MANGU HIGH SCHOOL

NAME: .....CLASS:.....

ADM NO..... INDEX NO.....

232/1
PHYSICS
PAPER 1
JULY 2015

Instructions to candidates

- This paper consists of two sections **A** and **B**.
- Answer **ALL** the questions in the two sections in the spaces provided after each question
- All working **MUST** be clearly shown.
- Electronic calculators and mathematical tables may be used.
- This paper consists of **10** printed pages.

EXAMINER'S USE ONLY

SECTION	QUESTION	MAX MARKS	CANDIDATE'S SCORE
I	1 – 12	25	
II	13	10	
	14	11	
	15	15	
	16	7	
	17	12	
TOTAL		80	

SECTION A (25 MARKS)

1. The **figure 1** below is a part of a micrometer screw gauge when the jaws are closed without the object.

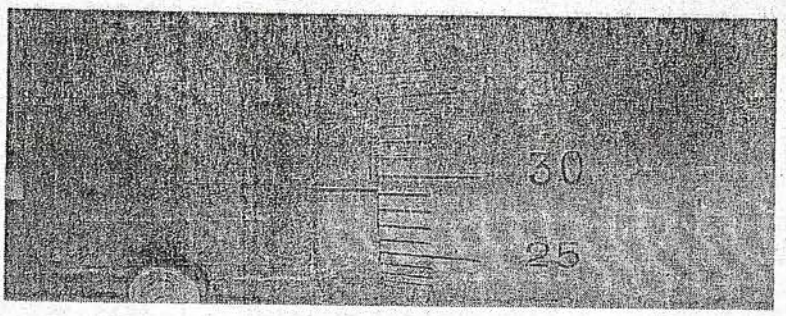


Fig 1

i. State the zero error of the instrument. (1 mk)

ii. The micrometer screw gauge is used to measure the thickness of a wire whose actual diameter is 1.67mm. Determine the reading of the micrometer screw gauge. (2 mks)

2. A single smoke particle is confined in a box full of air as shown in **figure 2.**

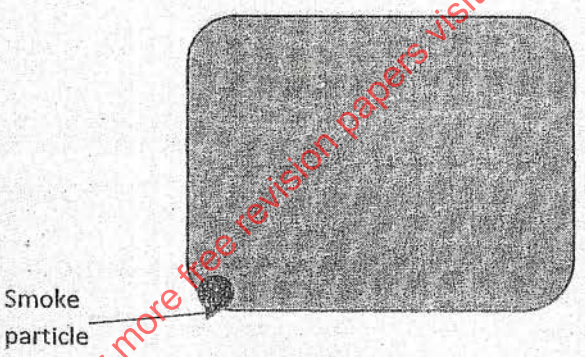


Fig 2

a) Show using arrows how the particle moves. (1 mk)

b) What will happen to the speed of the motion when this box is placed in a freezer? (1 mk)

3. (a) The **figure 3** below shows four brass pins pressed on a cooking stuck until they are flat on the wood. A white gummed paper was then stuck on the wood covering the pins. The stick was then passed over a Bunsen flame a few times.

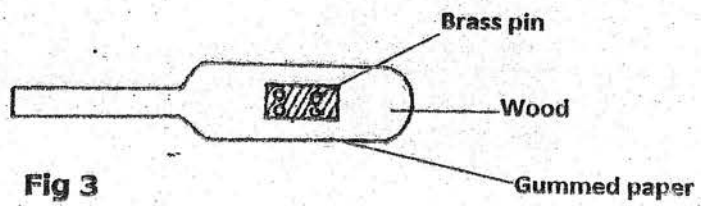


Fig 3

It was observed that the paper got charred leaving four white spots. Explain this observation. (1mk)

4. Abednego said that the mass of an astronaut on the moon is one-sixth of his mass on earth. Explain why his statement is wrong. (1mk)

5. It is advisable to use a pressure cooker at high altitudes. Explain. (2mks)

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

7. The **Fig 4** below 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. Explain this observation. (2mks)

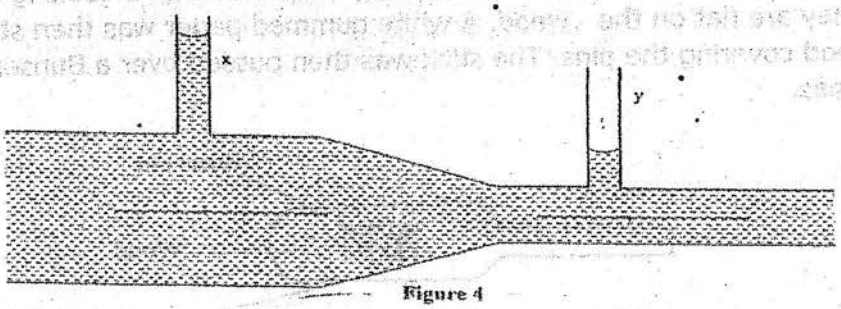


Figure 4

8. The **figure 5** below shows an experiment carried out by a form one student.

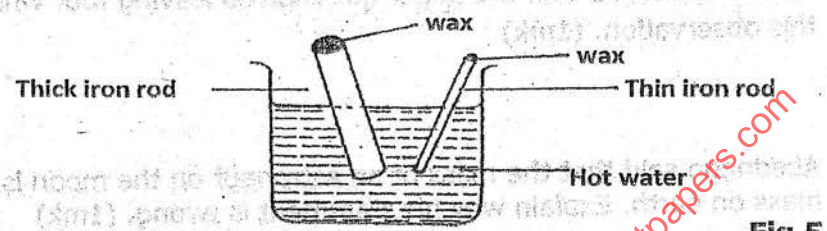


Fig 5

The student dipped two iron rods of the same length but different thickness into a beaker of hot water at the same time. State and explain the observations made after about 10 minutes. (2mks)

9. The **figure 6** shows an athlete lifting weights while standing with the feet apart.

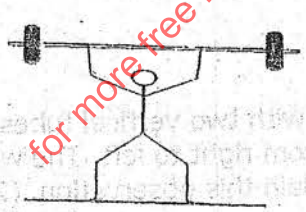


Figure 6

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

10. Two immiscible liquids are poured in a container to the levels shown in the **figure 7** below.

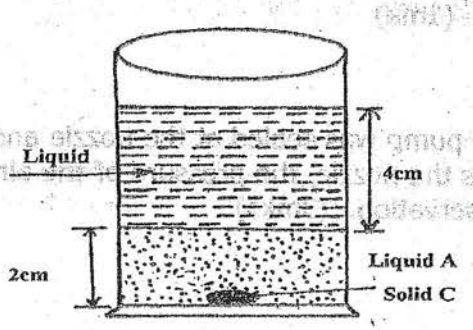
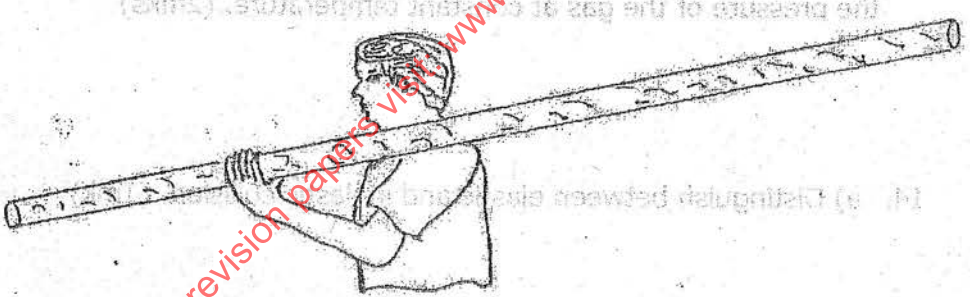


Fig 7

If the densities of the liquids **A** and **B** are $1g/cm^3$ and $0.8g/cm^3$ respectively, find the pressure acting upon solid **C** at the bottom of the container due to the liquids (3 mks)

11. John carried a uniform post of mass 20kg horizontally on his shoulder as shown in the figure below. 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.



Determine the value of the force F. (3mks)

12. A machine is made up of a wheel and an axle. The efficiency of the machine is 80%. It is used to raise 400 N of building materials. The wheel and axle have diameters of 75 cm and 15 cm respectively. Calculate the effort needed to raise the load. (3mks)

SECTION B (55 MARKS)

13. a) State Boyle's law. (1mk)

c) 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. (3mks)

d) A tube 100 cm long is lowered vertically mouth downwards into a tank of water. Calculate the depth of the top of the tube when the water has risen 20 cm inside the tube. (atmospheric pressure = 10.4m head of water) (4mks)

d) Show that the density of a fixed mass of a gas is directly proportional to the pressure of the gas at constant temperature. (2mks)

14. a) Distinguish between elastic and inelastic collision. (1mk)

b) Two ice hockey players suitably padded collide directly with each other and immediately became entangled. One has a mass of 110 kg and is travelling at 4m/s while the other has a mass of 90 kg and is travelling at 6m/s towards the first player. Determine the speed they travel after they become entangled. (3mks)

b) The **figure 9** below shows the starting of the motion of two arrows 10m above the ground. Both arrows were shot with initial velocity of 20m/s from one point and at the same instant

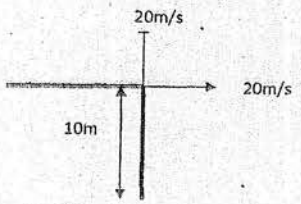


Fig 9

i) Determine the total height reached by the arrow shot vertically (3mks)

ii) Calculate the time taken by the arrow shot horizontally as it strikes the ground (2mks)

iii) Calculate the horizontal distance covered by the arrow shot horizontally as it strikes the ground (2mks)

15. a) Explain why a ship raises a little out of water as it sails from fresh water to salty water

b) A cubic block of side 3cm and density 800kg/m^3 is attached to the base of a tank containing water of density 1000kg/m^3 by means of an inextensible cable of negligible weight. Determine

i) the weight of the block (2mks)

ii) the upthrust acting on the block (3mks)

iii) the tension in the cable (3mks)

c) A ship of mass 1200 tones floats in sea water. Given the density of sea-water = 1030kg/m^3 and that of fresh water = 1000kg/m^3

i) Determine the volume of sea-water the ship displaces (2mks)

ii) If the ship enters fresh water, determine the mass of cargo that must be unloaded so that the same volume of water is displaced as before (3mks)

16. **Figure 10** shows a car of mass M moving along a curved part of the road with a constant speed

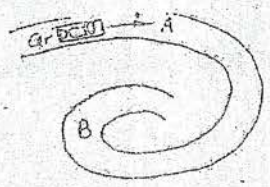


Fig 10

i) Explain the fact that the car is more likely to slide at B than at A if the speed is not changed (2mks)

ii) The radius of the path at B is 250m and the car has a mass of 6000kg. Given the coefficient of friction between the road and the tyre is 0.3, determine the maximum speed the car can be driven while at B to avoid skidding (3mks)

iii) Wet clothes in a clothes drier fitted with small holes dry faster when the drier is whirled at a high speed. Explain how the rotation of the drier causes the clothes to dry so fast (2mks)

17. a) Define the specific latent heat of vaporization (1mk)

b) Calculate the mass of steam at 100^0C which is needed to raise the temperature of 2kg water from 15^0C to 60^0C. (ignore the heat required to heat the container and assume no heat is lost to the surrounding) Take specific heat capacity of water = 4200$Jkg^{-1}K^{-1}$ and specific latent heat of vaporization of water = $2.26x10^6Jkg^{-1}$ (3mks)

c) **Figure 11** shows the features of a domestic refrigerator. A volatile liquid compression pump

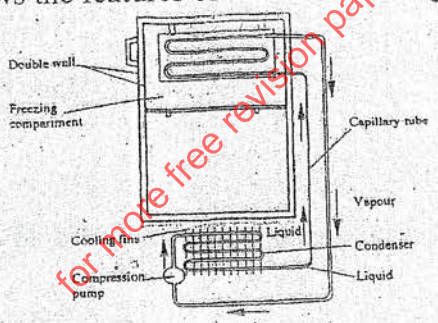


Fig 11

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

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

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

d) Give a reason why a bottle of milk cools faster if the bottle is wrapped in a wet cloth than if the same bottle is immersed in water in a bucket (2mks)