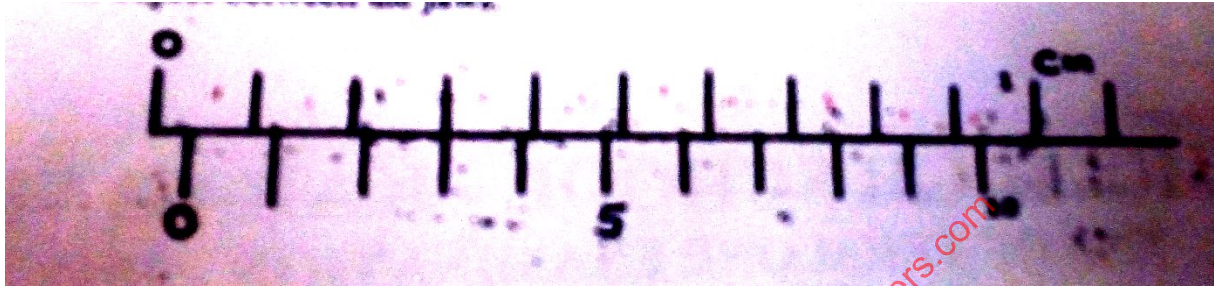# PHYSICS PAPER ONE 232/1
FORM 4

NAME_____ADM NO_____ CLASS_____

SECTION A (25 MARKS)

1. The figure shows a section of vanier clipers when the jaws are closed withuot an object between them.

a. State the zero error on the vanier calipers. 1mk

b. A student used the vanier shown to measure the diameter of a test tube whose actual diameter was 2.2cm .determine the reading of the calipers of the test tube.

2.a. a student observed that when the lower end of a verticalclean glass capillary tube was just immersed in water, the water rose up the tube. Explain the observation. 1mk.

c. bristles of a paint brush spread when the brush is in the water and cling together when out of weter. Explain. 2mks

3.a. a mixture of air was illuminated and viewed through a microscope in a glass sided box. Small bright specks were seen to be moving randomly . explain this observation. 2mks.

b. when the stopper of a bottle containing liQUID ammonia is removed, the gas is smelt allover the room. Explain   (1mks)

4. State two assumptions made when determining the diameter of a molecule in the oil drop experiment. (2mks)

b. State one application of Bournoullis effect (1mks)

5. The figure below shows a silvery shinny surface electric kettle being used to heat water from a main supply.
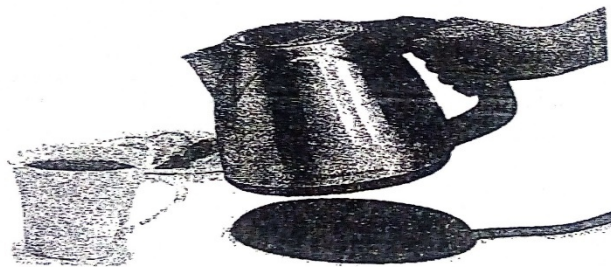
Explain two features of the kettle which enhances its efficiency (2mks)

6. A uniform plank weighing 300N and lengh 6.0m is acted upon by other forces as shown in the figure below.
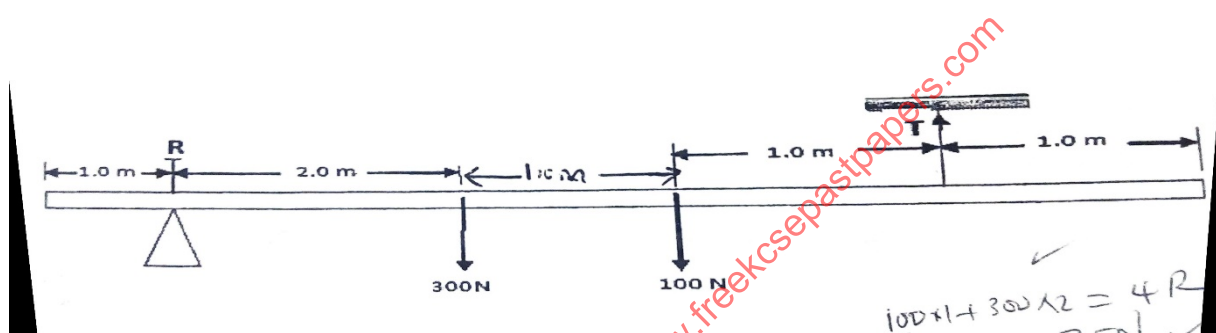
Calculate the tension T in the string and the reaction R at the pivot. (3mks)

7. A faulty thermometer reads 5^0C when placed in pure melting ice and 20^0C when placed in water at a temperature of 25^0C. What is the actual temperature when this thermometer reads 78^0C. (3mks)

8.a. The height of a mountain is 1360m. The barometer reading at the base of the mountain is 740mmHg. Given that the density of mercury is 13.6g/cm^3 and that of air is 1.25Kg/M^3, determine the barometer reading at the top of the mountain? (3mks)

b. Two home economics students were cooking, one on top of a high mountain and the other down in a valley. State and explain which of the two students should use a pressure cooker for faster cooking? (2mks)

Section B (55mks)

9.a. During the construction of dam of thye dam is **widened** and **curved**. Explain. (2mks)

b. A block of density 1.58g/cm^3 and measures 3cm by 5cm by 7cm was placed on the ground. Determine the difference between the maximum and minimum pressure that would be exerted on the ground by the block (3mks)

10.a. The figure below shows a ball of mass 50Kg thrown from the top of a wall 20m high with a horizontal velocity 20m/s. The ball strikes the smaller piston A of the hydraulic lift and compresses a cotton bail B with a 25200N force.
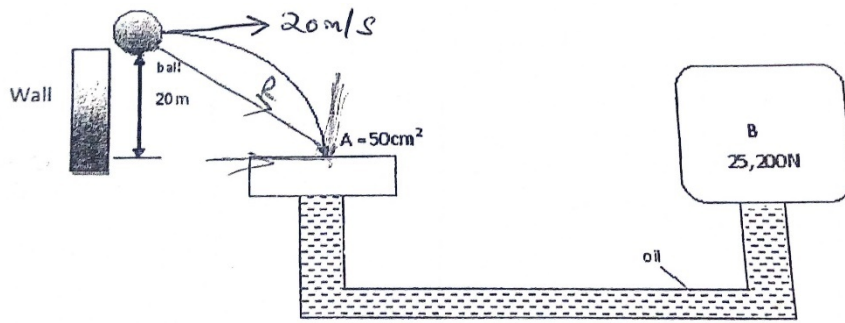
Determine;

(i). The time taken by the ball to hit the piston A (2mks)

(ii). The horizontal distance covered by the ball from the foot of the wall to the piston (2mks)

(iii). The vertical velocity with which the ball hits the piston A (2mks)

(iv). The force with which the ball strikes piston A (Assume the ball hits the piston verically) (2mks)

(v). The area of the load piston B asuming that the two pistons were initially at the same level. (2mks)

b. (i). State Hookes law (2mks)

(ii). A string extends by 5cm when supporting a load of 10N. Determine the spring constant of 3 such springs when placed side by sides. (2mks)

(iii). What is the extension of the three springs in part ii above when supporting a load of 50N? (2mks)

11. a. Give a reason why a steel rod sinks in water while a ship made of steel floats on water. (1mks)

b. The figure below show a bouy B of volume 40 litres and mass 10Kg. It is held in the position shown below in sea water of density $1.04g/cm^3$ by a light inextensible cable at the bottom so that ¾ of its volume is submerged below the surface of the sea water.
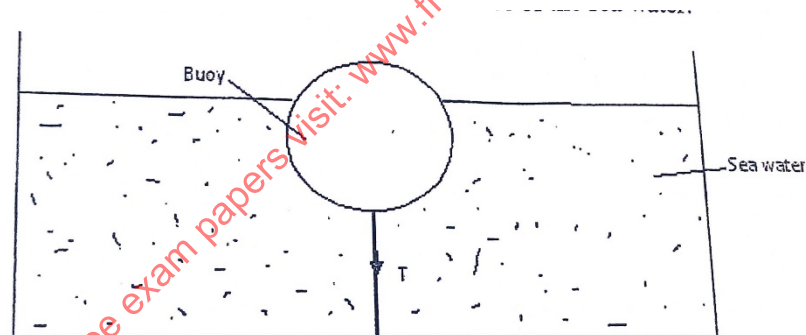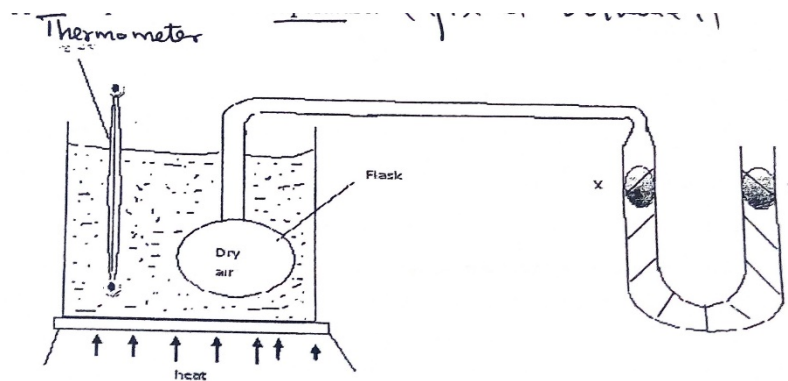

Determine the tension in the cable (3mks)

c. State a factor which detrmines a depth to which a body sinks in a liquid (1mks)

d. A student constructed a hydometer for use in the milk industry. What is the name given to this hydrometer ? (1mks)

12. The apparatus below was used to investigate the variation of presuure of a trapped sample of air with temperature.

(a) Why must the heat be supplied slowly during the experiment? (1mks)

(b) How would you ensure that the air trapped in the flask was at the temperature recoreded by the thermometer ? (2mks)

(c) Why the U tube is always adjusted so that the level of mercury in the tube X stays the same (1mks)

(d) What measurements would be recorded in the experiment above ? (2mks)

13. During an experiment a 30g metal block was heated in a blast furnace to a temperature of 850^0C. Then quickly transferred to a copper calorimeter of mass 200g containing 60g of water at 80^0C. It was observed that 20g of water vapourized. Given that the specific heat capacity of water and that of copper are 4.2kJ/Kg/K and 390J/Kg/K respecively, and the specific latent heat of vapourisation of steam is $2.26×10^6$J/Kg.

i. Write an expression for the heat lost by the meatl block given that the specific heat capacity is C_m. (2mks)

ii. Determine the heat gained by the water anf the calorimeter (3mks)

iii.   Calculate the specific heat capacity of the metal (3mks)

iv.   State on possible source of error in the experiment (1mks)

14.

(a) Explain why a motorist rider leans towards the centre of the curve while negotiating a bend
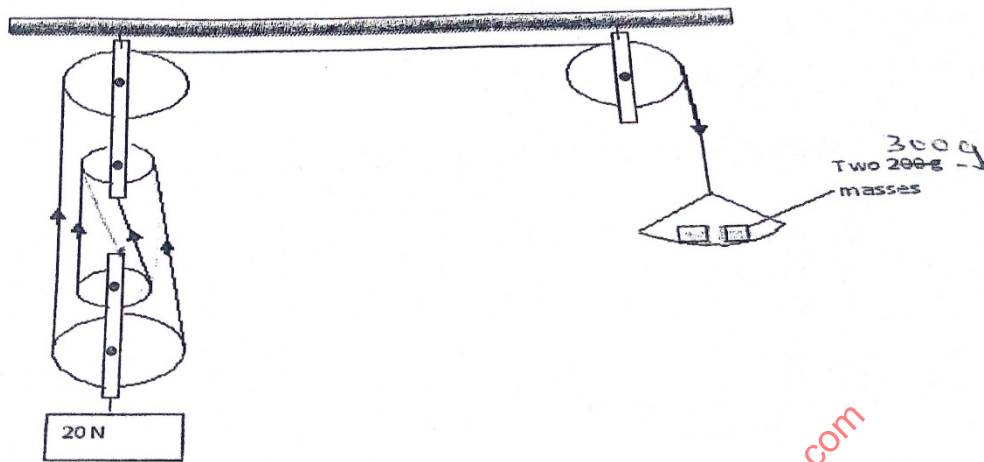   (1mks)

(b) In an experiment to determine the tension of a string, a solid ball was roatate round a turn table
    of diameter 80cm at different velocities. The tension T at different values of velocity squared
    was obtained and the results represented on a graph shown below.
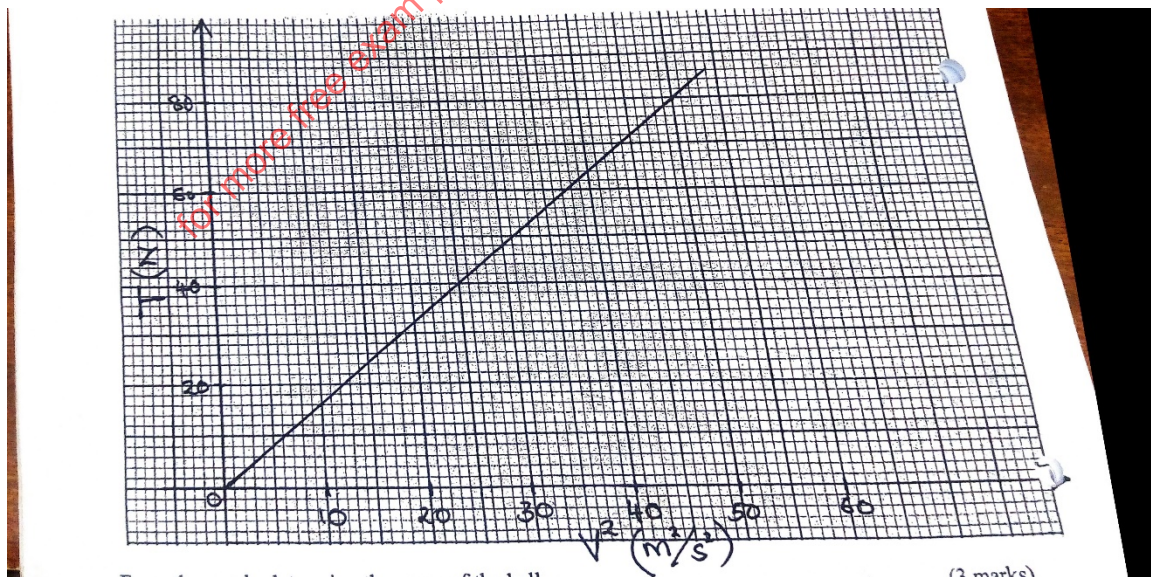
From the graph, determine the mass of the ball   (3 marks)

15. the diagram below shows a pulley system with a load of 20N hung at the lower block. The effort consists of a pan on which weights are added one at a time.
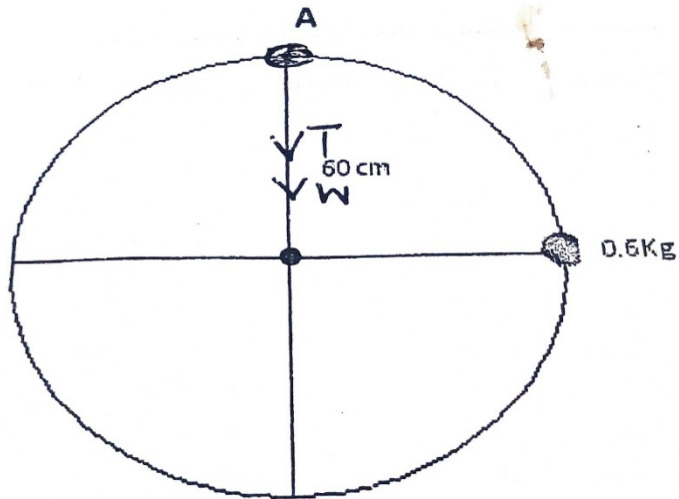

Determine;

(a) The velocity ratio of the machine   (1mks)

(b) The mechanical advantage if the two 200g masses coul cause the 20N load to raise steadily (2mks)

(c) The efficiency of the system (2mks)

(d) When the load was increased, it was observed that the efficiency assumed the trend shown in graph below

State and explain results obtained   (2mks)

(e) A body of mass 0.6Kg is whirled in a vertical circle of radius 60cm as shown in the diagram below

If the tensionin the string at the highest point A is 19N, determine the minimum velocity needed to keep the body in a circular path (2mks)