NAME……………………………………………………………………INDEX NO………………..SIGNATURE……………………

232/1

PAPER 1

PHYSICS

(Theory)

JULY/AUGUST 2014

2 Hours

# RABAI SUB-COUNTY JOINT EXAMINATION-2014

### FORM FOUR PHYSICS

<u>INSTRUCTION TO CANDIDATES</u>

1. Write your Name and Index Number in the space provided above.
2. This paper consists of two sections and B.
3. Answer all questions in Section A and in the spaces provided.
4. All working MUST be clearly shown.
5. Mathematical tables and silent non-programmable calculators may be used.

<u>FOR EXAMINERS USE ONLY</u>
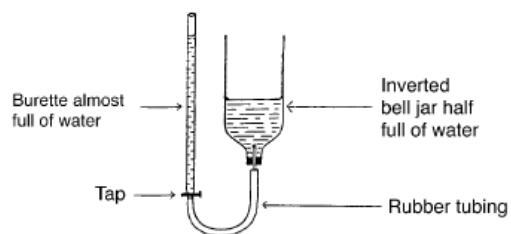
| SECTION | QUESTION | MAX SCORE | CANDIDATE SCORE |
|---------|----------|-----------|-----------------|
| A | 1-12 | 25 | |
| B | 13 | 08 | |
| | 14 | 12 | |
| | 15 | 08 | |
| | 16 | 13 | |
| | 17 | 13 | |
| TOTAL | | 80 | |

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

1. The water level in a burette is 35cm$^3$. If 20 drops are added, what is the new level if each drop has a volume of 0.15cm$^3$? (2marks)

2 Figure 1 shows a burette interconnected to an inverted gas jar via a rubber tube. The tap is initially closed.



Explain what is observed when the tap is opened. [2marks]

3 When a thermometer is immersed in ice cold water, the mercury thread is observed to rise before dropping steadly in the capillary tube. Explain (2marks)

4.      Figure 2 shows a representation of then motion of pollen grains in a glass of water when viewed under a high power microscope.


random movement
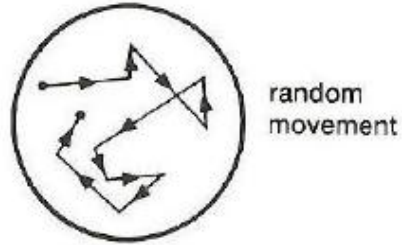
Explain the cause of the random motion.                                  (2 marks)

5.      A small wind pump develops an average power of 50W. It raises water from a bore hole to a point 12m above the water level. Determine the mass of water delivered in one hour.  (2marks)

6.      Give a reason why a clinical thermometer should have a large bulb.                 (1mark)
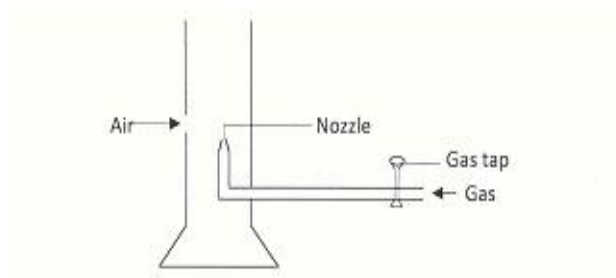
7.      The tape in figure 3 shows part of a ticker tape from a timer connected to an a.c source of frequency 50Hz. The tape was connected to a body falling freely.


1cm                                          3.8cm
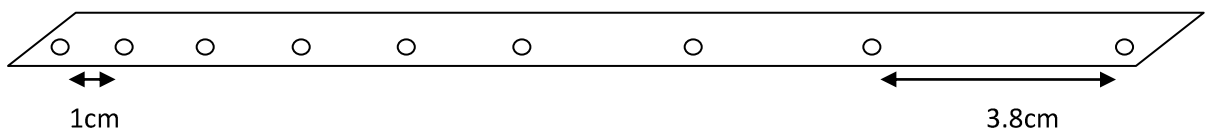
Determine the acceleration of the body. (3 marks)

8. Figure 4 shows a Bunsen burner.



Explain how the air is drawn into the burner when the tap is opened [2 marks]

9 Explain, using Newton's First Law, why passengers without seat belts in a stationary car are thrown forwards in the car, when the car stops suddenly [ 2 marks]

10. A uniform meter rule pivoted at the 20cm mark is balanced by a load of 1.2N is hung at the zero mark. Determine mass of the meter rule. (3 marks)

11. Some water is heated in a flask fitted with a thermometer until it boils. The flask is then inverted and some cold water from the tap run over as shown in figure 5.
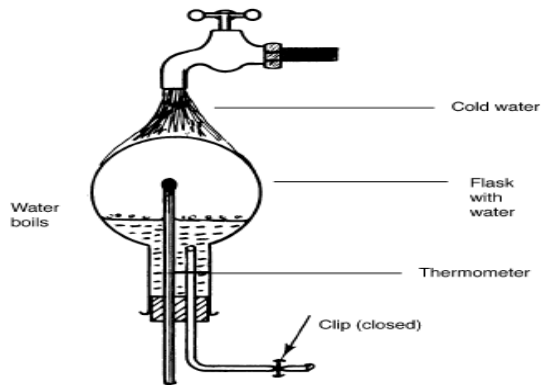


Explain what is observed when some cold water runs over as shown. [2marks]

12 Water flows at a velocity of 48cm/s in a drainage pipe with a non-uniform cross sectional area at a point where the radius of the pipe is 2.1cm. Calculate the diameter of the pipe in a section in which the velocity becomes 32cm/s. (2marks)

SECTION B (55 MARKS)

13      Figure 6 shows a load being pulled at a constant velocity on a bench.



   i)      Show on the same figure all the forces acting o the load.                    [2 marks]

   ii)     State the magnitude of the resultant force on the load.                       [1 mark]

   iii)    State giving your reason the change that will be observed in the motion of the load if a small
           piece of plasticine is added on the load.                                     [2 marks]

b)    A car of mass 2000 kg accelerates at $0.8m/s^2$. The frictional drag force acting against the car is
      1700 N. What is the force exerted by the engine.                                   [4marks]

14. a) What is meant by an ideal gas? (1mark)

b) A car tyre is inflated in the morning when the temperature is low. It is observed that in the afternoon when the temperature is higher, the pressure had increased. Explain this observation using the kinetic theory of gases. (3marks)

c) $80cm^3$ of air at a pressure of 760mmHg at $13^0C$ is compressed to $25cm^3$ under a pressure of 1320mmHg.calculate the rise in temperature. (4marks)

d) You are provided with the following;

-A helical spring

-a set of slotted masses

-A mounted stand
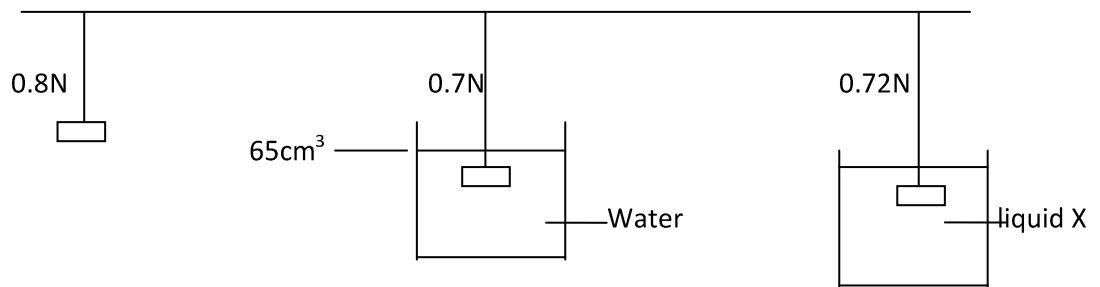
- A metre-rule

Describe an experiment of how you will determine the spring constant. (4 marks)

15    a.)  **State** the law of floatation.                                                                (1 mark]




b) The diagram in figure 7 shows the same metal block weighed in air, water [density 100kg/m$^3$] and liquid X.



i.    The upthrust of the metal block in;


Water.                                                                                          [1 mark]



Liquid X.                                                                                       [1 mark]



The relative density of liquid X                                                               [2 marks]




Ii)      The density of the metal solid.                                                              [3markd]

16  a.)  A stone of mass 200g is whirled with uniform speed in horizontal circle of radius of 100cm.it takes 10 seconds to describe an arc of length 40cm, calculate the:

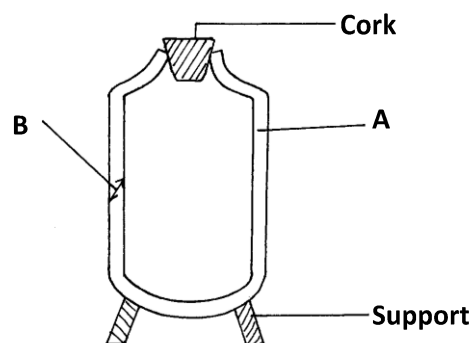       i.     Angular velocity.                                      (3marks)

      ii.    Centripetal acceleration                          (3marks).

b.) State two factors that will determine the maximum speed at which a car can safely negotiate a corner without skidding.                          [2 marks]

c) Figure 8 shows a cross section of a vacuum flask

**Fig.8**

(ii)    Name the parts labelled **A** and **B**                                    [2marks]

**A** …………………………………………………………………………..
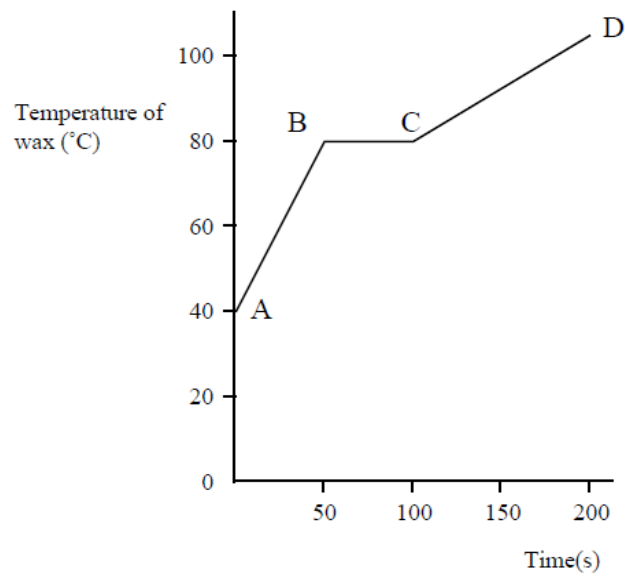
**B** …………………………………………………………………………..

(ii) Explain how the heat losses are minimized when hot liquid is poured into the flask   [3marks]

17      a) Distinguish between specific heat capacity and latent heat capacity of a substance.[2 marks]

b)   The graph in figure 9 shows how the temperature of a 2 kg lump of solid wax varies with
time when heated.

I) Explain the graph in the sections [2marks]

AB

BC

ii) Give a reason why AB is steeper than CD. [1marks]

c ) If a 200 W heater was used to heat the wax, calculate the specific latent heat of fusion of the solid wax. (4marks)

d) A motor rated 4KW is used to raise a load of mass 2000kg through a vertical height of 20m is 3 minutes. What is the efficiency of the motor? (4marks)