PHYSICS PAPER 1 2004 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.

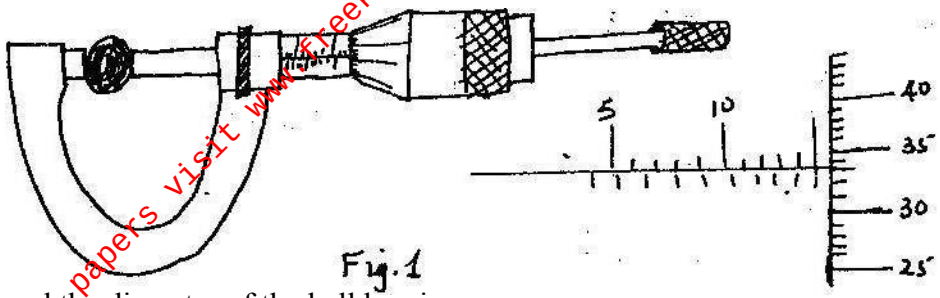


Fig. 1

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 10^0c higher for sometime.

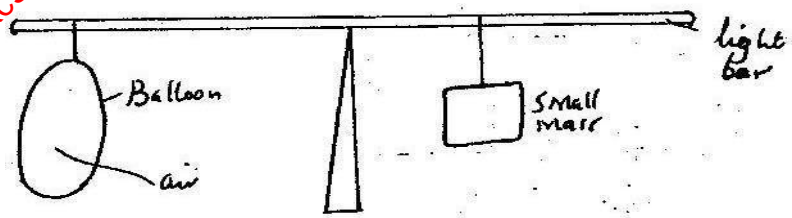


Fig. 2

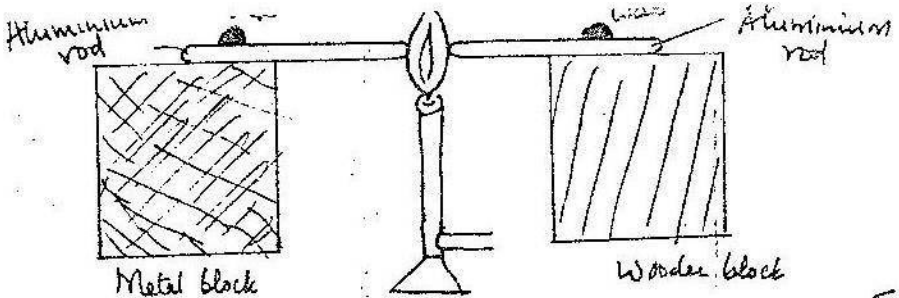
Explain why it tips to the right immediately it is returned to the room.

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.



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

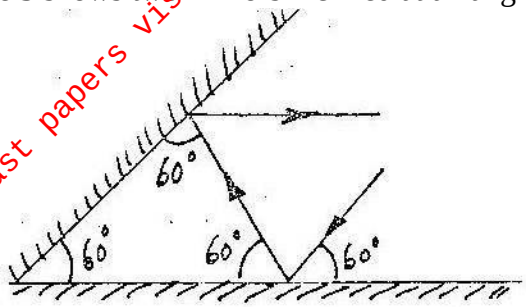


Fig 5

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.

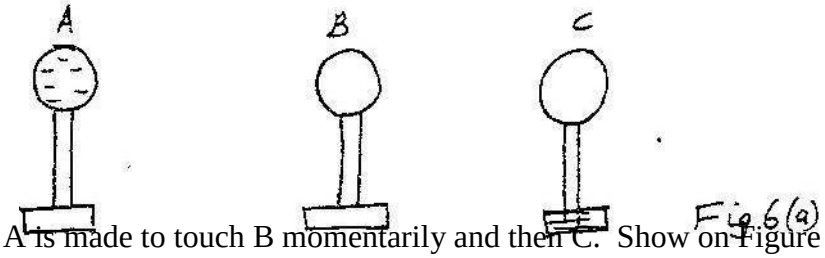


Fig 6(a)

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

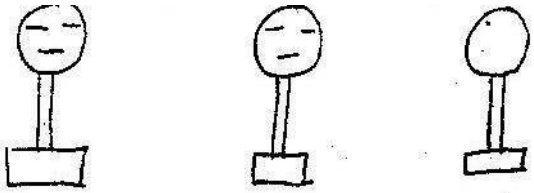
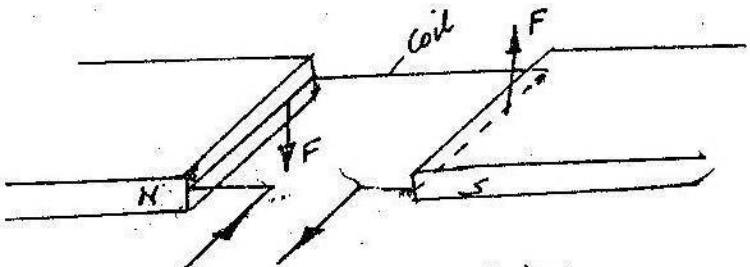


Fig 6(b)

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 7

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



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.

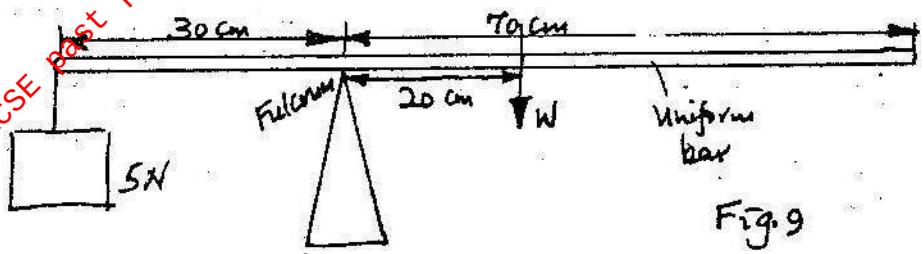


Fig. 9

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.

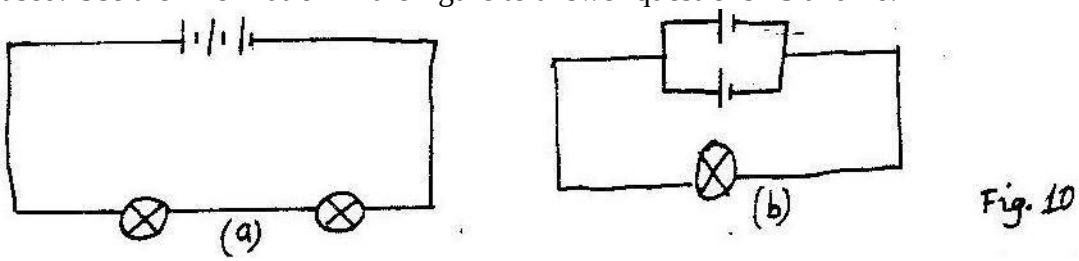
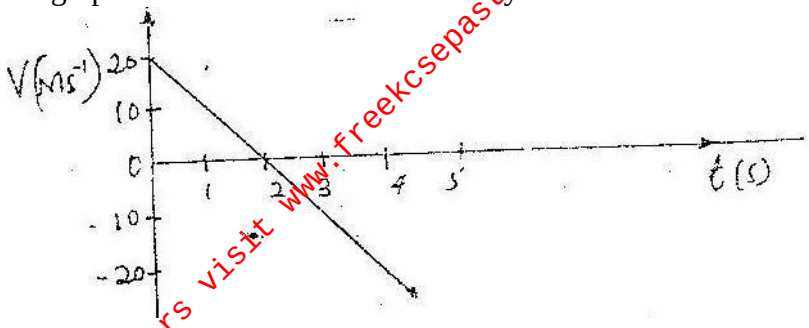


Fig. 10

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

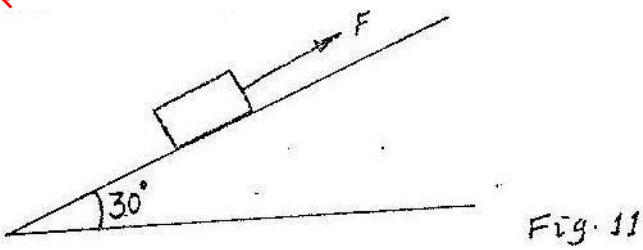
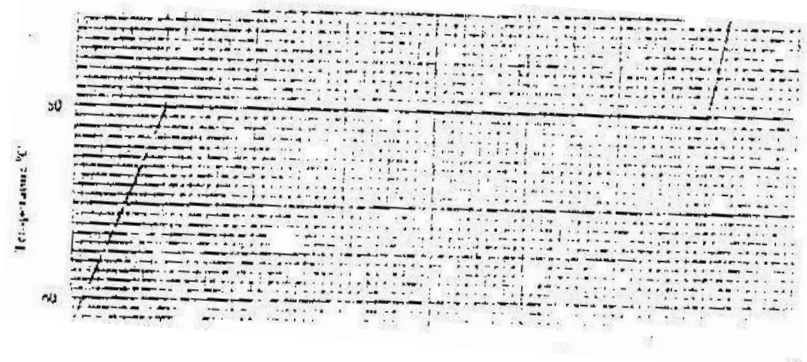


Fig. 11

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

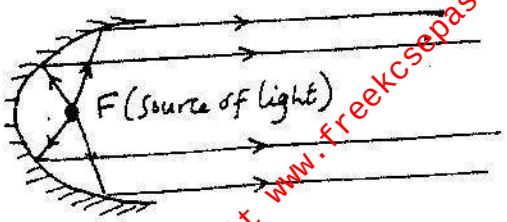


Fig. 12

Drarays 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.

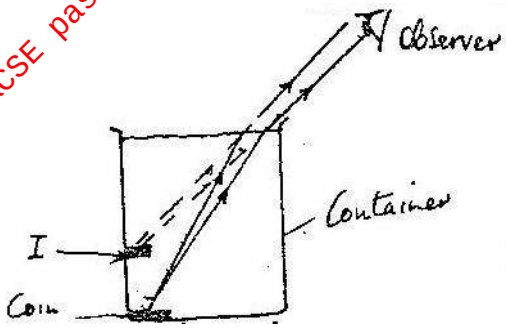


Fig. 13

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.

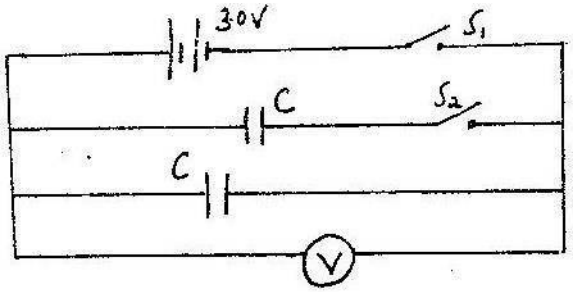


Fig. 14

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.

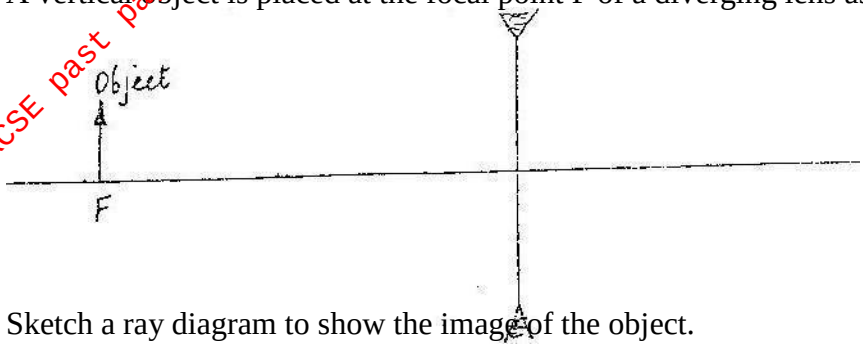
27. A balloon is filled with air to volume of 200ml at a temperature of 293K. Determine the volume when the temperature rises to 353K at the voltmeter, V.

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.

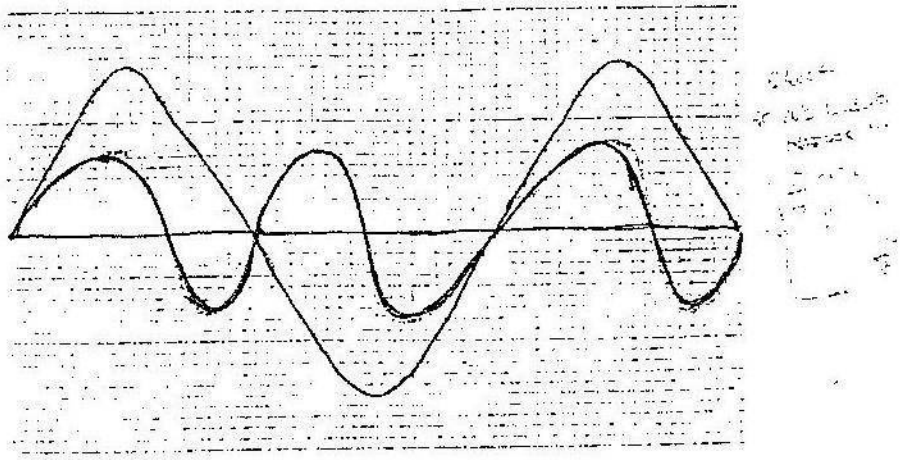
Complete the diagram to show the pattern of the waves beyond the aperture in each case.

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)= 1.6×10^{-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

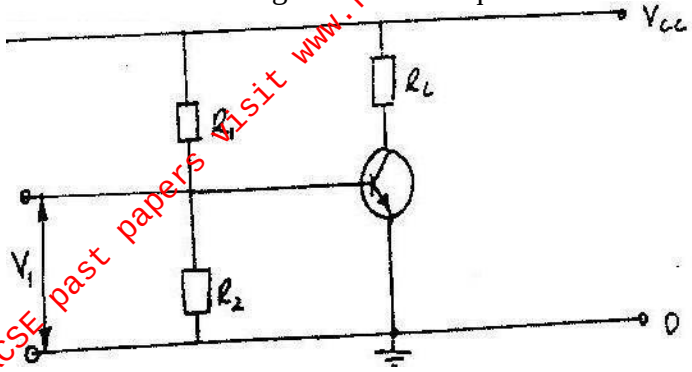


Fig 18

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.