P510/3
PRACTICAL
PHYSICS
Paper 3
June/July, 2018
3¼ hours

ACEITEKA JOINT MOCK EXAMINATIONS 2018

Uganda Advanced Certificate of Education

PHYSICS

PRACTICAL

Paper 3 3 hours

15 minutes

INSTRUCTIONS TO CANDIDATES:

Answer ***question*** **1***and* ***ONEother*** *question.*

Candidates will not be allowed to use the apparatus or write for the first fifteen minutes.
Graph papers are provided.
Non – programmable silent electronic calculators may be used.

Candidates are expected to record on their scripts all their observations as they are made and to plan the presentation of the records so that it is not necessary to make a fair copy of them.
The working of the answers is to be handed in.

Details on the question paper should not be repeated in the answer, nor is the

theory of the experiment required unless specifically asked for.

Candidates should however record any special precautions that they have taken and any particular features of their method of going about the experiment.

Marks are given mainly for a clear record of the observations actually made, for their suitability and accuracy, and for the use made of them.

Question 1

In this experiment, you will determine the mass, M, of the metre rule provided using two methods. ***(40 marks)***

METHOD I

(a) Tie a knot on the metre rule using a piece of thread.

(b) Suspend the metre rule from the clamp of the retort stand.

(c) Suspend a 40 g mass at distance d = 4.0 cm from the zero cm mark of the metre rule.

(d) Adjust the position of the knot until the metre rule balances horizontally as shown in figure 1.

(e) Measure and record the distances d_1 and d_2. (f) Calculate the value, M_1 from

$$M_1 = \frac{d_1 \times 40}{d_2}$$

(g) Repeat the procedure in (c) and (d) for the value of d = 6.0 cm.

(h) Measure, and record the new values of d_3 and d_4 respectively. (i)

Determine the value of M_2 from the expression, $M_2 = \frac{d_3 \times 40}{d_4}$

(j) Calculate the average value, **M**, of M_1 and M_2.

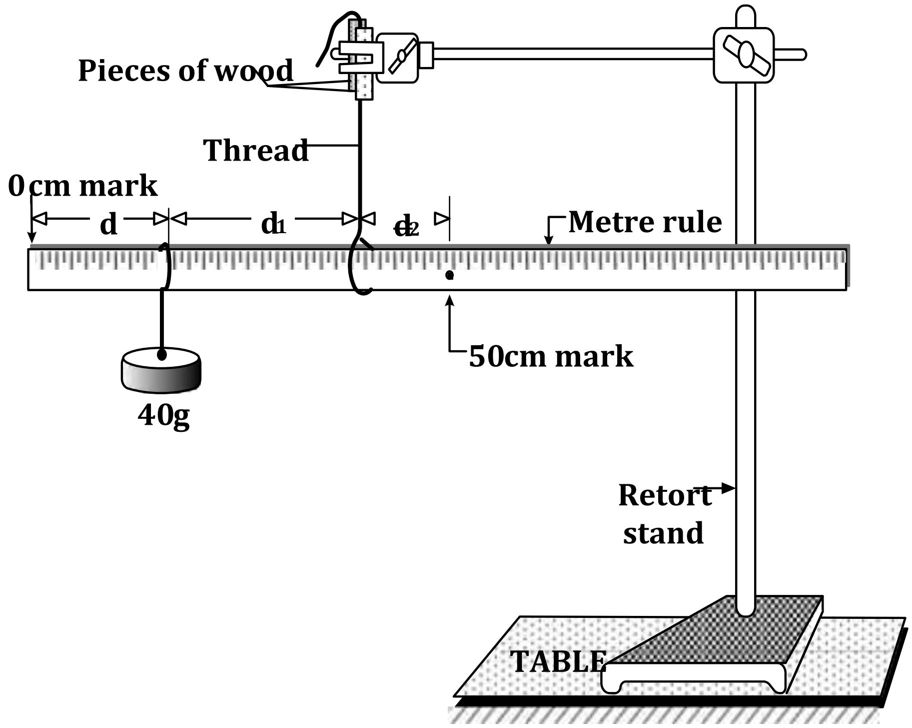

Fig 1

METHOD II

(a) Weigh the half metre rule provided and record its mass, $\mathbf{m_0}$.

(b) Remove the 40 g masses from the metre rule.

(c) Suspend two 20 g masses from the half metre rule such that one is at the 15.0 cm mark while the other is at the 35.0 cm mark.

(d) Suspend the loaded half metre rule from the metre rule such that the distance x = 10.0cm.

(e) Adjust the knot at B such that the metre rule balances horizontally. Ensure that the whole system balances as shown in figure 2

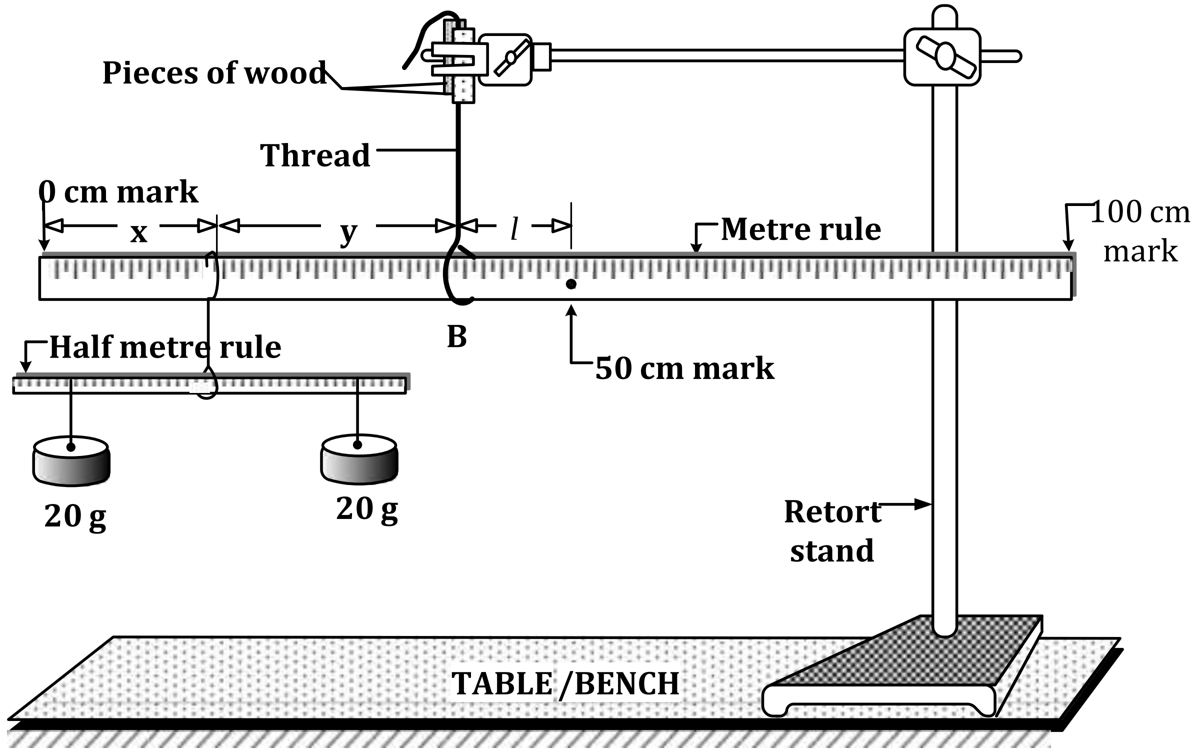

Fig. 2

(f) Measure and record the distances y and l

(g) Repeat the procedure from (d) to (f) for values of x = 15.0, 20.0, 25.0, 30.0 and 35.0 cm.

(h) Record your results in a suitable table including values of y^2 and l^2

(i) Plot a graph of y^2 against l^2 (j) Determine the slope, **S**, of the graph.

(k) Calculate the value of **M** from the expression, $S = \left(\frac{M}{40 + m0}\right)^2$

Question 2

In this experiment you will determine the constant, S, of the glass block provided using two methods: ***(40 marks)***

METHOD I

(a) Measure and record the length, l of the glass block.

(b) Fix the first plain sheet of paper provided on a soft board using drawing pins.

(c) Draw a straight line on the plain white sheet of paper provided.

(d) Place the glass block with the smallest area over the line .

(e) Hold an optical pin horizontally so that its pointed end is adjacent to the glass block as shown in figure 3.

(f) Adjust the position of the optical pin until it appears to coincide with the image of the line as seen through the glass block from above.

(g) Measure and record the height, y of the pin from the line on the sheet of paper.

(h) Calculate the constant, **S** of the glass block from the expression, $l = \boldsymbol{S}\,(l - y)$.

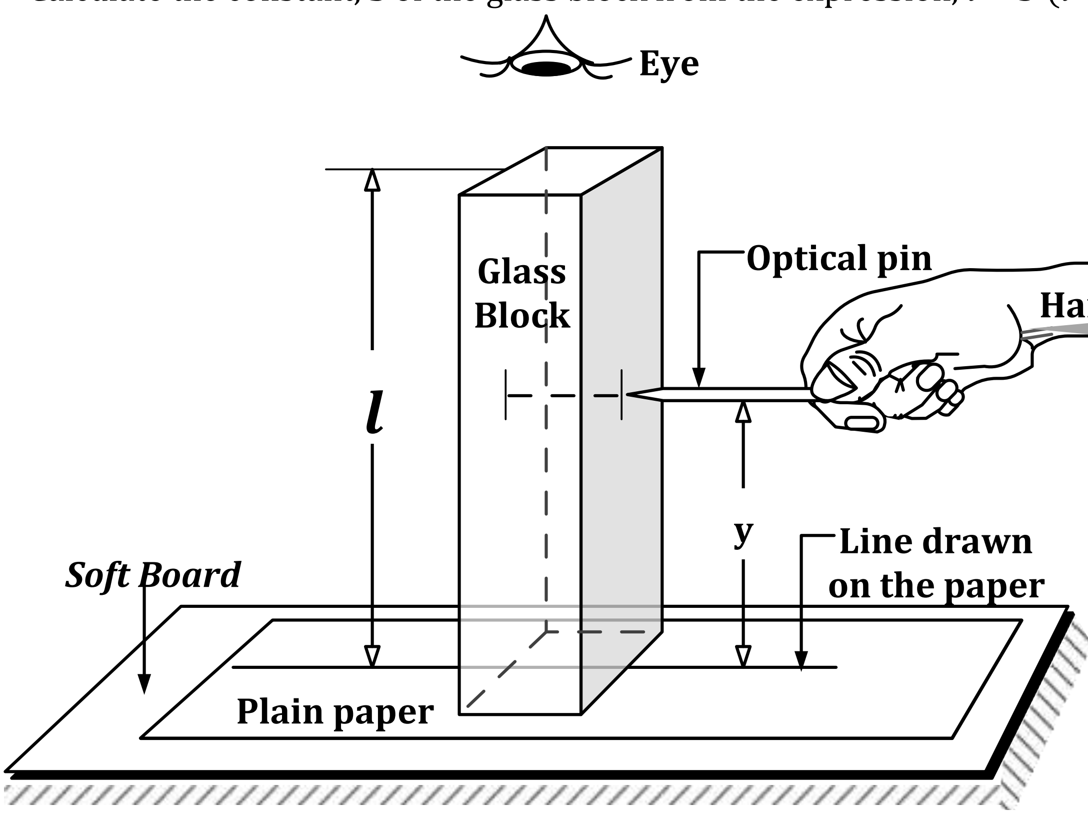

Fig. 3

METHOD II

(a) Measure and record the width, ***b***, of the glass block.

(b) Fix the second plain sheet of paper provided on a soft board using drawing pins.

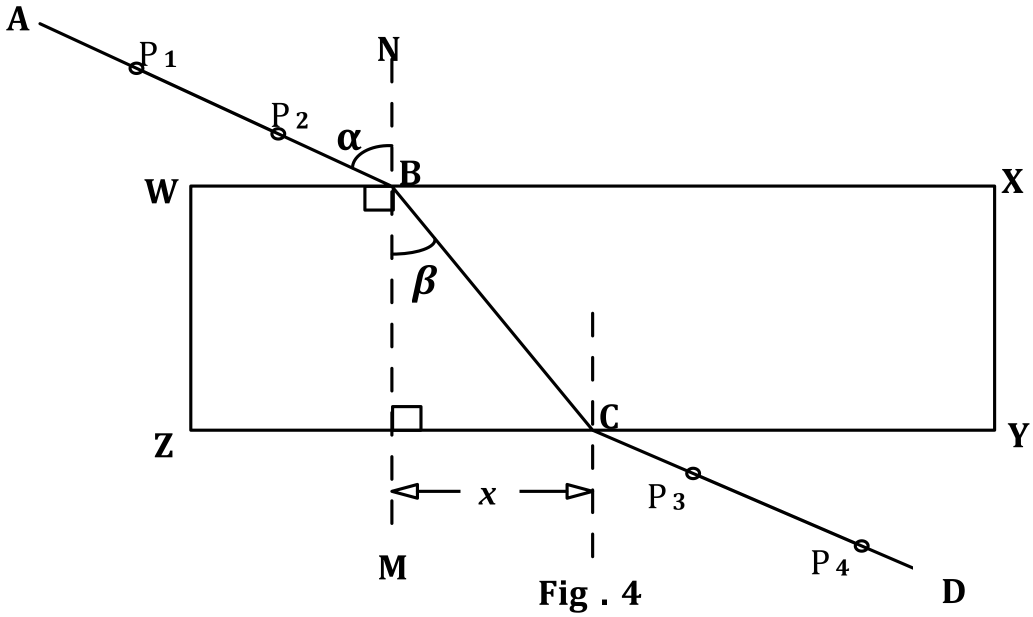

Fig . 4

(c) Place the glass block in the middle of the plain sheet of paper with the largest face top most, and draw its outline **XYZW** as shown in figure 4. (d) Remove the glass block.

(e) Draw a perpendicular NM to WX at B such that $WB = \frac{1}{4}(WX)$.

(f) Draw a line AB such the angle, $\alpha = 20°$.

(g) Replace the glass block on its outline.

(h) Stick two optical pins P_1 and P_2 on the line AB.

(i) While looking through the glass block from side YZ, stick pins P_3 and P_4 such that they appear to be in line with the images of pins P_1 and P_2.

(j) Remove the glass block and all the pins.

(k) Draw a line through P_3 and $P_4$to meet YZ at C.

(l) Join C to B.

(m) Measure and record the angle **β** and the distance **.**

(n) Repeat the procedures (f) to (m) for values of $\alpha = 25°, 30°, 40°, 50° and\ 60°$

(o) Tabulate your results, in a suitable table including values of $\sin\alpha$ and $\frac{x\cos\beta}{b}$

(p) Plot a graph of $\sin\alpha$ against $\frac{x\cos\beta}{b}$

(q) Determine the slope, **S** , of the graph.

Write your name on all your tracing paper(s) and hand them together with the rest of the answer scripts. **Question 3**

In this experiment, you will determine the cross-sectional area A_0 of the bare wire N, provided. ***(40 marks)***

PART I

(a) Measure a length L = 1.00 m of wire **N**, and connect up the circuit shown in figure 5.

(b) Close switch K, then adjust the rheostat Z until the ammeter indicates a current $I_1 = 0.20$ A

(c) Read and record the voltmeter reading V_1. (d) Open switch K.

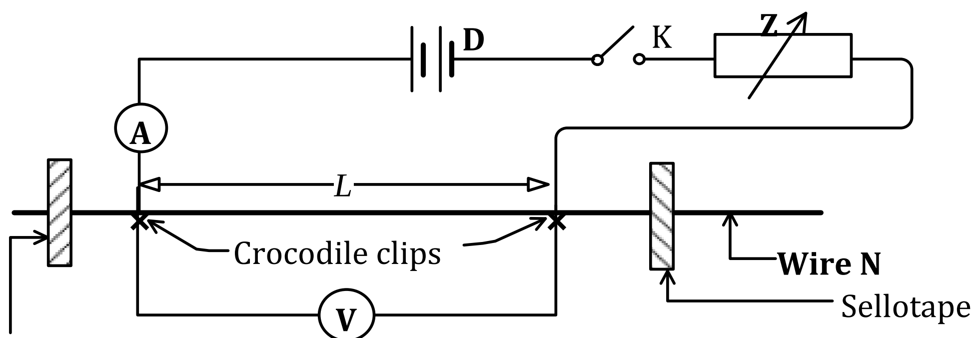

Fig. 5

(e) Calculate, A_1 of the wire N, from $A_1\left(\frac{V_1}{I_1}\right) = k_1$ where,

$k_1 = 1.0 \times 10^{-6}\ \Omega\ m^2$

PART II

(a) Connect up the circuit as shown in figure 6 using a length of wire C, PQ = 100.0 cm.

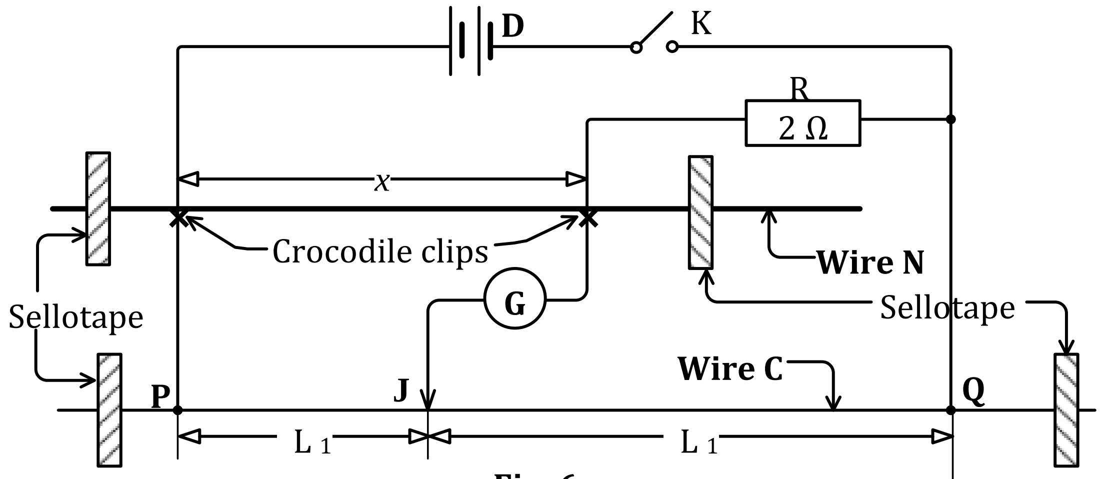

Fig. 6

(b) Connect a measured length of wire N, x = 0.200 m, into the circuit in figure6.

(c) Close switch K and tap the jockey J gently on the wire C, until the centre zero galvanometer G, shows no deflection.

(d) Measure and record the balance lengths, L_1 and L_2.

(e) Open switch K.

(f) Repeat the procedures (b) to (e) above for values of x = 0.300, 0.400, .500, 0.600 and 0.700 m.

(g) Tabulate your results into a suitable table including values of $\frac{1}{x}$ and $\frac{1}{y}$ where, $y = R\left(\frac{L_1}{L_2}\right)$ and $R = 2\ \Omega$.

(h) Plot a graph of $\frac{1}{y}$ against $\frac{1}{x}$

(i) Determine the slope S_0 of the graph.

(j) Calculate, A_2 of the wire N, from the expression, $A_2 = \rho S_o$ Where, $\rho = 1.0 \times 10^{-6}\ \Omega m$

(k) Determine the constant A_0 of the wire, from the expression;

$$A_0 = 0.500\,(A_1 + A_2)$$

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