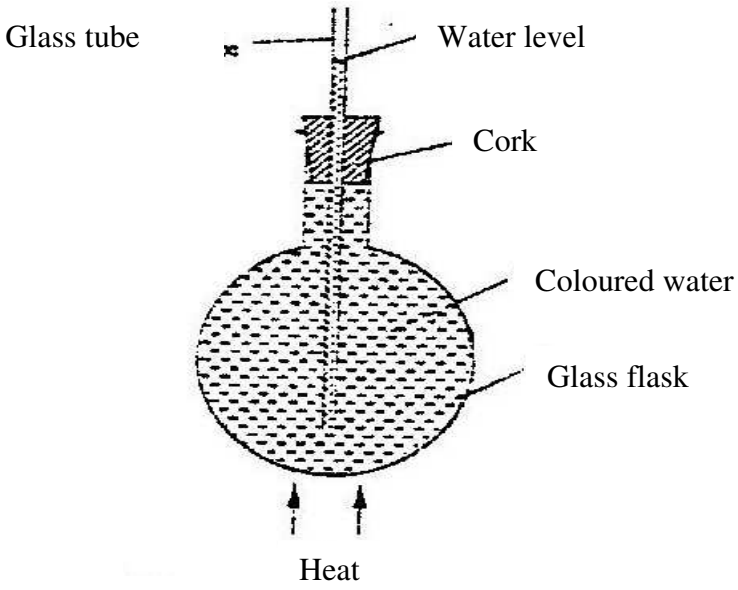



Figure 4
Explain this observation

7. When a Bunsen burner is lit below wire gauze, it is noted that the flame initially burns below the gauze as shown in Figure 5 (i).After sometime, the flame burns below as well as above the gauze as shown in Figure 5(ii).

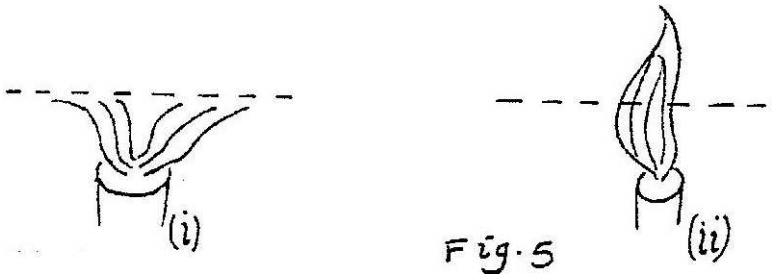



Fig. 5

Explain this observation

8. Figure 6 shows a ray of light being reflected from a mirror.

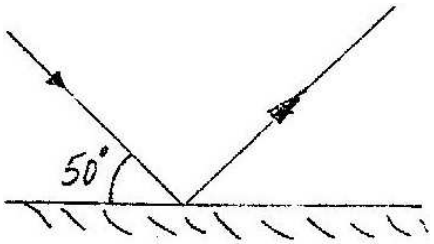



Figure 6
What is the angle of reflection?

9. Figure 7 shows a highly negatively charged rod being brought slowly near the cap of a positively charged leaf electroscope. It is observed that the leaf initially falls and then rises.

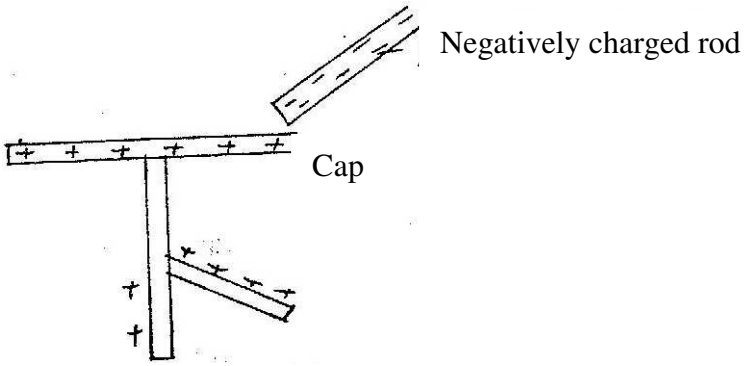



Figure 7
Explain this observation

10. State one advantage of a lead – acid accumulator over a nickel – iron (NiFe) accumulator.

11. One of the factors that affect the surface tension of a liquid is the presence of impurities. State one other factor.

12. Figure 8 shows a bar of soft iron placed near a magnet.


Figure 8
On the same diagram, sketch the magnetic field pattern due to the set up

13. Give a reason why the core of the electromagnet of an electric bell is made of soft iron and not steel.

14. Figure 9 shows a uniform bar in equilibrium under the action of two forces.

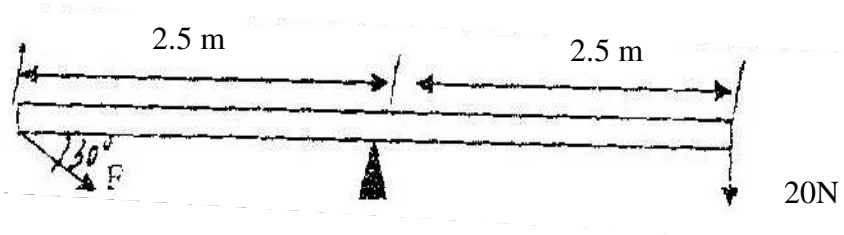



Figure 9
Determine the value of F

15. One of the conditions for total internal reflection to occur is that angle of incidence must be greater than the critical angle of the medium. State the other condition.

16. Figure 10 (draw to scale) shows an image I formed by a diverging lens, L.

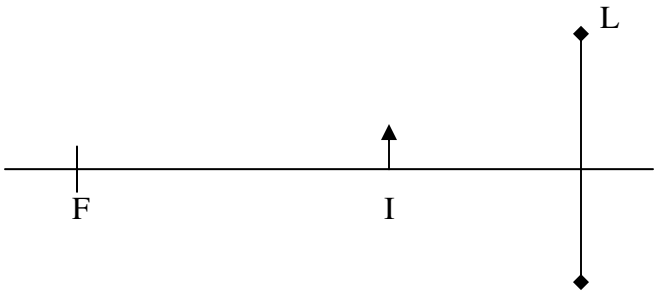



Fig 10

On the same diagram, draw appropriate rays to locate the position of object.
Determine the object distance.

17. An electric bulb is rated 75W, 240V. Determine the resistance of the bulb

18. The following equation shows part of a radioactive decay process.

$$\begin{matrix} 234 \\ \mathbf{T} \\ 90 \end{matrix} \xrightarrow{x} \begin{matrix} 234 \\ \mathbf{Pa} \\ 91 \end{matrix}$$

Name the radiation x.

19. Pure silicon can be changed into p –type semiconductor by adding an impurity. Explain how this is achieved.

20. When a piece of metal is placed on water, it sinks. But when the same piece of metal is placed on a block of wood, both are found to float. Explain this observation.

21. A girl standing 600m away from a cliff bangs two pieces of wood together and hears and echo 3.5 seconds later. Determine the speed of sound in air at that place.

22. On the axes provided in Figure 11, sketch a graph of velocity ( V0 versus time (t) for uniformly accelerated motion given that when t = 0, v s greater than zero

Figure 11

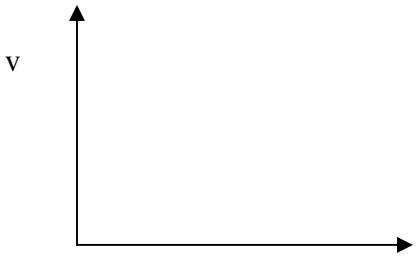



fig. 11

23. In the circuit diagram shown in fig. 12, the lamps are Identical and the cells are also identical.

Figure 12.

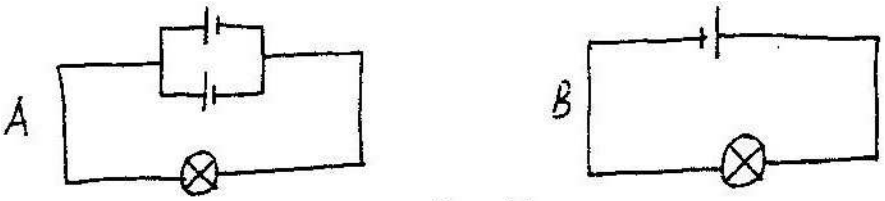



Fig. 12

State with reason, in which circuit the lamp will be lit for longer period.

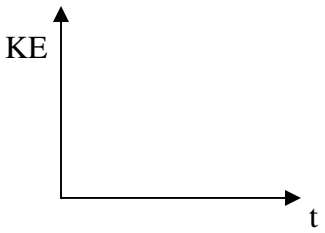
24. On the axes provided in Fig. 13, sketch a graph of pressure(p) against reciprocal of volume(1/V) for a fixed mass of an ideal gas at constant temperature.


fig. 13

25. Give a reason why the target in an X-ray tube is made of tungsten or molybdenum.

26. Two identical stones A and B are released from the same height above the ground fall through air while A falls through water.

Figure 14.




On the axes provided in Figure 14, sketch the graphs of kinetic energy (KE) against time (t)

27. Figure 15 shows an experimental arrangement for determining the wavelength of light,

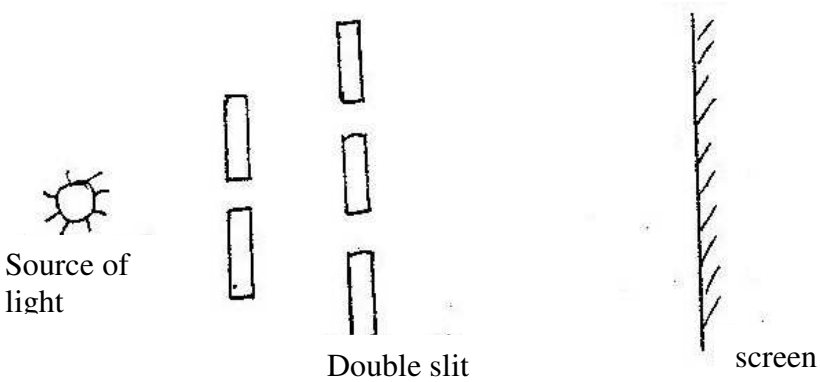
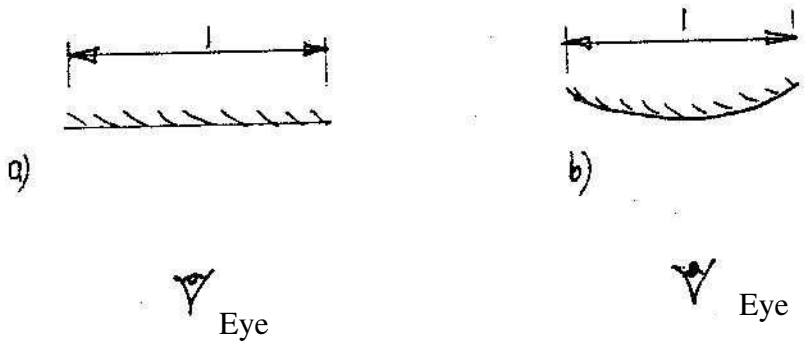



Fig 15

State and explain the difference in the patterns observed on the screen other than the difference in colour when the source of red light is replaced by a source of violet light.

28. A heating element rated 2.5 kW is used to raise the temperature of 3.0kg of water through 500$^{o}$C. Calculate the time required to effect this. (Specific heat capacity of water is 4200 J/kgK)

29. Figure 16 (a) and (b) show a convex mirror and a plane mirror of equal aperture.
Figure 16




By sketching a pair of incident and reflected rays for each (a) and (b) show how the convex mirror provides to the eye, a wider field of view than the plane mirror.

30. A resultant force F acts on a body of mass m causing an acceleration a1 on the body. When the same force acts on a body of mass 2m, it causes an acceleration $a_2$. Express $a_2$ in terms of a.

31. Arrange the following gin order of increasing frequency:
Visible light, infrared radiation, X – rays, u. v. radiation, radio waves.

Two identical copper coils p and Q are placed close to each other as shown in Figure 17. Coil P is connected to a D>C power supply and coil Q is connected to a galvanometer, G.

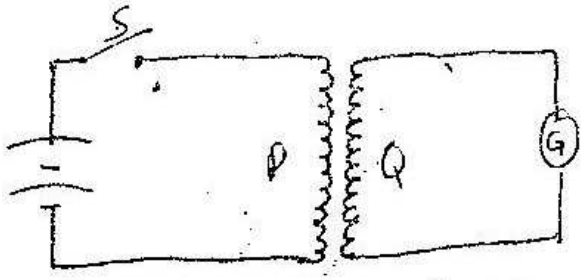



Fig 17

Use this information to answer questions 32 and 33.

32. State and explain what would be observed on the galvanometer immediately the switch S is closed.

33. State with reason the difference that would be noted in the observation made in question 32 if the number of turns in coils Q were doubled.

34. Figure 18 shows the pattern produced by an A.C voltage on a CRO screen.
Figure 18.

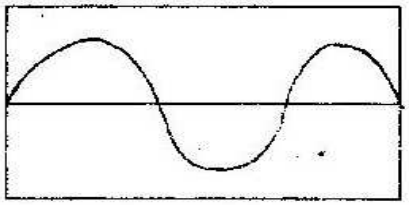


Fig 18

On the same figure, sketch the pattern produced by the same voltage when the time base is switched off.

35. The minimum frequency of radiation necessary to cause photoelectric effect on a certain metal surface in 9.06 x $10^{14}$ Hz. Determine the work function for the metal.(planks constant h = 6.63 x $10^{-34}$ Js)

36. Figure 19 shows a pith ball placed in a flask. When a jet of air is blown over the mouth of the flask as shown, the pith ball is observed to rise form the bottom
Figure 19

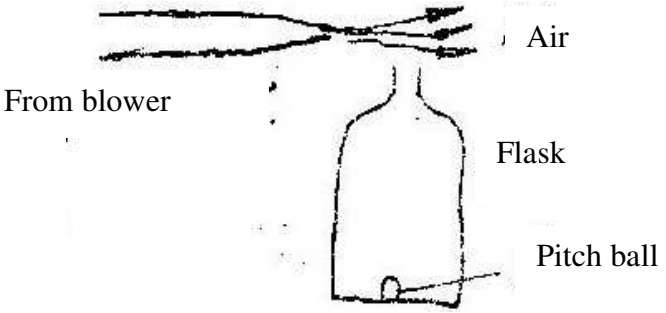
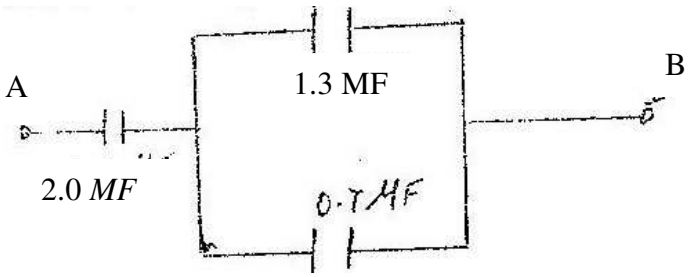



fig. 19

Explain this observation

37. Figure 20 shows three capacitors connected between two points A and B.
Figure 20




Determine the capacitance across AB

# K.C.S.E 2004
## PHYSICS PAPER 232/1
## QUESTIONS

1. Figure 1 shows a micrometer screw gauge being used to measure the diameter of a ball bearing.

   A magnified portion of the scale is shown.

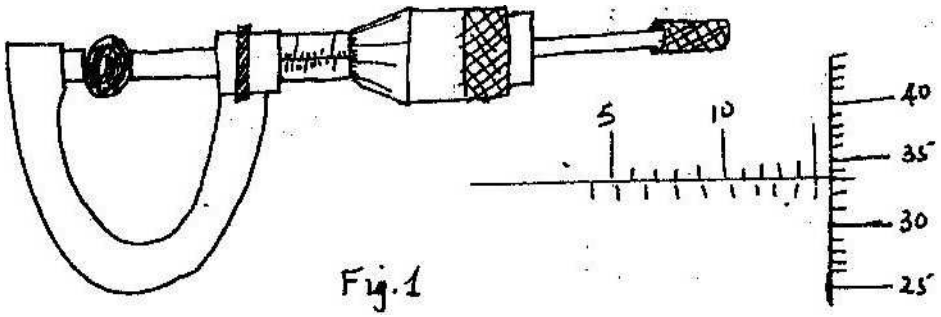


Fig.1

   Record the diameter of the ball bearing ……..

2. The system in figure 2 is in equilibrium at room temperature.
   The system is taken outside where the temperature is $10^0$c higher for sometime.

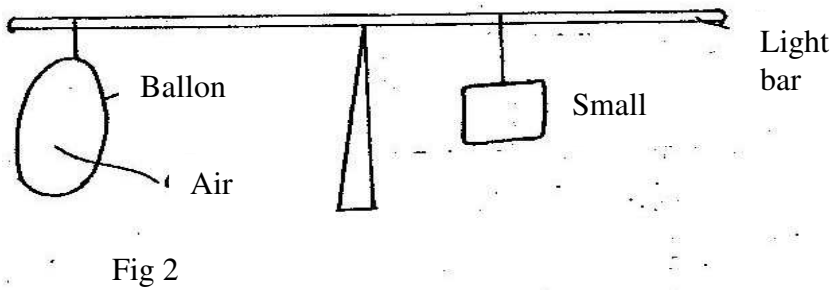


Fig 2

   Explain why it tips to the right immediately it is returned to the room.

3. Fig 3 shows a rectangular block of wood with a hollow section (inside) at the position shown.

   The block is resting on a Horizontal bench
   (i) State the effected on the stability of the block when the hollow section is filled with water.
   ii) Explain your answer in (i) above.

4. Give a reason why water is not a suitable liquid for use in a barometer.

5. The temperature of water in a measuring cylinder is lowered from about $20^0$ c to $0^0$. On the axes provided, sketch the graph of the Volume against temperature assuming the water does not freeze.


6. Two identical aluminium rods as shown in figure 4. One rests on metal block the other on the wooden Block. The protruding ends are heated on a Bunsen burners shown.

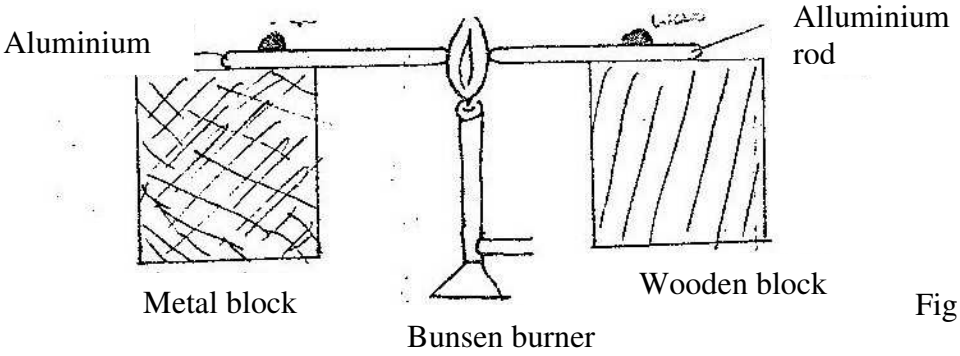



Fig 4

State with reason on which bar the wax is likely to melt.

7. Figure 5 shows two mirrors inclined at an angle of $60^0$ to each other. A ray of light is shown

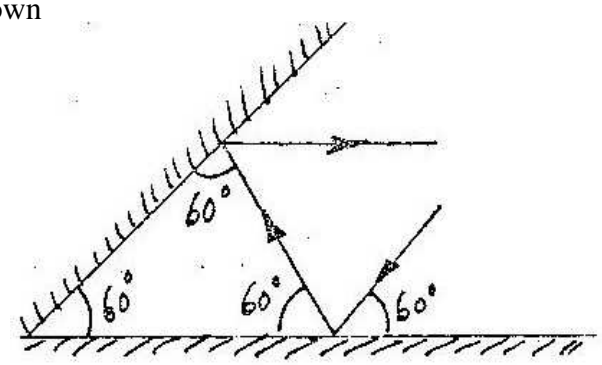



Fig. 5

Sketch the same diagram, the path of the ray until it leaves the two mirrors. Indicate the angles at each reflection.

8. Figure 6 (a) shows three spherical balls of the same size placed on insulating stands. Balls A and B are conductors while ball C is non conductor. Ball A was initially charged as shown. The quantity of charge is represented by the number of dashes.

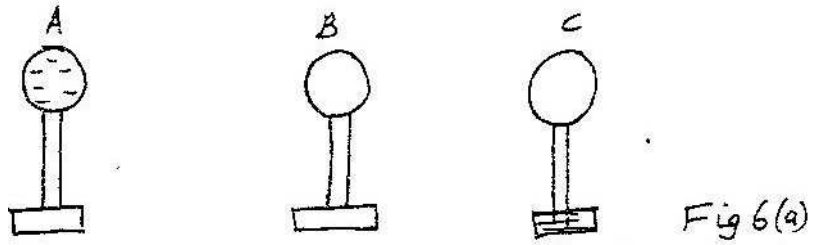



Fig 6(a)

Ball A is made to touch B momentarily and then C. Show on Figure 6(b), the final distribution of charge on the balls.

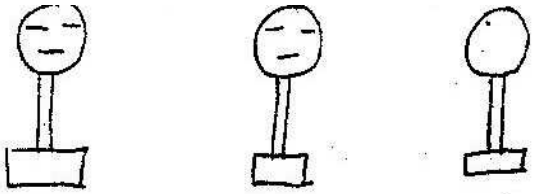


Fig 6(b)

9. State the purpose of Manganese dioxide in a dry cell

10. State one way of reducing surface tension in water.

11. Figure 7 shows the poles of two magnets close together.


Fig 4

Figure 8 shows a current-carrying coil in a magnetic field.

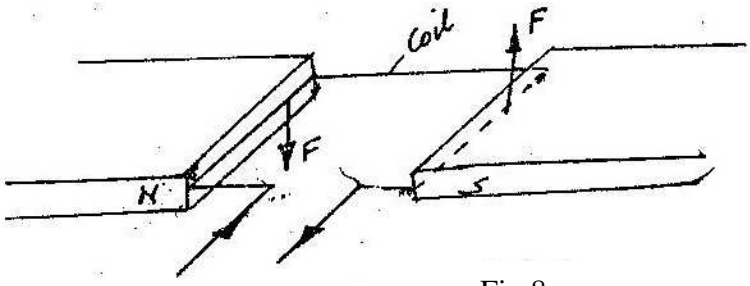



Fig 8

Use the information on the figure to answer question 12 and 13.

12. Mark on figure 8 the direction of the forces acting on the sides of the coil labeled

13. State two ways of increasing the force on the coil.

14. The system in figure 9 is in equilibrium.

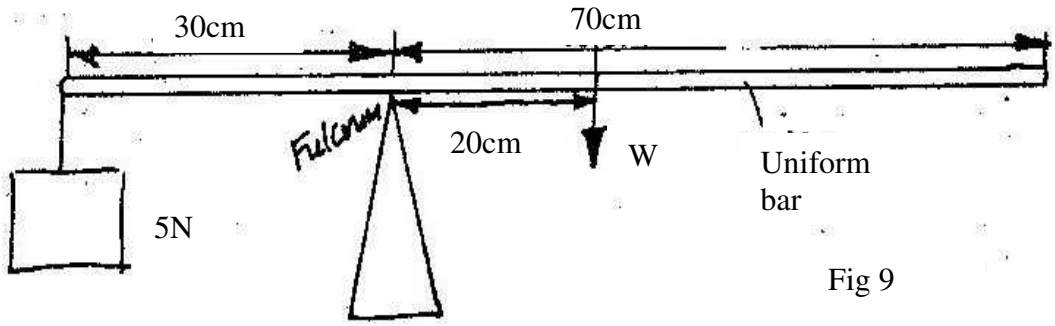



Fig 9

Determine the weight if the bar.

15. Figure 10 show two circuits in which identical dry cells and identical bulbs are used. Use the information in the figure to answer questions 15 and 16.

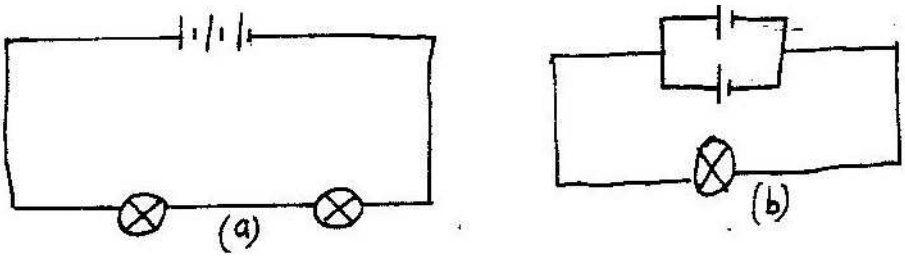
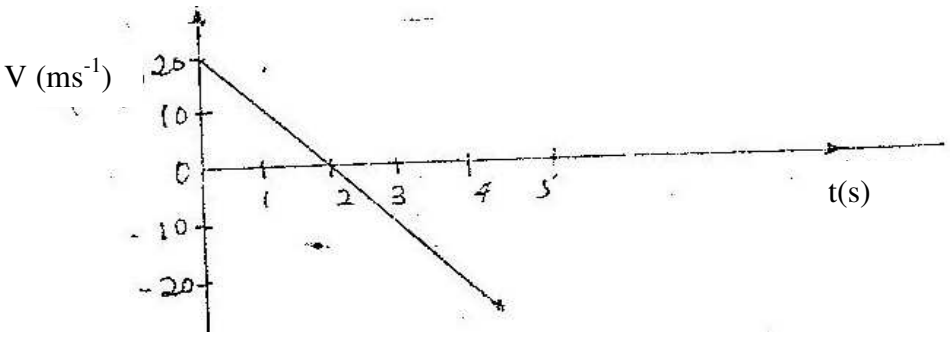



Fig 10

Explain why the bulb in Figure 10(10) will be brighter than each of the bulbs in Figure 10 (a)

16. Give the reason why the cells in figure 10(b) can be used for a longer period than the cells in Figure 10 (a)

17. The graph below shows how the velocity varies with time for a body thrown vertically upwards.




Determine the total distance moved by the body.

18. A body of mass 60kg is pulled at a uniform velocity up smooth inclined surface as shown in Figure 11

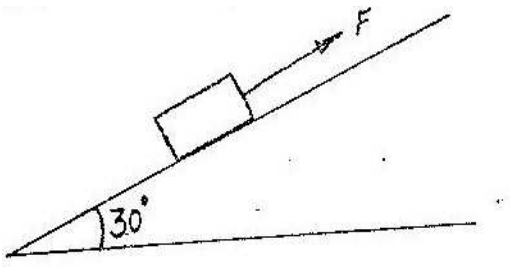



Fig 11

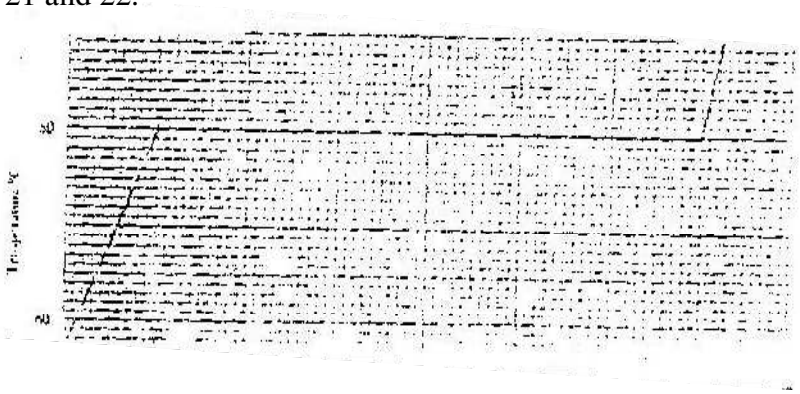
If the distance moves along the incline is 4.0m, determine work done by the Force F.

19. State the difference between mechanical and electromagnetic waves.

20. An electric heater is connected to the mains supply. A fault in the mains reduces the supply potential slightly.

Explain the effect on the rate of heating of the heater.

A certain powder of mass. 0.10kg was heated in a container by an electric heater rated 50 w for sometime. The graph below shows the variation of the temperature of the powder with time. Use this information and the graph to answer question 21 and 22.

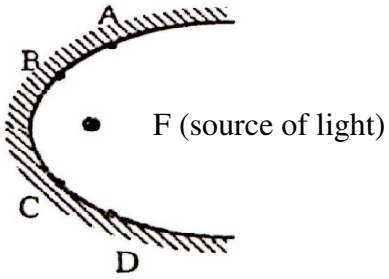


21. Determine the quantity of heat by the heater from the time the power starts to melt to the time it has all melted.

22. Determine the specific latent heat of fusion of powder assuming the container absorbs negligible amount of heat.

23. Figure 12 shows a parabolic surface with a source of light placed at its focal point F

Figure 12




Draw rays to show reflection from the surface when rays from the source strike The surface at points ABC and D.

24. Figure 13 shows a coin placed in a large empty container. And observer looking into the container from the position shown is unable to see the coin.

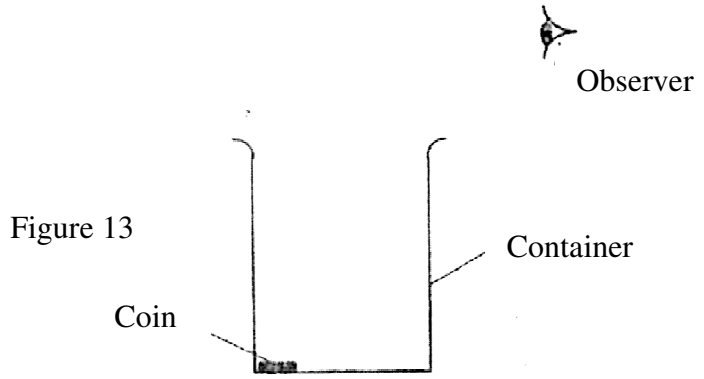



Figure 13

Sketch two rays from a point on the coin to show how the observer is able to see the image of the coin after the container if filled with water.

25. 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 why the trolley slows down.

26. The capacitors in the circuit in fig 14 are identical and initially uncharged.

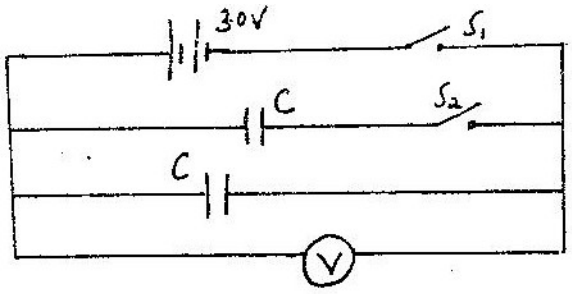



Fig. 14

Switch $S_1$ is closed while switch $s_2$ remains open. After sometime, switch $s_1$ is opened and switch $s_2$ closed. Determine the final reading of the voltmeter, V.

27. A balloon is filled with air to volume of 200ml at a temperature of 293K. Determine the volume when the temperature rises to 353K at the voltmeter, V.

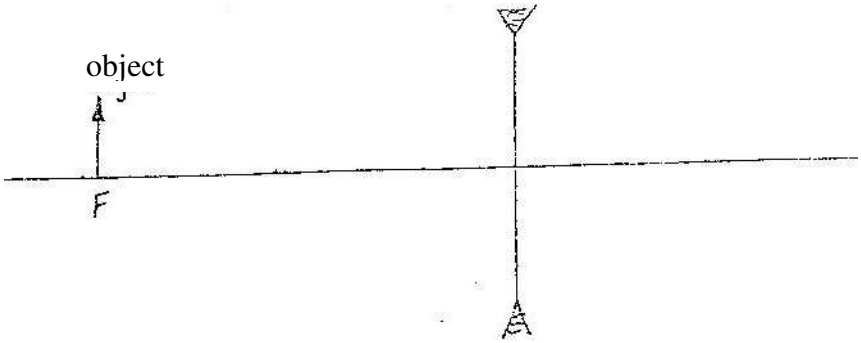
28. State the difference between X-rays and Gamma rays in the way in which they are produced.

29. A body mass 0.50kg 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.

30. Fig. 15 shows water waves of different wavelengths incidentical apertures A and B.

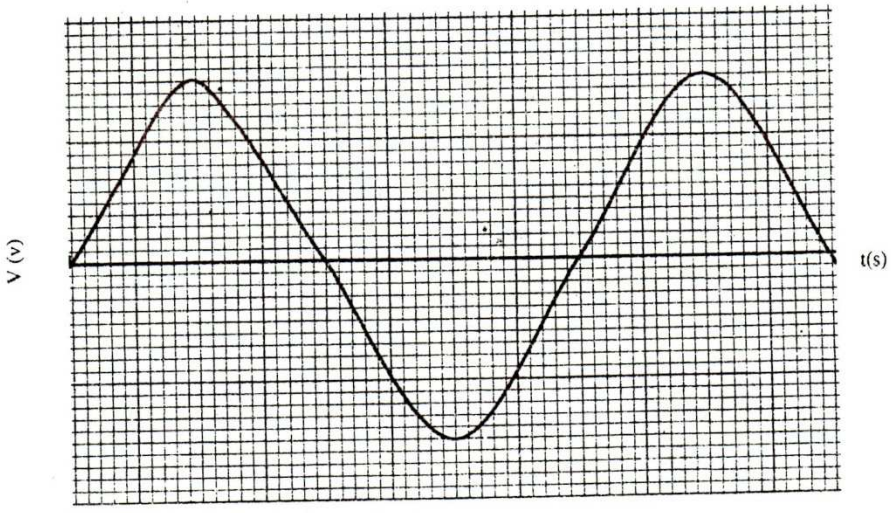

Complete the diagram to show the pattern of the waves beyond the aperture in each case.

31. A vertical object is placed at the focal point F of a diverging lens as shown in Figure 16.




Sketch a ray diagram to show the image of the object.

32. Figure 17 shows the appearance of an alternating signal on a screen of a cathode ray oscilloscope.



On the same diagram, sketch the appearance of the signal when the frequency is doubled and the voltage halved.

33. State the difference between hard X-ray and soft X-rays.

34. The work function of a certain material is 3.2 3V. Determine the threshold frequency for the material. (1 electron Volt (eV)= 1.6 $x10^{-19}$) and planks Constant h=6.62 x $10^{-34}$Js)

Figure 18 shows the circuit of a npn-n transistor amplifier in common –emitter mode. Use the information on the figure to answer question 35 and 36

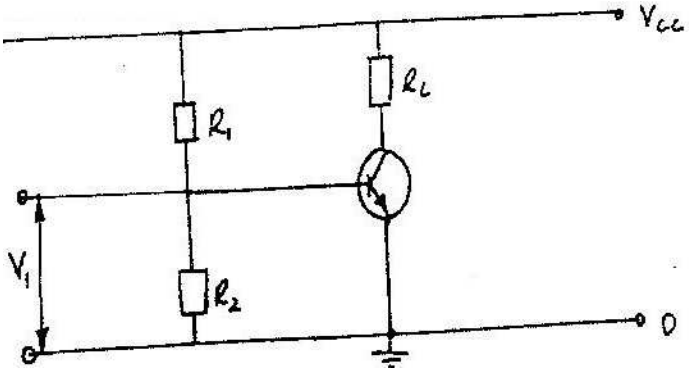



Fig 18

35. On the diagram
    a) Label the collector current, $I_c$ and $I_B$
    b) Indicate the directions of $1_c$ and $1_B$ you have labeled in (a) above.

36. Indicate on the diagram, the position where the output $V_0$ would be tapped.

# K.C.S.E 2005

## PHYSICS PAPER 232/1

## QUESTIONS

1. Figure 1 shows the reading on a burette after 55 drops of a liquid have been used.

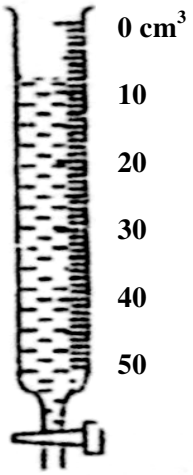



**Figure 1**

If the initial reading was at Zero mark, determine the volume of one drop. (2mks)

2. Fig 2 shows a solid cylinder standing on a horizontal surface. The cylinder is in stable equilibrium.

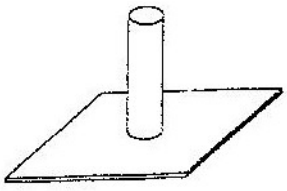
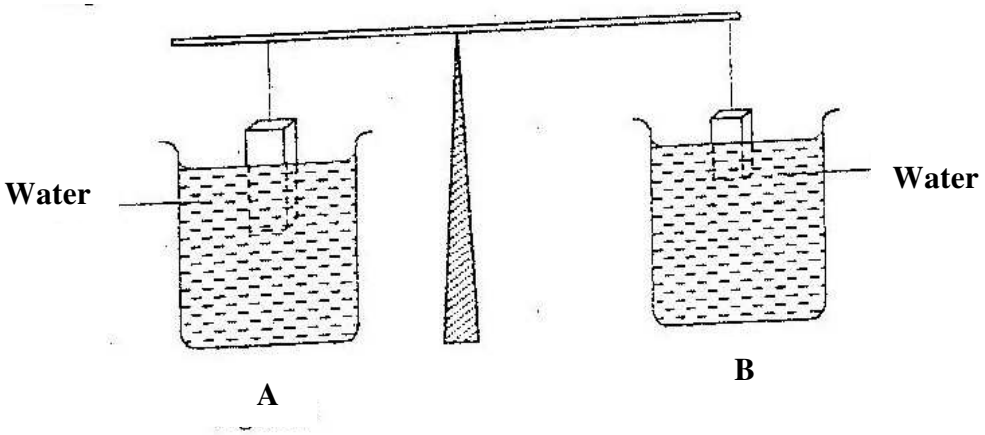


**Fig 2**

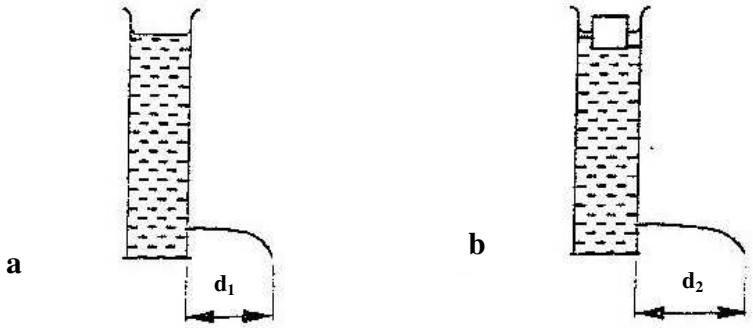
On the horizontal space provided, sketch the cylinder in neutral equilibrium. (1mk)

3. The light uniform bar in Fig 3 is equilibrium. The two beakers A and B contain water at the same temperature. The two blocks are made of the same material.




If the temperature of the water in beaker A is now raised, explain why the beam tips to side A.
Assume the solid does not expand.

4. A can with a hole on the side is filled with water to a certain height. Water jets out as shown in Fig. 4(a). a second identical can is filled with water to the same height and a block of wood floated on the water as shown in Fig. 4 (b)




State the reason why the maximum distance of the jet, $d_2$ is greater than $d_1$ (1mk)

5. In a vacuum flask the walls enclosing the vacuum are silvered on the inside.
State the reason for this. (1mk)

6. Fig 5. Shows an arrangement of a source of light, an opaque object and a screen.

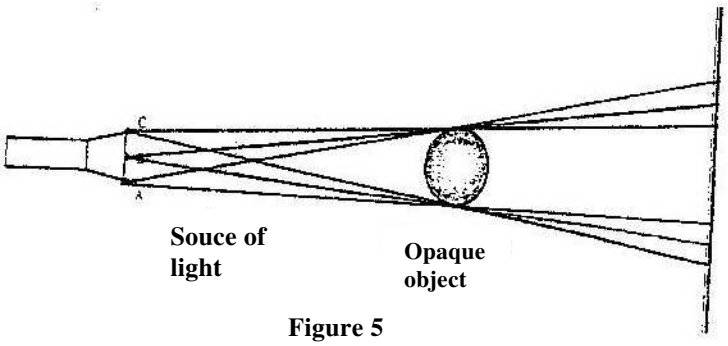
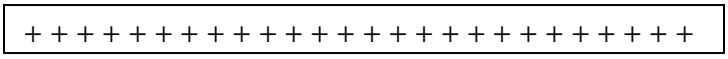



**Figure 5**

Using A, B and C as point sources, sketch on the same figure labeled ray diagram to show what is observed on the screen. (2mks)

7. Two identical tubes A and B held horizontally contain air and water respectively. A small quantity of coloured gas is introduced at one end of A while a small quantity of coloured water is introduced at one end of B. state with reason the tube in which the colour will reach the other end faster.

8. Sketch the electrostatic field pattern due to the arrangement of the charges shown in **Fig 6**




(1mk)

**Fig 6**

9. Fig 7 shows the features of a dry cell(Luclache'). Use the information in the figure to answer question 9 and 10

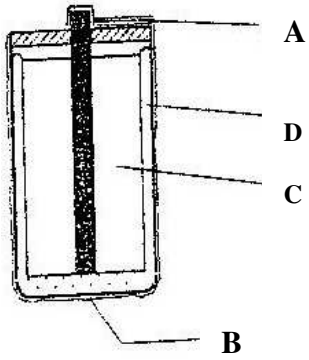



**Fig 7**

State the polorites of the parts labeled A and B. (1mk)

A……..

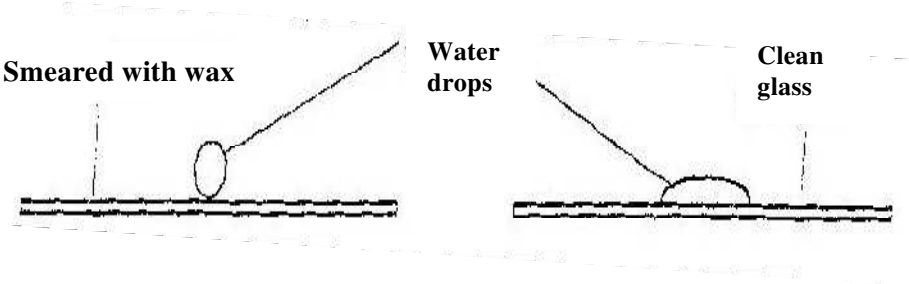
B……..

10. Name the chemical substance in the parts labelled C and D (2mks)

C……..

D……...

11. Fig 8 shows water drops on two surfaces. In 8 (a) the glass surface is smeared with wax while in 8 (b) the glass surface is clean.




a) b)

**Fig8**

Explain the difference in the shapes of the drops. (2mks)

12. Fig 9 shows a current carrying coil in a magnetic field. The direction of the current and the resulting force are shown. Study the figure and answer questions 12 and 13.

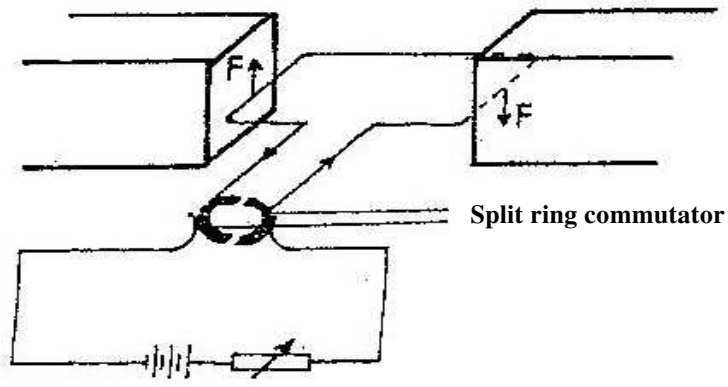



**Fig 9**

Label the poles of the magnets. (1mk)

13. Explain the purpose of the split ring commutator in the principle of the D.C motor shown in the diagram. (2mks)

14. A bullet is fired horizontally from a platform 15m high. If the initial speed is 300ms$^{-1}$. Determine the maximum horizontal distance covered by the bullet. (3mks)

15. A certain machine uses an effort of 400N to raise a load of 600N. If the efficiency of the machine is 75%, determine its velocity ratio. (3mks)

16. Fig 10 represents a transverse wave of frequency 5 Hz traveling in the x direction.

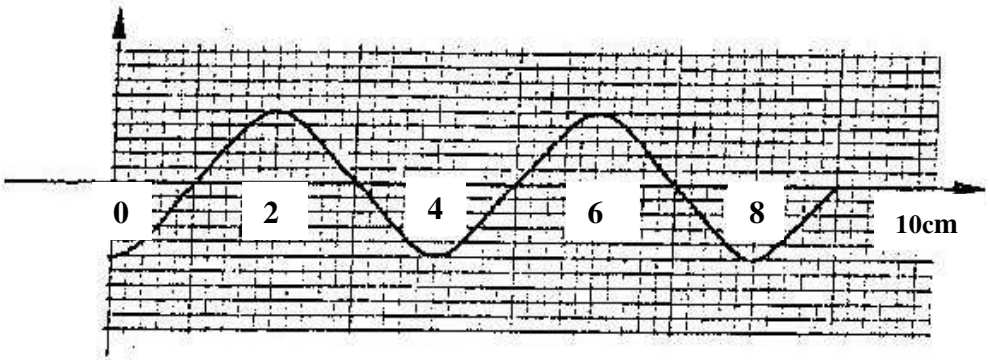



**Fig 10**

Determine the speed of the wave. (3mks)

17. An electronic siren producing sound continuously at a certain frequency is dropped from the top to a deep hole. State and explain what is observed about the pitch of the sound reaching the observer at the top. (3mks)

18. A student wishes to investigate the relationship between current and voltage for certain device X. In the space provided, draw a circuit diagram including two cells, rheostat, ammeter, voltmeter ad the device X that would be suitable in obtaining the desired results. (1mk)

19. A hair drier is rated 2500W, 240V. Determine its resistance. (3mks)

**Fig 11** shows the variation of temperature,θ, with time t, when an immersion heater is used to heat a certain liquid. Study the figure and answer questions 20 and 21.

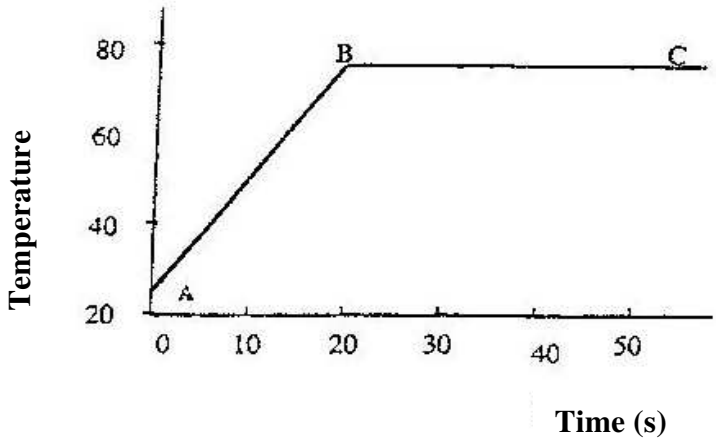



**Fig 11**

20. State the reason for the shape of graph in the section labeled BC (1mk)

21. Sketch on the same axes the graph for another liquid of the same mass but higher specific heat capacity when heated from the same temperature. (1mk)

22. Fig. 12 shows a vertical object, O, placed in front of a convex mirror.

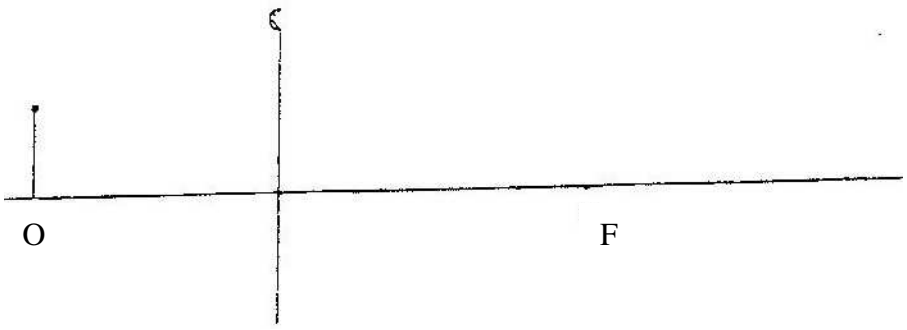



**Fig 12**

On the same diagram draw the appropriate rays and locate the image formed (3mks)

23. Fig 13 shows rays of light AO, BO, and CO incident on a glass-air interface. OA' OB' and OC' are the corresponding emergent rays. Study and answer questions 23 and 24.

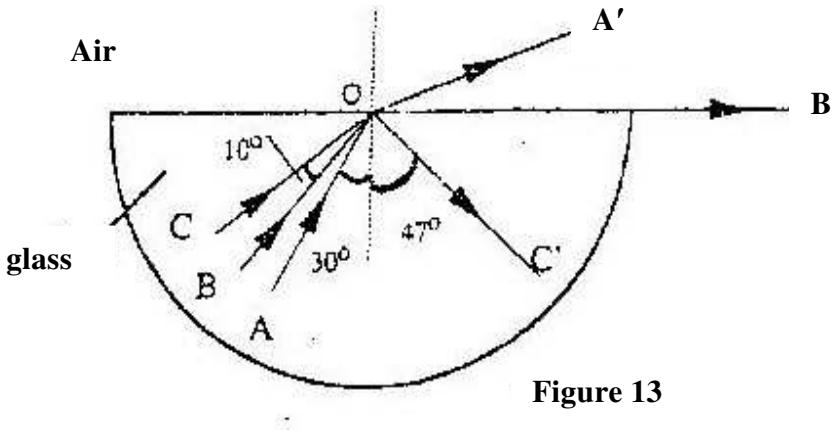



**Figure 13**

Determine the critical angles of the glass material

24. Determine the refractive of index of the glass material. (3mks)

25. Fig 14 shows the velocity- time graph for a small metal sphere falling through a viscous fluid.

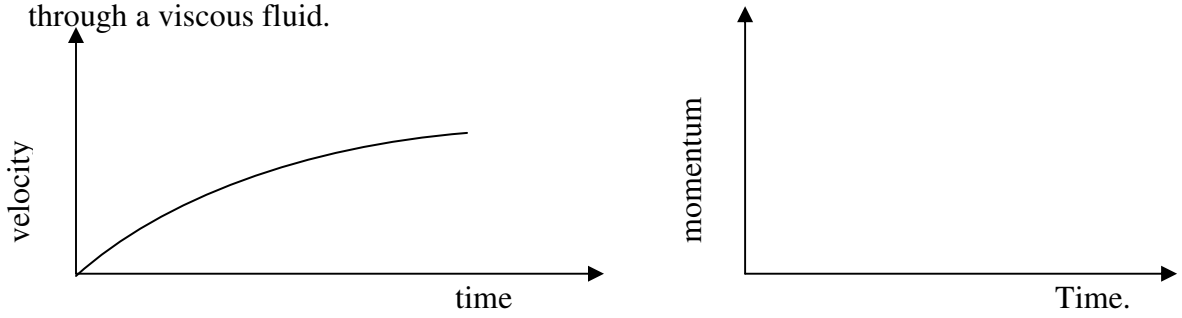



**Fig 14 .**

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

26. State Bernoulli's principle. (1mk)

27. The melting point of oxygen is given as -281.3$^0$C. Covert this temperature to Kelvin (K) (1mk)

28. Fig 15 shows an arrow which indicates the direction of travel of a wave in a medium. P is a particle of the medium that is in path of the wave.


**Fig 15**

In the space provided sketch diagram to show how the particles P moves when the wave is

(i) A transverse wave

(ii) A longitudinal wave. (1mk)

29. A car of mass 800kg moves on a circular track of radius 20m. The force of friction between the tyres and the tarmac is 4800N Determine the maximum speed at which the car can be driven on the track without skidding.

30. An illuminated vertical object is initially placed on the principal axis of a converging lens and 32cm from it. The focal length of the lens 15cm.The object is new placed at a point 12cm from the lens and on the same side. State two changes other than magnification than magnification that that are observed on the image formed due to this change.

31. Explain how an "excited' hydrogen atom is able to emit radiations of different wavelengths.

32. Fig 16 shows wave fronts in a ripple tank approaching a shallow region in the tank.

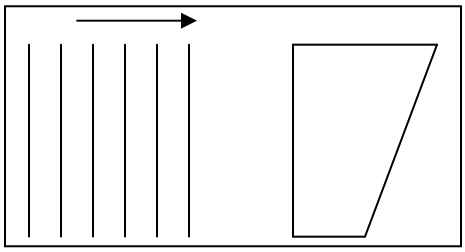


**Figure 16**

Complete the diagram to show the wave front as they pass over the shallow region and after leaving the regions. (1mk)

33. The target of X-ray tube s made of melting point. Give a reason for this (1mk)

34. Explain why a drop of methylated spirit on the back of the hand feels colder than a drop of water at the same temperature.

35. Draw appropriate symbols the circuit diagram of a junction diode in reverse bias. (1mk)

36. The following represents a nuclear reaction involving the nuclide polonium Po

$$\overset{218}{Po} \xrightarrow{m} \overset{214}{Pb} \xrightarrow{n} \overset{214}{Bi} \longrightarrow \overset{214}{X}$$

$$\underset{84}{\quad} \qquad \underset{82}{\quad} \qquad \underset{83}{\quad} \qquad \underset{84}{\quad}$$

(3mks)

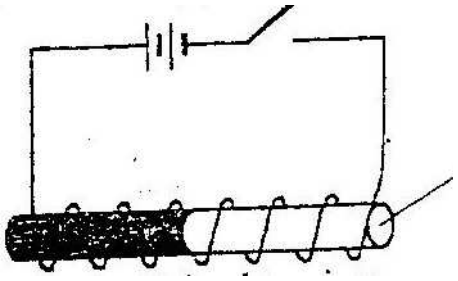
Identify m, n and X

m

n

X

37. In the set up Fig 17 the metal rod is made up of steel and iron pieces joined end. Your are provided with two iron nails.




Explain how you would use two nails provided to determine which side is iron (2mks)

38. Fig 18 shows two spherical materials one an insulation conductor, the other a conductor, Negative charge are introduced at point A in each case.

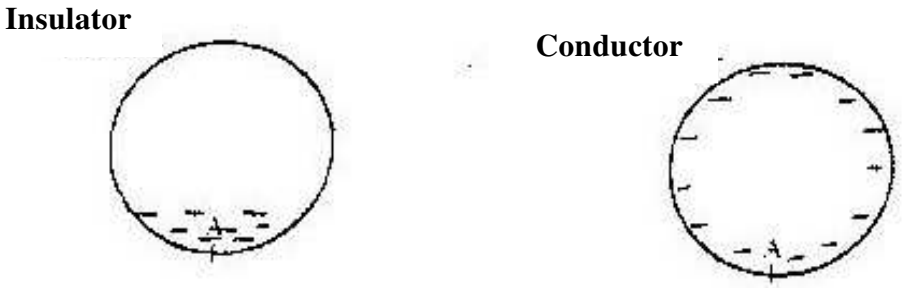



**Figure 18**

One the same figure indicate the final position of the charges. Explain your answer. (2mks)

# K.C.S.E 2006
## PHYSICS PAPER 232/1
## QUESTIONS

### SECTION A (25 MKS)
***Answer all questions in this section***

1. Figure 1 shows the change in volume of water in a measuring cylinder when an irregular solid is immersed in it.

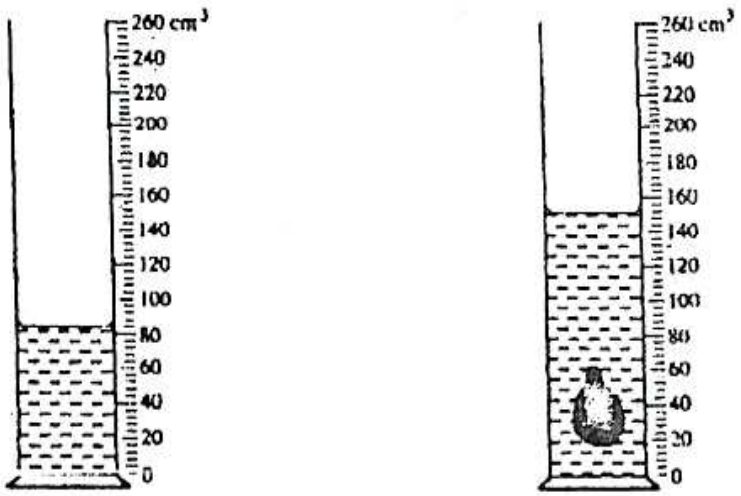



**Figure 1**

Given that the mass of the solid is 567 g, determine the density of the solid in gcm$^{-3}$ ( Give your answer correct to 2 decimal places) (3 mks)

2. Figure 2 (a) shows body being acted on by two forces, $F_1$ and $F_2$


On figure 2 (b) draw the force $F_3$ that has same effect on the body as the two forces (1 mk)

**Figure 2**

3. State Pascal's principle of transmission of pressure in fluids (1 mk)

4. Figure 3 shows a bimetallic strip with a wooden handle, suspended horizontally using a thin thread.

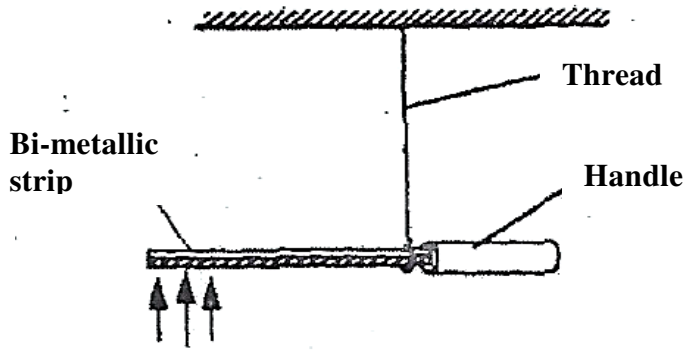
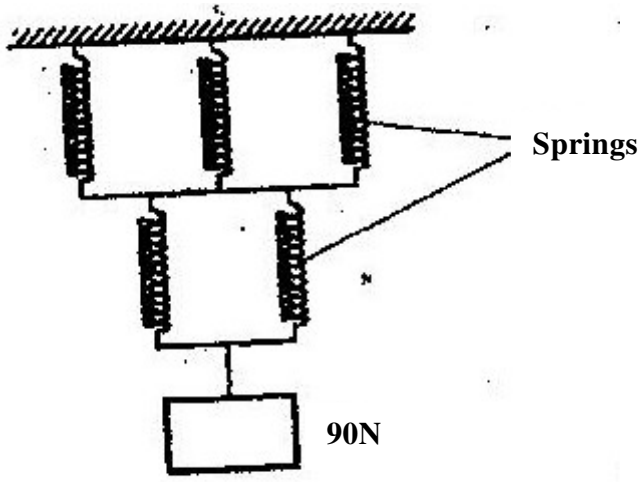



**Figure 3**

The strip is heated at the point shown. Explain why the system tips to the right

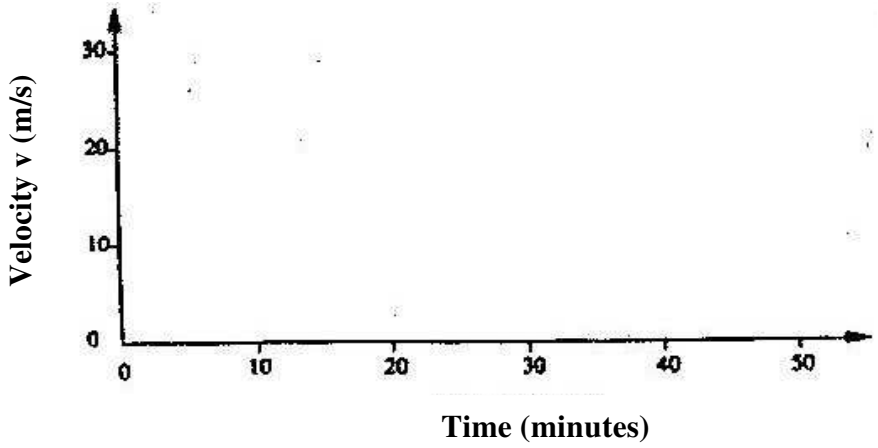
5. The spiral springs shown in figure 4 are identical. Each spring has a spring constant k= 300N/m



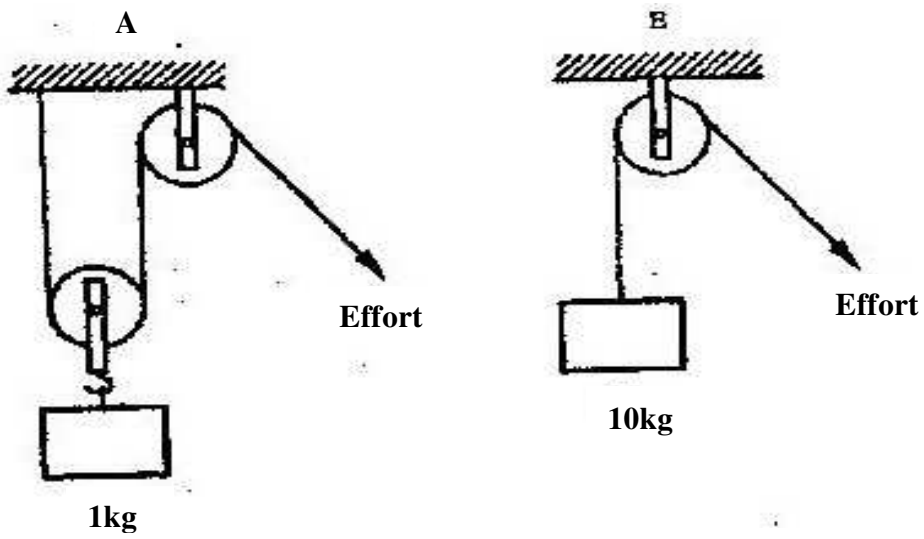

Determine the total extensions caused by the 90N weight. (ignore the weight of the spring and connecting roots) (3 mks)

6. A car starting from rest accelerates uniformly for 5 minutes to reach 30m/s. It continues at this speed for the next 20 minutes and then decelerates uniformly to come to stop in 10 minutes.

On the axes provided, sketch the graph of velocity against time for the motion of the car. (1 mk)



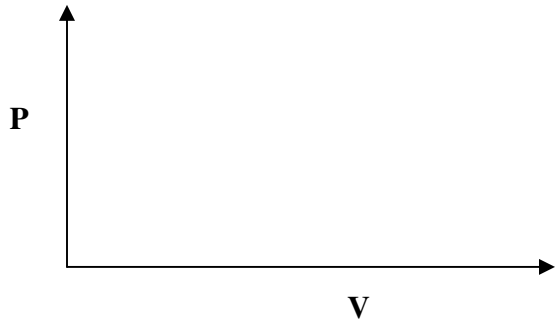

7. Figure 5 shows two pulleys systems being used to raise different loads. The pulleys identical.




State one reason why system B may have a higher efficiency than system A. (1 mk)

8. Beaker A contains 200g of water at $0^0$ C while beaker B contains 200g of a mixture of ice and water at $0^0$C. Two identical metal blocks are removed from a hot furnace. One block is dropped into beaker A while the other is dropped into beaker B at the same time.
Explain why more water evaporates from beaker A than from beaker B (2 mks)

9. On the axes provided sketch the graph of pressure P against volume V for a fixed mass of an ideal gas. ( 1 mk)




10. Figure 6 shows the path taken by a matatu traveling on a horizontal ground (a winding road)

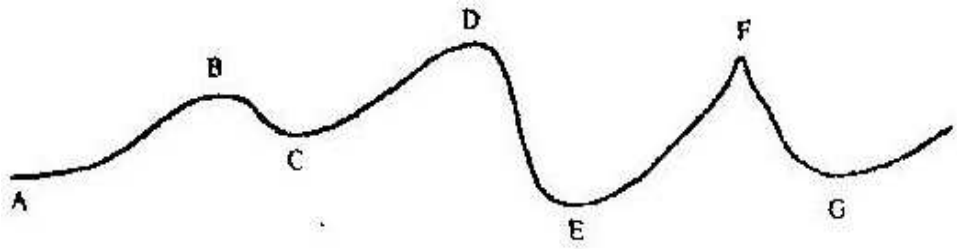
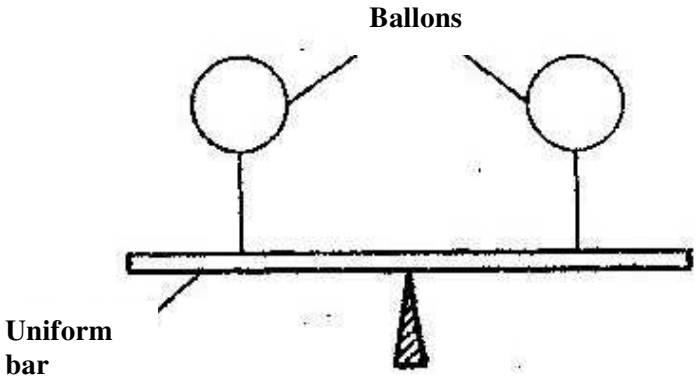



**Figure 6**

The speed of the matatu is constant. Identify with reason the point along the path which a load placed loosely on the rack (carrier) of the matatu is most likely to roll off. (2 mks)

11. A pipe of radius 6 mm is connected to another pipe of radius 9 mm. If water flows in the wider pipe at the speed of $2ms^{-1}$, what is the speed in the narrower pipe? (3 mks)

12. The uniform bar in figure 7 is provided at its midpoint. It is in equilibrium under the action of two identical balloons filled with equal volumes of different light gases at the same temperature.



Explain why the bar may not remain in equilibrium if the temperature of the surrounding changes. (2 mks)

13. 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? (3 mks)

**SECTION B (55 MARKS)**

***Answer ALL questions in this section in the spaces provided***

14. (a) Distinguish between solid and liquid states of matter in terms of intermolecular forces (1 mk)

(b) In an experiment to estimate the diameter of an oil molecule, an oil drop of diameter 0.05 cm spreads over a circular patch whose diameter is 20 cm

Determine

(i) The volume of the oil drop ( 2 mks)

(ii) The area of the patch covered by the oil ( 2 mks)

(iii) The diameter of the oil molecule ( 3 mks)

(c) State

(i) Any assumption made in (b) (iii) above ( 1 mk)

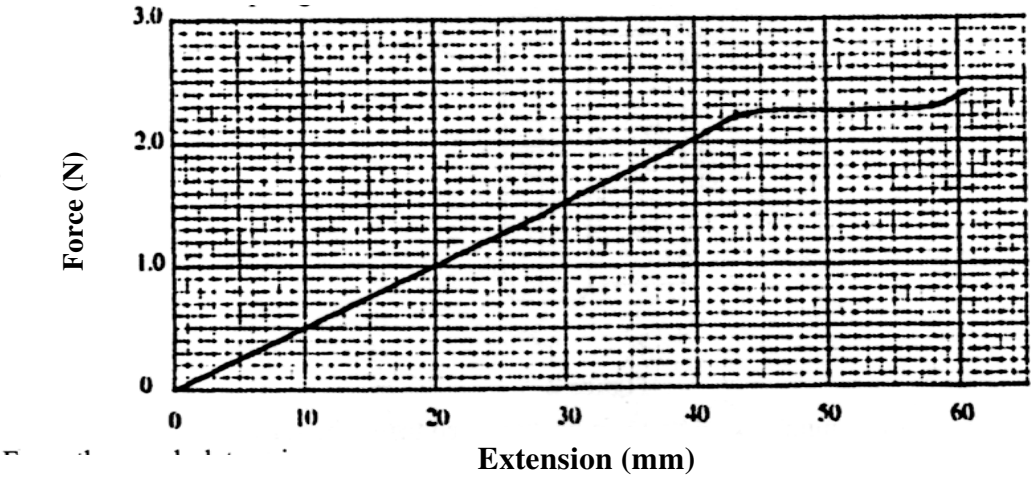
(ii) Two possible sources of errors in this experiment ( 2 mks)

15. (a) You are provided with two wires of same material and same thickness. Describe how you would make two spiral springs of different springs constants (assume that other apparatus to make springs are available). (2 mks)

(b) In an experiment, two identical springs are attached end to end. One end of the combined springs is fixed to a rigid support such that the spring hangs vertically. Masses are then hang from the lower end.

The graph in figure 8 shows the relation between the force (weight) and the extension for the combined springs.

**Figure 8**




From the graph determine

(i) The elastic limit for the combined springs (1 mk)

(ii) The springs constant of the combined spring and hence for each spring (4 mks)

(iii) The work done in stretching the combined spring from 15 mm to 32 mm (3 mks)

16. (a) State what is meant by an ideal gas (1 mk)

(b) The pressure acting on a gas in a container was changed steadily while the temperature of the gas maintained constant. The value of volume V of the gas was measured for various values of pressure. The graph in figure 9 shows the relation between the pressure, p and the reciprocal of volume $^{1}/v$

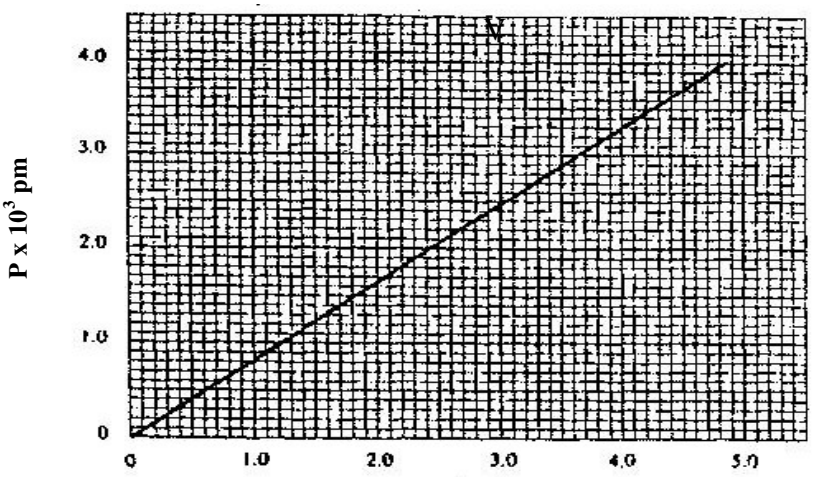



**Figure 9**

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

(ii) Given that the relation between the pressure $P_1$ and the volume, $V_1$ of the gas is given by

$$PV = k$$

When k is a constant, use the graph to determine the value of k.

(iii) What physical quantity does k represent? ( 4 mk)

(iv) State one precautions you would take when performing such an experiment (1 mk)

(c) A gas occupies a volume of 4000 litres at a temperature of $37^0$C and normal atmospheric pressure. Determine the new volume of the gas if it heated at constant pressure to a temperature of $67^0$C (normal atmospheric pressure P= $1.01 \times 10^5$ pa)

17. (a) state Archimedes principle ( 4 mks)

(b) in an experiment to determine the relative density of methylated spirit applying Archimedes Principal, the following were provided, a spring balance, some masses, a piece of thread, water in a beaker and methylated spirit in a beaker. The table below shows the results obtained.

| Mass (g) | 100 | 150 | 200 |
|---|---|---|---|
| Weight in air ( N) | 1.00 | 1.50 | 2.00 |
| Weight in water (N) | 0.88 | 1.32 | 1.76 |
| Weight in spirit (N) | 0.91 | 1.36 | 1.82 |

(i) Draw labeled sketch diagrams to show how the readings in the table were obtained ( 1 mk)

(ii) For each mass, determine the upthrust in water and the upthrust in the spirit ( 2 mks)

(iii) Determine the average relative density of the spirit ( 3 mks)

(c) A weather balloon of volume $1.2m^3$ is tied to a rigid support while being filled with helium gas. The mass of the fabric making the balloon is 0.30kg.

Determine the maximum tension on the string trying the balloon to the rigid support

18. (a) Define specific latent heat of fusion of a substance ( 1 mk)

(b) Water of mass 200 g at a temperature of $60^0$C is put well lagged copper calorimeter of mass 80g. A piece of ice at $0^0$ C and mass 20 g is placed in the calorimeter and the mixture stirred gently until all the ice melts. The final temperature, T of the mixture is then measured.

**Determine**

(i) The heat absorbed by the melting ice at $0^0$ C. ( 2 mks)

(ii) The heat absorbed by the melted ice ( water) to rise to temperature T
(answer may be given in terms of T) ( 2 mks)

(iii) The heat lost by the warm water and the calorimeter ( 2 mks)
(answer may be given in terms of T) ( 2 mk)

(iv) The final temperature T of the mixture
(specific latent heat of fusion of ice = 334 000 J $kg^{-1}$
( specific heat capacity of water = 4 200 J$kg^{-1}$ $k^{-1}$
Specific heat capacity of copper = 900 J $kg^{-1}$) ( 4 mks)

# K.C.S.E 2007
## PHYSICS PAPER 232/1
## QUESTIONS

### SECTION A (25 Marks)
***Answer all questions in this section in the spaces provided***

1. Figure 1 shows a metal cube of mass 1.75g placed between the jaws of a micrometer screw gauge. The magnified portion of the scale is also shown. The reading on the gauge when the jaws were fully closed without the cube was 0.012 cm. Use this information and the figure to answer questions 1 and 2

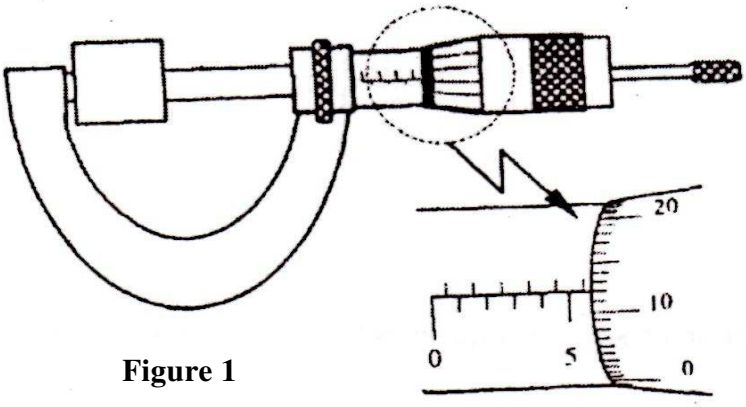



**Figure 1**

What is the length of the cube? ( 1 mk)

2. Determine the density of the metal cube giving your answer correct to three significant figures. ( 3 mks)

3. Figure 2 shows a tube of varying cross sectional area

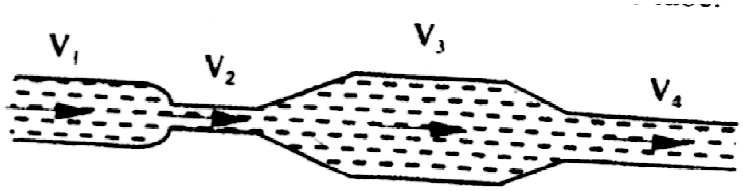



**Figure 2**

Arrange the speed $V_1V_2V_3$ and $V_4$ in decreasing order starting with the highest (1 mk)

4. Figure 3 shows the levels of two liquids A and B after some air has been sucked out of the tubes through the tap. Use this information and the figure to answer questions 4 and 5.

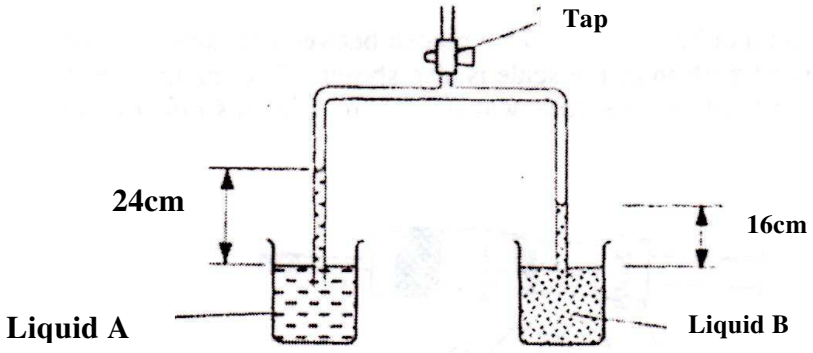



**Figure 3**

State the reason for the rise in the levels of the liquids when air is sucked from the tubes

5. Given that the density of liquid B is 1200 $kgm^3$, determine the density of liquid A. ( 3 mks)

6. Figure 4 show two identical balloons A and B. The balloons were filled with equal amounts of the same type of gas. The balloons are suspended at distances $X_1$ and $X_2$ from a metal cube filled with boiling water and placed on an insulating material. Use this information to answer questions 6 and 7.

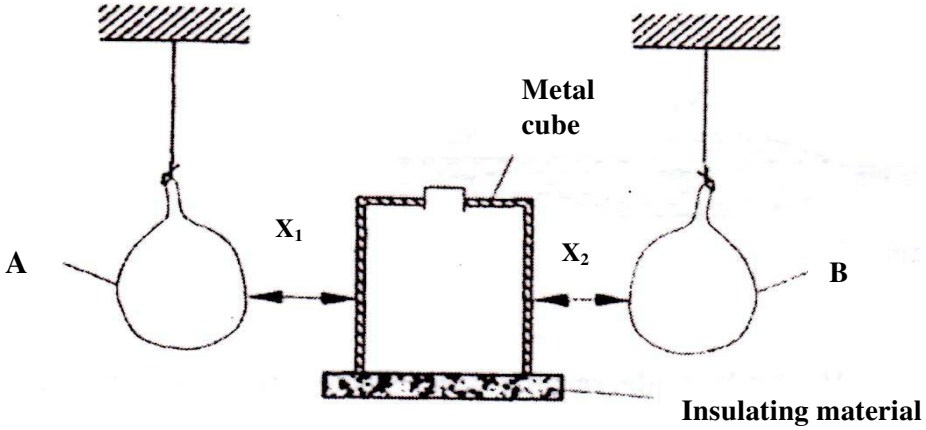



**Figure 4**

State the mode by which heat travels from the cube to the balloons (1 mk)

7. The face of the cube towards A. is bright and shiny and the face towards B is dull black. State with reason the adjustments that should be made on the distances $X_1$ and $X_2$ so that the rate of change of temperature in both balloons is the same. (2 mks)

8. Figure 5 shows a uniform bar of length 1.0 m pivoted near one end. The bar is kept in equilibrium by a spring balance as shown.

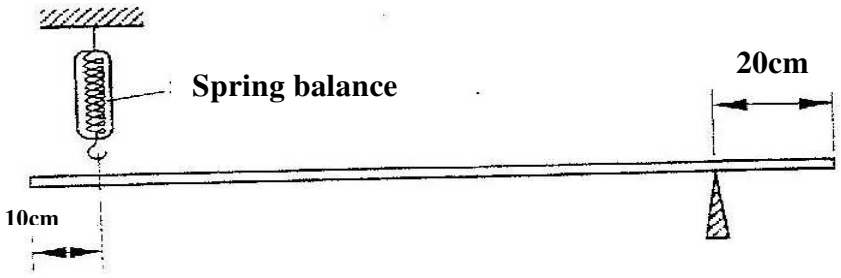



**Figure 5**

Given that the reading of the spring balance is 0.6 N. Determine the weight of the bar. ( 3 mks)

9. The graph in figure 6 shows the velocity of a car in the first 8 seconds as it accelerates from rest along a straight line. Use the graph to answer questions 9 and 10.

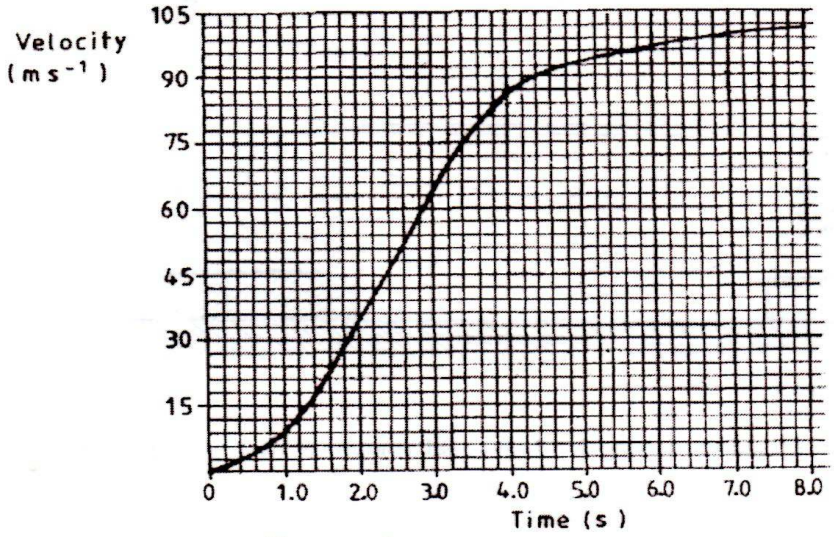



Figure 6

Determine the distance traveled 3.0 seconds after the start

10. Determine the acceleration of the car at 4.0 seconds (2 mks)

11. State two factors that effect the melting point of ice (2 mks)

12. The graph in figure 7 shows the relationship between the pressure and temperature for an ideal gas. Use the information in the figure to answer questions 12 and 13

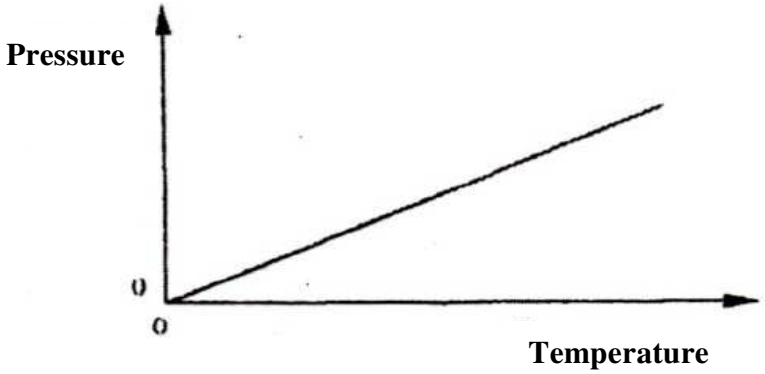



**Figure 7**

State the unit of the horizontally axis (1 mk)

13. Write a statement of the gas law represented by the relationship (1 mk)

14. Figure 8 shows a uniform light bar resting horizontally on corks floating on water in two beakers A and B.

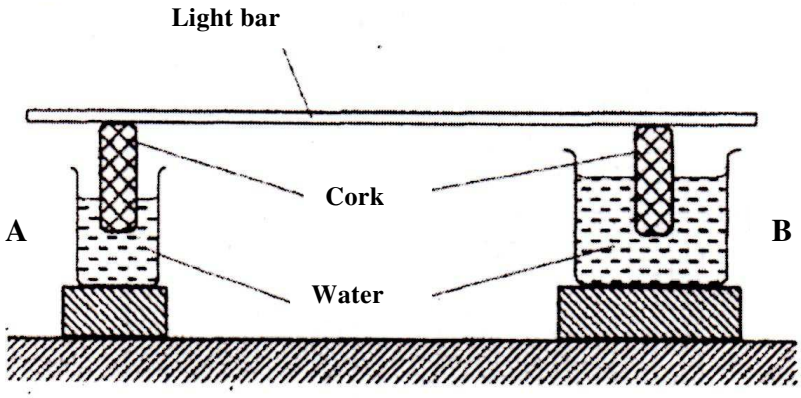



**Figure 8**

Explain why the bar tilts towards side A when equal amount of heat is supplied to each beaker ( 2 mks)

**SECTION B (55 MKS)**

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

15. Brown motion of smoke particles can be studied by using the apparatus shown in figure 9 to observe the motion, some smoke is enclosed in the smoke cell and then observed through the microscope.

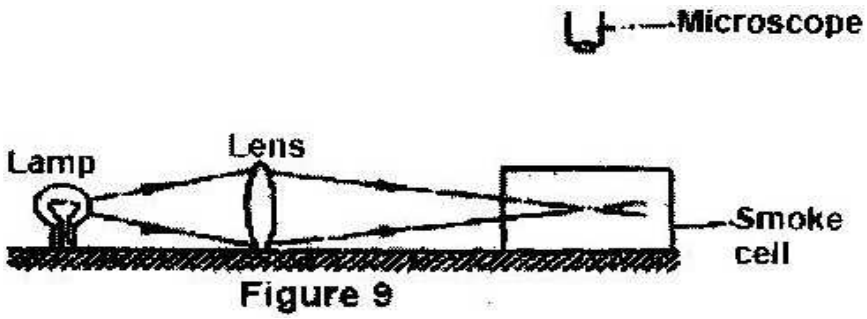



Figure 9

(a) Explain the role of the smoke particle, lens and microscope in the experiment

Smoke particles

Lens

(b) State and explain the nature of the observed motion of the smoke particles (3 mks)

(c) State what will be observed about the motion of the smoke particles if the temperature surrounding the smoke cell is raised slightly. ( 1 mk)

16. (a) State Newton's first law of motion ( 1 mk)

(b) A wooden block resting on a horizontal bench is given an initial velocity, u, so that it slides on the bench surface for a distance d, before coming to a stop. The values of d were measured and recorded for various values of initial velocity. Figure 10 shows the graph of $u^2$ against d.

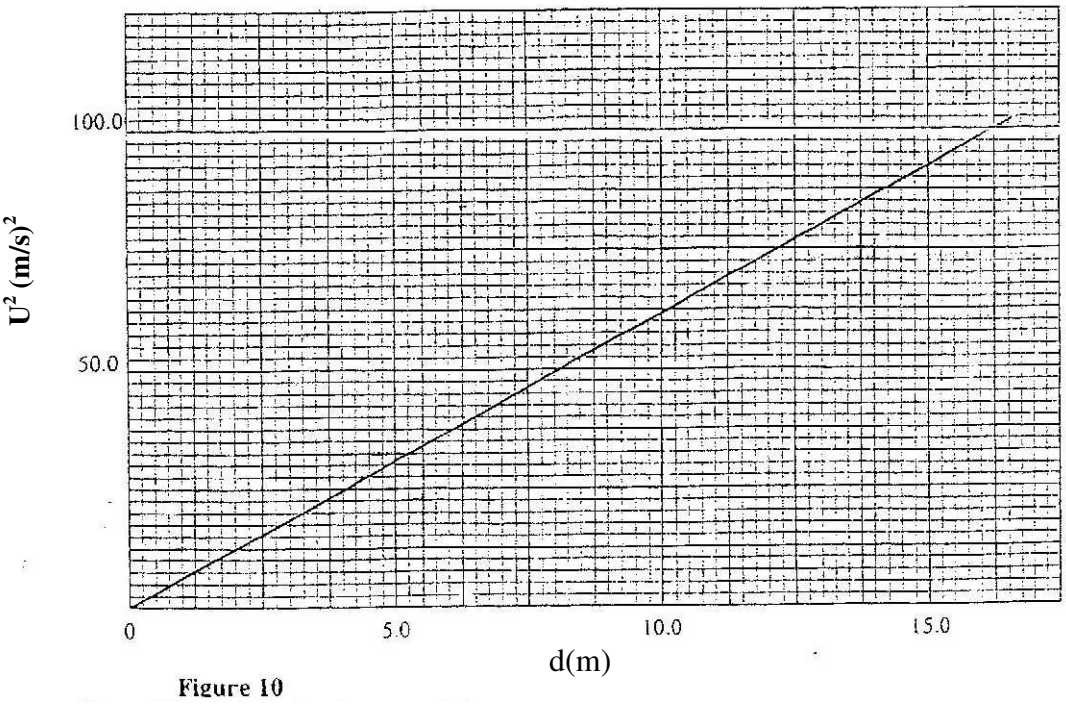



Figure 10

(i) Determine the slope, S of the graph ( 3 mks)

(ii) Given that $u^2 = 20$ kd, where k is a constant for the bench surface, determine the value of k from the graph ( 2 mks)

(iii) State how the value of k would be affected by a change in the roughness of the bench surface ( 1 mk)

(c) A car of mass 800 kg starts from rest and accelerates at 1.2 $ms^{-2}$. Determine its momentum after it has moved 400 m from the starting point ( 4 mks)

17. (a) Define the term specific latent heat of vaporization of a substance

(b) Figure 11 shows the features of a domestic refrigerator. A volatile liquid circulates through the capillary tubes under the action of the compression pump.

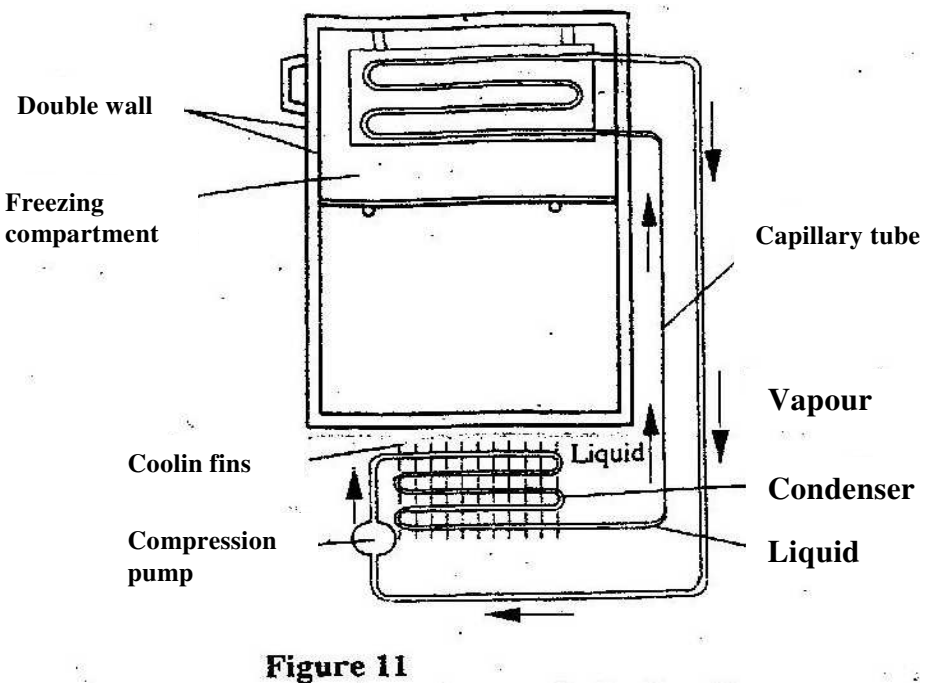



Figure 11

(i) State the reason for using a volatile liquid (1 mk)

(ii) Explain how the volatile liquid is made to vaporize in the cooling compartment and to condense in the cooling fins (2 mks)

(iii) Explain how cooling takes place in the refrigerator (3 mks)

(iv) What is the purpose of the double wall? (1 mk)

(c) Steam of mass 3.0 g at $100^0$ C is passed into water of mass 400g at $10^0$C. The final temperature of the mixture is T. the container absorbs negligible heat. (Specific latent heat of vaporization of steam = 2260 kJ/ kg, specific heat capacity of water = 4200Jkg$^{-1}$K$^{-1}$)

(i) Derive an expression for the heat lost by the steam as it condenses to water at temperature T. ( 3 mks)

(ii) Derive an expression for the heat gained by water ( 2 mks)

(iii) Determine the value of T ( 2 mks)

18. (a) State what is meant by centripetal acceleration

(b) Figure 12 shows masses, A, B and C placed at different points on a rotating table. The angular velocity, ω, of the table can be varied.

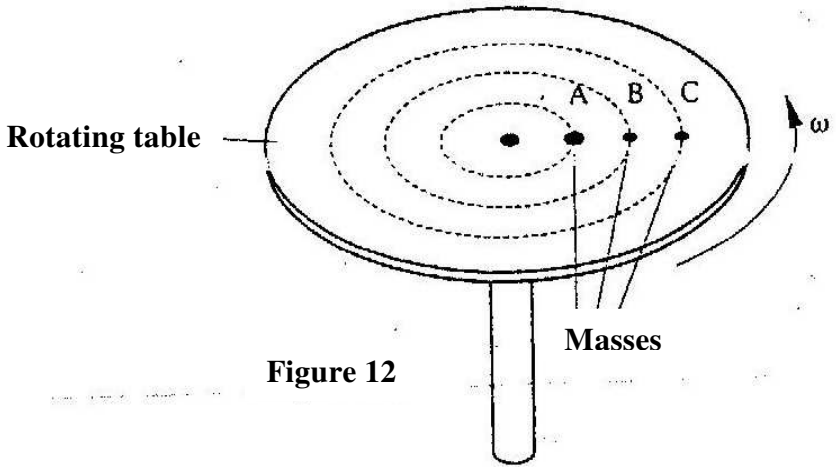



**Figure 12**

(i) State two factors that determine whether a particular mass slides off the table or not ( 2 mks)

(ii) It is found that the masses slide off at angular velocities $\omega_A$, $\omega_B$, and $\omega_C$ respectively. Arrange the values of $\omega_A$, $\omega_B$, $\omega_C$ in decreasing order.

(c) A block of mass 200g is placed on a frictionless rotating table while fixed to the centre of the table by a thin thread. The distance from the centre of the table to the block is 15 cm. If the maximum tension the thread can withstand is 5.6N. Determine the maximum angular velocity the table can attain before the thread cuts. (4 mks)

19. (a) State the law of floating ( 1 mk)

(b) Figure 13 shows a simple hydrometer

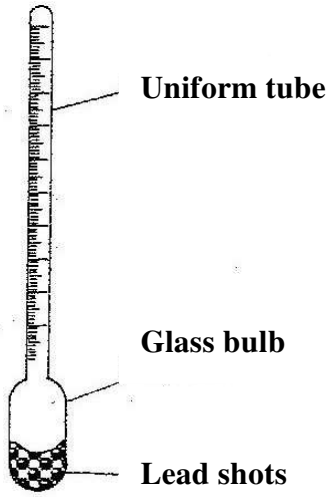



**Figure 13**

(i) State the purpose of the lead shots in the glass bulb ( 1 mk)

(ii)How would the hydrometer be made more sensitive? ( 1 mk)

(iii) Describe how the hydrometer is calibrated to measure relative density

(c) Figure 14 shows a cork floating on water and held to the bottom of the beaker by a thin thread.

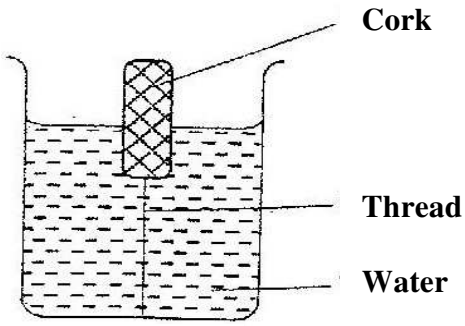



**Figure 14**

(i) Name the forces acting on the cork ( 3 mks)

(ii) Describe how each of the forces mentioned in ( i) above changes when water is added into the beaker until it fills up. ( 3 mks)

# K.C.S.E 2008
## PHYSICS PAPER 232/1
## QUESTIONS

### SECTION A (25 MKS)
***Answer all the questions in this section in the spaces provided.***

1. A drug manufacturer gives the mass of the active ingredient in a tablet as 5 mg. Express this quantity in kilogramme and in standard form. (1mk)

2. The masses of equal volumes of a certain liquid and of water were found to be $m_v$ and $m_w$ respectively. Given that the density of water is $1gcm^{-3}$, express the density, p, of the liquid in terms of $m_v$ $m_w$ (show your work) (2mks)

3. Fig. 1 shows a brick placed on a plane inclined at an angle θ to the horizontal. The weight, W, of the brick is shown.

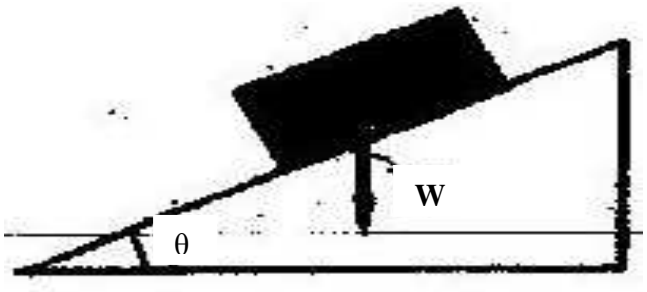


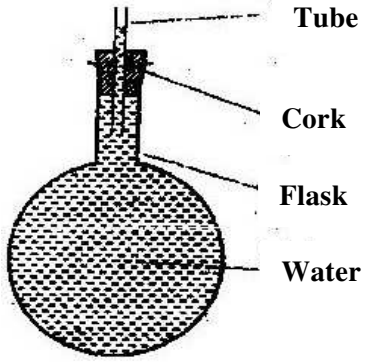

**FIGURE 1**

a) On the same diagram show with arrows the other two forces acting on the brick and name them. (1mk)

b) State how each of the two forces named (a) above is affected when the angle θ is reduced. (1mk)

4. Water is known to boil at $100^0$C. A student heated some water and noticed that it boiled at $101^0$C.
State two possible reasons for this observation. (2mks)

5. Fig: 2 shows a flask filled with water. The flask is fitted with a cork through which a tube is inserted. When the flask is cooled, the water level rises slightly, then falls steadily.




**Figure**

Explain observation. (3mks)

6. 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 6 and 7.

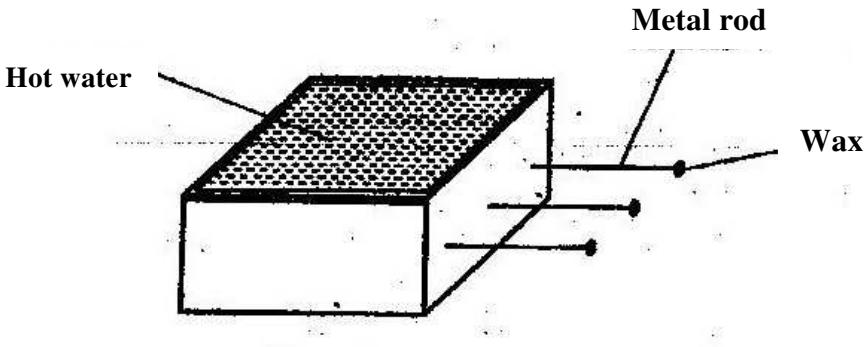



**Figure 3**

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

7. Besides the length of the rods that is kept constant, what else should be kept constant when comparing the property for the different metal rods? (1mk)

8. Fig. 4 shows a conical flask 15cm high, filled with a liquid of density 1200kgm$^{-3}$. The atmospheric pressure of the surrounding is 8.4 x 10$^4$Pa.

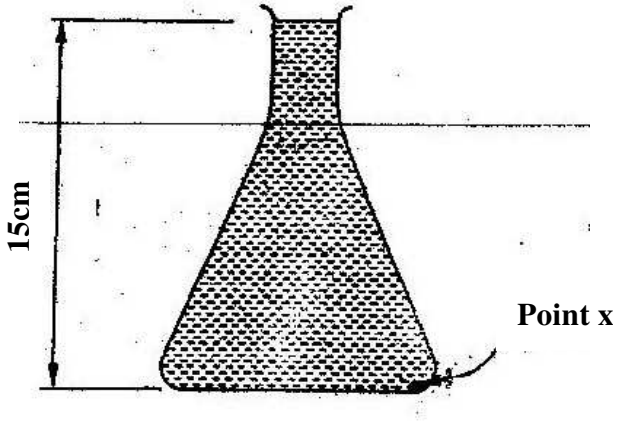
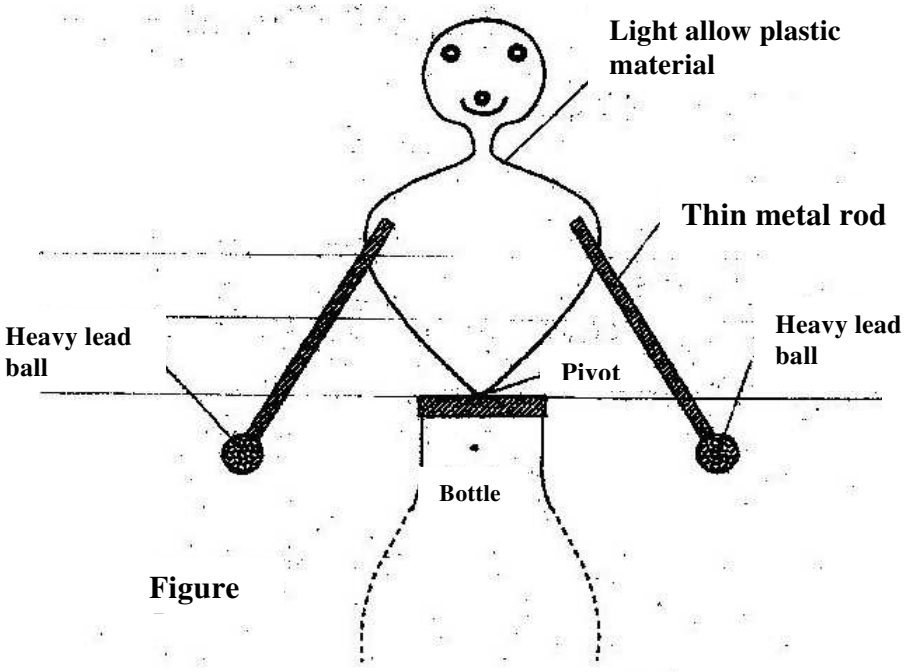



**Figure 4**

Determine the pressure at the point mked X, at the bottom of the flask. (3mks)

9. Explaining the difference between a liquid and a gas in terms of intermolecular distances and forces. (2mks)

10. Fig. 5 shows a toy resting on top of a closed bottle. Use the information on the figure to answer questions 10 and 11.




**Figure**

Mk on the diagram, point Q, the approximate centre of gravity of the toy. (1mk)

11. Giving a reason, name the state of equilibrium of the toy (2mks)

12. Fig. 6 shows a sheet of paper rolled into a tube.

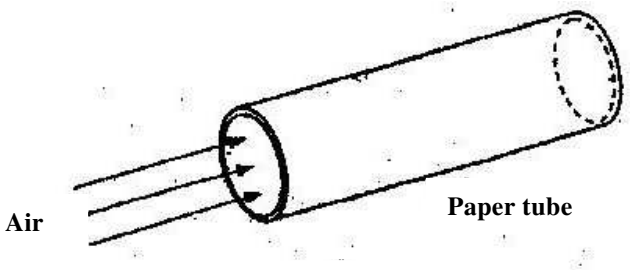



**Figure 6**

When a fast stream of air is blown into the tube as shown in the diagram the paper tube collapses. Explain the observation. (2mks)

13. The graphs in Fig. 7 represent the relations between extension e and mass m added on two springs x and y.

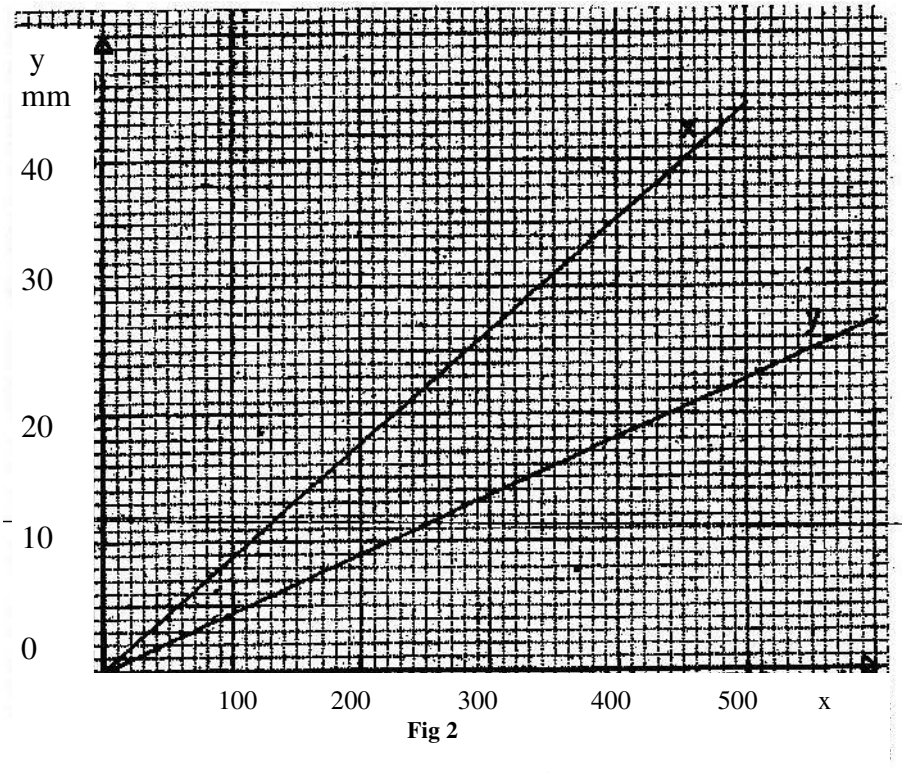



**Fig 2**

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

14. The system in Fig. 8 is in equilibrium

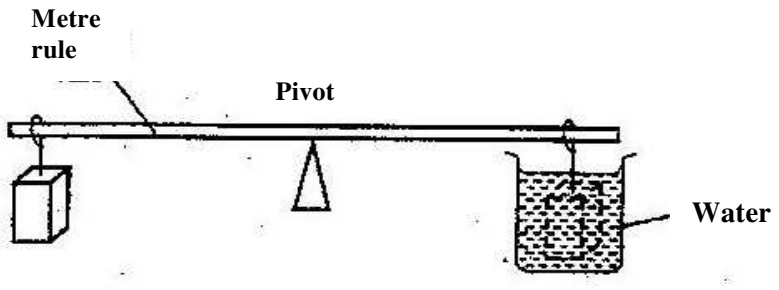



**Figure 8**

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

## SECTION B (55 MKS)

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

15. a) State Newton's second law of motion. (1mk)

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

Determine

(i) Its acceleration; (3mks)

(ii) Its velocity, after 7seconds (2mks)

c) A trolley moving on a horizontal bench of height 1.2m, strikes a barrier at the edge of the bench. The brass mass on the top of the trolley flies off on impact and lands on the ground 2.5m from the edge of the bench.

Determine:

(i) The time taken by the brass mass to reach the ground; (2mks)

(ii) The speed at which the trolley struck the barrier. (2mks)

16. a) Define the term heat capacity. (1mk)

b) You are provided with the apparatus shown in Fig. 9 and a stop watch.

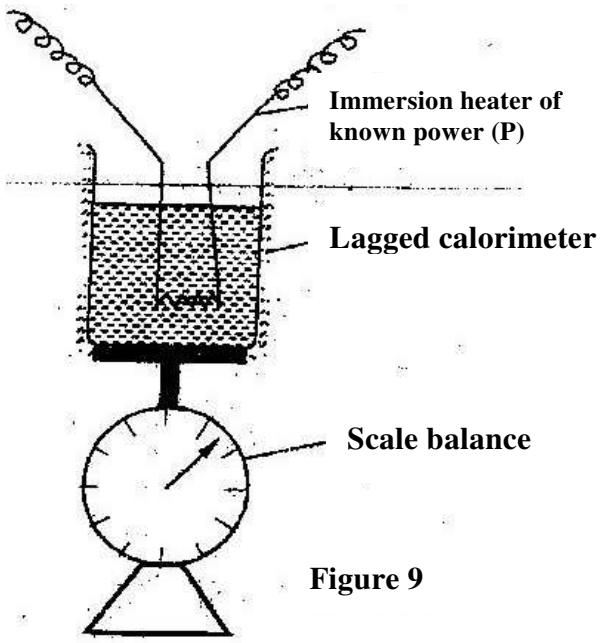



**Figure 9**

Describe an experiment to determine the specific latent heat of steam, l, using the set up. In your answer clearly explain the measurements to be made and how these measurements could be used to determine l. (6mks)

c) A block of metal of mass 150g at $100^0$C is dropped into a lagged calorimeter of heat capacity $40JK^{-1}$ containing 100g of water at $25^0$C. The temperature of the resulting mixture is $34^0$C. (Specific heat capacity of water = $4200JK^{-1)}$.

Determine:

(i) Heat gained by calorimeter; (2mks)

(ii) Heat gained by water; (1mk)

(iii) Heat lost by the metal block; (1mk)

(iv) Specific heat capacity of the metal block (3mks)

17. a) What is meant by absolute zero temperature? (1mk)

**Fig. 10** shows a set up to investigate the relationship between temperature and volume for a certain gas.

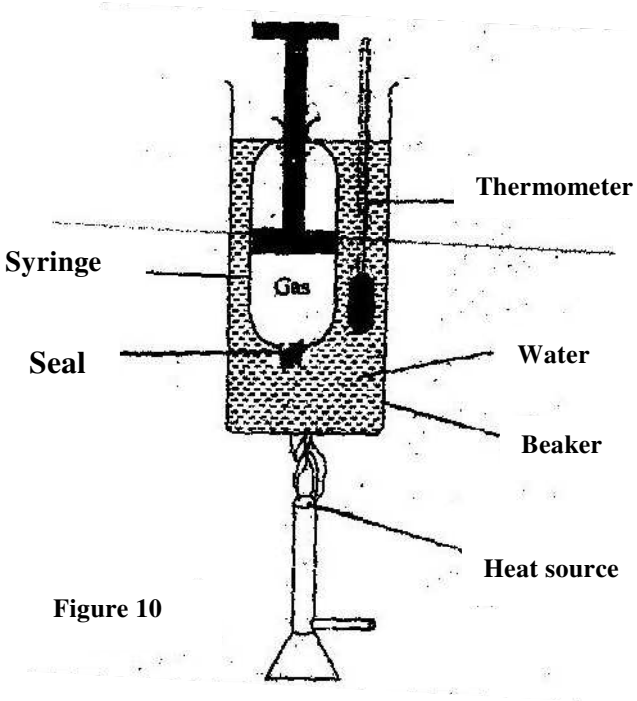
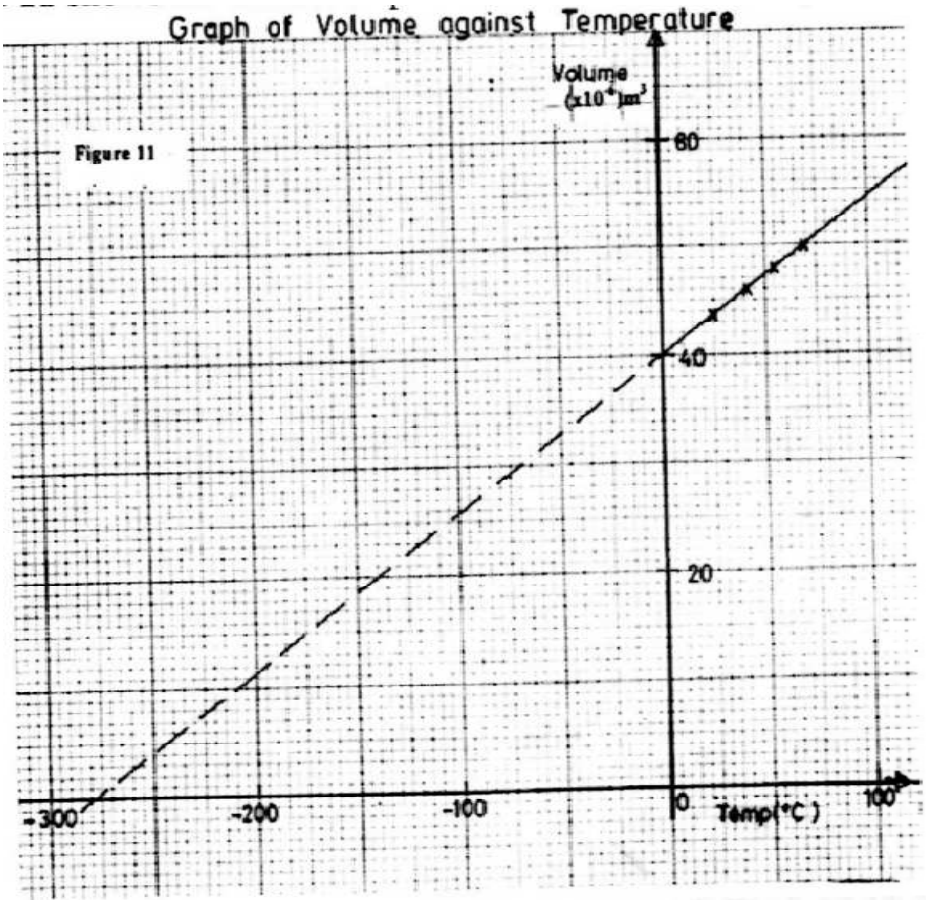



**Figure 10**

b) State two factors that are kept constant, in order to determine the relationship. (2mks)

c) The graph in Fig.11 shows the relationship between volume and temperature for the experiment.




(i) What was the volume of the gas at $0^0$C? (1mk)

(ii) At what temperature would the volume of the gas be zero? (1mk)

(iii) Explain why the temperature in part (ii) above cannot be achieved. (2mks)

d) A sealed gas cylinder contains 300cm$^3$ of certain gas at a temperature of $25^0$C, and at a pressure of 9.5 x $10^4$pa. The gas in the cylinder was then cooled to $10^0$C.

Determine the new pressure of the gas in the cylinder. (4mks)

18. (a) Define the term velocity ratio of a machine. (1mk)

(b) Fig. 12 shows part of a hydraulic press. The plunger is the position where effort is applied while the Ram piston is the position where load is applied. The plunger has cross-section area, a $m^2$ while the Ram piston has cross-section area, a $m^2$.

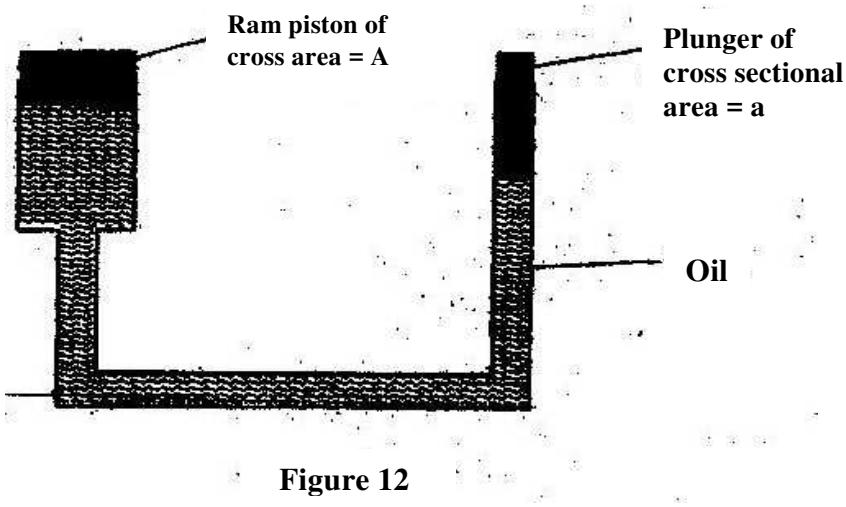



**Figure 12**

When the plunger moves down a distance d the Ram piston moves up a distance D.

(i) State the property of liquid pressure on which the working of the hydraulic press works. (1mk)

(ii) Derive an impression for the velocity ratio (V.R) in terms of A and a. (4mks)

c) A machine of velocity ratio 45, overcomes a load of 4.5 x $10^3$N when an effort of 135N is applied.

Determine:

(i) The mechanical advantage of the machine; (2mks)

(ii) Efficiency of the machine; (2mks)

(iii) The percentage of the work that goes to waste. (1mk)

19. a) State the principle of moments. (1mk)

b) A uniform metal strip is 3.0cm wide, 0.6cm thick d 100cm long. The density of the metal is 2.7 g/cm$^{3.}$

(i) Determine the weight of the strip. (3mks)

The strip placed n a pivot and kept in equilibrium by forces as shown in fig. 13

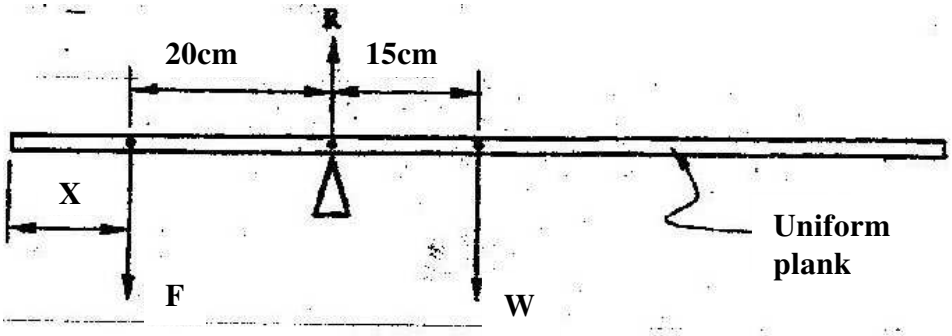



**Figure 13**

(ii) Determine the value of F and R (3mks)

(iii) X is the distance from the end of the plank to the point of application of force F. Force F is now applied at various points nearer to the pivot so that x increases. Equilibrium is maintained all the time. On the axes provided sketch the relation between force F and x.


(iv) Give a reason for the answer in (iii) above (1mk)

# K.C.S.E 2009

## PHYSICS PAPER 232/1

## QUESTIONS

### SECTION A (25 marks)

***Answer all questions in this section in the spaces provide***

1. In an experiment to measure the density of a liquid, a student filled a burette with a liquid to the 0 $cm^3$ mark. Figure 1 shows a section of the burette showing the level of the liquid after 54.5 g of the liquid had been run out

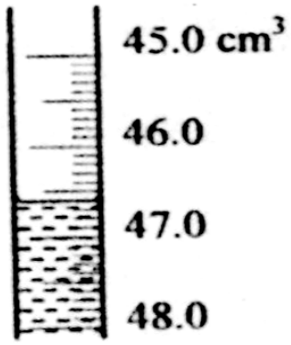


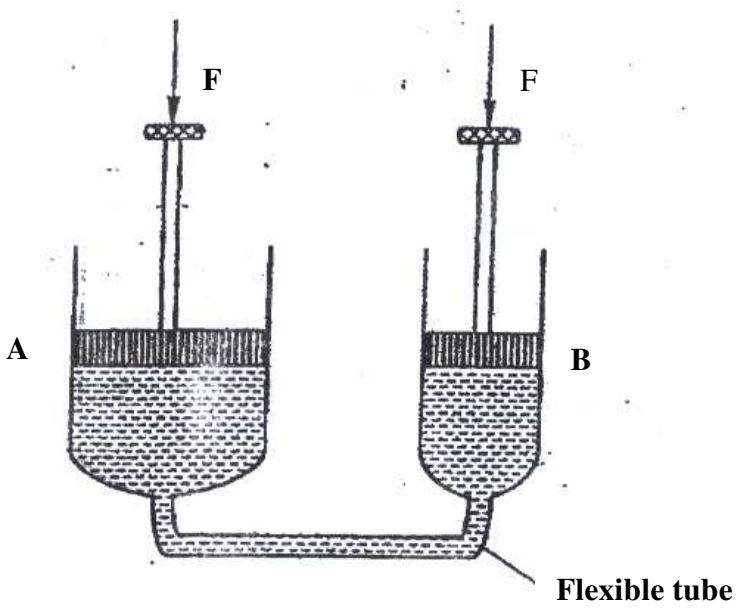

**Figure 1**

Determine the density of the liquid ( 3 mks)

2. In an experiment to determine the acceleration due to gravity g, a student measured the period, T and length L, of a simple pendulum. For a length L = 70.5 cm, the period T obtained as 1.7s. Given that $T = 2\pi \sqrt{L/g}$, determine the value of g correct to two significant figures ( 2 mks)

3. A steel needle when placed carefully on water can be made to float. When a detergent is added to the water it sinks. Explain this observation

4. Figure 2 shows two cylinders containing a liquid and connected with a tight – fitting flexible tube. The cylinders are fitted with air- tight pistons A and B as shown



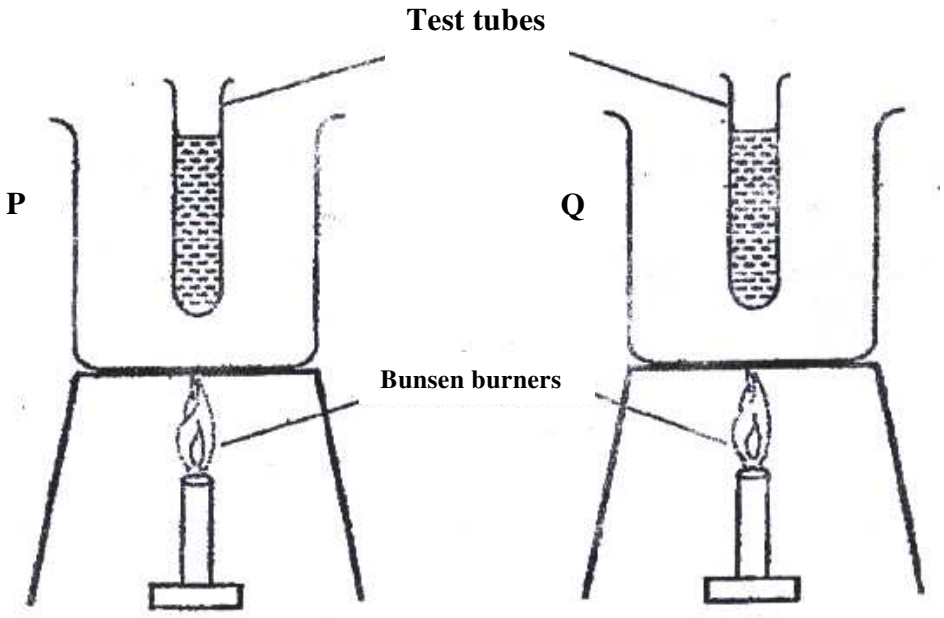

5. When equal forces, F are applied on the pistons as shown it is observed that piston A moves up while B moves down. Explain this observations (2 mks)

6. Two identical beakers A and B containing equal volumes of water are placed on a bench. The Water in A is cold while in B it is warm. Identical pieces of potassium permanganate are placed gently at the bottom of each beaker inside the water. It is observed that the spread of colour in B is faster than in A. Explain this observation. ( 2 mks)

7. A clinical thermometer has a constriction in the bore just above the bulb. State the use of this constriction.

***Use the following information to answer questions 7 and 8***

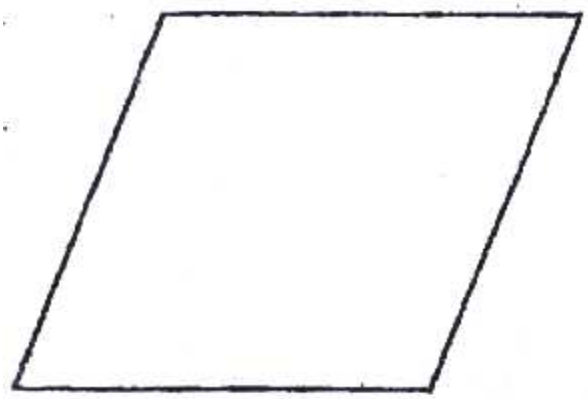
8. Two identical empty metal containers P and Q are placed over identical Bunsen burners and the burners lit. P is dull black while Q is shiny bright. After each container attains a temperature of $100^0$C the burners are turned off. Identical test tubes containing water are suspended in each container without touching the sides as shown in figure 3




Explain why the container Q may become hot faster than P. ( 2 mks)

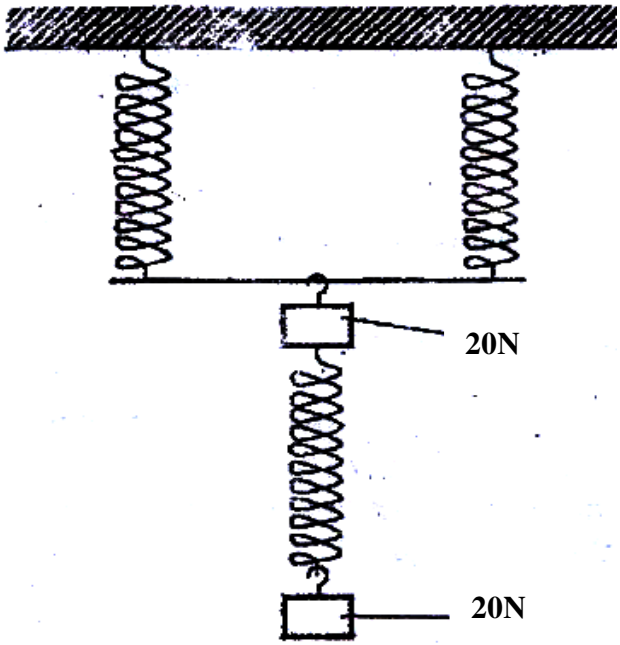
Explain why the water in test- tube in P becomes hot faster than in Q ( 2 mks)

9. Figure 4 shows a uniform cardboard in the shape of parallelogram



Locate the centre of gravity of the cardboard ( 1 mks)

10. The three springs shown in figure 5 are identical and have negligible weight. The extension produced on the system of springs is 20 cm.




Determine the constant of each spring ( 2 mks)

11. Figure 6 shows two inflated balloons hanging vertically on light threads

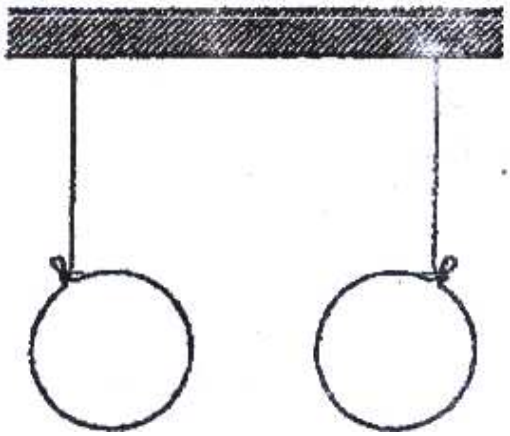
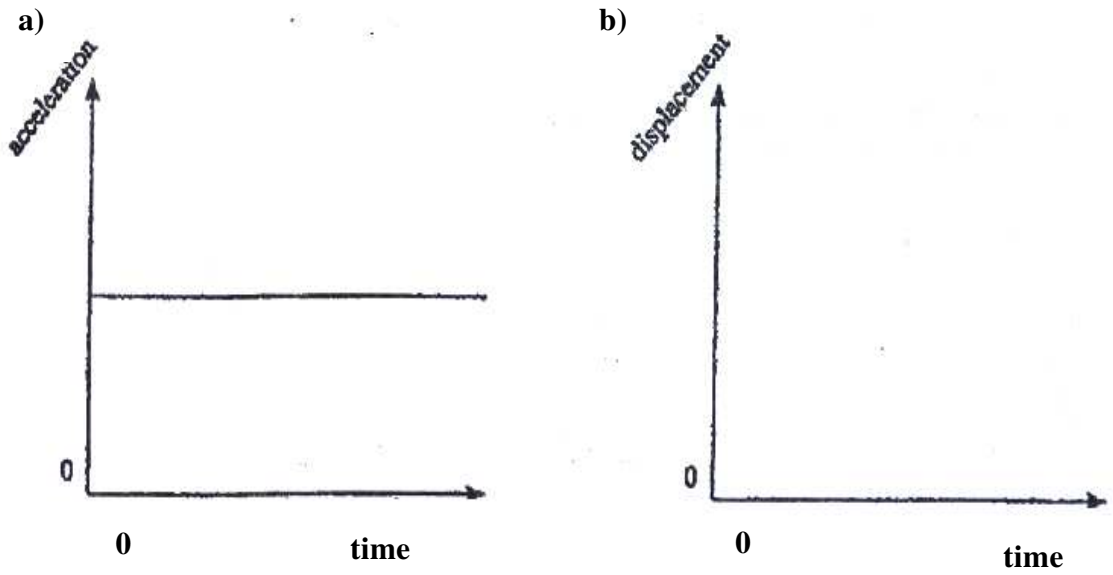


**Figure 6**

When a stream of air is blown in the space between the balloons, they are observed to move towards each other. Explain this observations ( 1 mk)

12. Figure 7 (a) shows the acceleration – time graph for a certain motion




On the axes provided in figure 7 (b), sketch the displacement – time graph for the same motion ( 1 mks)

13. State what is meant by absolute zero temperature (zero Kelvin or $273^0$C)

14. A turntable of radius 8 cm is rotating at 33 revolutions per second. Determine the linear speed of a point on the circumference of the turntable

**SECTION B (55 MKS)**
**Answer all the questions in this section in the spaces provided**

15. (a) State two factors that affect the boiling point of a liquid ( 2 mks)

(b) 100g of a liquid at a temperature of $10^0$ C is poured into a well lagged calorimeter .
An electric heater rated 50W is used to heat the liquid. The graph in figure 8 shows the variation of the temperature of the liquid with time.

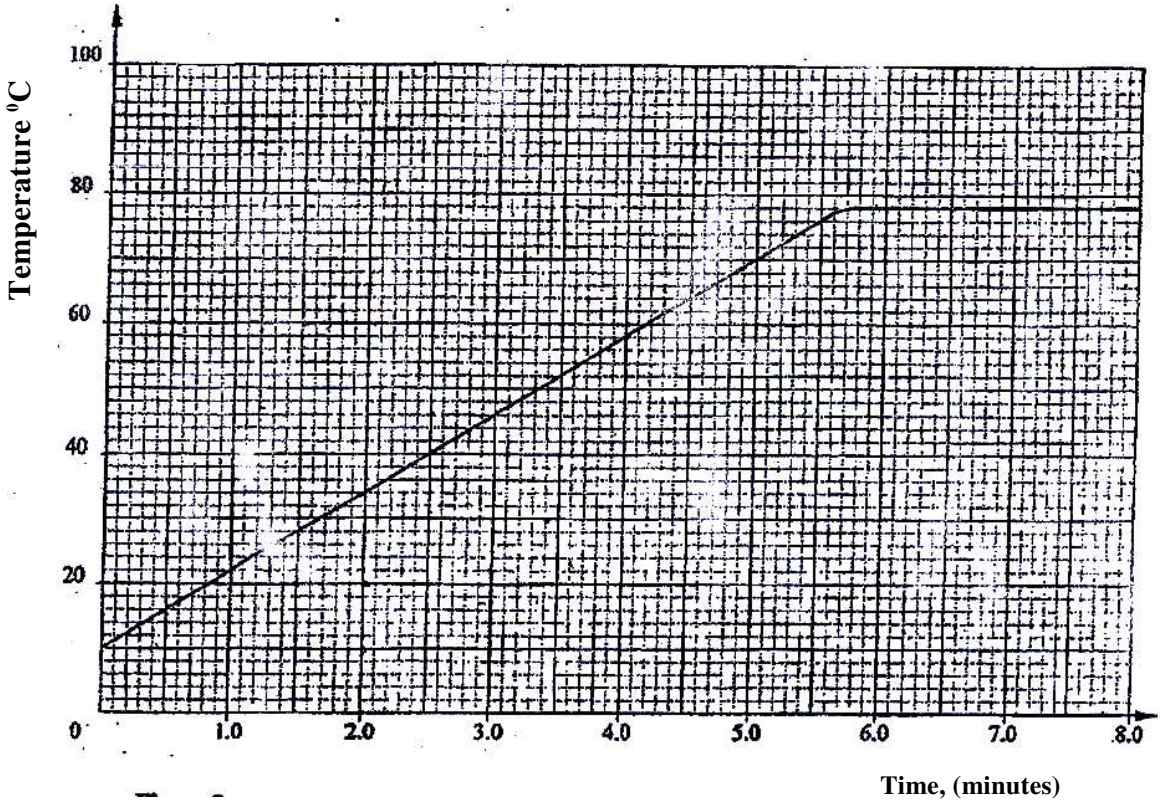



**Figure 8**

(i) From the graph, determine the boiling point of the liquid ( 1 mk)

(ii) (I) Determine the heat given out the by the heater between the times t= 0.5 minutes and t= 5.0 minutes ( 2 mks)

(II) From the graph determine the temperature change between the times

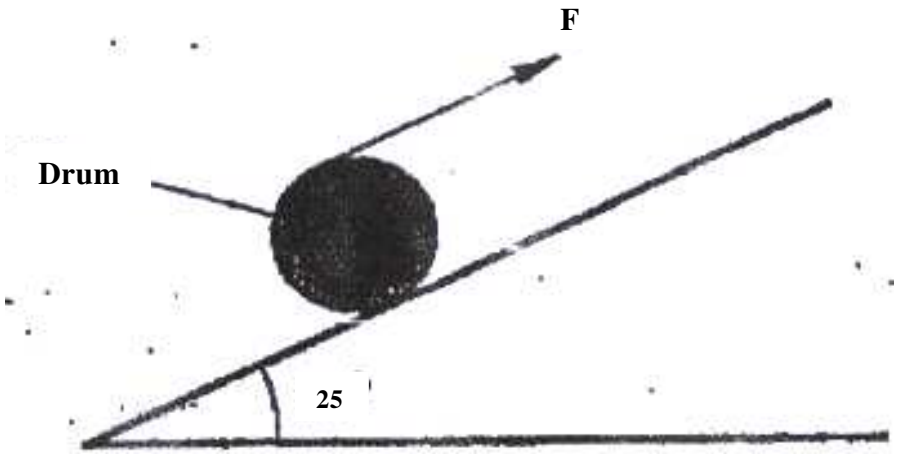
t = 0.5 minutes and t= 5.0 minutes ( 1 mk)

(III) Hence determine the specific heat capacity of the liquid ( 2 mks)

(iii) 1.8 g of vapour was collected from above the liquid between the times t= 6.8 minutes and t= 7.3 minutes. Determine the specific latent heat of vaporization of the liquid ( 4 mks)

16. (a) Define the term efficiency of a machine ( 1 mk)

(b) Figure 9 shows a drum of mass 90 kg being rolled up a plane inclined at $25^0$ to the horizontal. The force F applied is 420N and the distance moved by the drum along the plane is 5.2 m




Determine:

(i) The work done by the effort ( 3 mks)

(ii) The work done in raising the drum ( 3 mks)

(iii) The efficiency of the inclined plane as a machine ( 2 mks)

17. (a) State the law of flotation ( 1 mk)

(b) Figure 10 shows a rectangular metal block of density 10500 $kgm^{-3}$ and dimensions 30 cm x 20 cm x 20 cm suspended inside a liquid of density 1200 $kgm^{-3}$ by a string attached to a point above the liquid. The three forces acting on the block are the tension T, On the string, the weight W, of the block and the upthrust, U due to the liquid.

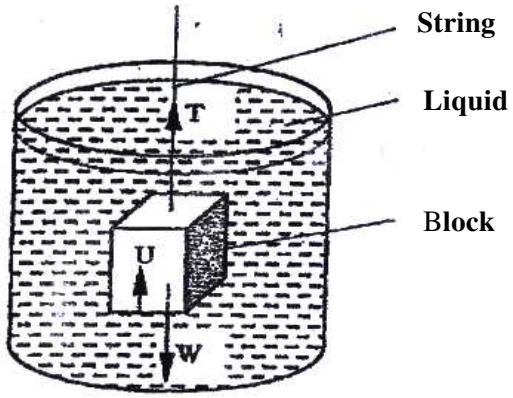



**Figure 10**

(i) Write the expression relating T, W and U when the block is in equilibrium inside the liquid ( 1 mks)

(ii) Determine the weight, W of the block ( 3 mks)

(iii) Determine the weight of the liquid displaced by the fully submerged block ( 2 mks)

(iv) Hence determine the tension, T in the string ( 1 mk)

(c) A certain solid of volume 50 $cm^3$ displaces 10 $cm^3$ of kerosene (density 800 $kgm^3$) when floating. Determine the density of the solid. ( 4 mks)

18. (a) State the pressure law for an ideal gas ( 1 mk)

(b) An air bubble is released at the bottom of a tall jar containing a liquid. The height of the liquid column is 80 cm. The volume of the bubble increases from 0.5 $cm^3$ at the bottom of the liquid to 1. 15 $cm^3$ at the top. Figure 11 shows the variations of pressure, P, on the bubble with the reciprocal of volume 1/v, as it rises in the liquid.

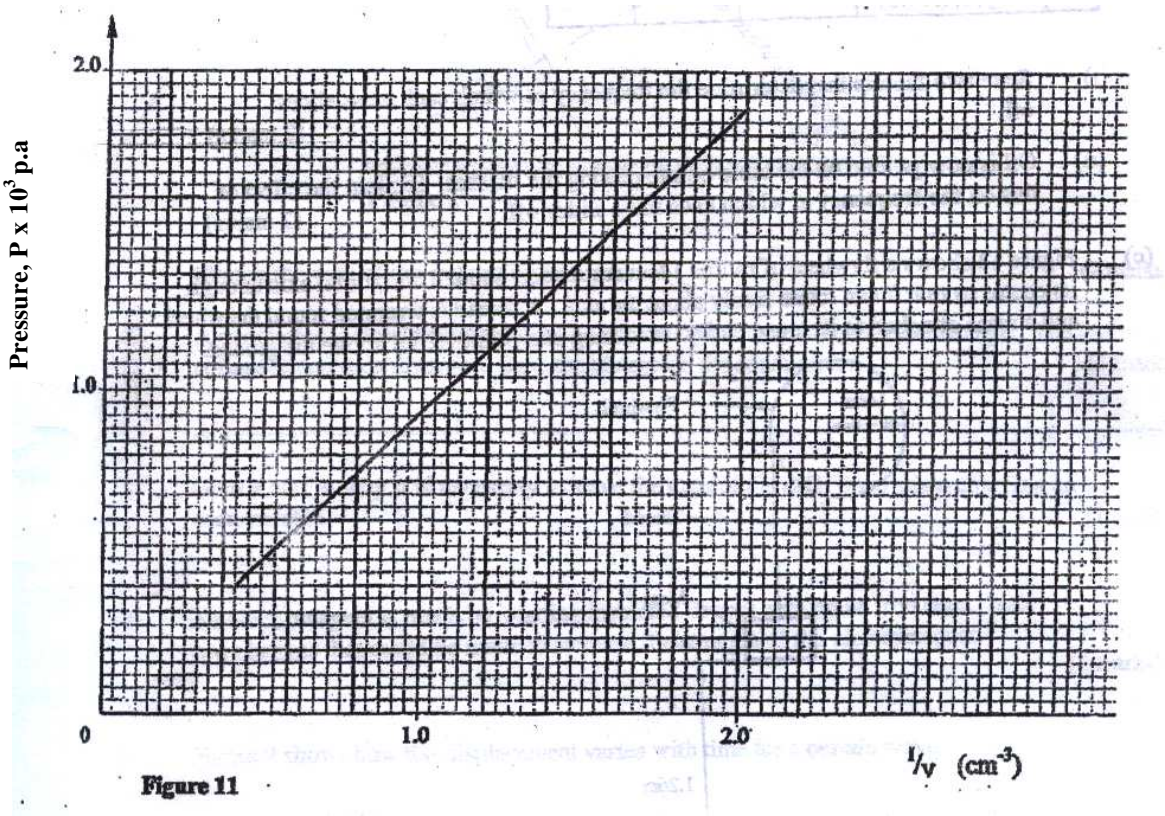


Figure 11

(i) State the reason why the volume increases as the bubble rises in the liquid Column ( 1 mk)

(ii) From the graph, determine the pressure on the bubble:
(I) At the bottom of the liquid column; ( 2 mks)
(II) At the top of the liquid column ( 1 mk)

(iii) Hence determine the density of the liquid in kgm$^{-3}$ ( 3 mks)

(iv) What is the value of the atmospheric pressure of the surrounding? (1 mk)

(c) A rubber tube is inflated to pressure of 2.7 x $10^5$ Pa and volume 3800 cm$^3$ at a temperature of 25$^0$C. It is then taken to another place where the temperature is 15$^0$C and the pressure 2.5 x $10^5$Pa. Determine the new volume. ( 4 mks)

19. (a) Define angular velocity ( 1 mk)

(b) Three masses are placed on a rotating table at distances 6 cm, 9 cm and 12 cm respectively from the centre of rotation. When the frequency of rotation is varied, it is noted that each mass slides off at a different frequency of rotation of the table. Table 1 shows the frequency at which each mass slides off.

**Table 1**

| Radius r (cm) | 12 | 9 | 6 |
|---|---|---|---|
| Sliding off Frequency, f, (rev/s) | 0.68 | 0.78 | 1.0 |

(i) State two factors that determine the frequency at which each mass slides off ( 2 mks)

(ii) Oil is now poured on the table before placing the masses. Explain the effect of this on the frequency at which each mass slides off. ( 2 mks)

(c) Figure 12 shows a flywheel of radius 14 cm suspended about a horizontal axis through its centre so that it can rotate freely about the axis. A thread is wrapped round the wheel and a mass attached to its loose end so as to hang at a point 1.2c above the ground.

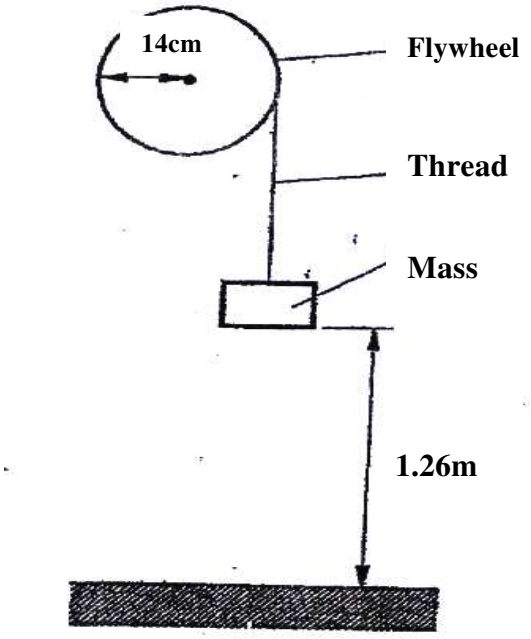



**Figure 12**

When the mass is released, it accelerates at 0.28 $ms^{-2}$. Determine the angular velocity of the wheel just before the mass strikes the ground. ( 4 mks)

# K.C.S.E 2010

## PHYSICS PAPER 232/1

## QUESTIONS

1. Figure 1 shows a vernier caliper being used to measure the internal diameter of a tube.

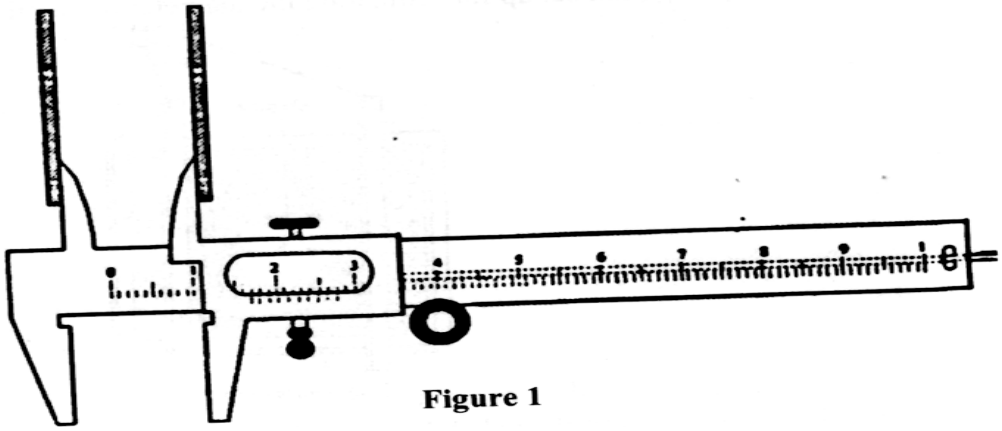


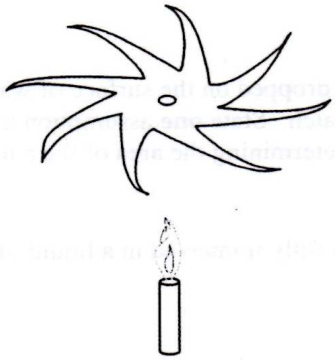
**Figure 1**

Record the diameter of the tube (1mk)

2. A stop watch started 0.50s after the started the start button was pressed. The time recorded using the stop wacth for a ball bearing failing through a liquid was 2.53s. Determine the time of fail. (1mk)

3. Some water in a tin can was boiled for some time. The tin can then sealed and cooled. After some time it collapsed. Explained this observation. (2mks)

4. A paper windmill in a horizontal axis was placed above a candle as shown in figure 2.

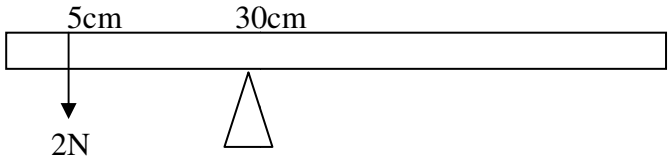


**Lit candle**

When the candle was lit the paper windmill begun to rotate. Explain this observation. (2mks)

5. When a liquid is heated in a glass flask, its level at first fails, mthen rises. Explain this observation. (2mks)

6. **Figure 3** shows a uniform metre rule pivoted at 30cm mk. It is balanced by weight of 2N suspeded at the 5cm mk.




Determine the weight of the metre rule. (2mks)

7. **Figure 4** shows a horizontal tube with two vertical tubes x and y. water flows through the horizontal tube from right to left. The water level in tube x is higher than water in tube y.

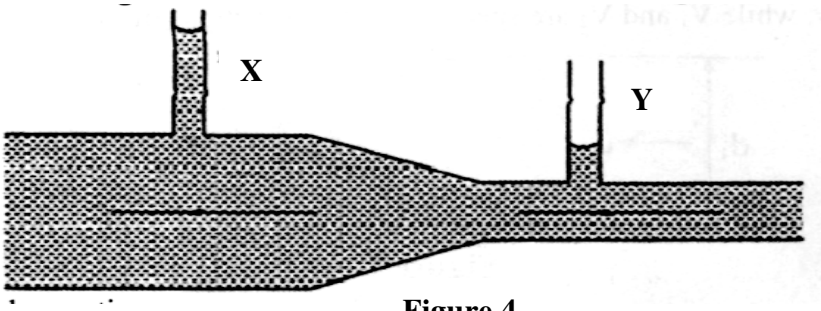



**Figure 4**

Explain this observation. (2mks)

8. A cart of mass 30kg is pushed along a horizontal path by a horizontal force of 8N and moves with a constant velocity. The force is then increased to 14N. determine:

   i. The resistance to the motion of the cart. (2mks)

   ii. The ecceleration of the cart. (1mk)

9. When a drop of oleic acid of known volume is dropped on the surface of water in a large trough, it spreads out to form a large circular patch. State one assumption made when the size of the molecule of oleic acid is estimated by determining the area of the patch. (1mk)

10. The weight of a solid in air is 5.0N. when it is fully immersed in a liquid of density 800kgm$^{-3}$ its weight is 4.04N. determine:

    a. The upthrust in the liquid (1mk)

    b. The volume of the solid. (1mk)

11. When a bicycle pump was sealed at the nozzle and the handle slowly pushed towards the nozzle, the pressure of the air inside increased.
    Explain this observation. (1 mk)

12. Figure 5 shows a mass of 200g connected by a string through a hollow tube to a mass of 0.5kg. Teh 0.5kg mass is kept stationary in the air by whirling the 200g mass round in a horizontal circle of radius 1.0 metre.

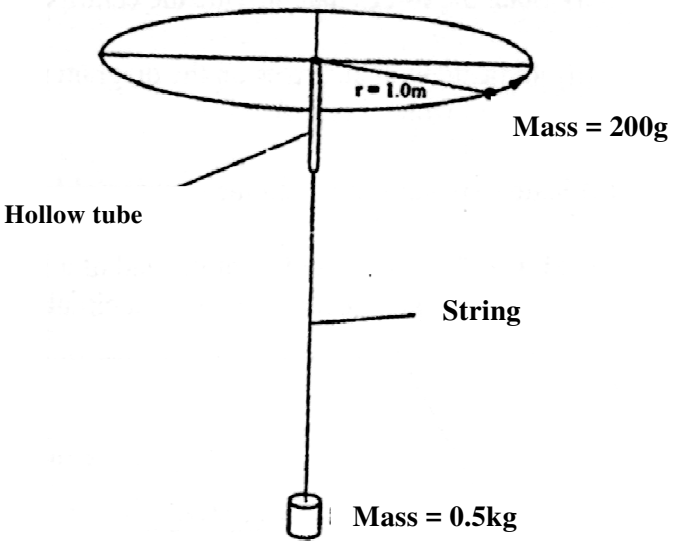



**Figure 5**

Determine the angular velocity of the 200g mass. (3 mks)

13. State the SI unit of a spring constant (NB in words) (1 mk)

14. Figure 6 shows an athlete lifting weights while standing with the feet apart.

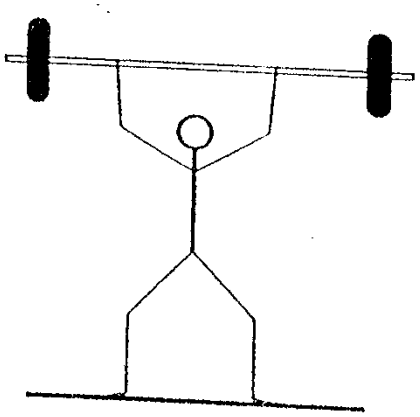


Figure 6

Explain why standing with the feet apart improves an athlete's stability. (1 mk)

## SECTION B( Marks)

**Answer all the questions in their section in the spaces provided**

15. a) A cyclist initially at rest moved down a hill without pedalling. He applied brakes and eventually stopped. State the energy changes as the cyclist moved down the hill. (1 mk)

b) Figure 7 shows a mass of 30kg being pulled from point P to point Q with a force of 200N parallel to an inclined place. Teh distance between P and Q is 22.5m. In being moved from P to Q the mass is raised through a vertical height of 7.5m.

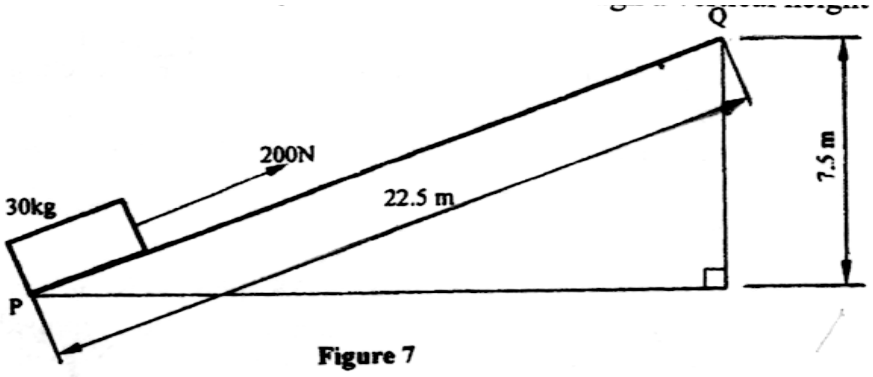



Figure 7

i) Determine the work done:

I by the force (2mks)

II on the mass (2 mks)

ii) Determine the efficiency of the inclined plane. (2 mks)

c) Suggest one method of improving the efficiency of an inclined plane. (1 mk)

16. In an experiment to determine the density of sand using a density bottle, the following measurements were recorded:

Mass of empty density bottle - 43.2g
Mass of density bottle full of water = 66.4g
Mass of density bottle with some sand = 67.5g
Filled up with water = 82.3g

Use the above data to determine the:

a) Mass of the water that completely filled the bottle: (2 mks)

b) Volume of water that completely filled the bottle: (1 mk)

c) Volume of the density bottle: (1 mk)

d) Mass of sand

e) Mass of water that filled the space above the sand. (1mk)

f) Volume of teh sand:

g) Density of the sand (2 mks)

17. a) Explain why it is advisable to use the pressure cooker for cooking at high attitudes (2 mks)

b) Water of mass 3.0kg initially at $20^0$C is heated in an electric kettle rated 3.0KW. The water is heated until it boils at $100^0$C. (Take specific heat capacity of water 4200jkg$^1$K$^{-1}$. Heat capacity of the kettle = 450JK-1, Specific latent heat of vaporization of water = 2.3mjkg-1)

Determine

i) The heat absorbed by the water. (1 mk)

ii) Heat absorbed by the electric kettle (2 mks)

iiii) The time taken for teh water to boil (2 mks)

iv) How much longer it will take to oil away all the water. (2 mks)

18. Figure 8 shows a stone of mass 4.0kg immersed in water and suspended from a spring balanced with a string. The beaker was placed on a compression balance whose reading was 85N. The density of the stone was $3000kg^{-3}$ while the density of the liquid was $800kg^{-3}$.

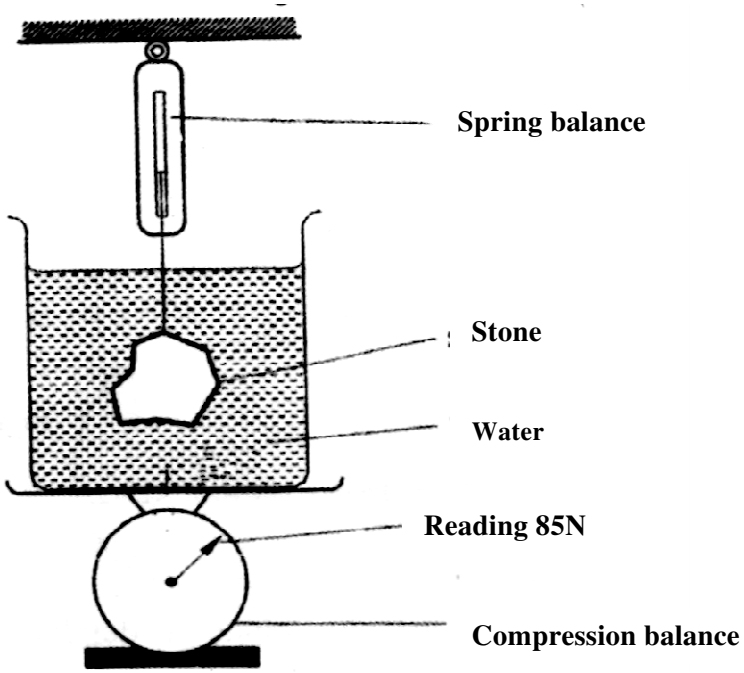
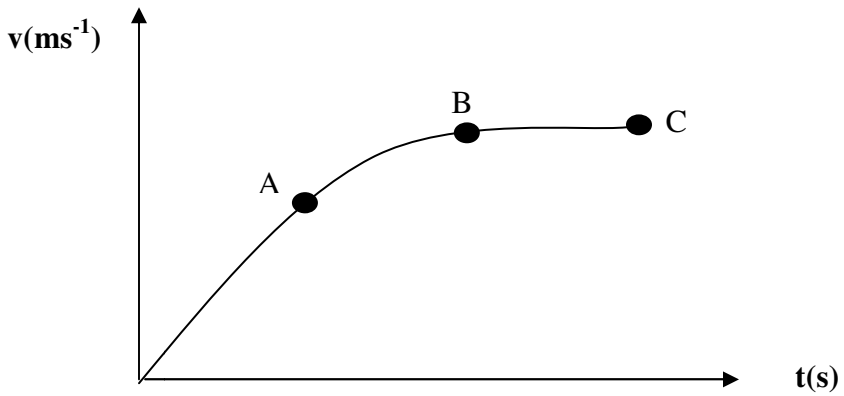



**Figure 8**

Determine the:

a) Volume of the liquid displaced. (2 mks)
b) Upthrust on the tone (4 mks)
c) Reading of the spring balance: (2 mks)
d) Reading of the compression balance when the stone was removed from the water. (2mks)

19. a) Figure 9 shows a velocity-time graph for the motion of a certain body.



Describe the motion of the body in the region.

i) **OA** (1 mk)

i) **AB** (1 mk)

iii) **BC** (1 mk)

b) A car moving initially at $10ms^{-1}$ decelerates at $2.5ms^{-2}$

i) Determine

I its velocity after 1.5s:

II the distance travelled in 1.5s (2 mks)

III the time taken for the car to stop (2 mks)

ii) Sketch the velocity-time graph for the motion of the car up to the time the car stopped. (1 mk)

iii) From the graph, determine the distance the car travelled before stopping. (2 mks)

# K.C.S.E 2011
## PHYSICS PAPER 232/1
## QUESTIONS

**SECTION A (25 marks)**

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

1. Figure 1 shows a lorry moving on an inclined section of a straight road. At the back is a chain hanging from a point on a horizontal axis through the centre of gravity of the lorry.

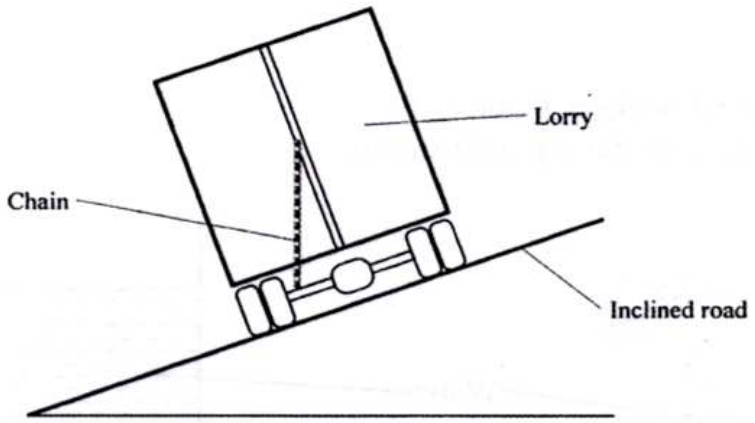



**Figure 1**

State with a reason whether the lorry is stable or not stable.

2. State the constant force that opposes the motion of a stone initially at rest, as it falls Through air from a tall building . ( 1 mk)

3. Figure 2 shows a spring balance. It's spring constant is $125Nm^{-1}$. The scale spreads over a distance of 20cm.

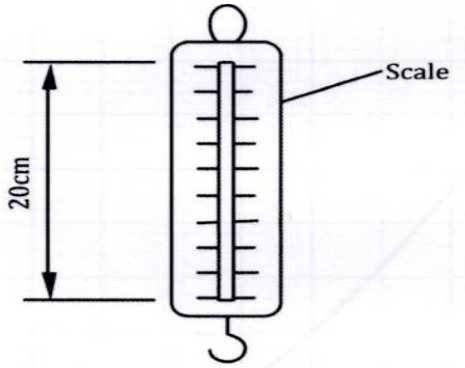



**Figure 2**

Determine the maximum weight that can be measured using this spring. (3 mks)

4. Figure 3 shows an aluminum tube tightly stuck in a steel tube .

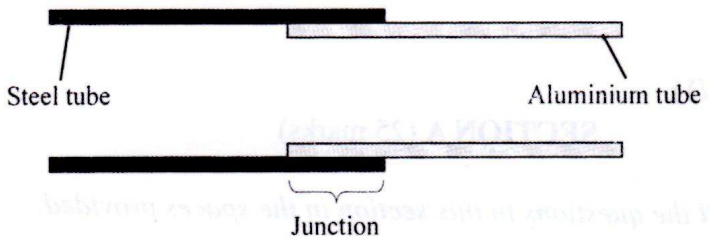



**Figure 3**

Explain how the two tubes can be separated by applying a temperature change at the junction given that aluminium expands more than steel for the same temperature rise. (2mks)

5. Figure 4 shows two identical beakers P and Q full of water at 90°C. Two similar cold wet clothes are wrapped, one around the top of P and the other around the bottom of Q.

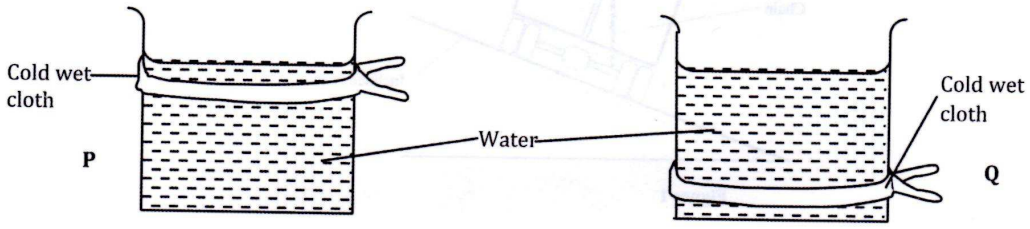



**Figure 4**

State with a reason, the, beaker in which the water cools faster. (2 mks)

6. Figure 5 is a graph of net force on a body against it's, velocity as it falls through a liquid.

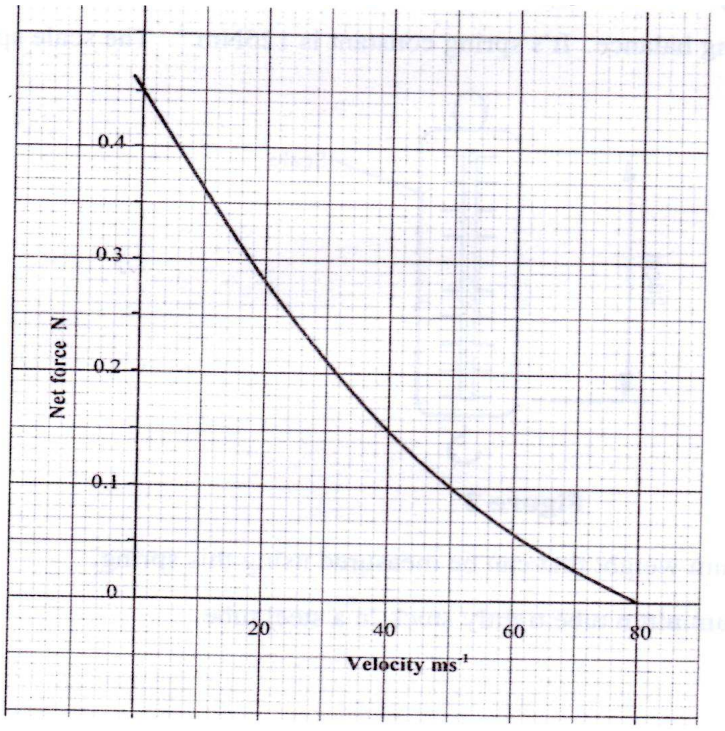



Figure 5

Determine the terminal velocity of the body. (1 mk)

7. Figure 6 shows a small toy boat floating on water in a basin. X and Y are-two points near the toy.

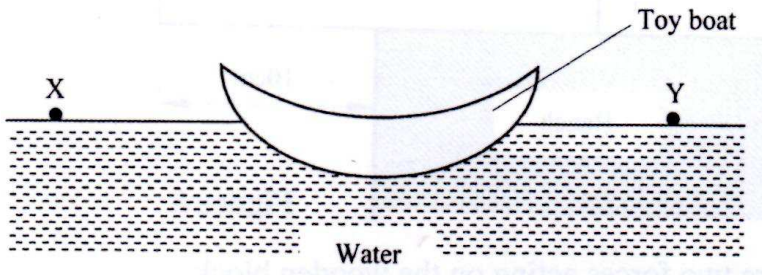



**Figure 6**

When a hot metal rod is dipped into the water at point X, the toy is observed to move towards Y. Explain this observation. (2 mks)

8. When the temperature of a gas in a closed container is raised, the pressure of the gas increases. Explain how the molecules of the gas cause the increase in pressure. (2 mks)

9. Figure 7 shows part of a petrol engine, in which air flowing under atmospheric pressure passes into a constriction, where it mixes with petrol. The mixture then flows into a combustion cylinder.

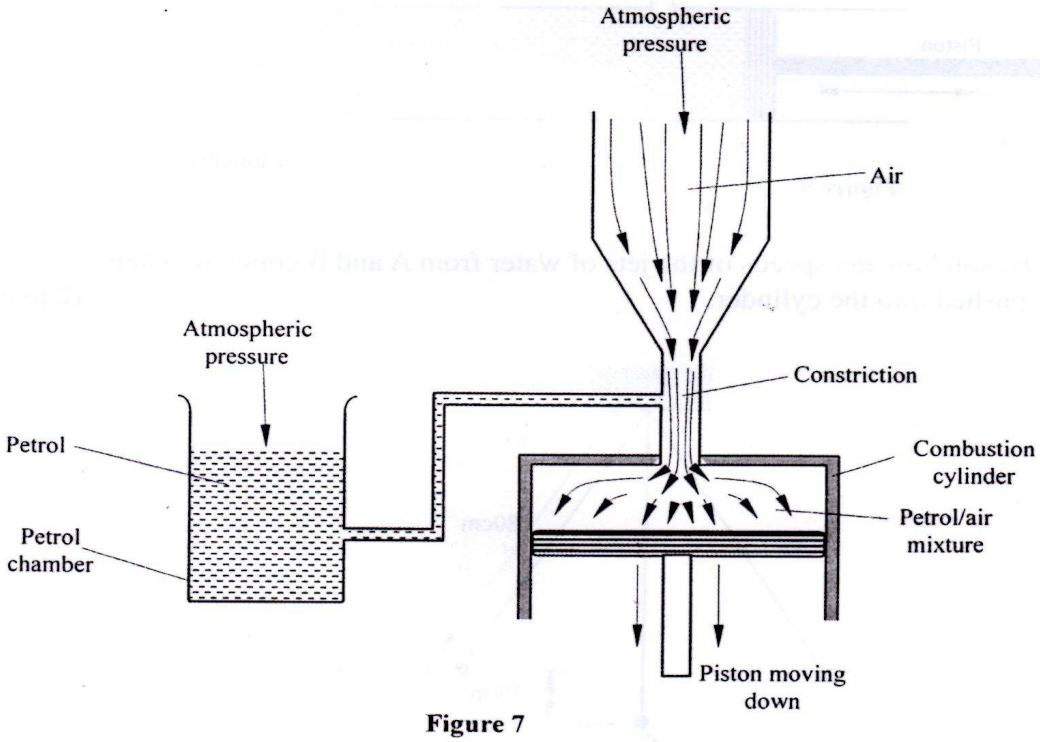



**Figure 7**

Explain what causes the petrol to move from the petrol chamber to the air stream in the constriction when the piston is moved downwards. (2 mks)

10. State the reason why it is easier to separate water into drops than to separate a solid into smaller pieces. (1 mk)

Figure 8 shows a uniform wooden block of mass 2kg and length 25cm lying on a bench. It hangs over the edge of the bench by 10cm. Use the figure to answer questions 11 and 12.

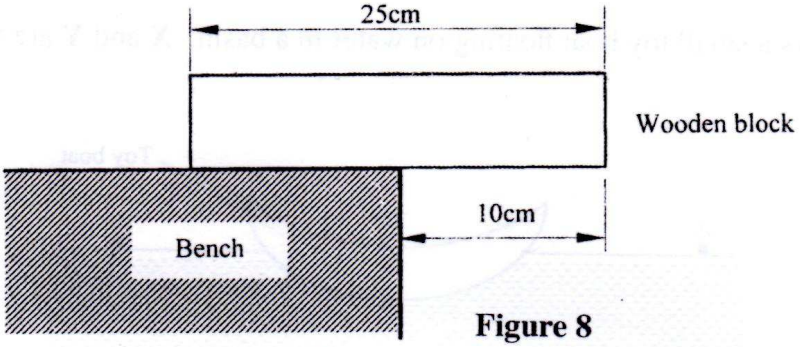



**Figure 8**

11. Indicate on the figure two forces acting on the wooden block. (1mk)

12. Determine the minimum force that can be applied on the wooden block to make it turn about the edge of the bench. (2 mks)

13. A particle starts from rest and accelerates uniformly in a straight line. After 3 seconds it is 9m from the starting point. Determine the acceleration of the particle. (3 mks)

14. Figure 9 shows a syringe full of water. It has two identical holes A and B drilled along it's cylinder. The cylinder nozzle is closed.

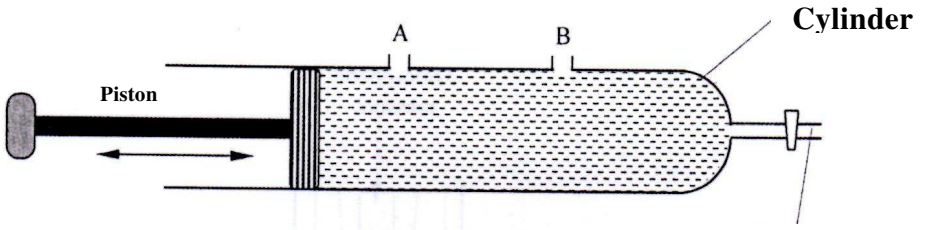



**Figure 9**

State with a reason how the speeds of the jets of water from A and B compare when the piston is pushed into the cylinder.

**SECTION B: (55 mks)**

***Answer all questions in this section***

15. Figure 10 shows a simple pendulum of length 80cm. The pendulum bob whose mass is 50g oscillates between points A and B, through its rest position C. A and are both 10cm higher than C.

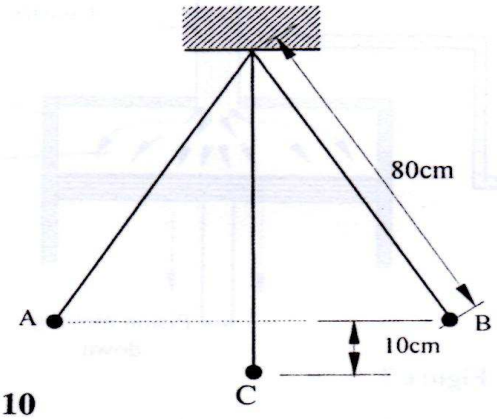



**Figure 10**

(a) (i)Indicate with an arrow, on the path ACB, the direction of the greatest velocity of the bob as it moves from A to B. (1 mk)

(ii) State the form of energy possessed by the pendulum bob at point A. (1mk)

(b)Determine:

(i) the velocity of the bob at point C (3mks)

(ii) the tension in the string as the bob passes point C (3mks)
(take acceleration due to gravity g - 10 $m/s^2$)

c) After some time, the pendulum comes to rest at point C. State what happens to the energy it initially possessed. (1 mk)

16. Figure 11 shows a stone attached to the end of a string moving in a horizontal circle with a uniform speed of $2ms^{-1}$. When the stone reaches point X on the circle, the string breaks.

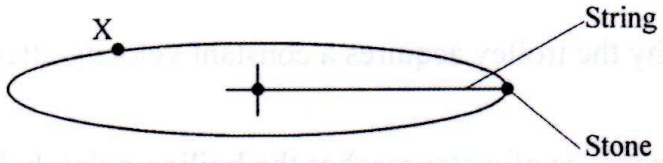



**Figure 11**

(i) Indicate on the diagram with an arrow, the direction of the motion of the stone when the string breaks. (1 mk)

(ii) State the magnitude of the velocity after the string breaks. (1mk)

(iii)Give a reason for your answers in (i) and (ii) (1mk)

(b) Figure 12 shows a lorry towing a trailer using a rope.

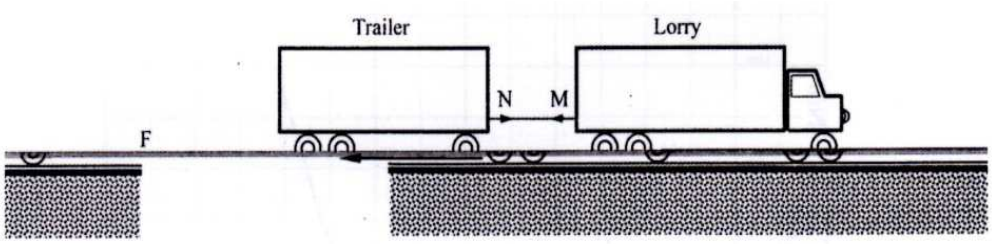



Figure 12

The lorry exerts a force N on the trailer and the trailer exerts an equal but opposite force M on the lorry. The frictional force between the trailer and the road is F.

Explain how the forces N, M and F enable the trailer to move. (2 mks)

(c) Figure 13 shows a frictionless trolley of mass 2kg moving with uniform velocity towards a wall. At the front of the trolley is a spring whose spring constant is $25Nm^{-1}$. The trolley comes to rest momentarily after compressing the spring by 3cm and then rebounds from the wall.

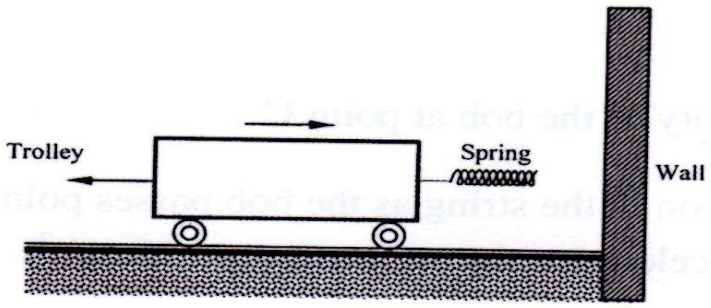



**Figure 13**

**(i)** Determine

(I) the force exerted on the wall by the spring. (3 mks)

(II) the maximum acceleration of the trolley as it rebounds from the wall. (3 mks)

**(ii)** State the reason why the trolley acquires a constant velocity after it rebounds. (2 mks)

17. (a) When the temperature of water reaches the boiling point, bubbles rise To the surface.

(i) State what is contained in the bubbles. (1 mk)

(ii) State the reason why bubbles rise to the surface only at the boiling point. (1 mk)

(b) Figure 14 shows a graph of vapour pressure against the temperature of water vapour, in a laboratory where a mercury barometer indicates a height of 61.8 cm.

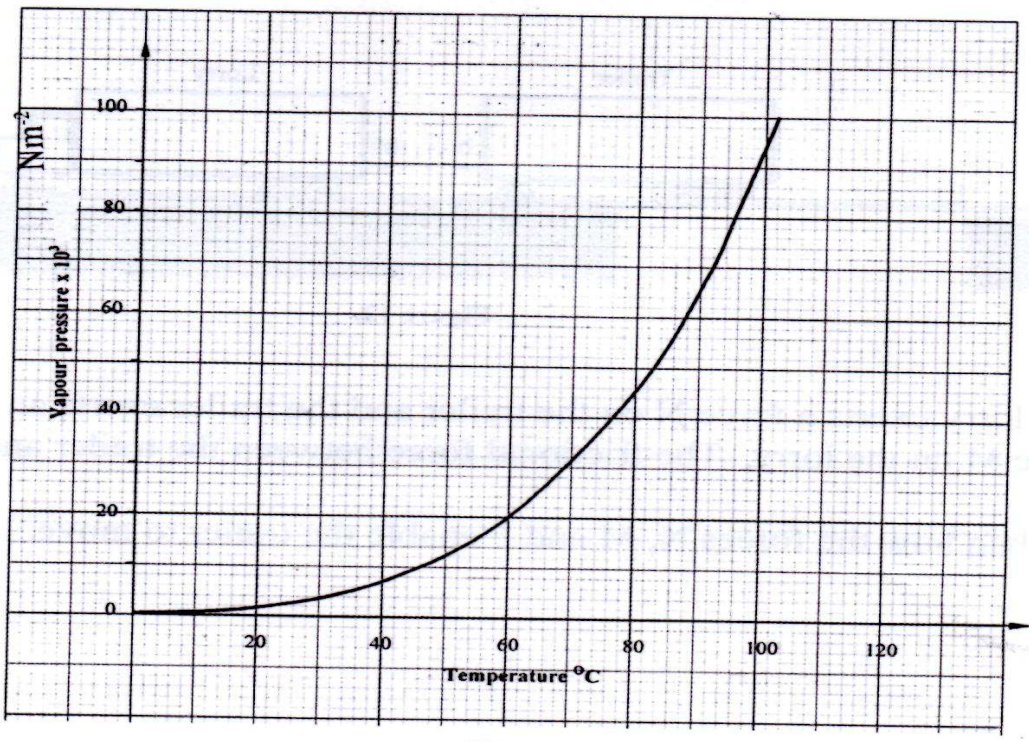



**Figure 14**

(b) (i) Determine the atmospheric pressure in the laboratory in $Nm^{-2}$
(Take g - $10m/S^2$ and density of mercury =13600 $kg/m^3$). (3 mks)

(ii) Use the graph to determine the boiling point of water in the laboratory. (1mk)

(c) In an experiment to determine the specific heat capacity of a metal, a100g of the metal was transferred from boiling water to a lagged copper calorimeter containing cold water. The water was stirred and a final steady temperature was realized. The following data was recorded.

Initial temperature of cold water and calorimeter = 20°C.
Temperature of boiling water = 99°C.
Final temperature of water, calorimeter and the metal = 27.7°C.
Mass of cold water and calorimeter = 130g.
Mass of calorimeter = 50g.

(Take specific heat capacity of water as 4200Jkg-$^{1}$K$^{-1}$)
(Specific heat capacity of copper as 400Jkg$^{-1}$K$^{-1}$).

Use the data to determine:

(i) the heat gained by the water and the calorimeter; (3 mks)

(ii) the specific heat capacity of the metal. (3 mks)

(d) State one possible source of error in the value of the specific heat capacity obtained in the experiment. (1 mk)

18. (a) Figure 15 shows a metal bolt which is threaded.

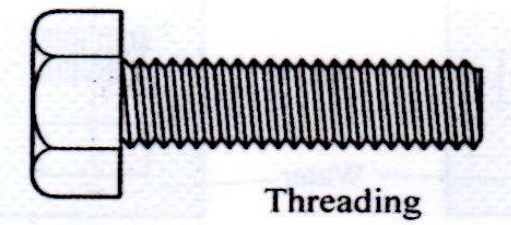



**Figure 15**

Explain how a metre rule can be used to measure The pitch (distance between adjacent peaks) of the threading. (2 mks)

(b) Figure 16 shows a screw jack whose screw has a pitch of .limn, and has a handle of 25 cm long.

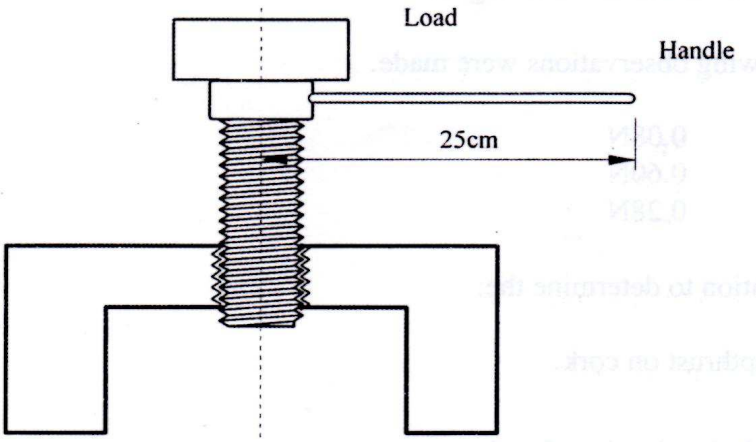



**Figure 16**

Determine the velocity ratio of the jack. (3mks)

(c) A bullet of mass 60g travelling at 800ms$^{-1}$hits a tree and penetrates a depth of 15 cm before coming.to rest

(i) Explain how the energy of the bullet changes as it penetrates the tree. (1 mk)

(ii) determine the average retarding force on the bullet. (3mks)

19. (a) State the condition necessary for a body to float in a fluid . (1 mk)

(b) A ship made of steel is observed to float on water yet the density of steel is approximately eight times that of water. Explain this observation.(2 mks)

(c) Figure 17 shows three stages of an experiment to determine relative density of cork which normally floats on water. To make it sink, a sinker is hung below

the cork.

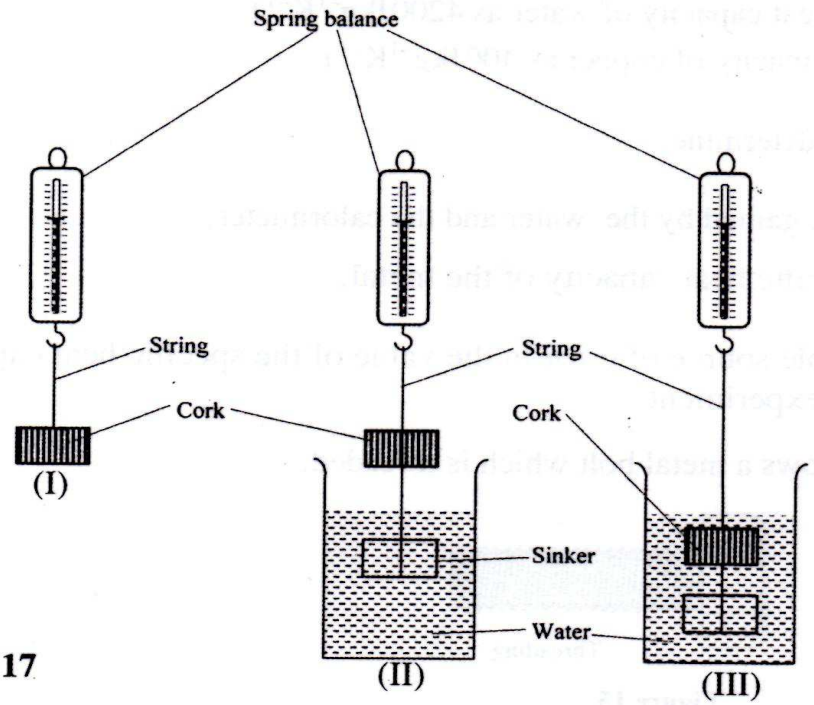



**Figure 17**

In (I) a spring balance is used to measure the weight W of the cork in air.
In (II) the spring balance is used to measure the apparent weight $W_1$, when only the sinker is submerged in water.
In (III) the spring balance is used to measure the apparent weight $W_2$ when both the cork and the sinker are submerged.

The following observations were made.

| | | |
|---|---|---|
| W | = | 0.08 N |
| $W_1$ | = | 0.060 N |
| $W_2$ | = | 0.28 N |

Use this information to determine the:

(i) upthrust on cork. (3mks)

(ii) Relative density of cork. (3 mks)

(d) Figure 18 shows parts of a simple submarine, a ship that can travel both

on water and under water.
To do this water is pumped in or out of the ballast tanks.

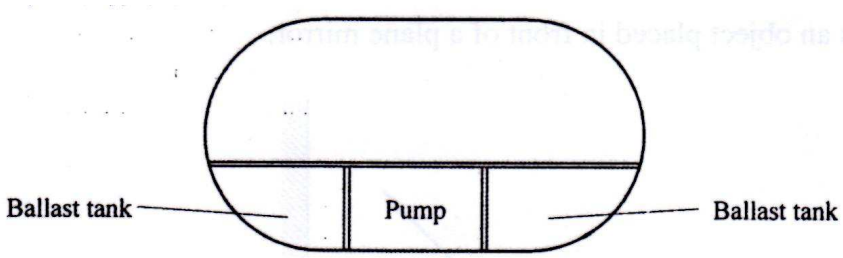



**Figure 18**

Explain how the tanks are used to change the depth of the submarine. (2 mks)

# PHYSICS PAPER 232/1
# QUESTIONS

1. **Figure 1** shows a measuring cylinder containing some water.

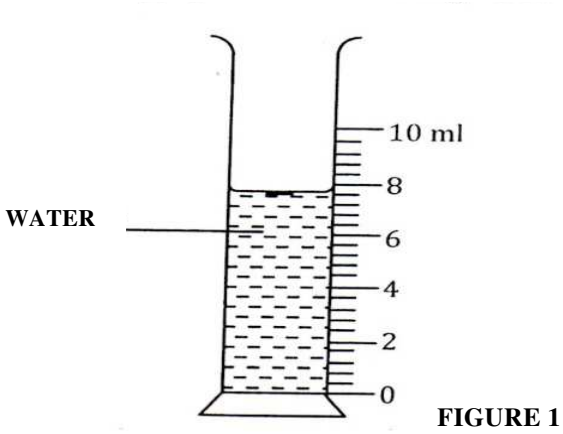



**FIGURE 1**

Determine the reading on the measuring cylinder, after three drops of water each of volume $0.6cm^3$ are added (2 mks)

2. A student pulls a block of wood along a horizontal surface by applying a constant force. State the reason why the block moves at a constant velocity. (1 mk)

3. A solid weighs 16.5 N on the surface of the moon. The force of the gravity on the moon is $1.7Nkg^{-1}$. Determine the mass of the solid. (3 mks)

4. A bottle containing a smelling gas is opened at the front bench of a classroom. State the reason why the gas is detected throughout the room. (1 mk)

5. Figure 2 shows a flat bottomed flask containing some water. It is heated

directly with a very hot flame.

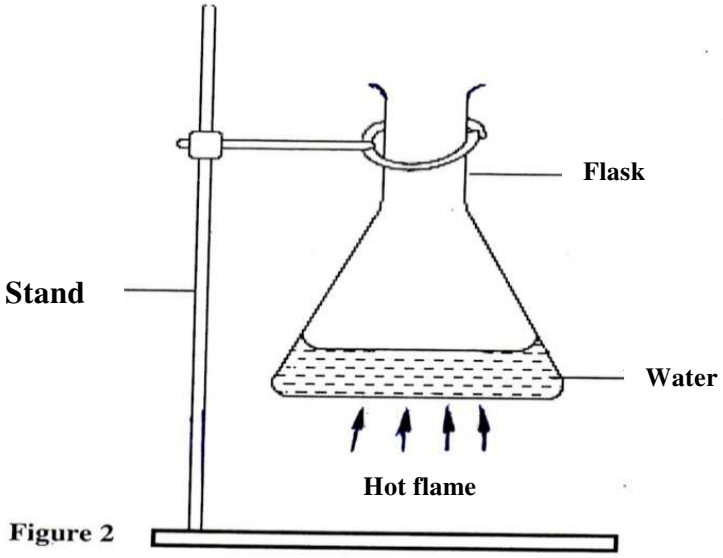



Figure 2

Explain why the crack is likely to crack (2 mks)

6. State two environmental hazards that may occur when oil spills over a large surface area of the sea. (2mks)

7. A balloon is filled with a gas which is lighter than air. It is observed to rise in air upto a certain height. State a reason why the balloon stops rising. (1mk)

8. In verifying the pressure law of gases, the temperature and pressure of a gas are varied at constant volume. State the condition necessary for the law to hold. (1 mk)

9. State the reason why a steel sphere resting on a horizontal surface is said to be neutral equilibrium. (1 mk)

10. Table 1 shows the result of an experiment carried out to study the properties of a spring.

Table 1

| Force (N) | 0 | 10 | 20 | 30 | 40 |
|---|---|---|---|---|---|
| Extension (cm) | 0 | 2 | 4 | 6 | 8 |

State with a reason whether the experiment was done within the elastic

limit of the spring. (2 mks)

11. Figure 3 shows a graph of velocity against time for a moving body.

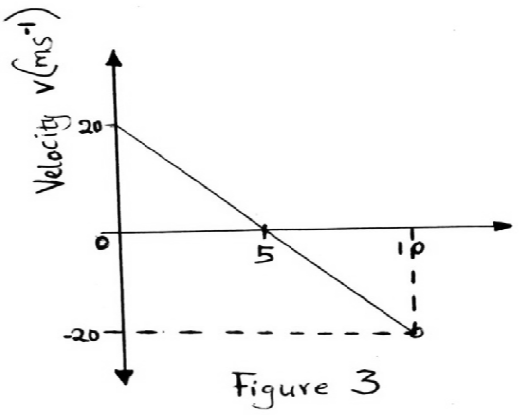


Figure 3

Describe the motion of the body during the 10seconds (2mks)

12. State two reasons why the efficiency of pulley system is always less than 100%

(2 mks)

13. Figure 4 shows a graph of temperature against time when pure melting ice at $0^0$C is heated uniformly.

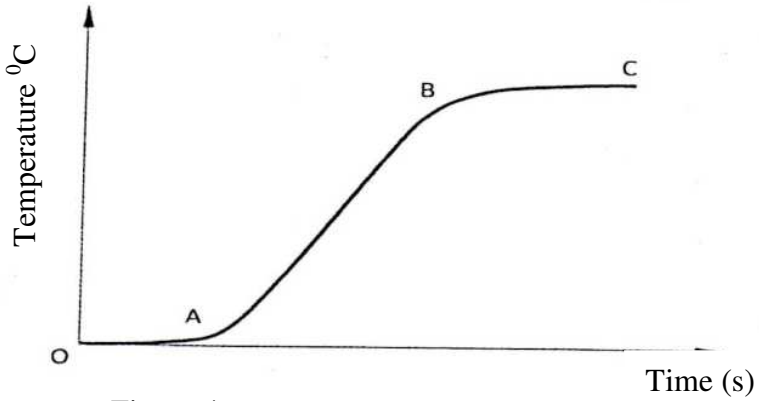


Figure 4

Explain what happens between parts:

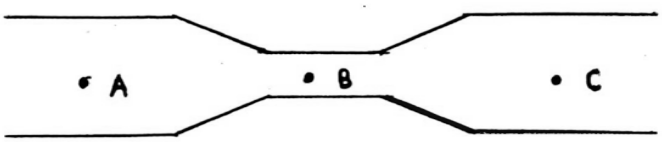
(i) OA (1 mk)

(ii) AB (1 mk)

14.

(a) An aeroplane is moving horizontally through still air at a uniform speed. It is observed that when the speed of the plane is increased, its height above the ground increases. State the reason for this observation. (1 mk)

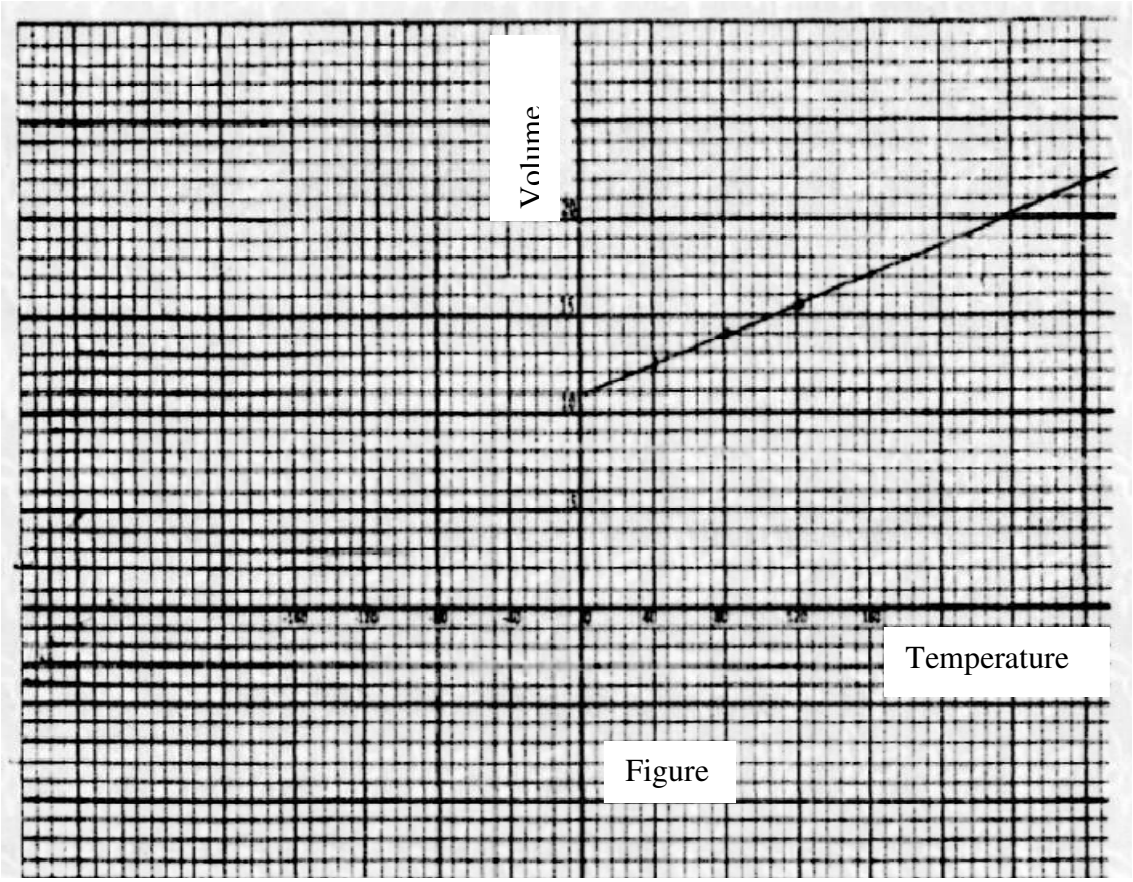
(b) Figure 5 shows parts A, B and C of a glass tube.




State with a reason the part of the tube in which the pressure will be lowest when air is blown through the tube from A towards C. (2 mks)

15.

(a) Figure 6 shows a graph of volume against temperature for a given mass of gas.




Figure

Use the graph to determine the absolute zero temperature in °C. (2 mks)

(b) Figure 7 shows a horizontal tube containing air trapped by a mercury thread of length 24cm. The length of the enclosed air column is 15cm. The atmospheric pressure is 76cmHg.

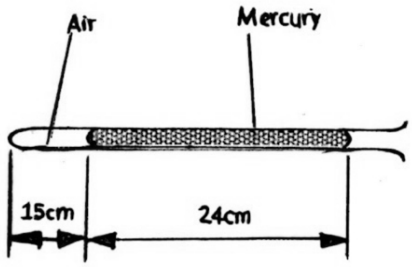



Figure 7

(i) State the pressure of the enclosed air. (1 mk)

(ii) The tube is now held in a vertical position with the open end facing upwards as shown in Figure 8.

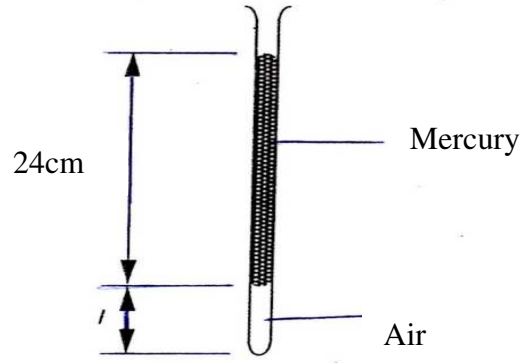



Figure 8

Determine:
(i) The pressure of the enclosed air.
(ii) The length (l) of the enclosed air column

c)

In an experiment to demonstrate atmospheric pressure, a plastic bottle is partially filled with hot water and the bottle is then tightly corked. After some time the bottle starts to get deformed.

(i) State the purpose of the hot water. 1 mk)

(ii)State the reason why the bottle gets deformed (1 mk)

(iii) Explain your answer in c (ii) (2 mks)

16.

(a) Figure 9 shows a trolley on a smooth surface being pulled by a constant force F.

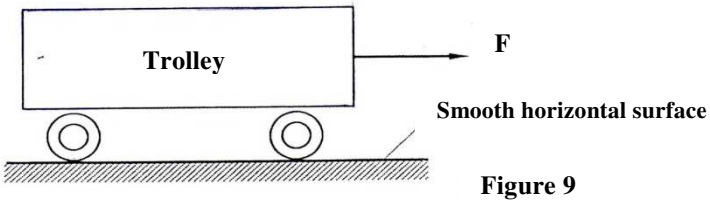



**Figure 9**

(i) On the axis provided, sketch the velocity-time graph for the motion of the trolley. (2 mks)


(ii) A parachute falling through the air attains terminal velocity after a short-time. State the reason why it attains terminal velocity. (1 mk)

**c)**

**Figure 10** shows the path of an object of mass m attached to a string of length r when whirled in a vertical circle at a constant speed V, a is the highest point on its path

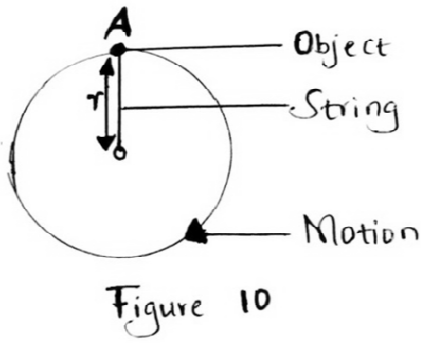



Figure 10

(i) State the forces that provide the centripetal force on the object when it is at point A. (2 mks)

(ii) Indicate with an arrow on the diagram the direction of the net force F acting on the object when it is at A. (1 mk)

**17.**

(a) **Figure 11** shows how an underground room was ventilated. It had two vents, one at A and other at B. A fire was lit at point C.

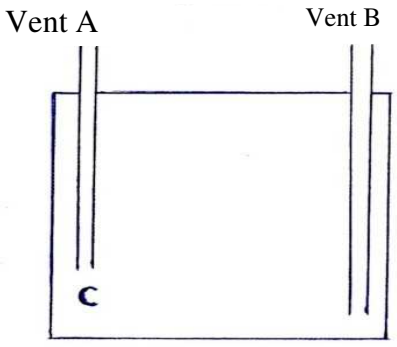
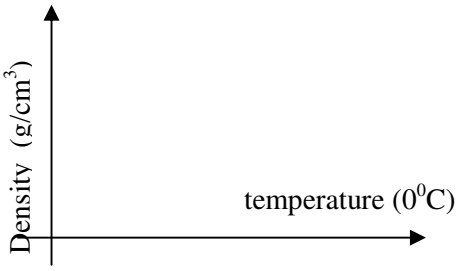



**Figure 11**

Explain what happened to the ventilation when the fire was lit. (3 mks)

(b) Explain how a vacuum flask minimizes loss of heat through radiation (1 mk)

c) In an experiment to investigate the unusual expansion of water, a fixed mass of water at $0^0$C was heated until its temperature reached $20^0$c .
On the axis provided, sketch a graph of density against temperature of the water from$0^0$C to $20^0$c (2 mks)




d)

An immersion heater rated 2.5 Kw is immersed into a plastic jug containing 2kg of water and switched on for 4minutes. Dermine;

(i) The quantity of heat gained by the water; (2 mks)

(ii) The temperature change for the water; (3 mks)
take specific heat capacity of water as 4.2 x $10^3$Jkg$^{-1}$K$^{-1}$).

**18.**

(a) **Figure 12** shows a set up used to determine the mass of a solid S. The rod is pivoted at its centre of gravity C.

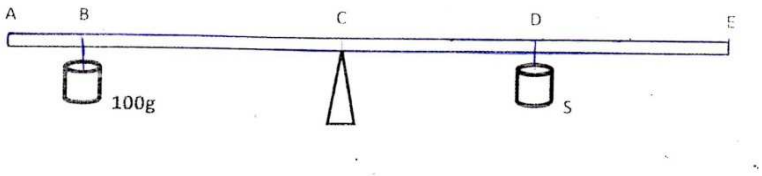



**Figure 12**

(i) State two measurements that need to be made to determine the mass of solid S. (1mk)

(ii) Write an expression to show how the measurements in (i) above are used to obtain the mass of S. (2mks)

b)

**Figure 13** shows a log of wood of mass 20kg submerged in water in a pond and held in position by striking fixed to the bottom of the pond.

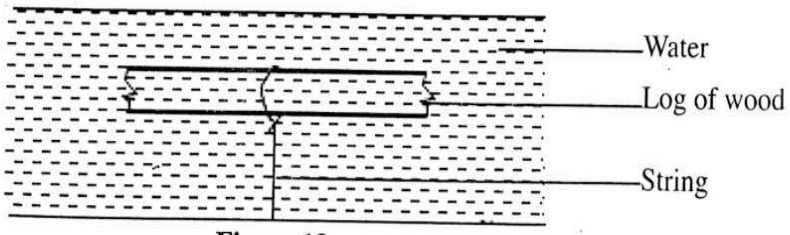



**Figure 13**

Given that density of water is $1000kgm^{-3}$ and that of wood is $800kg^{-3}$, determine the;

(i) Volume of the log, (3 mks)

(ii) Upthrust on the log. (2 mks)

(iii) Tension in the string (2 mks)

19. (a) **Figure 14** shows a lift pump.

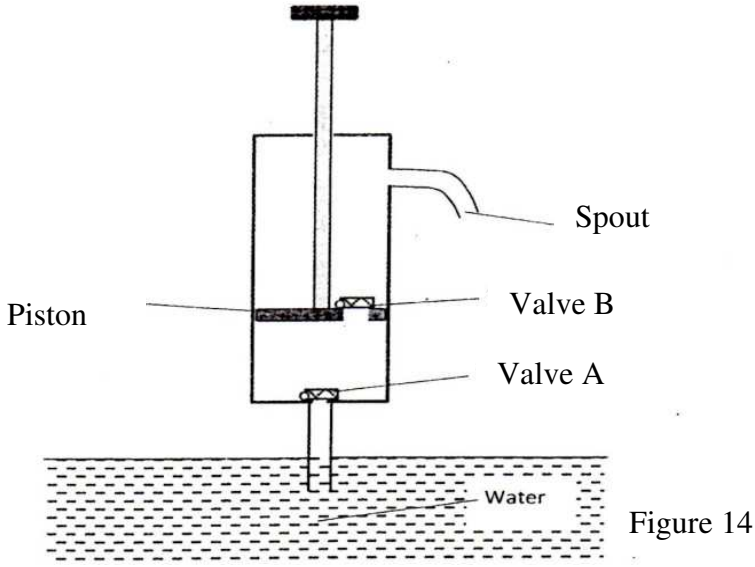



Figure 14

Explain why, when the piston is:

(i) Pulled upwards, valve A opens while valve B closes. (2 mks)

(ii) Pushed downwards, valve A closes while valve B opens. (2 mks)

(b) After several strokes, water rises above the piston as shown in **figure 15.**

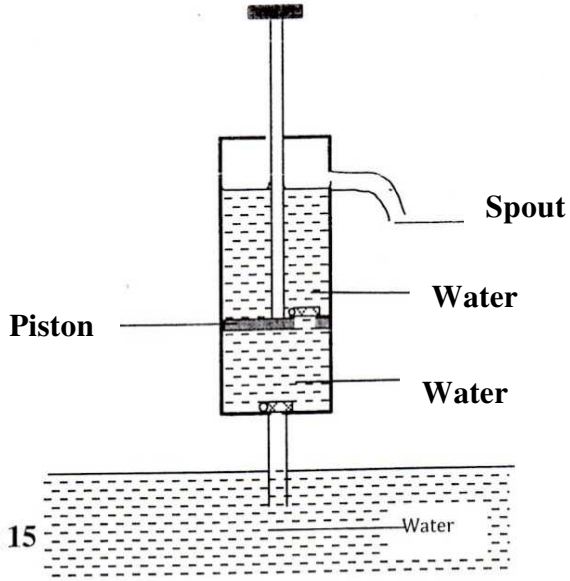



**Figure 15**

State how water is removed from the cylinder through the spout. (1mk)

(c) A lift pump can lift water to a maximum height of 10m.Determine the maximum height to which the pump can raise paraffin.

*(take density of paraffin as 800kgm-3 and density of water as 1000kgm$^{-3}$).* (3mks)

(d) State one factor that determines the height to which a force pump can

lift water. (1mk)

# K.C.S.E 2013

## PHYSICS PAPER 232/1

## QUESTIONS

### SECTION A (25 mks)

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

1. **Figure 1** shows part of the main scale and vernier scale of a vernier calipers.

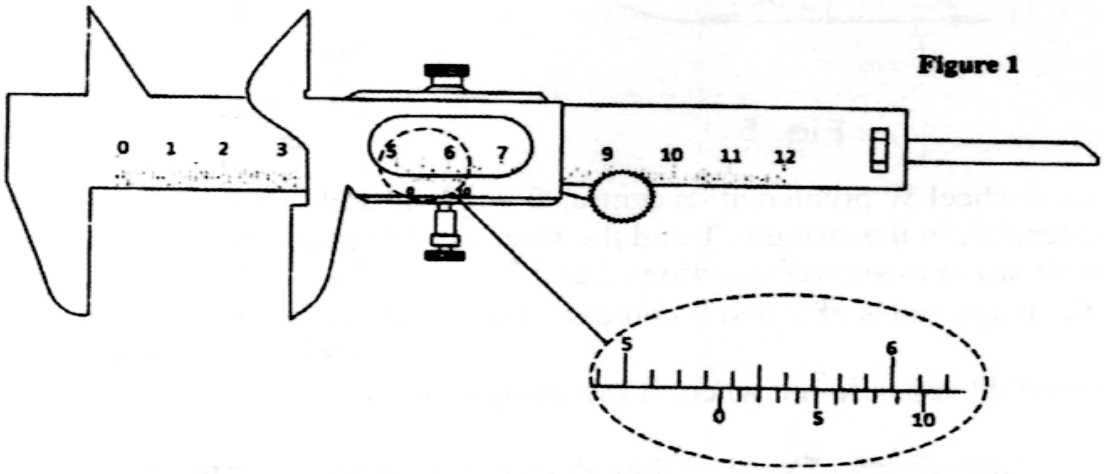



**Figure 1**

Record the reading indicated. (1 mk)

2. State one factor that affects the turning effect of a force on a body. (1 mk)

3. **Figure 2** shows some air trapped by mercury in a glass tube. The tube is inverted in a dish containing mercury.

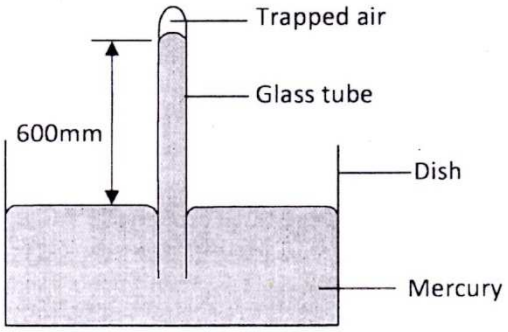



**Figure 2**

Given that the atmospheric pressure is 760 mmHg and the height of mercury column in the tube is 600 mm, determine the pressure of the air trapped in the tube in mmHg. (3 mks)

4. An object of weight 20 N attached at the end of a spring causes an extension of 0.5 cm on the spring. (1 mk)

   (a) Determine the spring constant of the spring. (2 mks)

   (b) Determine the weight of an object that would cause an extension of 0.86 cm when attached at the end of the same spring. (1 mk)

5. State two measurements you would take in an experiment to determine the upthrust of an object which is immersed in a fluid. (2 mks)

6. State how the measurements in question (5) are used to determine the upthrust of the object. (1 mk)

7. **Figure 3** shows a piece of wood fitted into a copper pipe and a piece of paper wrapped tightly around the junction.

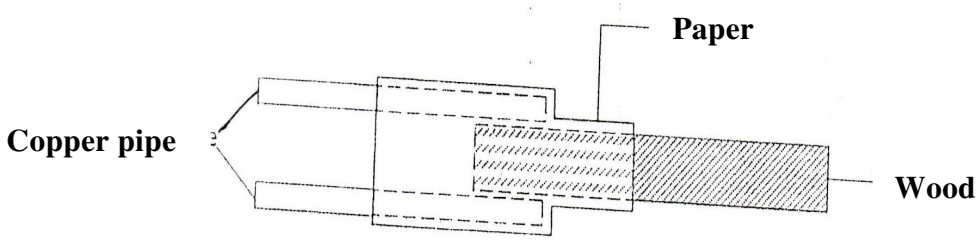



**Figure 3**

It is observed that when a flame is applied around the paper at the junction, the side of the paper around the wood burns first,. Explain this observation. (2 mks)

8. **Figure 4** shows a uniform meter rule of weight 1 N with two weights of 0.18 N and 0.12 N suspended from its ends.

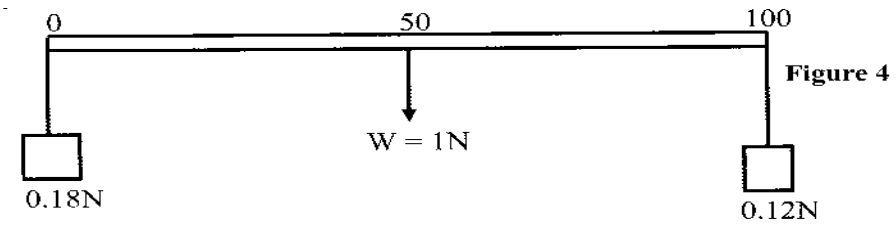



**Figure 4**

**Figure 4** e how far from the 0.18 N weight a pivot should be placed in order to balance the meter rule. (3 mks)

9. Explain why brakes fail in a hydraulic braking system when air gets into the system. (2 mks)

10. **Figure 5** shows a bunsen burner.

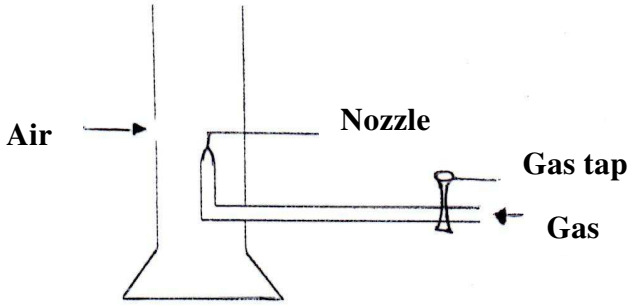



**Figure 5**

Explain how air is drawn into the burner when the gas tap is open. (3 mks)

11. **Figure 6** (a) and 6 (b) show capillary tubes inserted in water and mercury respectively.

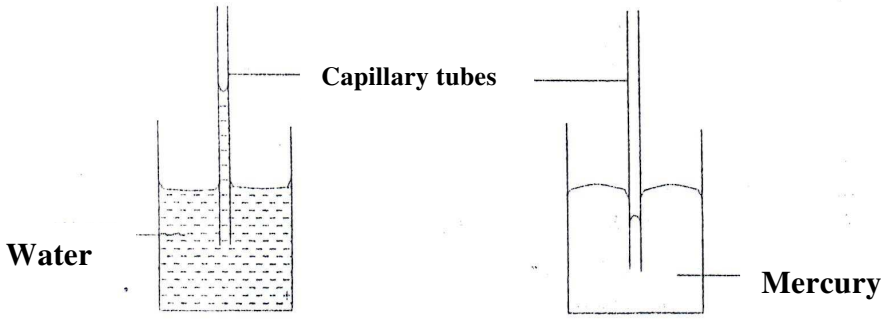



**Figure (6a)** **Figure 6(b)**

It is observed that in the water the meniscus in the capillary tube is higher than the meniscus in the beaker, while in mercury the meniscus in the capillary tube is lower than the meniscus in the beaker. Explain these observations. (2 mks)

12. State why it is necessary to leave an air space in a closed glass bottle of water when is to be kept in a refrigerator. (1 mk)

13. A drop of blue ink is introduced at the bottom of a beaker containing water. It is observed that after sometime, all the water in the beaker turns blue. Name the process that takes place. (1 mk)

**SECTION B (55 mks)**

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

14. (a) State two ways in which the centripetal force on a body of mass M can be increased. (2 mks)

(b) **Figure 7** shows an object at the end of a light spring balance connected to a peg using a string.
The object is moving in a circular path on a smooth horizontal table with a constant speed.

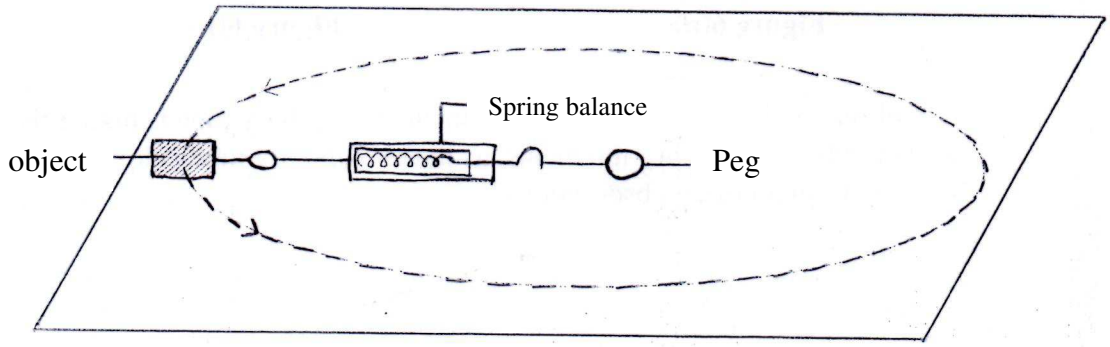



**Figure 7**

(i) State what provides the centripetal force. (1 mk)

(ii) Indicate with an arrow on the figure the direction of centripetal force. (1 mk)

(iii) State a reason why the object is accelerating while its speed remains constant. (1 mk)

(iv) Given that the mass of the object is 0.5 Kg and it is moving at a speed of 8 $ms^{-1}$ at a radius of 2m, determine the reading on the spring balance. (3 mks)

(c) A stone throw vertically upwards reaches a height of 100 m. Determine the:
(i) Initial velocity of the stone.
*(Neglect air resistance and take g = 10 $ms^{-2}$)* (2 mks)

(ii) Total time the stone is in air. (2 mks)

15. (a) State the meaning of the term "*specific latent heat of fusion*". (1 mk)

(b) **Figure 8** shows a set up of apparatus used in an experiment to determine the specific latent heat of fusion of ice.

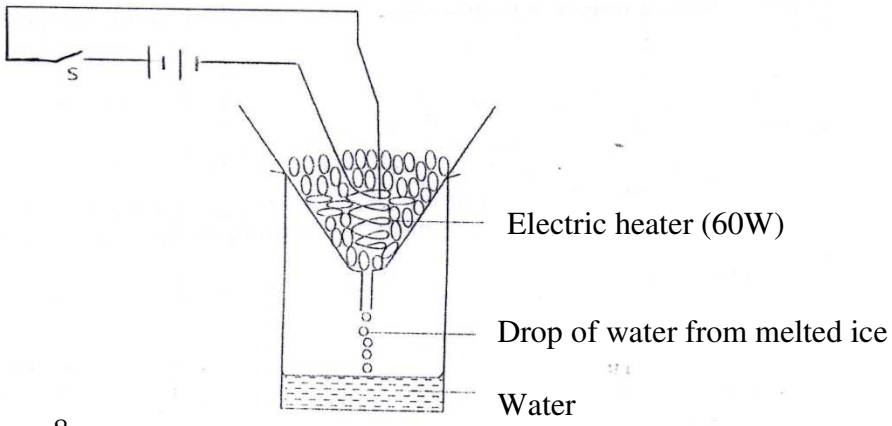



Figure 8

The following readings were noted after the heater was switched on for 5 minutes:

- Mass of beaker = 130 g
- Mass of beaker + melted ice = 190 g

(i) Determine the:

(I) energy supplied by the 60 W heater in the 5 minutes. (3 mks)

(II) specific latent heat of fusion of ice. (4 mks)

(ii) It was observed that some of the crushed ice melted even before the heater was switched on. State a reason for this observation. (1 mk)

16. (a) A horizontal force of 12 N is applied on a wooden block of mass 2kg placed on a horizontal surface. It causes the block to accelerate at 5 $ms^{-2}$. Determine the frictional force between the block and the surface. (3 mks)

(b) **Figure 9** shows a graph of velocity against time for a ball bearing released at the surface of viscous liquid.

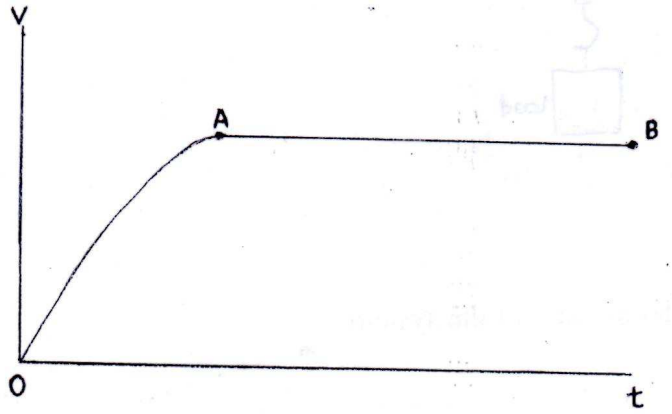



**Figure 9**

Explain the ball bearing for parts

(i) OA

(ii) AB

(c) **Figure 10** shows a pulley system used to raise a load by applying an effort of 500 N. State the:

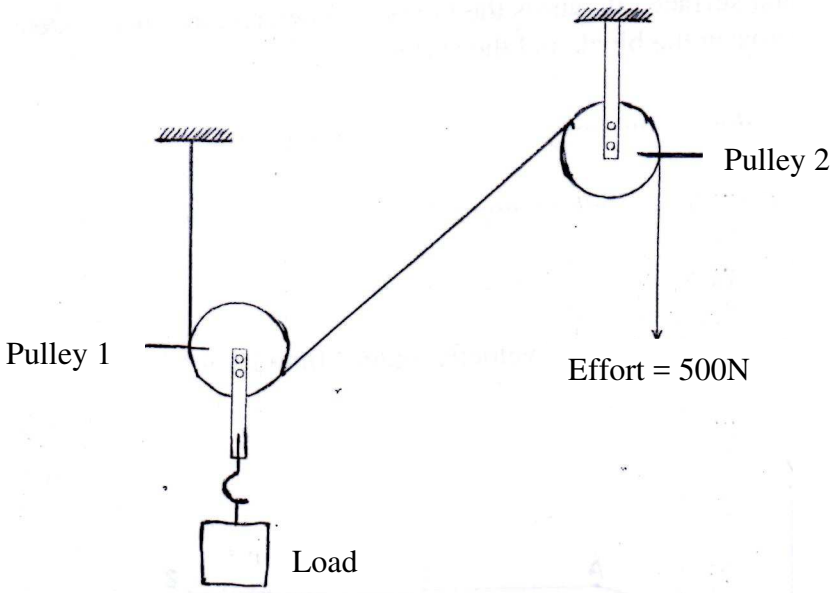



Figure 10

(i) Velocity ratio of the system (1 mk)

(ii) Purpose of the pulley 2 (1 mk)

(iii) Given that the machine has an efficiency of 80%, determine the maximum load that can be raised. (3 mks)

17. **Figure 11** shows an insulated cylinder fitted with a pressure gauge, a heating coil and a frictionless piston of cross – sectional area $100cm^{2.}$

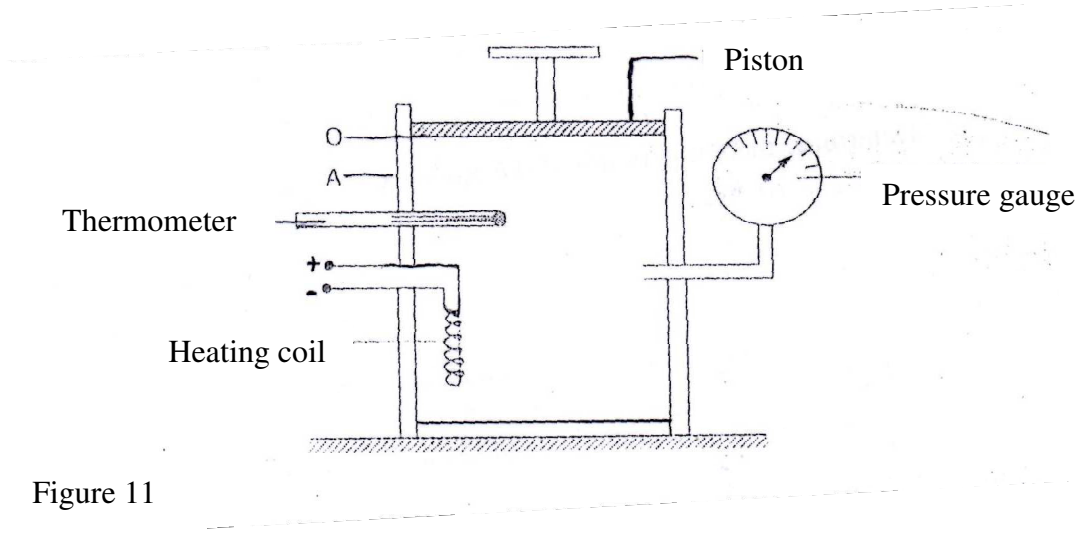



Figure 11

(a) While the piston is at position O, the pressure of the enclosed gas is 10 $Ncm^2$ at a temperature of $27^0C$. When a 10 kg mass is placed on the piston, it comes to rest at position A without change in the temperature of the gas.

(i) Determine the new reading on the pressure gauge. (4 mks)

(ii) State with a reason how the value obtained in (i) compares with the initial pressure.

(2 mks)

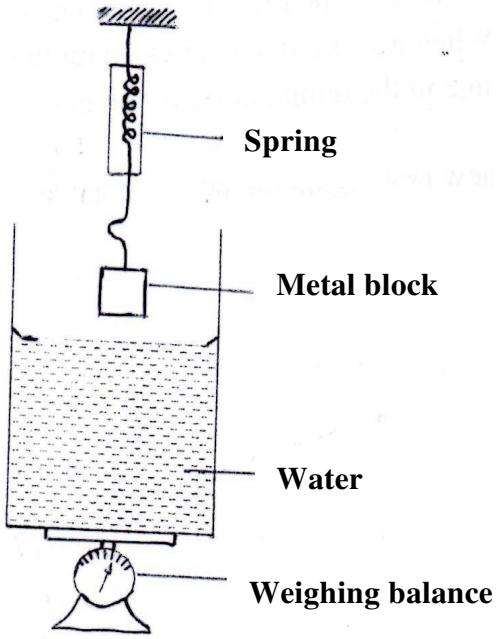
(b) The gas is now heated by the heating coil so that the piston moves back to the original position O.

(i) State the reading on the pressure gauge. (1 mk)

(ii) Determine the temperature of the gas in $^0C$. (4 mks)

(*Take* $g = 10\ Nkg^{-1}$)

18. (a) **Figure 12** shows a weighing balance on which a beaker containing some water is placed. The reading on the balance is 2.80 N. A metal block weighing 2.7 N is suspended from a spring balance.




(i) State what is observed on the spring balance and the weighing balance, as the metal block is gradually lowered into the water.

(I) Observation on spring balance. (1 mk)

(II) Observation on weighing balance. (1 mk)

(ii) Explain the observation made on the spring balance in (I). (2mks)

(iii) When the metal block is fully immersed in the water, the reading on the spring balnce is found to be 2.46 N. Determine the:

(I) reading on the weighing balance. (2 mks)

(II) density of the metal. (3 mks)

(c) **Figure 13** shows a hydrometer with a thin stem floating in water in a beaker.

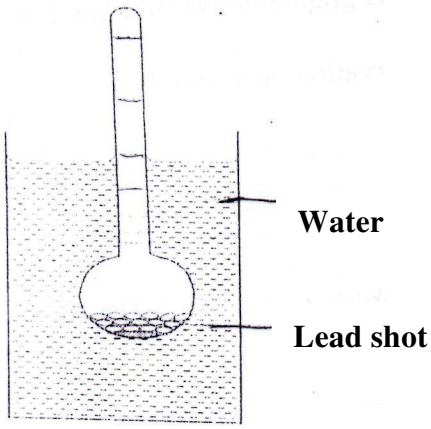



**Figure 13**

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

# K.C.S.E 2014
## PHYSICS PAPER 232/1
## QUESTIONS

*Answer **ALL** the questions in this section in the spaces provided.*

1. A student measured the length of a wire four times using a metre rule and obtained the following readings: 18.6cm; 18.5cm and 18:5. Determine the length the student should record (2 mks)

2. **Figure 1** shows a magnified scale of a micrometer screw gauge.

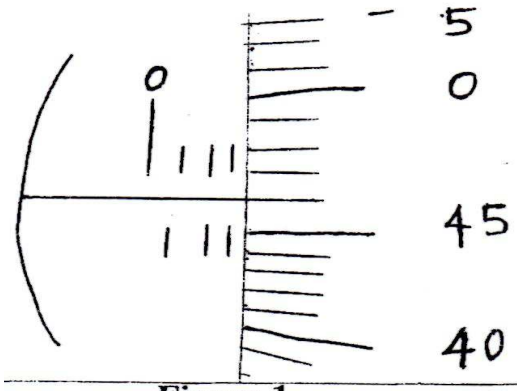


Figure 1

3. State the reason why it is **not correct** to quote the weight of solid objects in kilograms. (1 mk)

4. **Figure 2** shows a section of a curved surface **ABCD**. Point **A** is higher than point **B** while **BCD** is horizontal. Part **ABC** is smooth while **CD** is rough. **A** mass **m** is released from rest at **A** and moves towards **D**.

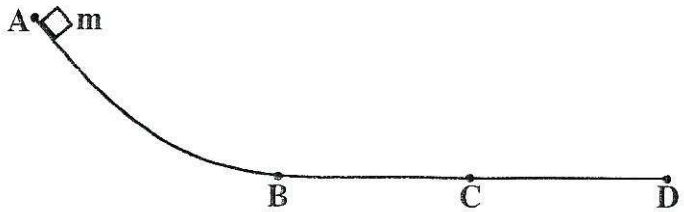


Figure 2

State the changes in the velocity of **m** between

a) **B** and **C** (1 mk)

b) **C** and **D.** (1 mk)

5. **Figure 3** shows two cylinders of different cross-sectional areas connected with a tube. The cylinders contain an incompressible fluid and are fitted with pistons of cross-sectional areas $4cm^2$ and $24cm^2$.

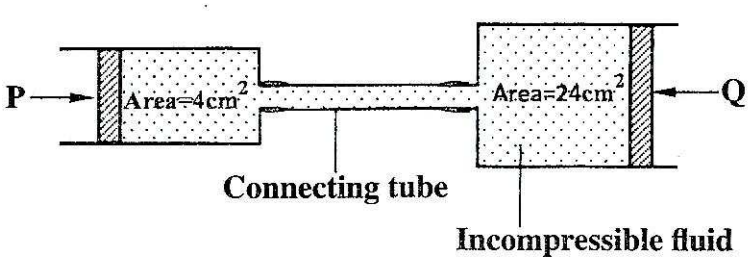



Figure 3

Opposing forces **P** and **Q** are applied to the pistons such that the pistons do not move. If the pressure on the smaller piston is $5N\ cm^{-2}$. Determine force **Q.** (2 mks)

6. An oil drop of volume V $m^3$ introduced on the surface of water spreads to form a patch whose area is A $m^2$. Derive an expression or obtaining the diameter, d of a molecule of oil (2 mks)

7. **Figure 4** show a shows a source of heat placed at equal distances from two identical flask **X** and **Y** containing air. The surface of **X** is painted black while **Y** is clear.

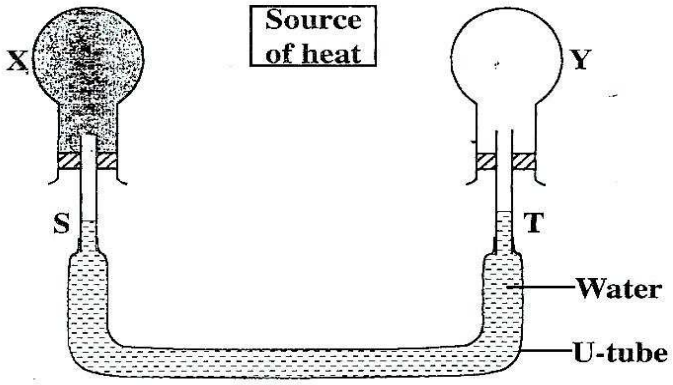



Figure 4

**X** and **Y** are linked by U- tube filled with water whose levels **S** and **T** are initially the same. It is later observed that **S** falls while **T** rises. Explain this observation.

(2 mks)

8. **Figure 5** shows a uniform rod 4 m long and of mass 2 kg. It is pivoted 1 m from one end and balanced horizontally by a string attached near the other end.

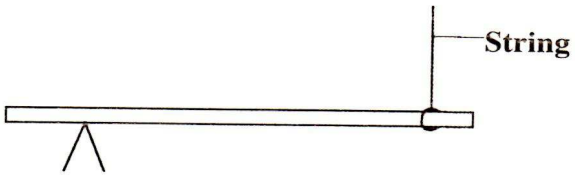



**Figure 5**

Determine the position where a mass of 5 kg should be placed on the rod so that the rod remains horizontal and the tension in the string is zero. (3 mks)

9. Figure 6 shows two identical rods **JK** and **LK** connected with a hinge at **K**.

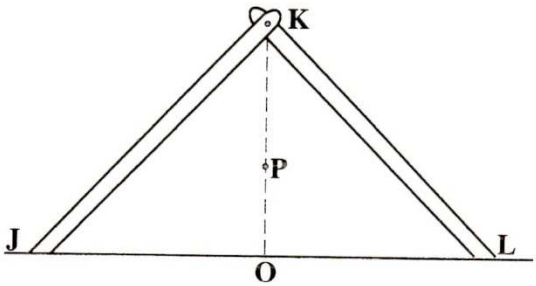



**Figure 6**

The position of the centre of gravity for the system is at **P**. The arrangement is now adjusted so that **J** and **L** move equal distances towards **O**. Sketch the new arrangement on the same diagram and mk the new position of the centre of gravity. (2 mks)

10. A light spiral spring extends by 4mm when loaded with a weight W. The spring is connected in series with an identical spring. The combination is loaded with the weight W. Determine the extension of the combination (2 mks)

11. **Figure 7** shows an incompressible fluid flowing through a pipe, $A_1$ and $A_2$ are the cross section areas of the pipes in the larger section and smaller section of the pipe respectively, while V1 and V2 are speeds of the fluid at the two section of the pipe.

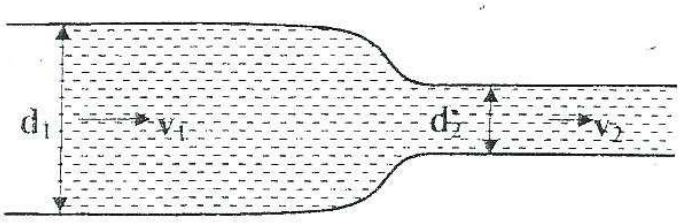
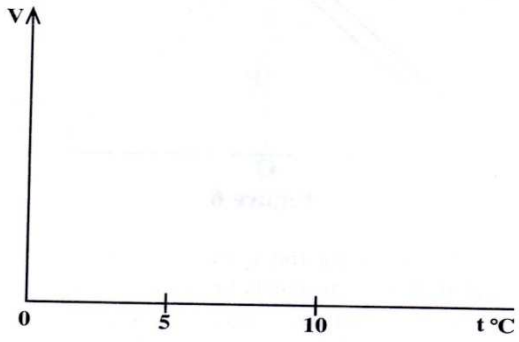



Figure 7

Derive an expression for the ratio of the speeds $V_2/V_1$ in terms of A1 and A2. (2 mks)

12. On the axis provided, sketch the graph which shows the relationship between volume and temperature of a fixed mass of water in the temperature range $O^0$ to $10^0$C.

(1 mk)




13. **Figure 8** shows a graph of the variation of temperature with time for a pure substance heated at a constant rate.

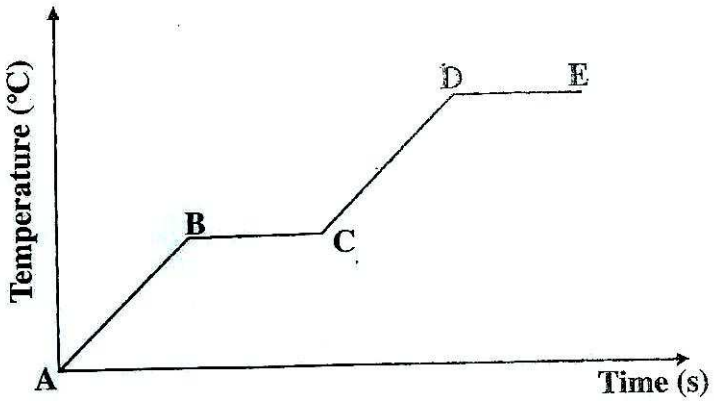



Figure 8

Assuming that heat transfer to the surroundings is negligible, state the changes observed on the substance in region;

a) **BC** (1 mk)

(b) **DE** (1 mk)

14. In a smoke cell experiment to demonstrate Brownian motion, smoke particles are seen moving randomly. State the cause of the randomness. (1 mk)

**SECTION B: (55 mks)**

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

15. **Figure 9** shows a velocity time graph for the motion of a body of mass 2 kg

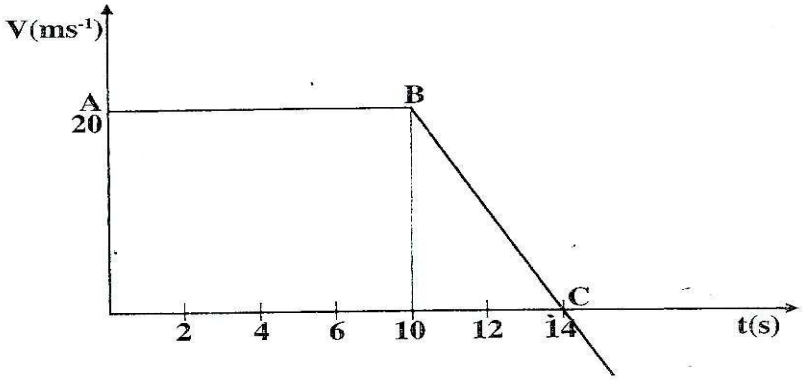



Figure 9

(a) Use the graph to determine the;

(i) Displacement of the body after 8 seconds. (3 mks)

(ii) Acceleration after point **B**; (3 mks)

(iii) Force acting on the body in part (a) (ii) (3 mks)

( b) Sketch a displacement time graph for the motion from point **A** to **C.** (2 mks)

16. **Figure 10** shows a trolley of weight 20N pulled by a force of 4 N from the bottom to the top of a inclined plane at a uniform speed.

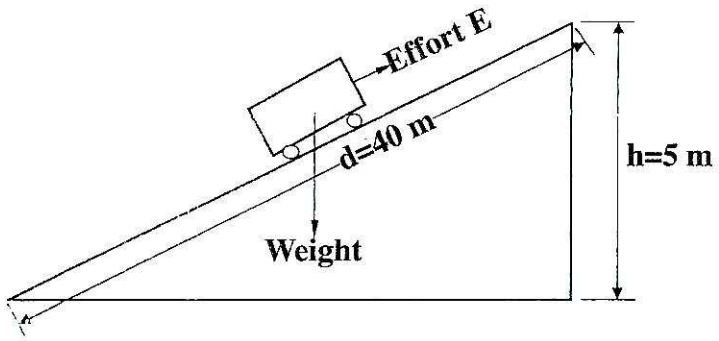



**Figure 10**

**a)** (i) State the value of the force acting downwards along the inclined plane. (1 mk)

( ii) Explain how the value in part (a) (i) is obtained. (2 mks)

b) For the system, determine the:
(i) Mechanical advantage; (3 mks)

(ii) Velocity ratio; (3 mks)

(iii) efficiency. (2 mks)

17. (a) Along horizontal capillary tube of uniform bore sealed at one end contains dry air trapped by a drop of mercury. The length of the air column is 142 mm

at $17^0$C. Determine the length of the air column at $25^0$C (3 mks)

(b) The pressure of the air inside a car tyre increases if the car stands out in the sun for some time on a hot day. Explain the pressure increase in terms of the kinetic theory of gases (3 mks)

(c) In an experiment to determine the specific latent heat of vapourization of water, steam of mass 10g at $100^0$C is passed into 100 g of water initially at $20^0$C in a container of negligible heat capacity. The temperature of the water rises to $70^0$C

*(Take the specific heat capacity of water as 4.2 x $10^3$ J $kg^{-1}$ $K^{-1}$ and the boiling point of water as $100^0$C)*

i) Determine the specific latent heat of vaporization of water. (4 mks)

ii) State **two** sources of error in this experiment (2 mks)

18. (a)When a bus goes round a bend on a flat road, it experiences a centripetal force. State what provides the centripetal force. (1 mk)

b) State the purpose of banking roads at bends (1 mk)

(c) A student whirls a stone of mass 0.2 kg tied to a string of length 0.4 m in a vertical plane at a constant speed of 2 revolutions per second. (***Take acceleration due to gravity gas 10ms$^{-2}$)***

(i) State two forces acting on the stone when it is at the highest point (2 mks)

(ii) Determine the:

1) Angular velocity of the stone (3 mks)

ii) Tension in the string when the stone is at the highest point; (3 mks)

19. **Figure 11** shows a test tube whose cross sectional area is $2cm^2$ partially filled with lead shot floating vertically in water.

*(Take gravitational acceleration as $10ms^2$ and density of water pw s 1 g $cm^{-3}$)*

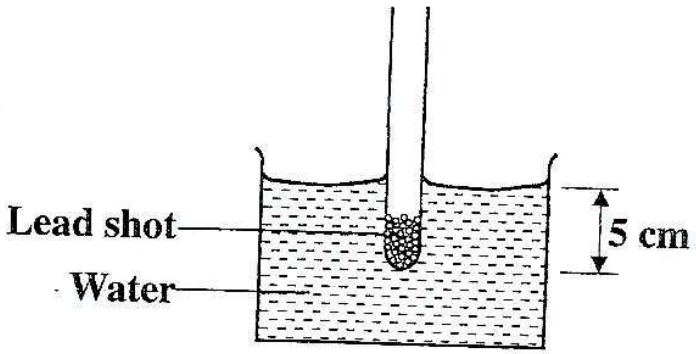



**Figure 11**

(a) (i) Determine the:

1) Volume of the water displaced (2 mks)

II Weight of water displaced (3 mks)

ii) State the combined weight of the test tube and the lead shot (1 mk)

iii) Determine the length of the test-tube that would be submerged in a liquid of density 0.8 g $cm^{-3}$ (4 mks)

(b) The set up in **figure 11** can be used as a hydrometer to measure densities

of liquids.

State how such a hydrometer would be improved to measure small differences in densities of liquids. (1 mks)

# K.C.S.E 2015
## PHYSICS PAPER 232/1
## QUESTIONS

**SECTION A: (25 mks)**

***Answer ALL the questions in this section in the spaces provided.***

1. Figure 1 shows part of the main scale of a vernier Calipers.

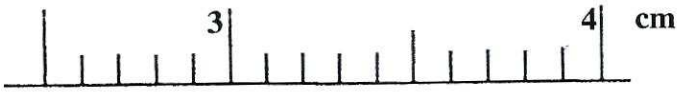



**Figure 1**

Insert the vernier scale to the main scale, to show a reading of 3.14 cm (1mk)

2. Figure 2 (a) shows the initial reading of a burette used to measure the volume of oil. After 50 drops of the oil were run out, the final reading was as shown in . Figure 2 (b)

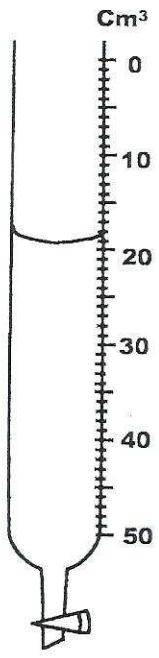



**Figure 2 (a)**

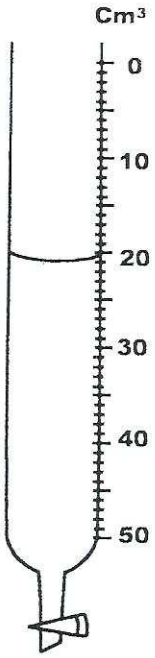



**Figure 2 (b)**

Determine the volume of one drop of oil (1 mk)

3. A spring extends by 6 cm when supporting a mass of 0.06 kg on earth. When the spring is used to support the same mass on the moon, it extends by 1 cm. Determine the moon's gravitational strength. (Take gravitational field strength on earth as 10 $Nkg^{1}$) (3 mks)

4. State two factors that determine the pressure at a point in a liquid. (2 mks)

5. A student wearing sharp pointed heeled shoes is likely to damage a soft wooden floor. Explain. (2 mks)

6. Figure 3 shows the arrangement of molecules in the three states of matter.

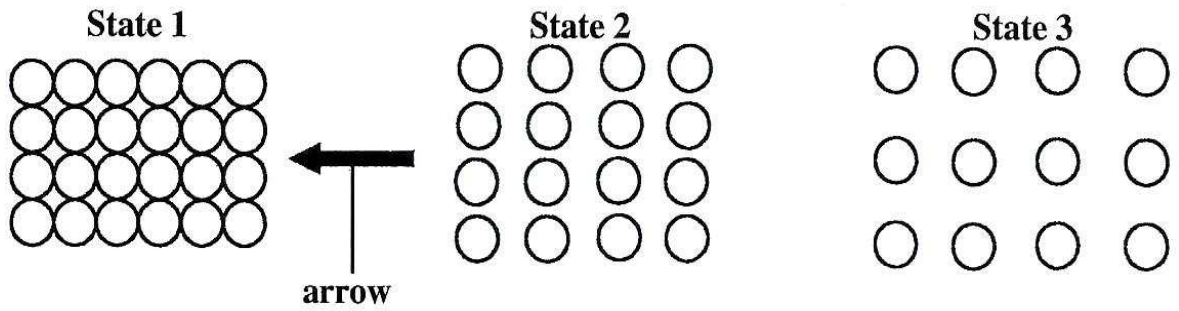



**Figure 3**

(a) Name the process represented by the arrow. (1 mk)

(b) State the reason for the arrangement of molecules in state 3. (1 mk)

7. Two containers A and B of equal dimensions but different metals are fitted with Identical glass casings. The two containers initially at the same temperature are simultaneously filled with boiling water. It is observed that the glass casing on A breaks earlier than the one on B.

Explain this observation. (2 mks)

8. Figure 4 shows a uniform metal rod balanced at it's centre by different forces.

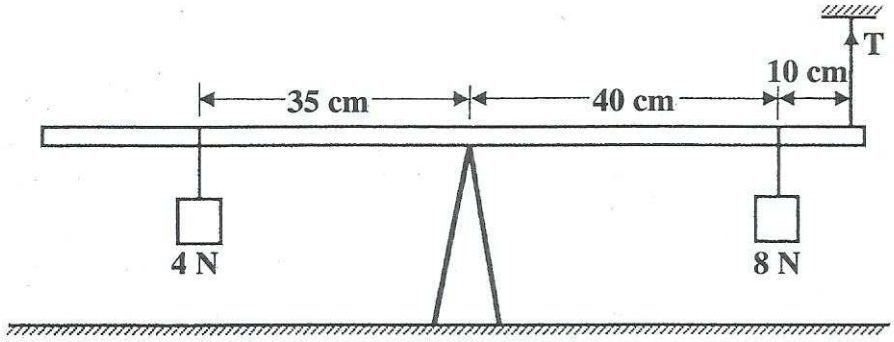



Figure 4

Determine the value of T. (3 mks)

9. Figure 5 shows air flowing through a pipe of different cross-sectional areas. Two pipes A and B are dipped into water

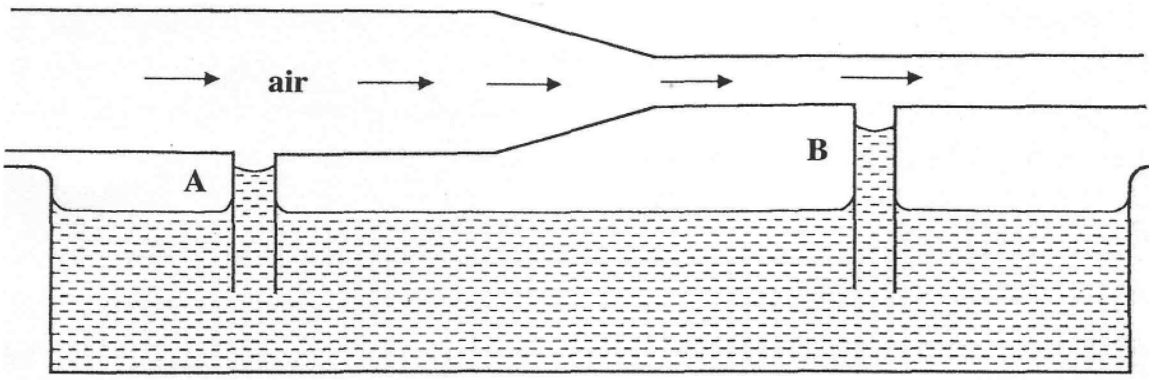



**Figure 5**

Explain the cause of the difference in the levels of water in the pipes A and B.

10. A balloon is filled with hydrogen gas and then released into the air. It is observed that as it rises higher into the air it expands. Explain why it expands. (2 mks)

11 A person carrying a heavy luggage using one hand leans away from the luggage. State the reason for this. (1 mk)

12. Figure 6 shows a glass tube with water fitted with two identical thermometers A and B. It is heated as shown State with a reason which one of the two thermometers shows a higher temperature (2 mks)

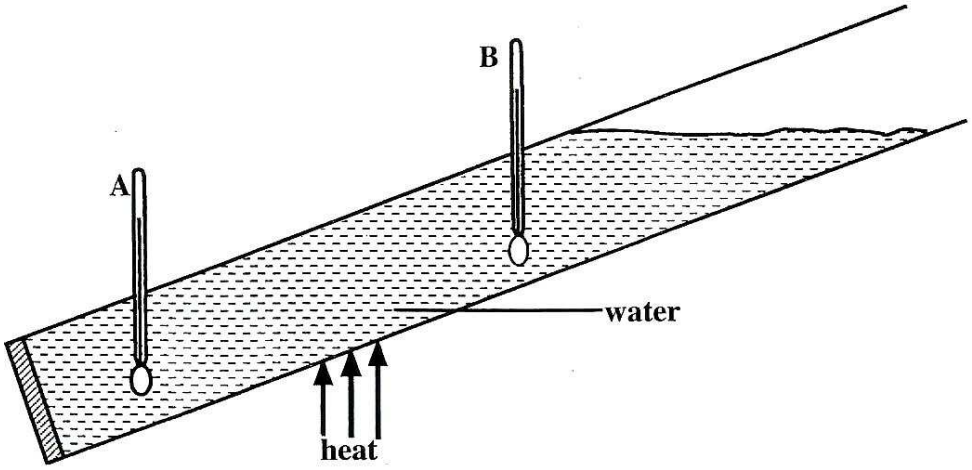



**Figure 6**

13. Mechanics is one of the branches of physics. State what it deals with (1 mk)

**SECTION B: 55 Mks**
**Answer ALL the questions I n this section in the spaces provided**

14 a) Figure 7 (drawn to scale) shows a section of tape after passing through a ticker timer operated at a frequency of 50Hz. The tape is attached to a trolley moving in the direction shown

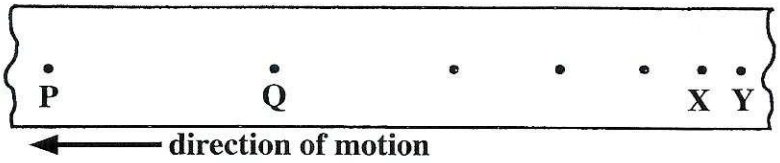



**Figure 7**

i) Determine the velocity between
i) P and Q (4 mks)
II) X and Y (2 mks)

ii) Determine the acceleration of the trolley (3 mks)

b) Two bodies of masses 5 kg and 8 kg moving in the same direction with velocities $20ms^{-1}$ and $15ms^{-1}$ respectively collide in elastically . Determine the velocity of the bodies after the collision (4 mks)

15. a) Figure 8 shows a 200 g mass placed on a frictionless surface and attached to a spring.

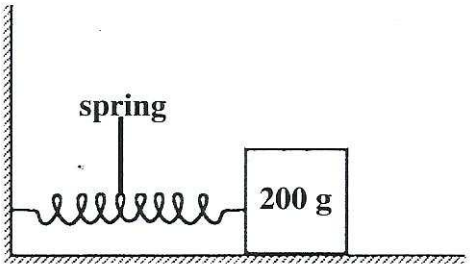



**Figure 8**

The spring is compressed and released. Given that the elastic potential energy of the compressed spring is $2.7 \times 10^{-2}$ J, determine the maximum speed with which the block moves after it is released. (4 mks)

(b) In a wheel and axle system, state the advantage of having a large wheel Diameter compared to the axle diameter for a frictionless system. (1 mk)

(c) A body is released from a height h. Sketch a graph of potential energy Against kinetic energy as the body falls to the ground. . (2 mks)

d) Figure 9 shows a hydraulic lift system. The radius of the small piston is 3cm while that of the larger piston is 9 cm. A force of 90N is applied to the smaller piston.

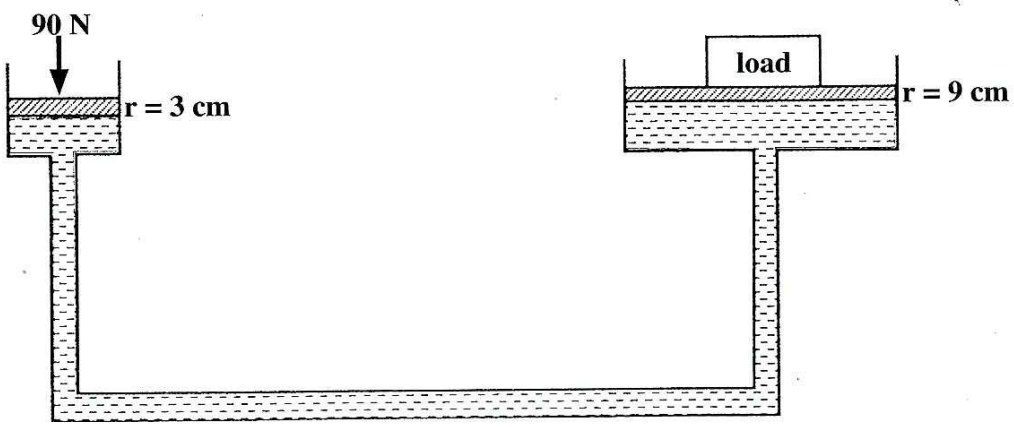


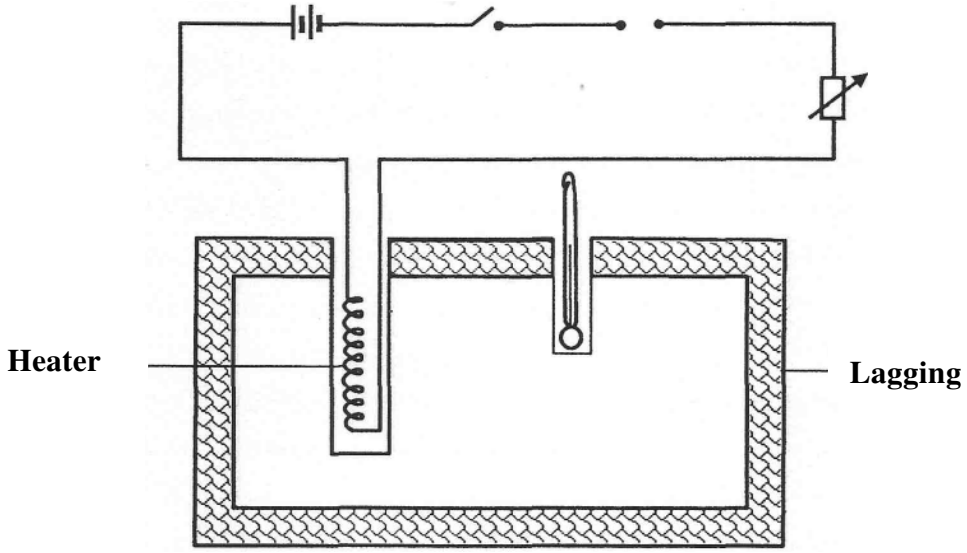

**Figure 9**

Determine the

i) Maximum load that can be lifted. (3 mks)

Ii) Efficiency of the system (3 mks)

16. (a) Figure 10 shows an incomplete set up that can be used in an experiment to determine the specific heat capacity of a solid of mass m by electrical method.




(i) Complete the diagram by inserting the missing components for the Experiment to work. (2 mks)

(ii) Other than temperature, state three measurements that should be taken. (3 mks)

(iii) The final temperature was recorded as θ. Write an expression that can be used to determine the specific heat capacity of the solid. (2 mks)

b) State three ways of increasing the sensitivity of a liquid in glass thermometer (3 mks)

17a) Figure 11 shows a graph of pressure (p) against volume (v) for a fixed mass of a gas at constant temperature

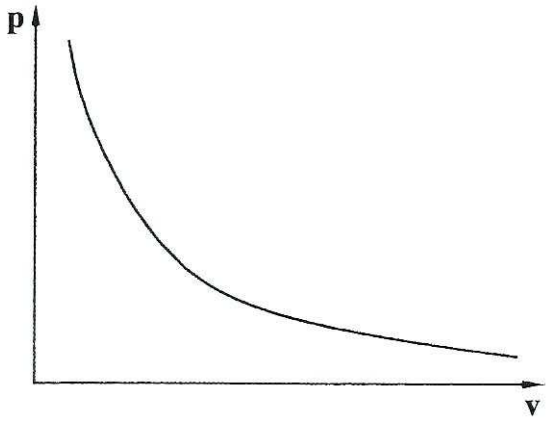



**Figure 11**

In the space provided, sketch the corresponding graph of P against $\frac{1}{v}$ (1 mk)

b) Explain the pressure law using the kinetic theory of gases (3 mks)

c) $20cm^3$ of a gas exerts a pressure of 760mmHg at 250C. Determine the temperature of the gas when the pressure increases to 900mmHg and the volume reduces to $15cm^3$ (4 mks)

d) Figure 12 shows the path of alight ball projected horizontally.

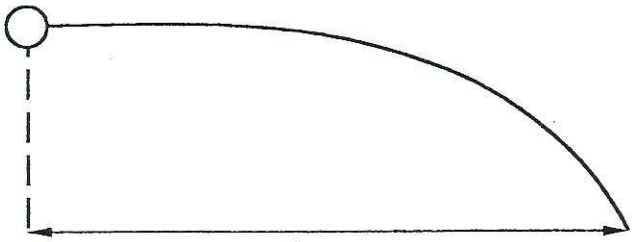



**Figure 12**

The ball is then made to spin in an anticlockwise direction as it moves:

(i) on the same axis, sketch the new path of the ball. (1 mk)

(ii) explain how the ball attains the new path. (2 mks)

18a) Figure 13 shows a pendulum bob suspended by a thread moving in a horizontal circle.

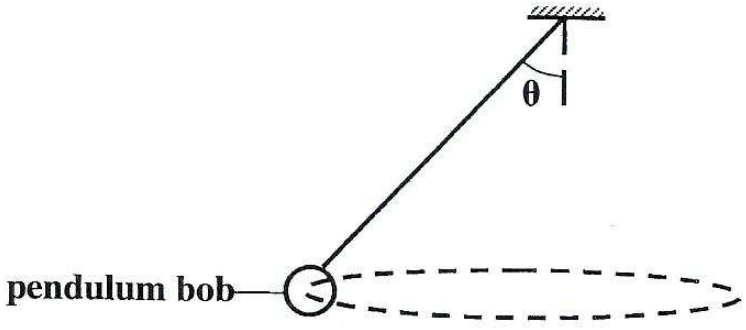



**Figure 13**

(i) Name two forces acting on the pendulum bob as it moves. (2 mks)

(ii) State what happens to each of the forces when the angular velocity of the pendulum bob is increased. (2 mks)

iii) State two applications of uniform circular motion in daily life (2 mks)

b) Figure 14 shows a block floating in water

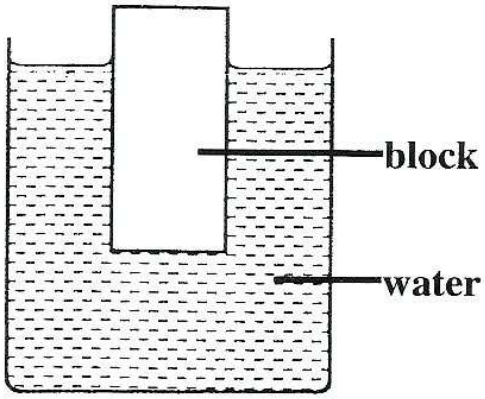



**Figure 14**

When the water is heated; it is observed that he block sinks further. Explain this observation (2 mks)

**PHYSICS**

**PAPER 1**

**NOV. 2016**

**SECTION A: (25 mks)**

***Answer all the questions in (his section in the spaces provided.***

1. State what mechanics as a branch of physics deals with. (1mk)
2. Figure 1 shows a change in volume of water in a measuring cylinder when an irregular solid is immersed in it

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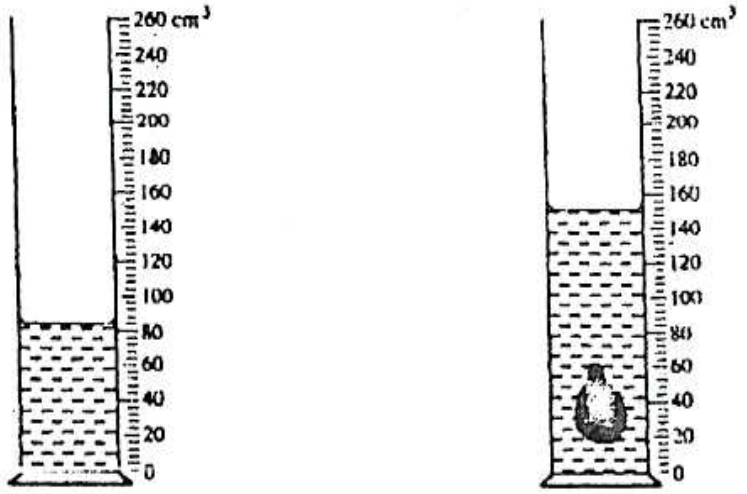



**Figure 1**

Given that the mass of the solid is 567g, determine the density of the solid in g/cm$^3$ (Give your answers correct to 2 decimal places), (3 mks)

3. When a drop of an organic acid of known volume is dropped on the surface of water in a large trough, it spreads to form a large circular .patch. State one assumption made when the size of the .molecule of the acid is estimated by determining the area of the patch. . (1 mk)

4. **Figure** 2(a) and 2(b) show capillary tubes inserted in water and mercury respectively

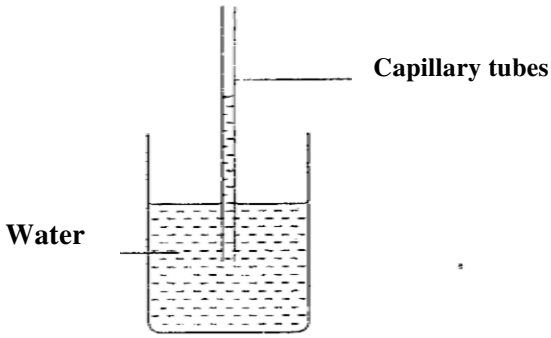



**Figure (2(a)**

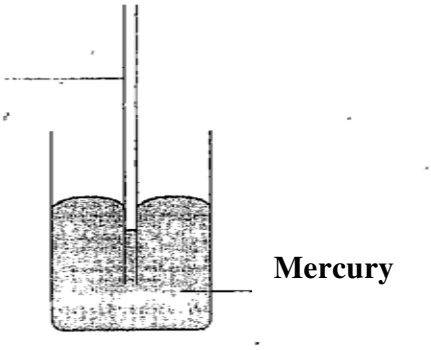



**Figure 2(b)**

It is observed that in water the meniscus in the capillary tube is higher than the meniscus in the beaker, while in mercury the meniscus in the capillary tube is lower than the meniscus in the beaker Explain these observations. (3mks)

5. Figure 3 shows a hot water bath with metal rods inserted through one of its ends. Some candle wax is fixed at the end of each rod. Use this information to answer-questions 5(a) and 5fb).

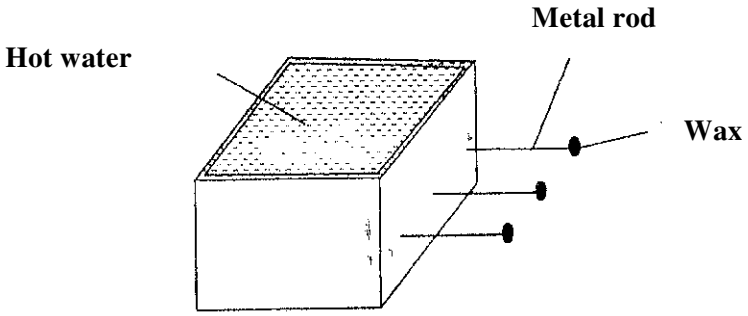
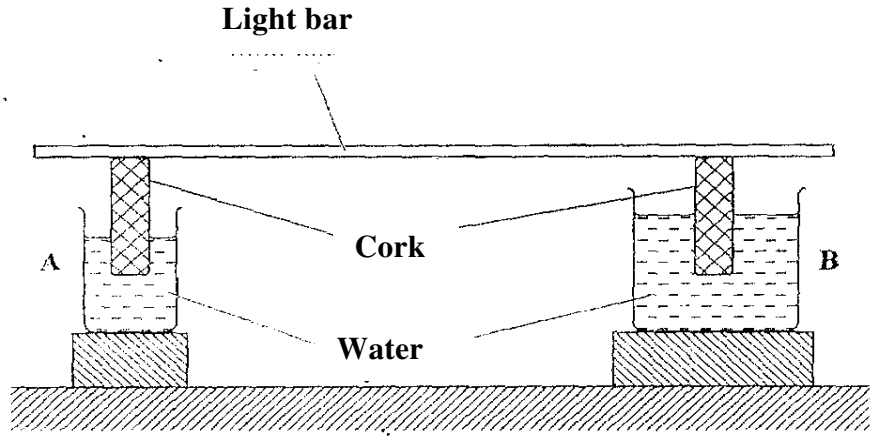



**Figure 3**

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

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

6. **Figure 4** shows a uniform light bar resting horizontally on corks floating on water in two beakers A and B.




Explain why the bar tilts towards side A when equal amount of heat is supplied to each beaker (2 mks)

7. Figure 5 shows an aluminium tube tightly stuck in a steel tube

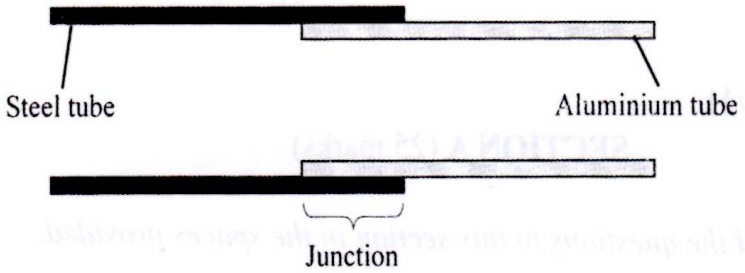
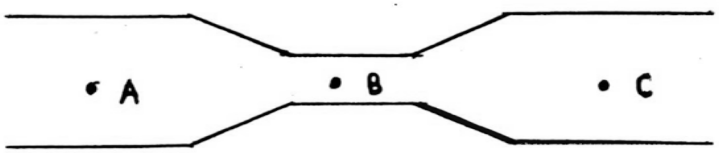



**Figure 3**

Explain how the two tubes can be separated by applying a temperature change at the junction given that aluminium expands more than steel for the same temperature rise. (2 mks)

8. (a) An aeroplane is moving horizontally through still air at a uniform speed. It is Observe that when the speed of the plane is increased, its height above the ground increases. State the reasons for this observation. (1 mk)

(b) Figure 6 shows parts A, B and C of a glass tube.




State with a reason the part of the tube in which the pressure will be lowest when air is blown through the tube from A towards C. (2 mks)

9. The three springs shown in **Figure** 7 are identical and have negligible weight. The extension produced on the system of springs is 20cm.

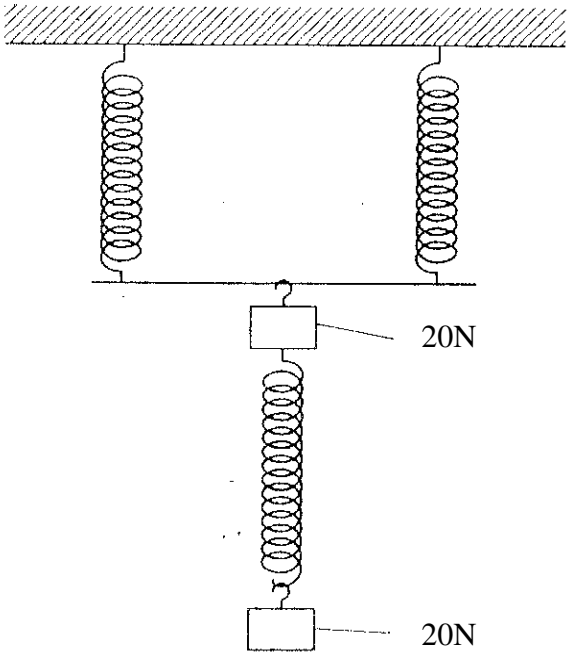



**FIGURE 7**

Determine the spring constant of each spring. (2mks)

10. **Figure** 8 showy two cylinders of different cross-sectional areas connected with a tube. The cylinders contain an incompressible fluid and are fitted with pistons of cross-sectional areas 4cm and 24cm$^2$.

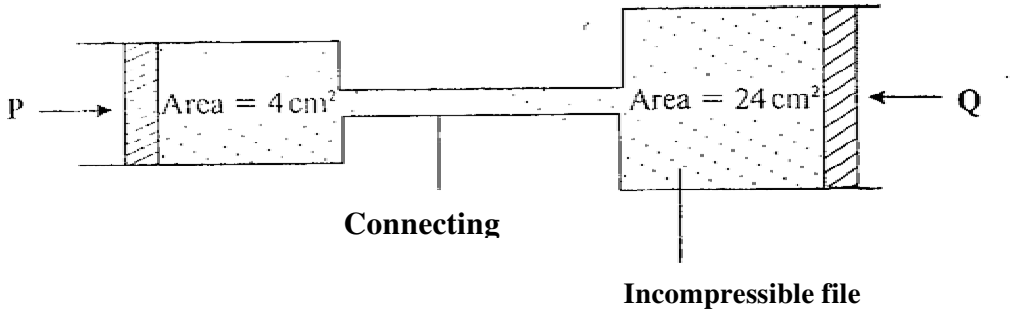
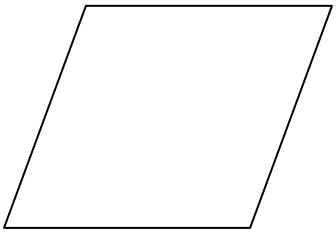



**Figure 8**

Opposing forces P and Q are applied to the pistons such that the pistons do not move. If the pressure on the smaller piston is 5N/cm$^2$, determine force Q. (2 mks)

**11.** **Figure** 9 shows a uniform cardboard in the shape of a parallelogram.



Figure

Locate the centre of gravity of the cardboard.

**12.** State why it is easier to separate water into drops than to separate a solid into smaller pieces. (1 mk)

**13.** The graph in **Figure 10** shows the velocity of a car in the first 8 seconds as it accelerates from rest along a straight line. (2 mks)

Determine the distance travelled 3.0 seconds after the-start.

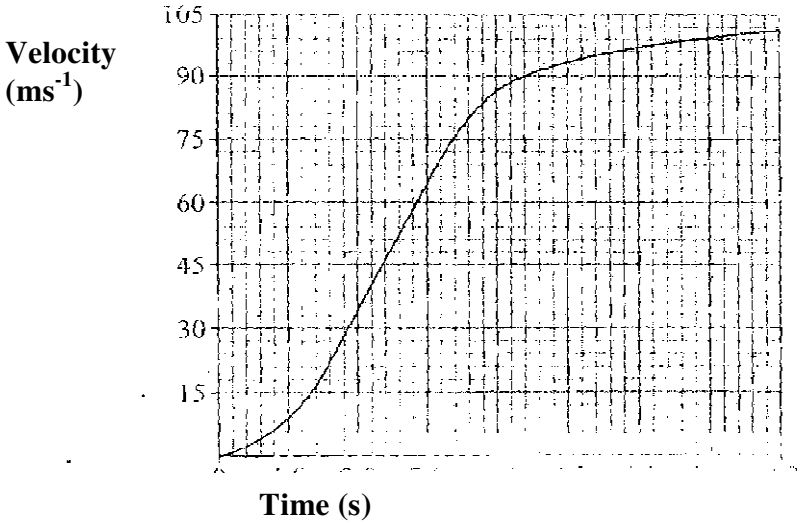



**Figure 10**

**SECTION B:** (55 mks)

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

14. a) Explain why it is advisable to use a pressure cooker for cooking at high altitudes. (2 mks)

(b) Water of mass 3.0 Kg at 20 °C is heated in an electric kettle rated 3.0 KW. The water is heated until it boils at $100^0$C. Given that the specific heat capacity of water = 4200 J $Kg^{-1}$ $K^{-1}$, heat capacity of the kettle = 450 $JK^{-1}$, specific latent heat of vaporisation of water = 2.3MJ$Kg^{-1}$.

**Determine:**

(i) The heat absorbed by the water. (3 mks)

ii) Heat absorbed by the electric kettle. (2 mks)

(iii) The time taken for the water to boil. (3 mks)

(iv) How much longer it will take to boil away all the water.

**15.** (a) State the meaning of the term ideal gas. (1mk)

(b) The pressure acting on a gas in a cylinder was changed steadily while the of the gas was maintained constant. The value of volume V of the gas was measured for various values of pressure. The graph in **Figure 11** shows the relation between tin pressure P, and the reciprocal of volume, Vv.

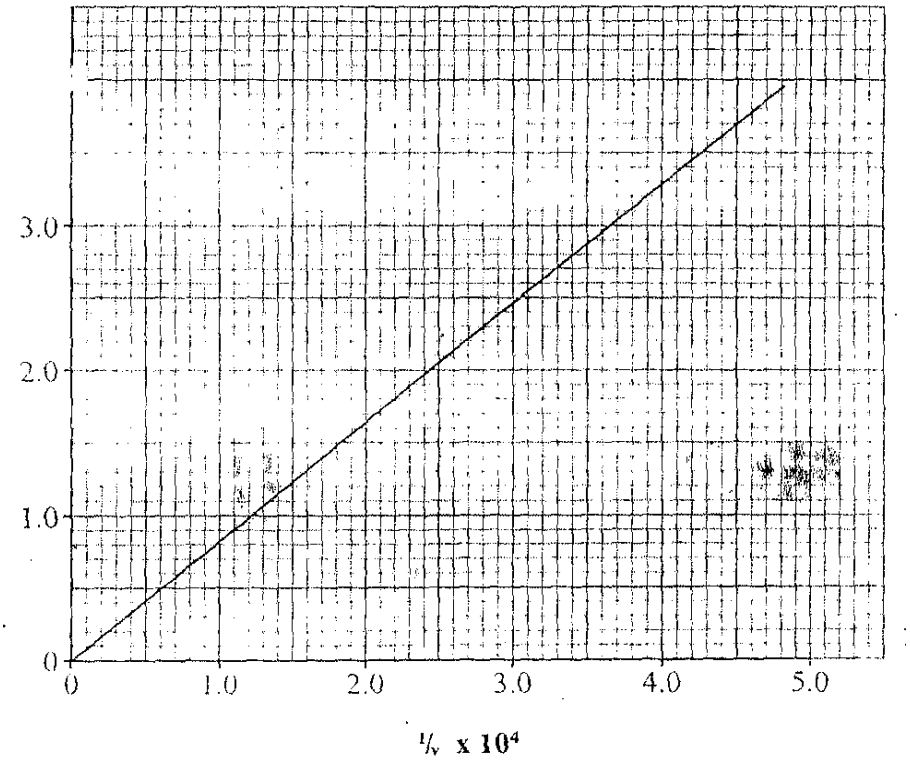



**Figure 11**

(i) Suggest how the temperature of the gas could be kept constant. (2 mks)

(ii) Given that the relation between the pressure $P_J$ and the volume, V, of the gas is given by PV = *K,* where A is a constant, use the graph to determine the value of *K.* (4 mks)

(iii) What physical quantity does *K* represent? (1 mk)

iv) State one precaution you would take when performing such an experiment. (1 mk)

*(c)* A gas occupies a volume of 400Q,litres at a temperature of 37°C and normal atmospheric pressure. Determine the new volume of the gas if it is heated at constant pressure to a temperature of 67 °C (Normal atmospheric pressure, P = -1.01 X $10^5$ Pa). (4 mks)

16. a) Define the term velocity ratio of a machine (1mk)

(b) **Figure** 12 shows part of a hydraulic press. The Plunger is the piston where effort *is* applied while the Ram piston is the position where the load is applied. The Plunger ha.[1] cross-section area *a* $m^2$ while the Rani piston has cross-section, *A* $m^2$.

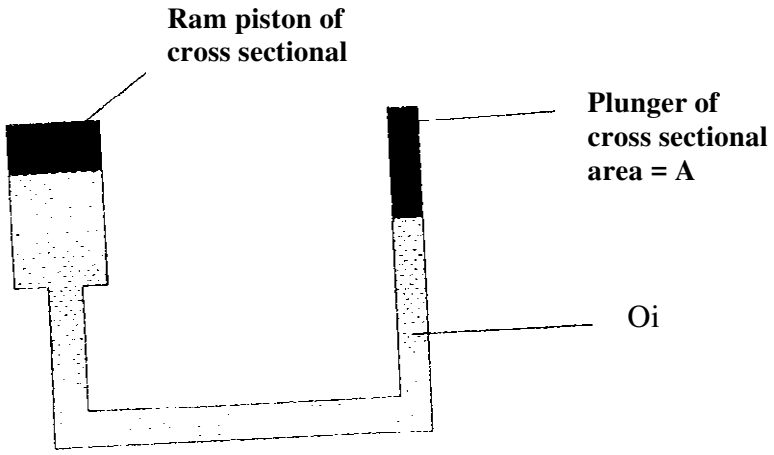



**Figure 12**

When the plunger moves down a distance d the Ram piston moves up a distance D. Derive an expression for the velocity Ratio (V.R ) in terms of A and a. (4 Mks)

c) A machine of velocity ratio 45 overcomes a load of 4.5 x 103 N when an effort of 135 N is applied. Determine

i)The mechanical advantage (M.A of the machine: (2mks)

(ii) Efficiency of the machine; (2 mks)

(iii) The percentage of the work that goes to waste. (3 mk)

17. (a) When a bus goes round a bend on a flat road, it experiences a centripetal force. State what provides the centripetal force. (1 mk)

(b) State the purpose of banking roads at bends. . (2 mks)

c) a student whirls a stone of mass 0.2 kg tied to string of length 0.4 m in a vertical plane t a constant speed of 2 revolutions per se cond. (Take acceleration due to gravity g = 10ms $^{-2}$)

i) State two forces acting on the stone when it is at the highest point (2 mks)

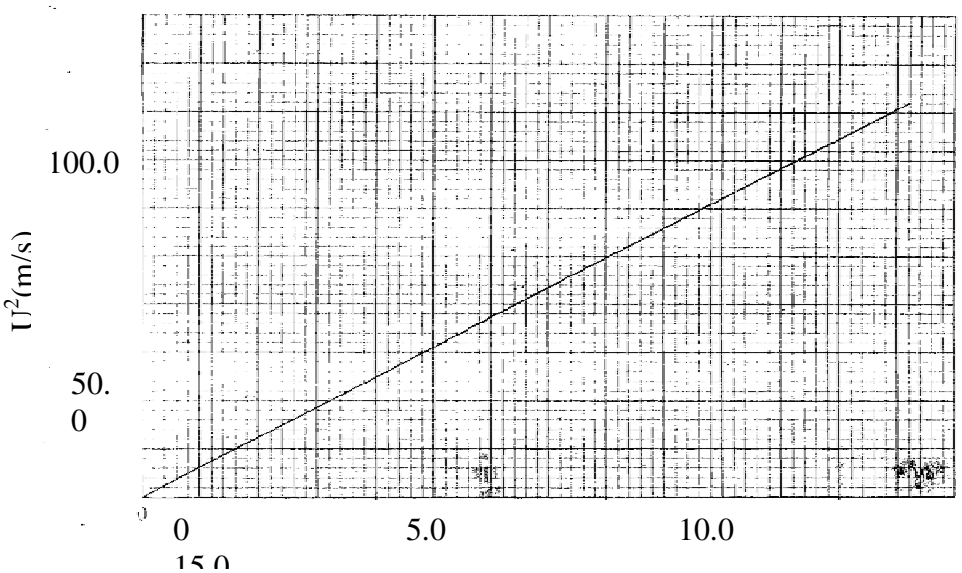
ii)Determine the

i. Angular velocity of the stone (3mks)

ii. Tension in the string when the stone is at the highest point (3mk)

18. a)State Newton's first law of motion (1mk)

b) A wooden block resting on a horizontal bench is given an initial velocity, u, so that it slides on the bench surface for a distance, d, before coming to a stop. The values of d were measured and recorded for various values of initial velocity. **Figure** 13 shows the graph of $\mathbf{u^2}$ against **d.**




Figure

(i) Determine the slope, s, of the graph. (2mks)

(ii) Given that $U^2 = 2Qkd$, where *k* is constant for the bench surface, determine the value of & from the graph. (2 mks)

c) A car of mass 800Kg starts from rest and accelerates at 1.2ms$^{-2}$. Determine its momentum after it has moved 400 m from the starting point