

**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, 13<sup>th</sup> 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,  $g = 10\text{ms}^{-2}$ .
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:

- 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.
- 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).

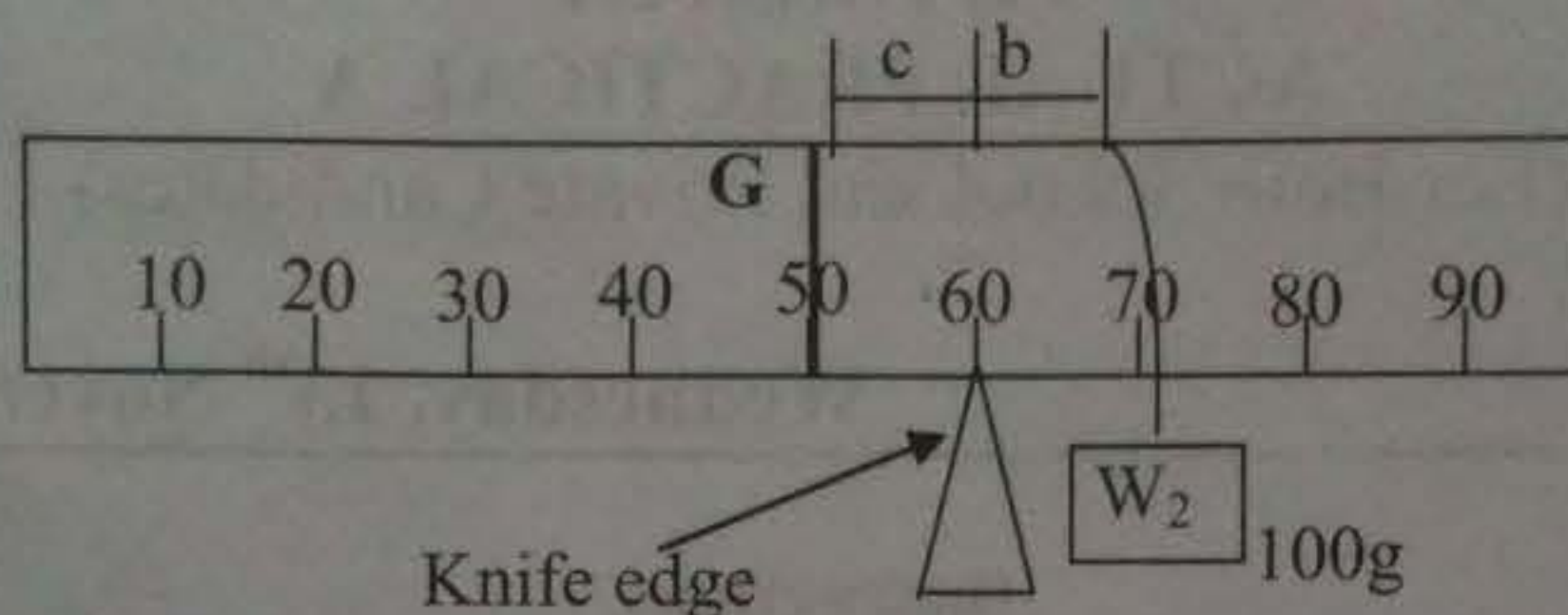


Figure 1 (a)

- 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'.

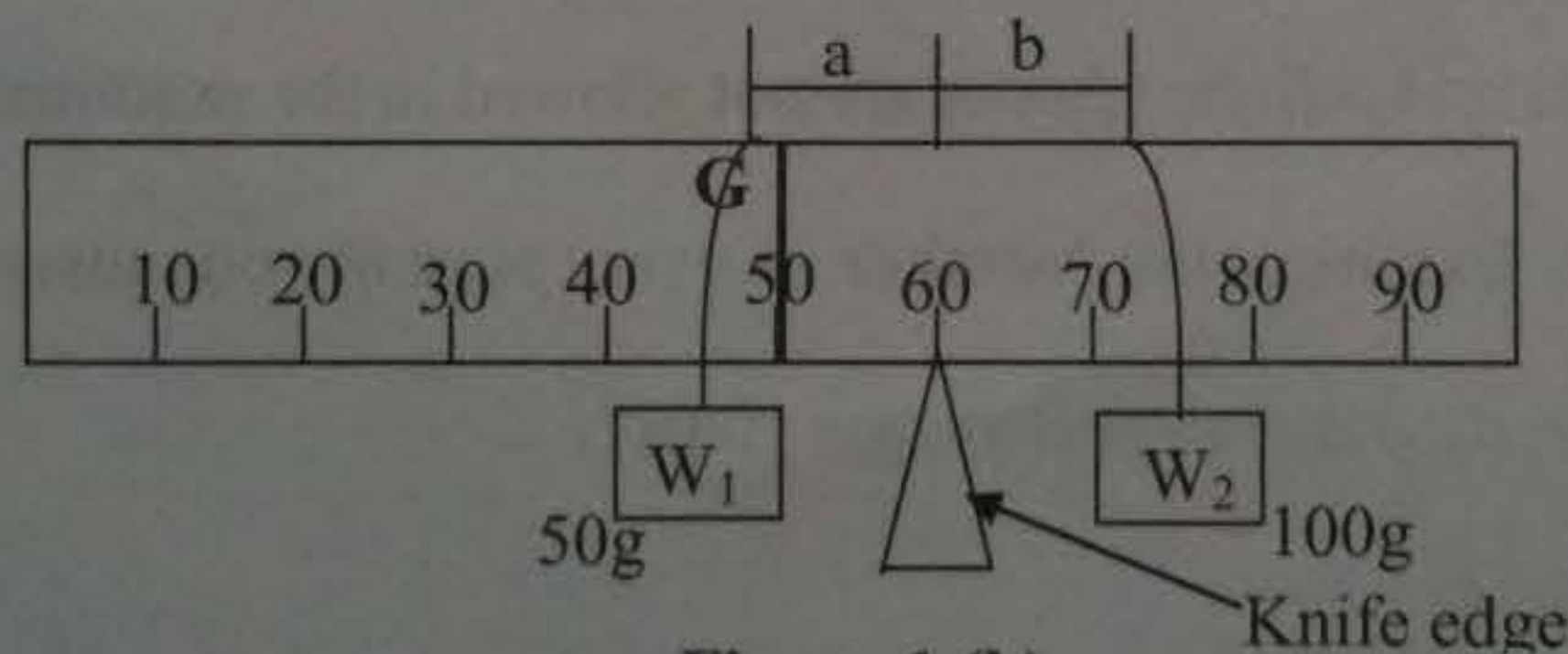


Figure 1 (b)

- 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)

- Plot a graph of "b" against "a".
- What is the nature of the graph?
- Calculate the slope S of the graph.
- (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, Protractor, 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  $M_1M_2$  as seen in Figure 2.

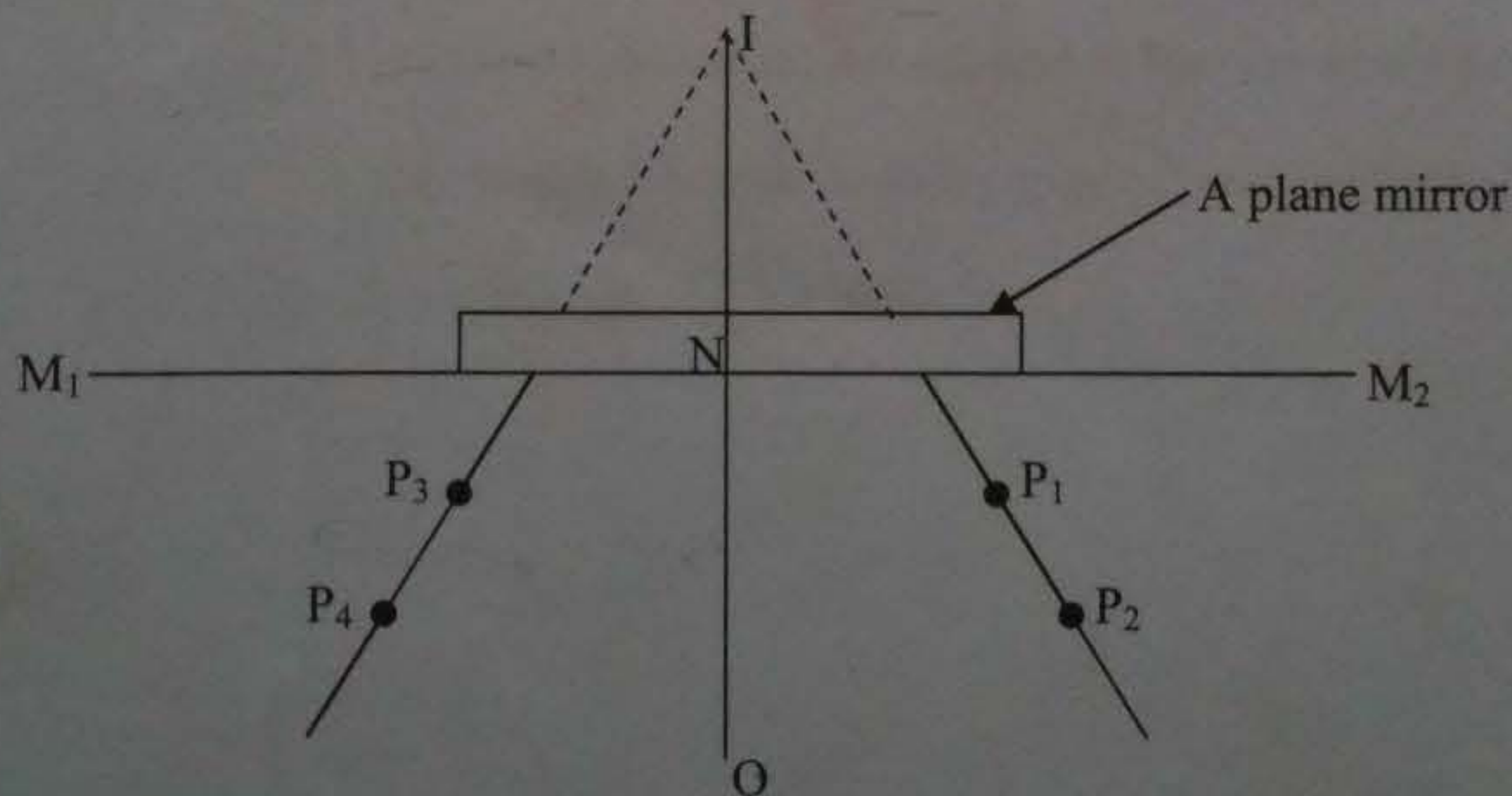


Figure 2

- (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)**