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

031/2A **PHYSICS 2A**
ACTUAL PRACTICAL A
(For Both School and Private Candidates)

Time: 2:30 Hours **Wednesday, 13th November 2013 a.m.**

Instructions

1. This paper consists of **two (2)** questions. Answer **all** questions.
2. Each question carries 25 marks.
3. Where calculations are involved show your work clearly.
4. Calculators and cellular phones are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).
6. Use acceleration due to gravity, $g = 10ms^{-2}$.
7. Use $\pi = 3.14$.

1. You are provided with a metre rule, a knife edge, two strings of length 100cm each and two weights W_1 and W_2 of masses 50 g and 100g respectively. Proceed as follows:

(a) Balance a metre rule on a knife edge, put a mark and write G at the balancing point using a piece of chalk or a pencil. Measure and record the length l, width w and thickness t of a metre rule using a vernier calliper.

(b) Place the metre rule on a knife edge so that the knife edge is at 60cm of your metre rule (see Figure 1 (a)). Suspend weight W_2 of 100g on the right hand side of the knife edge. Adjust W_2 until the metre rule balances horizontally. Read and record lengths 'b' and 'c' as seen in Figure 1 (a).

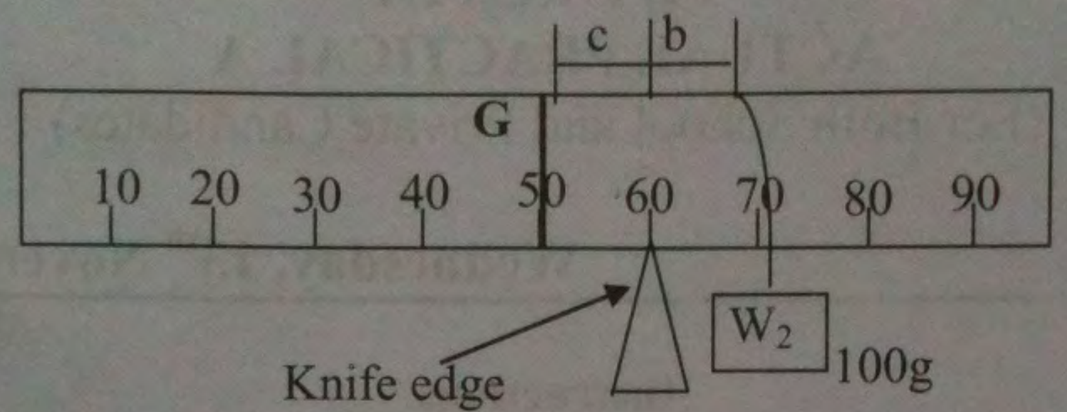

Figure 1 (a)

(i) Suspend weight W_1 of 50g on the left hand side of the knife edge at the position 47cm and adjust weight W_2 until the metre rule balances horizontally as seen in Figure 1 (b). Read and record the lengths 'a' and 'b'.

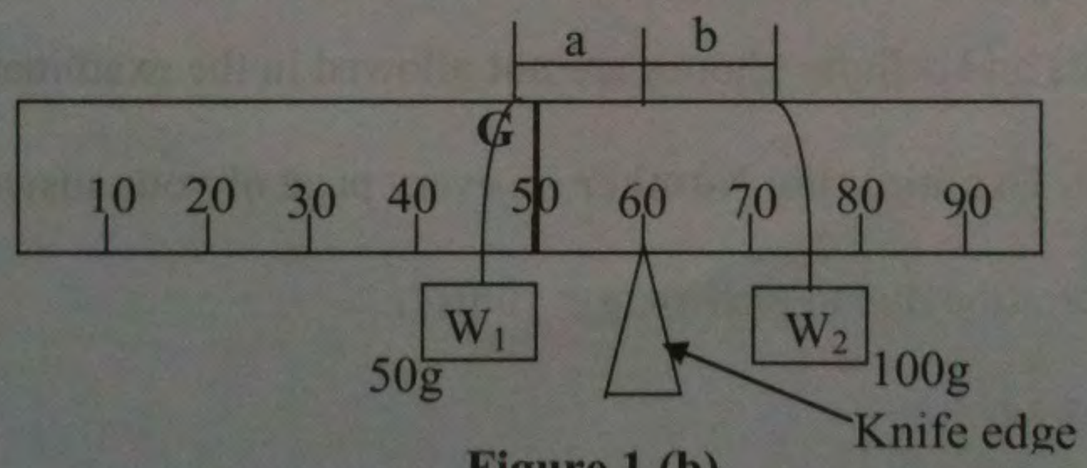

Figure 1 (b)

(ii) Repeat the procedures in (b) (i) by adjusting the position of W_1 to the left at the interval of 3cm to obtain other four (4) readings.

(c) Tabulate your results as shown in Table 1.

Table 1

a (cm)	b (cm)

(d) Plot a graph of "b" against "a".

(e) What is the nature of the graph?

(f) Calculate the slope S of the graph.

(g) (i) Read the b-intercept, given that $b = Sa + \frac{W}{W_2} \times c$

(ii) What does $\left[\frac{W}{W_2}\right]c$ represent in your graph?

(iii) Calculate the value of W using the relation $W_2 = \frac{Wc}{9.5cm}$. What does W represent?

(h) (i) Find the value of the ratio $P = \frac{l \times w \times t}{m}$.

Note: The mass m of a meter rule can be obtained by calculations.

(ii) What is the physical meaning of the value of P?

(i) State a possible source of error in this experiment.

(j) How can you minimize error in 1 (i).

(k) State the aim of this experiment.

(25 marks)

2. You are provided with a Plane mirror, a Ruler, Protract, Drawing board, Optical pins, Office pins and Plain papers. Proceed as follows:

(a) On the plain paper provided, draw a line 13cm from the top of the paper and call it M_1M_2. Pin your paper on the board provided and place the reflecting surface of the mirror along the line M_1 M_2 as seen in Figure 2.

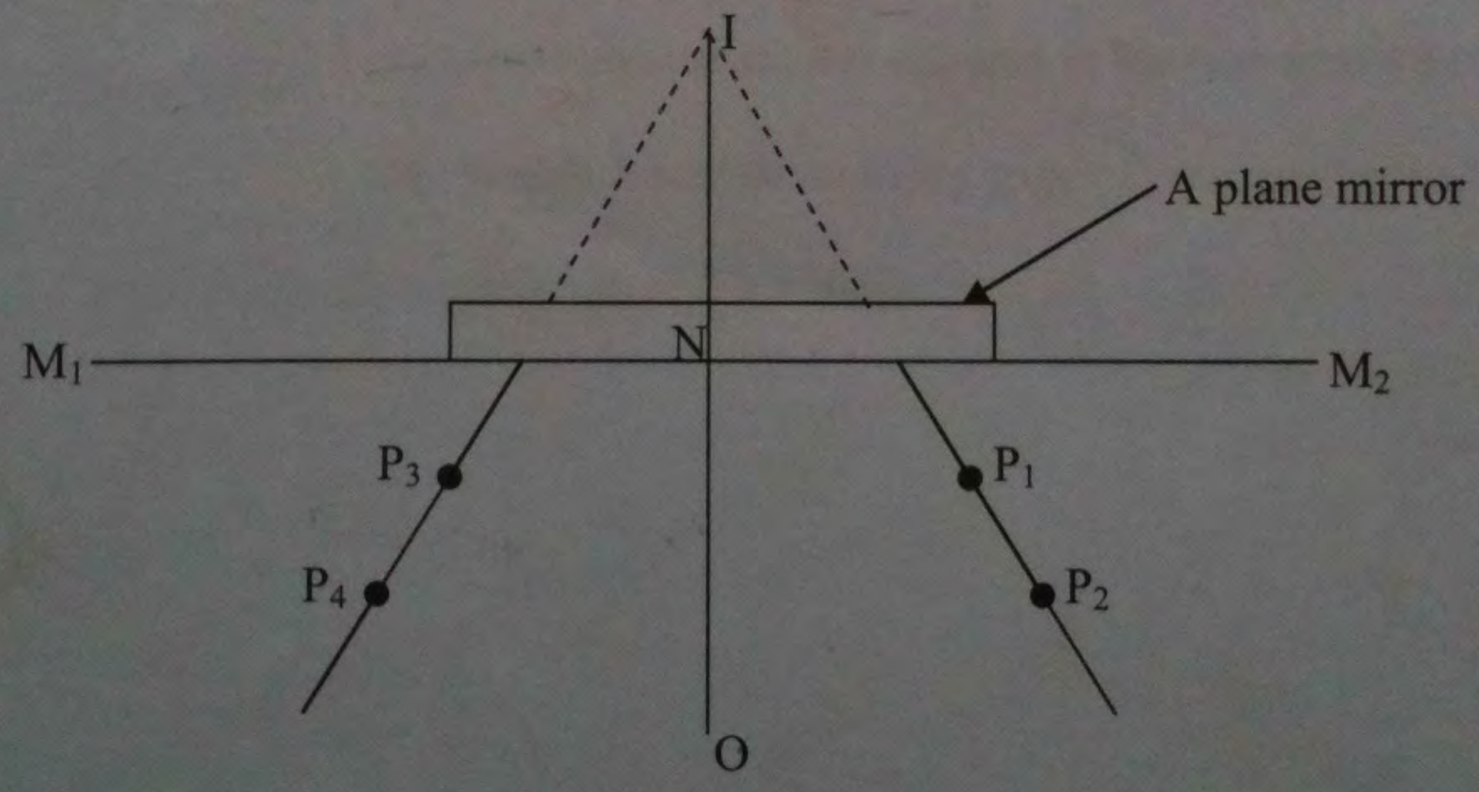

Figure 2

(b) Insert pin O as an object at 4.0cm in front of the mirror. Place pins P_1 and P_2 so as to appear in one straight line with the image of object O seen in the plane mirror.

(c) Remove pins P_1 and P_2, using other pins, place pins P_3 and P_4 so as to appear in a straight line with the image of object O in the other side (see Figure 2).

(d) Remove the mirror and pins. Draw lines joining P_1 and P_2 on one side and the other joining P_3 and P_4 on the other side of object O, extend both lines to meet at I on the other side of line M_1M_2.

(e) Join OI, a line cutting the reflecting surface at N.

(f) Repeat this procedure for the distance of an object being 6, 8, 10 and 12cm.

(g) On all the diagrams drawn:

(i) Measure the distance ON and NI.

(ii) Comment on the distances obtained in 2 (g) (i).

(iii) What is the nature of image? Give reasons for your answer.

(iv) State four characteristics of the image you obtained.

(v) What is the aim of this experiment?

(vi) Mention and state the law governing the experiment.

(vii) Explain a source of error in this experiment.

(viii) How can you minimize the error in (vii) above?

Note: The papers used for drawing should be attached and collected together with answer booklets.

(25 marks)