THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL
CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

031/2B

PHYSICS 2B
ALTERNATIVE B PRACTICAL
(For both School and Private Candidates)

Time: 2:30 Hours **Monday, 18th October 2010 a.m.**

Instructions

1. This paper consists of **three (3)** questions.
2. Answer **two (2)** questions including question **number 1.**
3. Whenever calculations are involved show your work clearly
4. Marks for questions are indicated at the end of each question.
5. Calculators and cellular phones are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet(s).

Take $\pi = 3.14$

This paper consists of 5 printed pages.

1. The aim of the experiment is to determine the density ρ of the liquid L. Proceed as follows:

(a) Put sufficient lead shots into the test tube to ensure that it just floats vertically in liquid L contained in a beaker. Keeping the floating test tube away from the sides of the beaker read and record the height h_o of the test tube that is submerged (see Figure1).

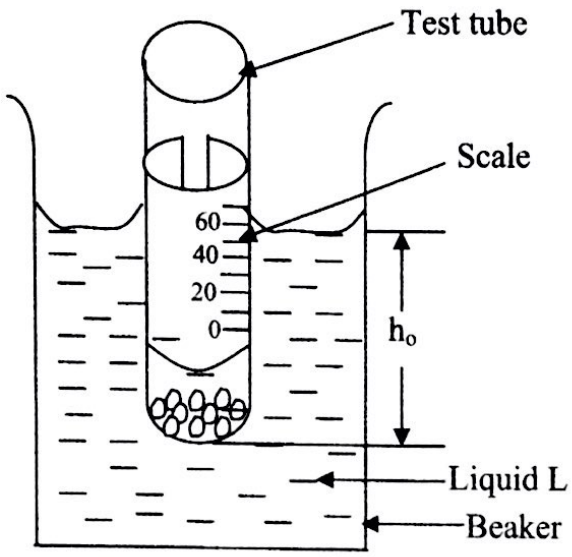


Figure 1

(b) Drop 3 clips into the test tube and record the new height of the test tube that is submerged. Repeat this procedure with 6, 9, 12 and 15 clips dropped into the test tube. For each new height h, calculate $(h - h_o)$.

(c) (i) Tabulate N (the number of clips), h and $h - h_o$.
(ii) Plot a graph of N (vertical axis) against $h-h_o$ (horizontal axis).
(iii) Determine the slope G of the graph.

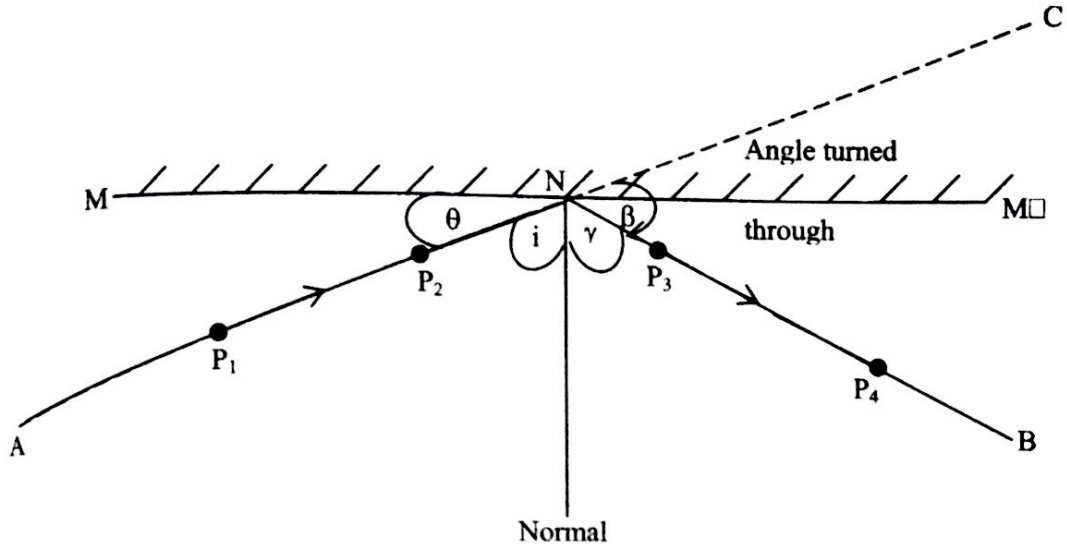
(d) Measure and record the external diameter D of the test-tube.

(e) Calculate the value of the density ρ given by the relation

$$\rho = \frac{4GM}{\pi D^2}$$, where M is the average mass of the clip in grams.

(25 marks)

The aim of this experiment is to investigate the relationship between the angle made by incident ray with the mirror and the angle turned through by the ray of light after striking the mirror.



MM′ is a plane mirror

Figure 2

Proceed as follows:

Draw a ray through pins P_1 and P_2 which form angle θ of 20° with the mirror. Trace the reflected ray and fix pins P_3 and P_4 when viewed from B along it. Remove the mirror and mark with dotted line the path of the incident ray NC. Measure the angle turned through by ray of light (angle β) and record your results. Repeat the set up for angle θ = 30°, 40°, 50° and 60° respectively.

(a) Record your results in the table below:

θ	β	γ
20°		
30°		
40°		
50°		
60°		

(b) Plot a graph of γ against β.

(c) Deduce the relation between θ and β.

(d) What is the relation between β and γ (the angle of reflection)?

(25 marks)

3. The aim of this experiment is to determine the resistivity ρ of a wire labeled W and the internal resistance r of the two dry cells provided.

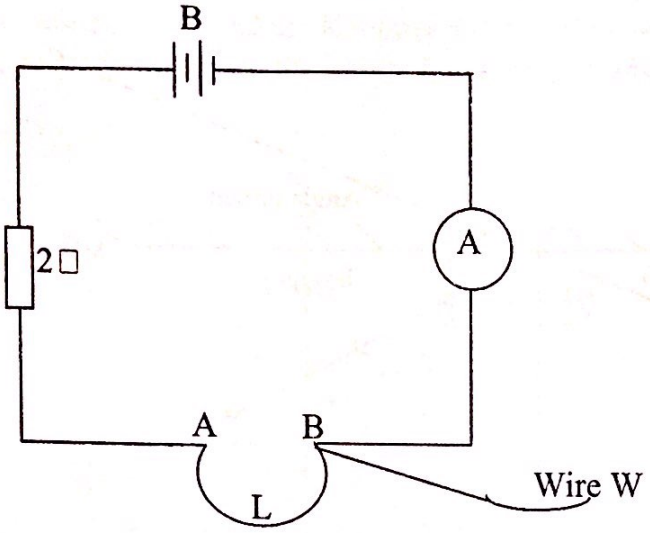


Figure 3

Set up the circuit as shown in Figure 3. Adjust the length L of the wire W in the gap AB to 20 cm. Record the ammeter (A) reading.

Repeat the procedure above for values of L = 40 cm, 60 cm, 80 cm and 100 cm, and each time record the corresponding current I.

Tabulate your results as shown below.

Length L of wire W (cm)	Current I (A)	$\frac{1}{I}$ (A^{-1})
20 40 60 80 100		

(a) Compute the value of $\frac{1}{I}$ (A^{-1}) in the table above.

(b) Plot a graph of (y – axis) against L (x – axis).

(c) From the graph determine the slope S and the intercepts.

(d) Using a micrometer screw gauge measure and record the diameter d of the wire W.

Calculate the:

(i) resistivity ρ

(ii) internal resistance r of the dry cells given that

$$S = \frac{4\rho}{\pi d^2 E} \text{ and}$$

$$\text{y - intercept} = \frac{R + r}{E}$$

where E is the e.m.f of the battery and R is the external resistor in the circuit.

(25 marks)