P510/3
Physics Practical
Paper 3
August 2019
3¼ HRS

WESTERN JOINT MOCK EXAMINATIONS 2018

Uganda Advanced Certificate of Education

PHYSICS PRACTICAL

PAPER 3

3¼Hours.

INSTRUCTIONS TO CANDIDATES.

- *Answer question* ***1*** *and* ***one*** *other question.*
- *Any additional question answered will not be marked.*
- *Candidates are not allowed to use the apparatus for the first fifteen minutes.*
- *Graph papers are provided.*
- *Mathematical tables and non-programmable scientific electronic calculators may be used.*
- *Candidates are expected to record all their observations as they are made and plan the presentation of the records, so that it is not necessary to make a fair copy of them.*
- *The working of the answer is to be handed in*
- *Details of the question paper should not be repeated in the answer, nor in the theory of theexperiment required. Candidates should, however, record any special precautions they have taken and any particular feature 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.*

1. In this experiment, you will determine the constant, **K** of the spiral spring provided.

Part 1

(a) Balance the metre, Q on a knife edge with its graduated face upwards and note the position, G of balance.
(b) Measure and record in metres the distance x of the knife edge from the hole, H
(c) Pass an optical pin through the hole, H and then fix the pin into the rubber bung or cork provided.
(d) Clamp the rubber bung or cork
(e) Attach a pointer, P_1 to one end of the spring provided
(f) Suspend the spring from the rod of a clamp
(g) Tie a pointer, P_2 firmly to the end, B of the metre rule Q using a piece of thread
(h) Tie the free end of the spring to the metre rule at the 99.0cm mark as shown in figure 1.
(i) Adjust the position of the clamp from which the spring is suspended until the metre rule is horizontal.

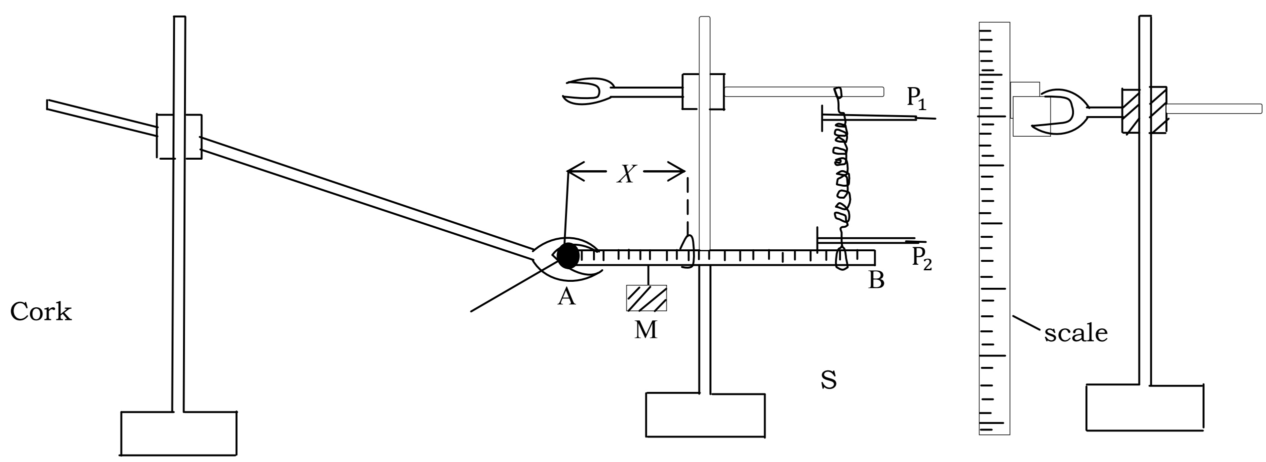


Fig. 1

(j) Clamp a metre rule vertically besides pins P_1 and P_2
(k) Read and record the initial positions P_0 and $P_0{}^1$ of the pointers P_1 and P_2, respectively on the scale.
(l) Hang a mass $M = 0.100kg$ on the metre rule, Q at point G using a piece of thread.
(m) Adjust the positions of the clamp from which the spring is suspended until P_2 returns to its initial position.
(n) Read and record the new positions $P_1{}^1$ of the pointer P_1 on the scale.
(o) Find the extension, $e = (P_1{}^1 - P_0)$, of the spring and record it in metres.
(p) Repeat procedures (l) to (0) for values of $M = 0.200, 0.300, 0.400, 0.500$ and $0.600kg$.
(q) Tabulate your results
(r) Plot a graph of e against M
(s) Find the slope S, of the graph
(t) Determine the constant, K of the spring from the expression, $K_1 = \frac{Xg}{0.98\,S}$,

where $g = 9.81\ ms^2$

PART II

(a) Remove mass M
(b) Adjust the position of the clamp from which the spring is suspended until the metre rule Q is horizontal.
(c) Read and record the initial position of the pointers P_1 and P_2 as P_0 and P_0^1
(d) Suspend a mass M = $0.300kg$ at a distance $y_1 = 30.0$cm from hole, H.
(e) Adjust the position of the clamp from which the spring is suspend until the pointerP_2returns to its initial position.
(f) Read and record the new position P_1^1 of the pointer P_1 on the scale.
(g) Find the extension $e_1 = (P_1^1 - P_0)$ of the spring
(h) Repeat procedures (d) to (g). for values of $y_2 = 70.0cm$ and record the new extension as e_2.
(i) Determine the constant, K_2 of the spring from the expression.

$$\mathbf{K_2 = \frac{3(y_2 - y_1)}{(e_2 - e_1)}}$$

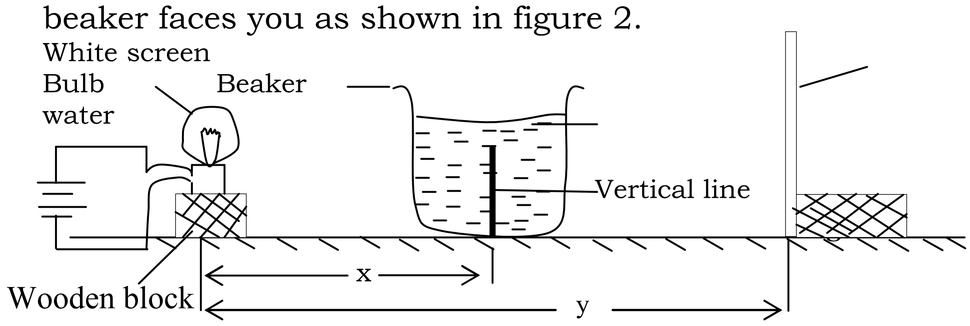
(j) Find K from the expression

$$K = \frac{1}{2}(\mathbf{K_1 + K_2})$$

2. In this experiment, you will determine the power, p of a cylindrical water lens by two methods.

METHOD 1

(a) Measure and record the external diameter, d, of the 250ml glass beaker provided.
(b) Draw, using a pen, a vertical line along the strip of paper provided.
(c) Stick the strip of paper vertically on the side of the glass beaker using pieces of cellotape.
(d) Align the torch bulb, beaker and the screen such that the vertical line on the beaker faces you as shown in figure 2.



(e) Pour water into the beaker up to the 250ml mark.
(f) Adjust the distance, x, to 20.0cm
(g) Adjust the position of the screen until a sharp vertical line image of the bulb is formed on it.
(h) Measure and record the distance, y of the screen from the bulb.
(i) Calculate the value of p, from the expression

$$p = \frac{y}{x(y - x)}$$

(j) Repeat the procedure (f) to (i) for x=30.0cm.

(k) Calculate the average value of p.

METHOD II

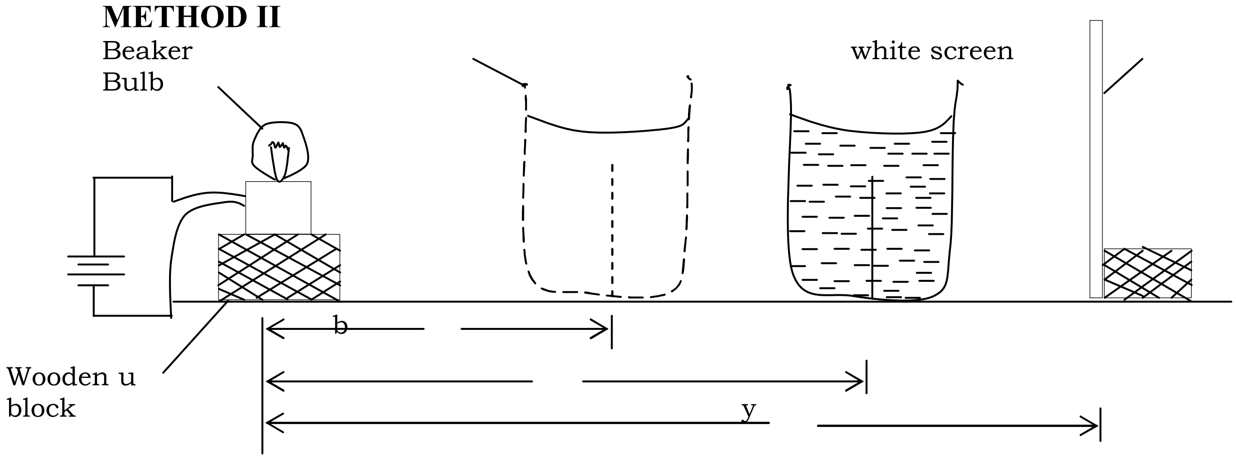


Fig 3

(a) Adjust the distance between the bulb and the screen to $y = 5dcm$ as shown in figure 3
(b) Starting with the beaker near the screen, move the beaker towards the bulb until a sharp vertical line image of the bulb is formed on the screen.
(c) Measure and record the distance, u of the beaker from the bulb.
(d) Keeping, $\boldsymbol{y}$, constant, move the beaker further towards the bulb until another sharp image is formed on the screen.
(e) Measure and record the new distance, b of the beaker from the bulb.
(f) Repeat the procedures (a) to (e) for values of y = 6d, 7d, 8d, 9d and 10dcm.
(g) Tabulate your results including values of $y^2, w = (u - b)$, $w^2$and $z = (y^2 - w^2)$.
(h) Plot a graph of z against y.
(i) Find the slope, S of the graph.
(j) Calculate the value of P, from the expression$p = \frac{4}{S}$

3. In this experiment, you will determine a constant K of the resistor marked R_S.
   (a) Connect the circuit shown in figure 3(a)

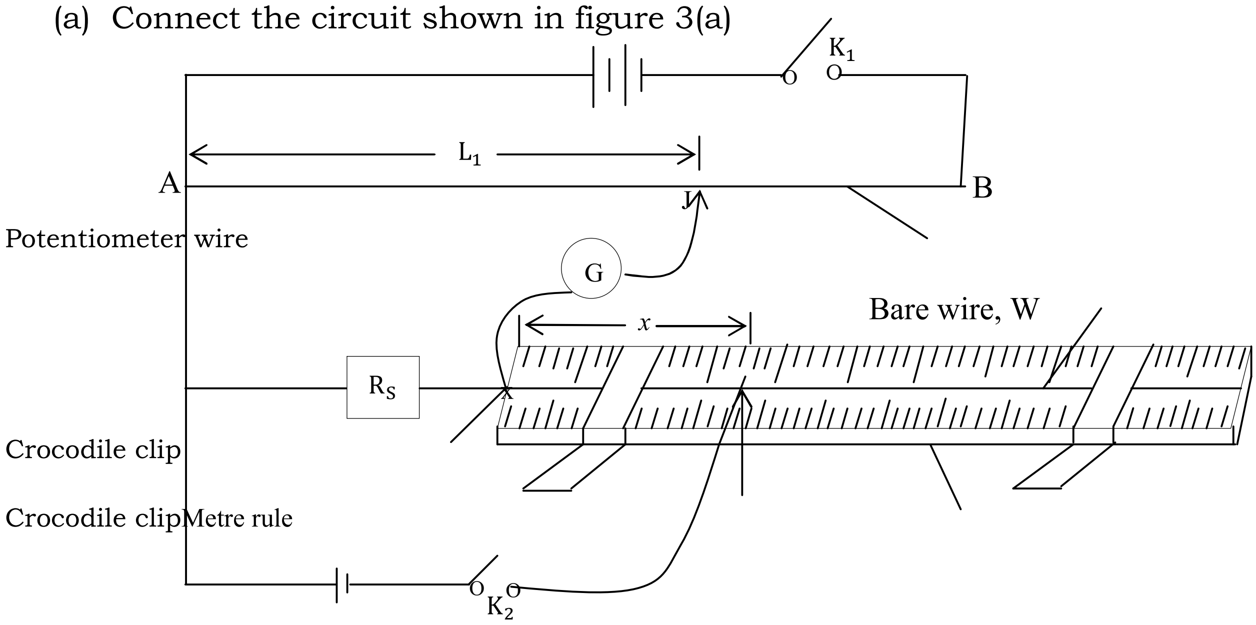


Fig. 3(a)

(b) Adjust the length x to 0.200m.

(c) Close switches K_1 and K_2

(d) Move the sliding contact J along the potential slide wire AB until a point is found where the centre zero galvanometer G shows no deflection.

(e) Read and record the balance length, L_1

(f) Open switches K_1 and K_2

(g) Repeat procedure (b) to (f) for values of x =0.300, 0.400, 0.500, 0.600, 0.700 and 0.800m

(h) Dismantle the circuit

(i) Connect the circuit shown in figure 3(b).

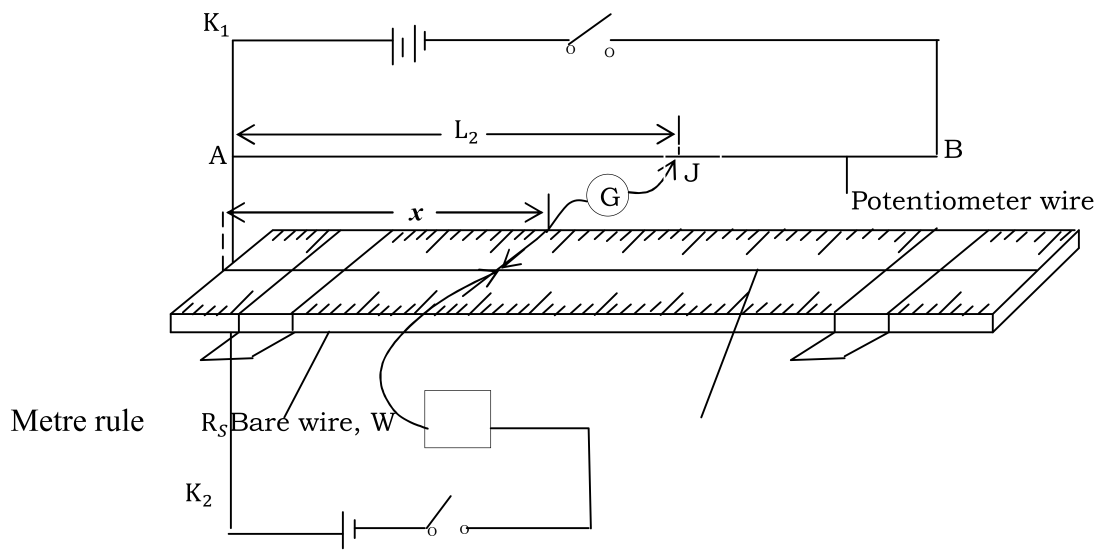


Fig. 3(b)

(j) Adjust the length x to 0.200m

(k) Close switches K_1 and K_2

(l) Move the sliding contact **J** along the potentiometer wire AB until a point is found when the centre zero galvanometer G shows no deflection

(m) Measure and record the balance length, L_2

(n) Open switches K_1 and K_2

(o) Repeat the procedures (j) to (n) for values of x= 0.300, 0.400, 0.500, 0.600, 0.700 and 0.800m

(p) Record your results in a suitable table including values of $\frac{L_2}{L_1}$

(q) Plot a graph of x against $\frac{L_2}{L_1}$

(r) Obtain the slope S of the graph

(s) Find the constant, K of the resistor R_S from **K=10 S** .

END