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

031/2A PHYSICS 2A

ALTERNATIVE A PRACTICAL
(For both School and Private Candidates)

TIME: 2 Hours 30 Minutes 2006/10/16 a.m.

Instructions

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

This paper consists of 3 printed pages.

1. In this experiment you are required to determine the mass of unknown object "X".

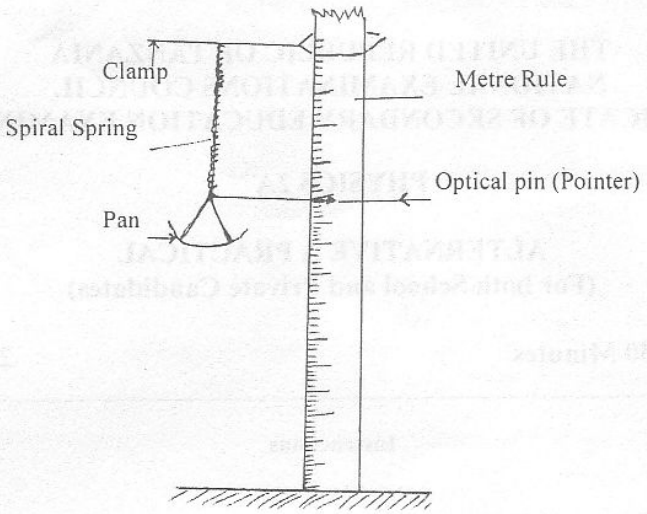


Fig. 1

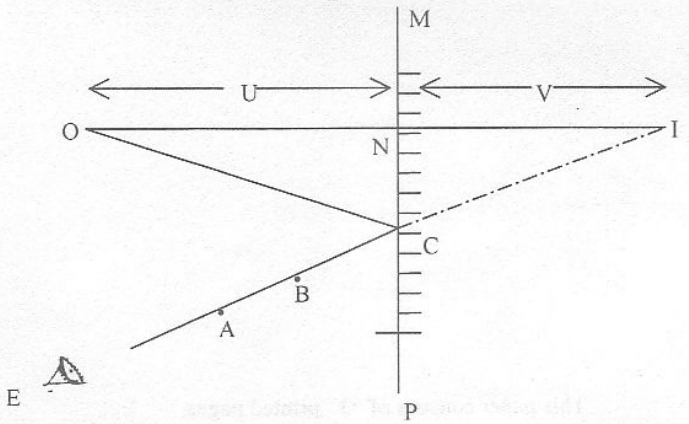
Assemble the pieces of apparatus as shown in figure 1, with zero mark scale of the rule at the lower most end.
Record the reading of the position of pointer on the scale of metre-rule when the pan is empty as S_o.
Put 20g to the pan and record pointer reading S.
Find extension e = S - S_o, cm
Repeat the procedure for mass of 40g, 60g, 80g and 100g. Put object x on the pan and record its pointer reading

(a) Summarize your results in a table as follows:

Mass on pan (g)	20	40	60	80	100	X
Pointer reading (cm)						
Extension, e = S – S_o (cm)						

(b) Plot graph of mass against extension (m Vs e).
(c) Find slope, P, of your graph.
(d) Find mass X.
(e) Find Q , given that Q = P x e_x, where e_x is extension of X.
(f) Comment on Q and X.

2. Set up the experiment as shown in the diagram below using plane mirror, soft board, three pins and a white sheet of paper.



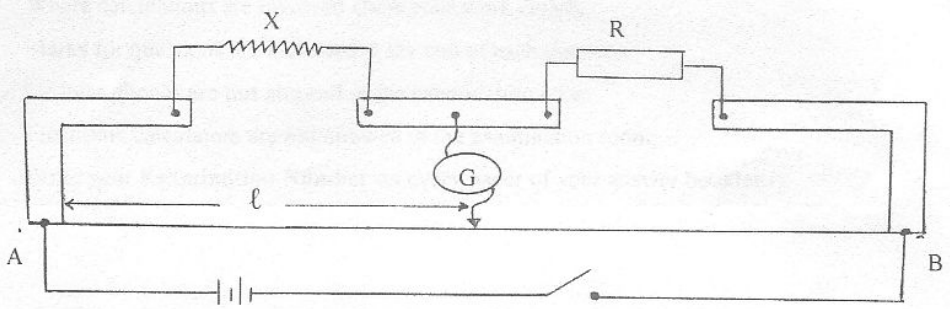
Fix a white sheet of paper on the soft board. Draw a line across the width at about the middle of the white sheet (MP). Draw line ONI perpendicular to MP
Fix optical pin O to make ON = U = 3 cm. By using plasticine or otherwise, fix plane mirror along portion of MP with O in front of the mirror. With convenient position of eye, E, look into the mirror and fix optical pins A and B to be in line with image, I, of pin O.
Measure and record NI = V. Repeat procedure for U = 6 cm, 9 cm and 12 cm.

(a) Tabulate your results as follows:

U (cm)	3	6	9	12
V (cm)				

(b) Plot graph of U against V
(c) Calculate slope, m, of the graph to the nearest whole number
(d) State relationship between U and V
(e) Write equation connecting U and V using numerical value of m with symbols U and V
(f) From your equation give position of the image when object is touching the face of the mirror.

3. You are required to determine the unknown resistance labelled X using a metre bridge circuit. Connect your circuit as shown below, where R is a resistance box, G is a galvanometer, J is a jockey and others are common circuit components.



Procedure:
With R = 1 Ω, obtain a balance point on a metre bridge wire AB using a jockey J. Note the length ℓ in centimetres. Repeat the experiment with R equal to 2 Ω, 4 Ω, 7 Ω and 10 Ω.
Tabulate your results for R, ℓ and $1/\ell$

(a) (i) Plot a graph of R (vertical axis) against $1/\ell$ (horizontal axis)
(ii) Determine the slope s of your graph
(iii) Using your graph, find the value of R for which $\frac{1}{\ell} = 0.02$.
(b) Read and record the intercept R_o on the vertical axis.
(c) Given that,

$$R = \frac{100x}{\ell} - x$$

Use the equation and your graph to determine the value of x
(d) Comment on your results in (a)(iii), (b) and (c) above.