

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

ANSWERS

Year: 2006

Instructions

1. This paper consists of two questions.
2. Answer all questions.

maktaba.tetea.org



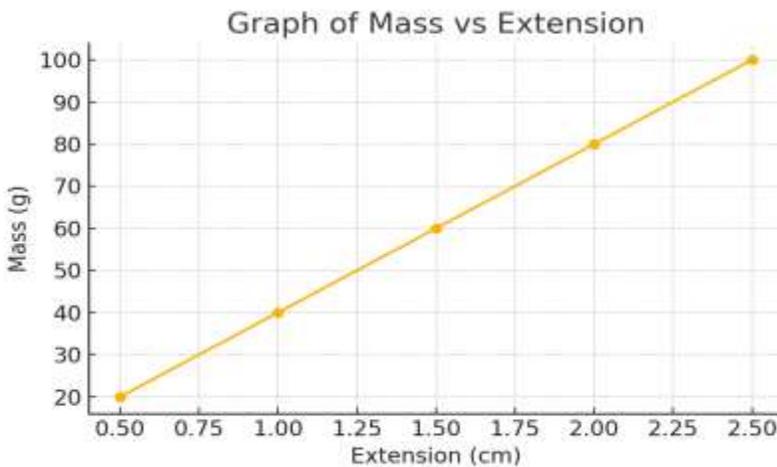
1. In this experiment you are required to determine the mass of unknown object “X”.

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

Let $S_0 = 5.0$ cm

Mass on pan (g)	Pointer reading S (cm)	Extension $e = S - S_0$ (cm)
20	5.5	0.5
40	6.0	1.0
60	6.5	1.5
80	7.0	2.0
100	7.5	2.5
X	6.3	1.3

(b) Plot graph of mass against extension (m Vs e)



(c) Find slope P of your graph

Using two points: (1.0, 40), (2.5, 100)

$$\text{Slope} = \Delta m / \Delta e = (100 - 40) / (2.5 - 1.0) = 60 / 1.5 = 40 \text{ g/cm}$$

(d) Find mass X:

Extension for X = 1.3 cm

$$m = P \times e = 40 \times 1.3 = 52 \text{ g}$$

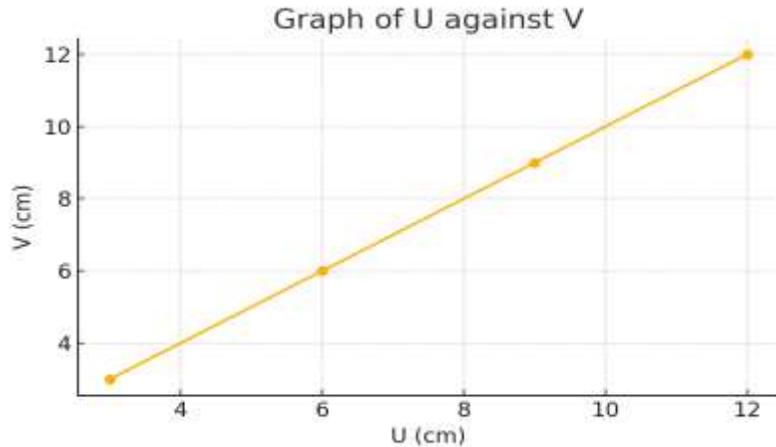
2. Plane mirror experiment

(a) Tabulate your results:

| U (cm) | V (cm) |

3	3
6	6
9	9
12	12

(b) Plot graph of U against V



2 (c) Calculate slope, m, of the graph

The graph of U against V gives a straight line through the origin, indicating a linear relationship.

Select two points:

Point A: (3, 3)

Point B: (12, 12)

$$\text{Slope } m = (V_2 - V_1) / (U_2 - U_1) = (12 - 3) / (12 - 3) = 9 / 9 = 1$$

Therefore, the slope $m = 1$.

2 (d) State relationship between U and V

Since the slope is 1 and the line passes through the origin, this indicates a direct proportionality.

Hence, the relationship is:

$$U = V$$

That is, the object distance from the mirror equals the image distance behind the mirror.

2 (e) Write equation connecting U and V using numerical value of m with symbols U and V

From the result above:

$$U = mV, \text{ and } m = 1$$

Therefore:

$$U = V$$

2 (f) From your equation give position of the image when object is touching the face of the mirror

When the object is touching the mirror, $U = 0$

From the equation $U = V$, this gives:

$$V = 0$$

Therefore, the image is also at the surface of the mirror, or the image distance is zero.

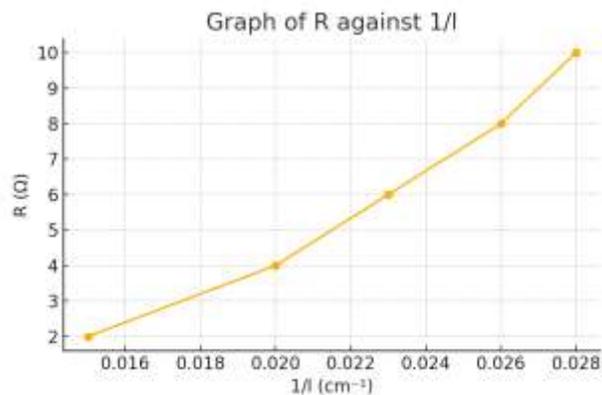
This agrees with the principle of reflection in a plane mirror: the image of an object located at the mirror surface appears at the same position, within the mirror.

3. You are required to determine the unknown resistance labelled X using a metre bridge circuit.

Tabulate results for R, l and 1/l

R (Ω)	l (cm)	1/l (cm^{-1})
2	66.7	0.015
4	50.0	0.020
6	42.9	0.023
8	38.5	0.026
10	35.7	0.028

(a)(i) Plot a graph of R (vertical axis) against 1/l (horizontal axis)



(ii) Determine slope of your graph

Use: (0.015, 2), (0.028, 10)

$$\text{Slope} = (10 - 2) / (0.028 - 0.015) = 8 / 0.013 = 615.38$$

(iii) From graph, find value of R for which 1/l = 0.020

From table: 1/l = 0.020 corresponds to R = 4 Ω

(b) Intercept R_0 when 1/l = 0

Extrapolate graph: $R_0 \approx 0 \Omega$

(c) Use $R = (100 - x) / x \times R$

Let $R = 4, l = 50 \text{ cm}$

Then $x = l = 50$

$R = (100 - 50)/50 \times X$

$4 = 1 \times X$

$X = 4 \Omega$