

Physics I

017

04 Nov. 2010 8.30 - 11.30 am

RWANDA NATIONAL EXAMINATIONS COUNCIL



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ORDINARY LEVEL NATIONAL EXAMINATIONS 2010

SUBJECT : PHYSICS I

DURATION : 3 HOURS

INSTRUCTIONS:

This paper consists of **three** sections **A, B** and **C**.

Attempt **all** questions in section **A**. (**55 marks**).

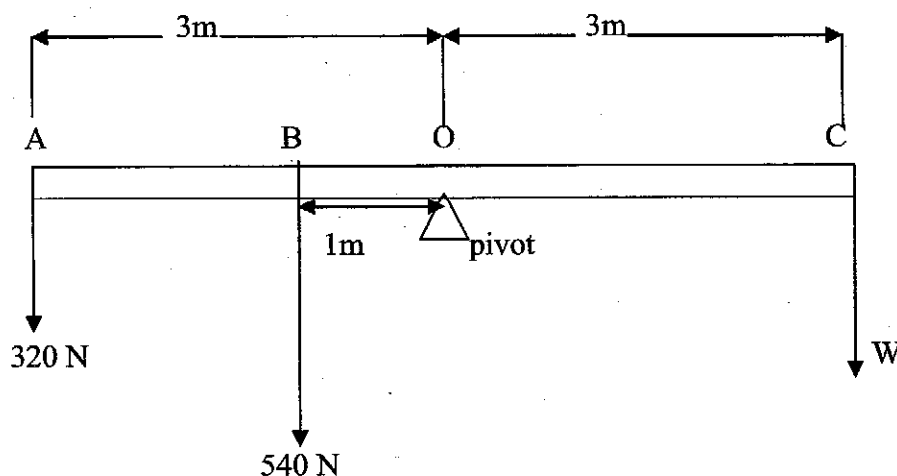
Answer **any Three** questions in section **B**. (**30 marks**)

Answer **only one** question in section **C**. (**15 marks**)

You may use a calculator and a mathematical instrument.

SECTION A: Attempt all questions (55marks)

1. Explain what is meant by average speed. State the unit of average speed. **(3 marks)**
2. A force of 25N acts on a mass of 5kg starting from the rest . Find the acceleration . **(3 marks)**
3. What is the difference between mass and weight? State the unit of each quantity. **(4 marks)**
4. Draw a cone (a) in a stable equilibrium (b) in unstable equilibrium and (c) in a neutral equilibrium . **(3 marks)**
5. Calculate the power of a pump which can lift 300kg of water through a vertical height of 8 m in 10 seconds. $g = 10\text{m/s}^2$. **(3 marks)**
- 6.(a) What is meant by the term density of a body ? **(2 marks)**
(b) A body has a volume of 15cm^3 and mass of 27g .What is its density ?Give the answer in kg/m^3 . **(3 marks)**
7. The diagram shows a balancing uniform rod. Calculate force W. **(4 marks)**



8. Show how a ray of light from the air passes through a glass block and explain why the ray behaves as you have shown in your diagram. **(5 marks)**
9. Draw an electric circuit composed of a dry cell , a switch, connectors, a resistor , ammeter and a voltmeter to read the voltage across the resistor. **(4 marks)**
10. A student dropped iron filings into sugar bowl by accident. Explain how sugar can be separated from the mixture. **(3 marks)**
- 11.(a) List energy changes which occur when a torch is switched on. **(2 marks)**
 (b) Which are other sources of electricity other than hydroelectric power in Rwanda? **(3 marks)**
12. Two cells each having an e.m.f of 1.5V and an internal resistance of 2Ω are connected (a) in parallel and (b) in series. Find the current in each case when the cells are connected to a 1Ω resistor. **(4 marks)**
- 13.(a) State Archimedes' Principle . **(2 marks)**
 (b) A piece of a metal is weighed
 (i) in air
 (ii) fully submerged in water
 (iii) fully submerged in a salt solution.
 The results obtained, but not in correct order, were 6 N, 5N and 8N. Which reading was obtained for b(i), b(ii) and b(iii) ? **(3 marks)**
14. Explain how heat is transferred in water. **(4 marks)**

SECTION B: Attempt only Three questions (30marks)

- 15 (a) Define the term specific heat capacity of a substance. (3 marks)
(b) A piece of aluminium of mass 600g is heated from 25°C to 100°C. How much heat is supplied if the specific heat capacity of aluminium is 900J/kgK? (7 marks)
What is the heat capacity of this metal? (2 marks)
- 16 (a) What is meant by (i) potential energy? (2 marks)
(ii) kinetic energy? (2 marks)
(b) An orange of mass 80g falls from its tree 2m high above the ground. Calculate the potential energy of the orange before it falls from its tree. Find the kinetic energy of the orange as it hits the ground. (6 marks)
- 17 (a) Distinguish between a converging and a diverging lens. (3 marks)
(b) What is meant by the term focal point of a lens? (1 mark)
(c) An object 1m tall stands vertically on the principal axis of a converging lens of focal length 4cm. Determine the nature of the image if the object is 6cm from the optical centre of the lens. (6 marks)
- 18 (a) Which instrument would you use to measure atmospheric pressure? (1 mark)
(b) With aid of a diagram show and explain that air of the atmosphere exerts force. (7 marks)
(c) Calculate the pressure exerted by water at 10m below the surface of the water in a lake. $g = 10\text{N./kg}$ and $\rho = 1000\text{kg/m}^3$. (2 marks)
19. A car of mass 1500kg traveling at 72km/h is brought to rest in 5 seconds.
Find (a) the average deceleration. (4 marks)
(b) the average braking force. (3 marks)
(c) the distance moved during the deceleration. (3 marks)

SECTION C: Attempt only one question (15marks)

- 20 (a) Draw a labelled electric circuit diagram which you can use to determine the unknown resistor in a circuit.

(4 marks)

- (b) A student carried out an experiment to determine the resistance of a conductor. The table shows the results obtained .

Potential difference / V	Current / A
1.2	0.6
2.2	1.1
4.0	2.0
6.4	3.2

- (i) Plot a graph (potential difference along y-axis and current along x-axis).

(7 marks)

- (ii) What law may be determined from the graph ?

(1 mark)

- (iii) Find the resistance of the conductor from the graph.

(3 marks)

21. A student carried out an experiment to determine the density of a liquid. Different masses of the liquid were measured and their respective volumes .

The table below shows the results obtained .

Mass / g	Volume / cm ³
4	5
8	10
12	15
16	20
20	25
24	30

- (a) Plot a graph of mass (y-axis) against volume (x-axis).

(9 marks)

- (b) Does the graph start from the origin ? Explain your answer .

(4 marks)

- (c) Determine the density of the liquid from the graph . Show on the graph how you get your answer.

(2 marks)

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