Physics I

011

01/11/ 2013 08.30am - 11.30am

REPUBLIC OF RWANDA

RWANDA EDUCATION BOARD

ORDINARY LEVEL NATIONAL EXAMINATIONS 2013

SUBJECT: PHYSICS I

DURATION: 3 HOURS

INSTRUCTIONS :

1. Do not open this question paper until you are told to do so.
2. This paper has **THREE** sections **A**, **B** and **C:**

   SECTION A : This section is compulsory **(55 marks)**

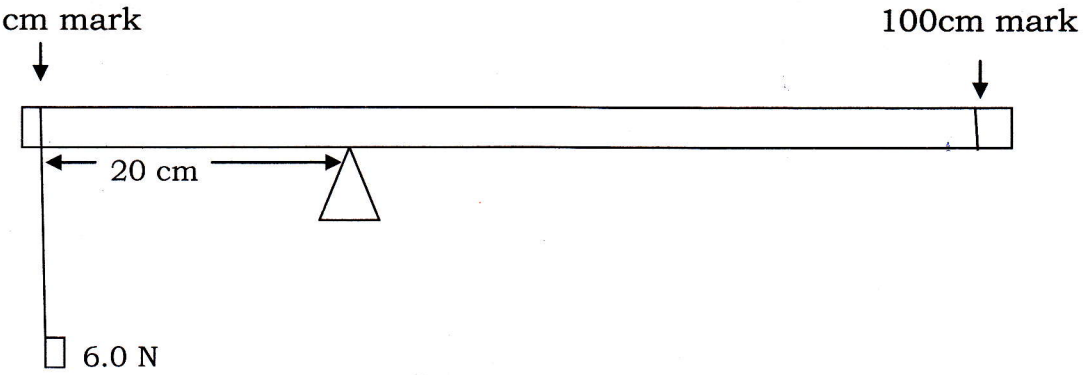
   SECTION B : Attempt any **three** questions **(30 marks)**

   SECTION C : Attempt **Only one** question. **(15 marks)**

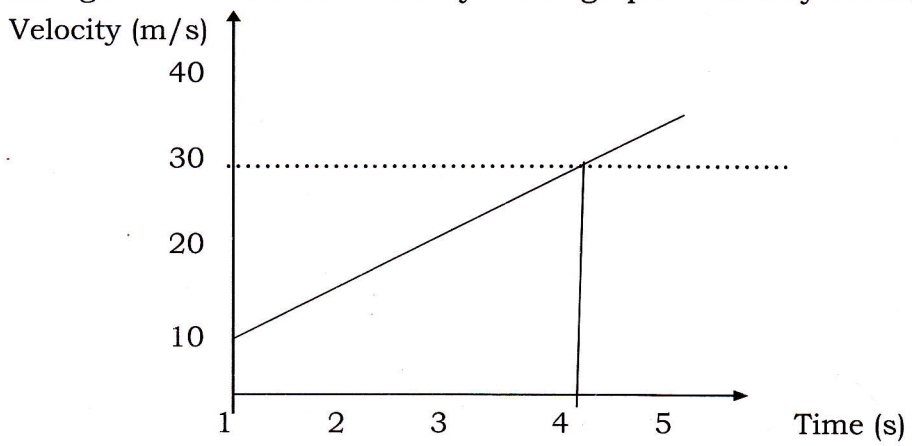
3. Calculators may be used.
4. Use only blue pen and pencil.

SECTION A : ATTEMPT ALL QUESTIONS (55 marks)

1. a) What is the instrument used to measure the density of milk called? **(1mark)**
   b) The density of salt is 2.16 g/cm^3. What is the volume of 216 g of salt? **(2marks)**
2. The diagram below shows a uniform metre rule balanced horizontally when a force of 6.0 N is hang at 0 cm mark. Calculate the weight of the metre rule. **(3 marks)**



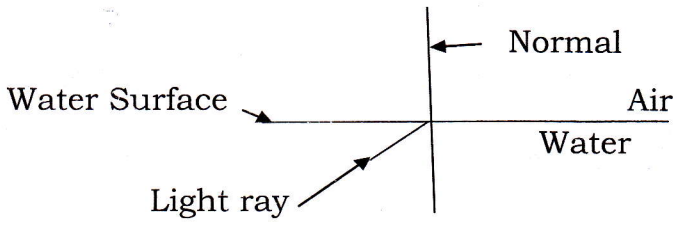
3. The figure below shows a velocity – time graph for a body moving with uniform cceleration.



From the above graph:

a) What is the initial velocity? **(1mark)**
b) What is the distance moved in 5 seconds? **(2marks)**

4. The mass of a rectangular block of dimensions 5 m x 1 m x 2m is 50kg. What is the minimum pressure that it can exert? Given that 1kg exerts a force of 10N. **(3marks)**
5. a) Copy the diagram below and complete it to show the path of the ray of light travelling from water to air. Angle of incidence is greater than critical angle. **(2marks)**



   b) Why does the ray of light take the path you have shown ? **(1mark)**
6. a) What is a neutral point in a magnetic field ? **(2marks)**
   b) State any two methods of making a magnet in a laboratory. **(2marks)**
7. a) What is meant by specific latent heat of vaporization? **(1mark)**
   b) State two factors which affect the boiling point of water. **(2marks)**
   c) What is the heat needed to change 0.8 kg of water at 100^{0}C to steam? Specific latent heat of vaporization of water = 2.26 x 10^6 J/kg. **(2marks)**

8. a) What is the difference between energy and power ? **(2marks)**
   b) What is the power of a water pump which can lift 100kg of water through a vertical height of 5m in 10s. Take g = 10m/s^2. **(2marks)**
   c) A ball is held 2m above the ground and then released. List the energy changes which occur. **(1mark)**

9. a) State two electrical charges. **(2marks)**
   b) A positively charged rod AB is suspended horizontally at its midpoint. One end of a positively charged rod is brought just below end A. State what happens to the end A of the rod AB? **(1mark)**
   c) A current of 3A flows for 5s, what charges passes ? **(2marks)**

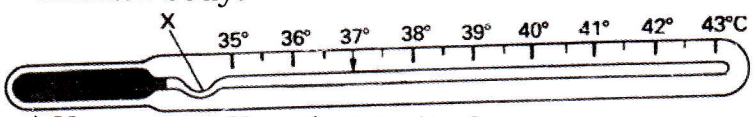
10. Three cells are arranged in parallel and connected to a 2 ohms resistor.
   a) Draw a simple electric circuit to represent this arrangement. **(2marks)**
   b) If each cell has a potential of 1.5V, calculate the current in the circuit. **(2marks)**
   c) If one cell is removed from the circuit, is there any change in the current in the circuit? **(1mark)**

11. a) Name two types of curved mirrors. **(2marks)**
   b) State two uses of a convex mirror. **(2marks)**

12. A measuring cylinder is filled with a liquid.
   a) What does the pressure of the liquid at the bottom depend on ? **(2marks)**
   b) If the depth of the liquid is 0.3m and the pressure it exerts at the bottom is 3000 Pa, find the density of the liquid. g = 10m/s^2. **(2marks)**

13. Give an example to justify that air of the atmosphere exerts force. **(4marks)**

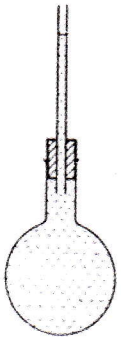
14. The diagram below shows a thermometer used to measure the temperature of human body.



   a) Name part X and state its function. **(2marks)**
   b) What happens when you place this thermometer under the tongue of a patient? **(1mark)**
   c) Why is the temperature range between 35^{0}C – 43^{0}C ? **(1mark)**

SECTION B : ATTEMPT ANY THREE QUESTIONS (30marks)

15. a) Name any two physical properties of matter which change with change of temperature. **(2marks)**
   b) Convert a temperature of 300 K to Celsius degrees, ^{0}C. **(2marks)**
   c) Explain what is meant by the term "unusual expansion of water". **(3marks)**
   d) Liquids expand when heated. The diagram below shows a flask full of water fitted with glass tube.



i. What happens when the flask is heated? **(1mark)**

ii. What happens when you continue heating the water? **(1mark)**

e) What effect does increase in pressure have on the melting point of ice? **(1mark)**

16. a) What are pulleys? **(2marks)**

b) State two reasons why the efficiency of pulleys is always less than 100% **(2marks)**

c) A pulley raises a load of sand of weight 30ON using an effort of 60N. What is the mechanical advantage of the system? **(2marks)**

d) Efficiency of a machine is 80% and mechanical advantage is 4. Find the velocity ratio. **(2marks)**

e) A pulley raises a load 4cm when an effort used moves 12cm. What is the velocity ratio? **(2marks)**

17. a) What is a lens ? **(2mark**

b) State the properties of images formed in a converging lens when the object is nearer the lens than the focal point. **(3marks)**

c) Give any two applications of a converging lens. **(2marks)**

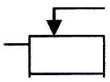
d)What are the characteristics of the images in a diverging lens? **(3marks)**

18. a) State Ohms' Law. **(2marks)**

b) What voltage is needed to drive a current of 2.5A through a resistance of 2? **(2marks)**

c) A voltmeter is connected in parallel in an electric circuit and an ammeter is connected in series in a circuit. Why? **(4marks)**

d) i. What does the symbol below represent in an electric circuit?



ii. State the function of the symbol in d) i. **(2marks)**

19. a) Dry wood of weight 20N floats on water. What is the weight of the liquid displaced by the wood? **(1mark)**

b) State Archimedes' principle. **(2marks)**

c) A body weighs 24 N in air and when wholly immersed in water it weighs 12N. What is the relative density of the body? **(2marks)**

d) A Ship is made of iron and some other materials but it does not sink into water. Why? **(3marks)**

e) A balloon filled with some amount of a light gas when released, rises into air. At some point it stops rising and drifts sideway. Explain why the balloon rises and then stops rising. **(2marks)**

SECTION C : ANSWER ONE QUESTION ONLY (15marks)

20. a) List eight basic laboratory rules which ensure safety of pupils and the materials in the laboratory. **(8marks)**

b) List any seven careers in which Physics is necessary. **(7marks)**

21. List five important ways in which science is useful in each of the cases below.

a) Industries. **(5marks)**

b) Work places **(5marks)**

c) Our lives . **(5marks)**