

NAME:CLASS:.....ADM NO:.....

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232/1

Physics

Paper 1

March / April 2017

MOI HIGH SCHOOL - KABARAK

END OF TERM ONE EXAMINATION - 2017

Kenya Certificate of Secondary Education (KCSE)

Physics Paper 1

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, mathematical tables may be used.
- All numerical answers **should be expressed** in the **decimal** notations.

For Examiner use only

SECTION	QUESTION	MAX MARKS	CANDIDATE'S SCORE
A		25	
B		55	
TOTAL		80	

This paper consists of 13 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

Section A (25 Marks)

1. The figure below shows a section of the vernier calipers when the jaws are closed without an object between the jaws.



- (a) State the zero error on the vernier calipers (1 mark)
- (b) A student used the vernier shown in the figure above to measure the diameter of a test tube whose actual diameter was 2.2cm. Determine the reading of the vernier calipers of the test tube. (2 marks)

2. (a) A student observed that when the lower end of a vertical clean glass capillary tube was just immersed in water, the water rose up the tube. Explain the observation. (1 mark)

- (b) Bristles of a paint brush spread when the brush is in water and cling together when out of water. Explain (2 marks)

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. (2 marks)

(b) When the stopper of a bottle containing liquid ammonia is removed, the gas is smelled all over the room. Explain (1 mark)

4. (a) State **two** assumptions made when deriving the equation of continuity. (2 marks)

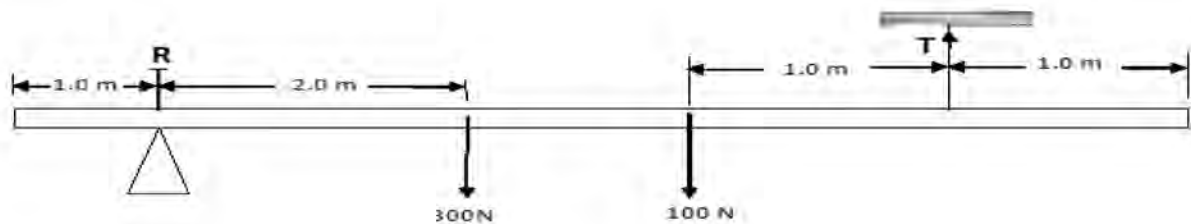
(b) State **one** application of Bernoulli's effect (1 mark)

5. The figure below shows a silvery shiny surface electric kettle being used to heat water from a mains supply.



Explain **two** features of the kettle which enhance its efficiency (2 marks)

6. A uniform plank weighing 300N and length 6.0m is acted upon by other forces as shown in the figure below.



Calculate the tension T in the string and the reaction at the pivot.

(3 marks)

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

8. (a) The height of a mountain is 1360m. The barometer reading at the base of the mountain is 740mmHg. Given that the densities of mercury and air are 13600Kg m^{-3} and 1.25Kg m^{-3} respectively, determine the barometer reading at the top of the mountain (3 marks)

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

Section B (55 Marks)

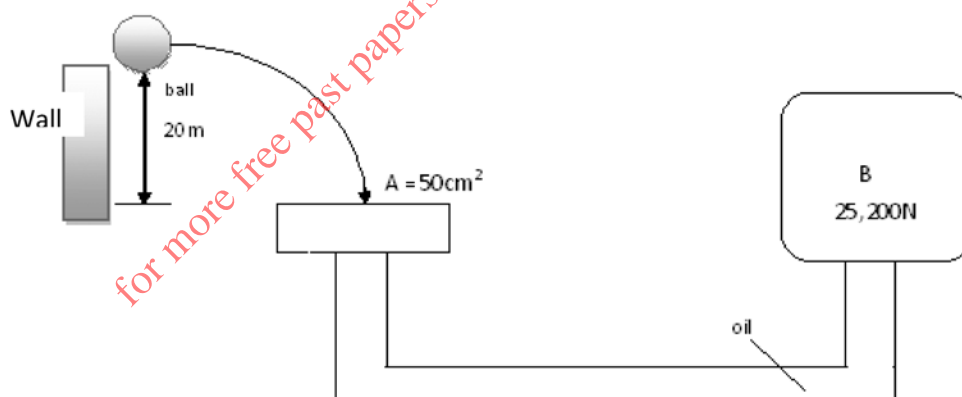
9. (a) During the construction of dams, the base of the dam is *widened* and *curved*. Explain.

(2 marks)

- (b) A block of density 1.58 g/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.

(3 marks)

10. (a) The figure below shows ball of mass 50kg thrown from the top of a wall 20m high with a horizontal velocity of 20m/s. The ball strikes the smaller piston A of the hydraulic lift and compresses a cotton bale B with a 25,200N force.



Determine;

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

(2 marks)

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

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

(iv) The force with which the ball strikes piston A (2 marks)

(v) The area of the load piston B assuming that the two pistons were initially at the same level (2 marks)

(b) (i) State Hooke's law (2 marks)

(ii) A string extends by 5cm when supporting a load of 10N

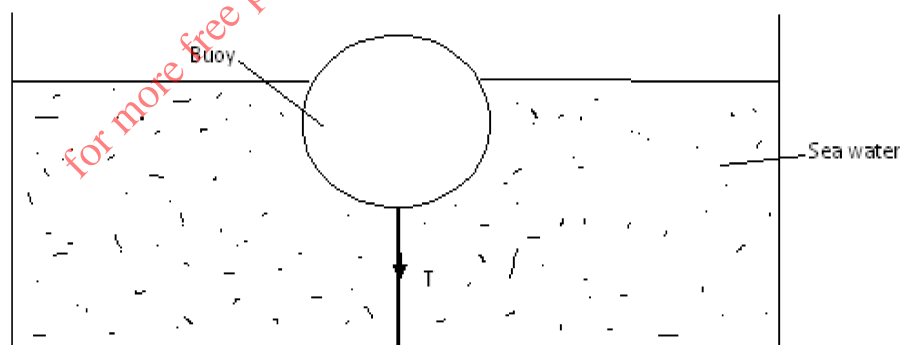
Determine the spring constant of three such springs when placed side by side (2 marks)

(iii) What is the extension of the three springs when supporting a load of 50N (2marks)

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

(1 mark)

(b) The figure below shows a buoy 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 three quarters of its volume is submerged below the surface of the sea water.



Determine the tension in the cable

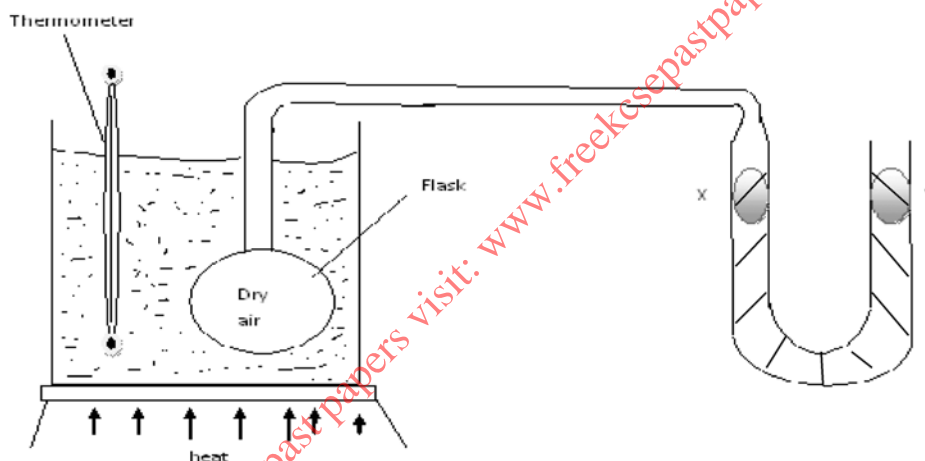
(3 marks)

(c) State a factor which determines the depth to which a body sinks in a liquid

(1 mark)

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

12. The apparatus in the figure below were used to investigate the variation of pressure of a trapped sample of air with temperature.



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

(1 mark)

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

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

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

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

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

(ii) Determine the heat gained by the water and the calorimeter (3 marks)

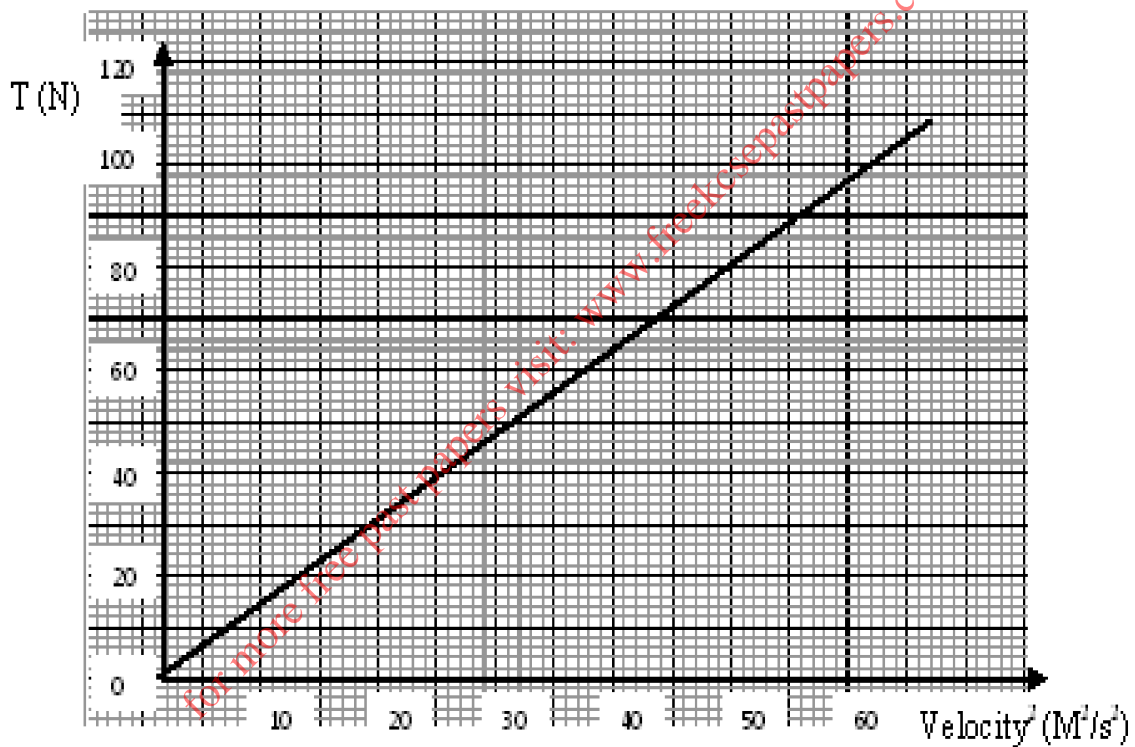
(iii) Calculate the specific heat capacity of the metal (3 marks)

(iv) State one possible error in this experiment (1 mark)

14. (a) Explain why a motorcycle rider leans towards the centre of the curve while negotiating a bend. (1 mark)

(b) In an experiment to determine tension in a string, a solid ball was rotated round a turn table of diameter 80cm at different velocities.

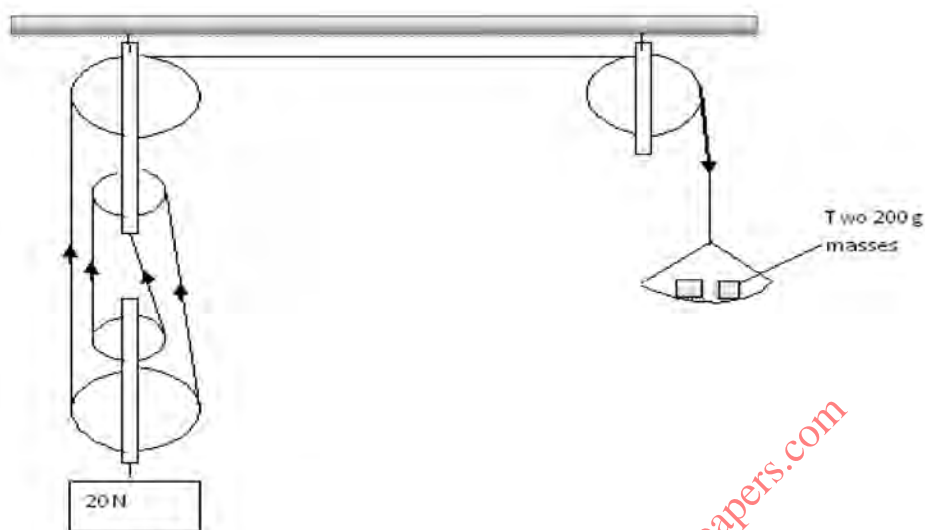
The tension T at different values of velocity squared was obtained and the results represented on a graph shown below.



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

(1 mark)

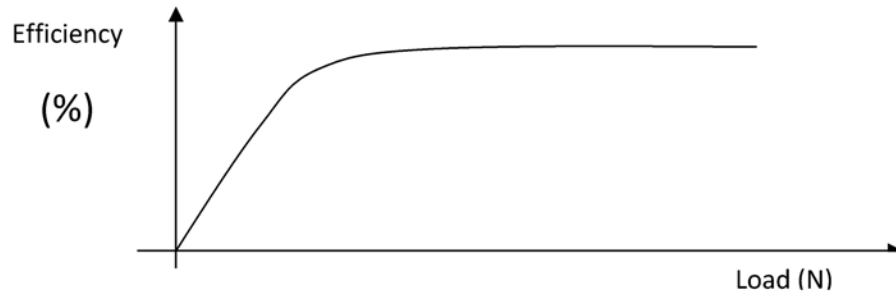
(b) the mechanical advantage if the two 200g masses could cause the 20N load to raise steadily

(2 marks)

(c) the efficiency of the system

(2 marks)

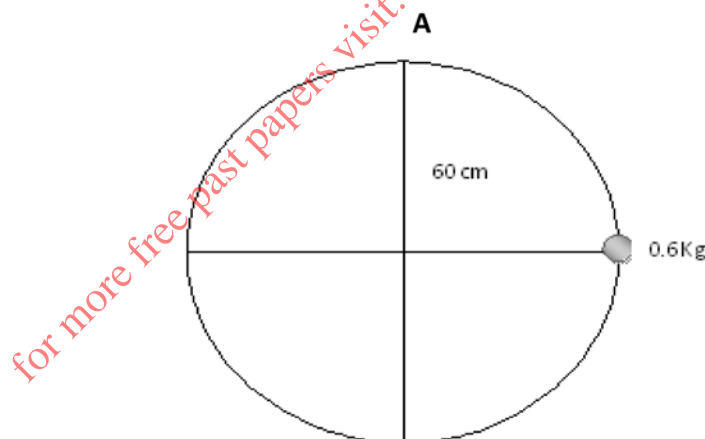
(d) when the load was increased, it was observed that the efficiency assumed the trend shown in the graph below



State and explain the results obtained

(2 marks)

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



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