THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

031/2B **PHYSICS 2B**

ACTUAL PRACTICAL B

(For Both School and Private Candidates)

Time: 2:30 Hours **ANSWERS** **Year: 2014**

Instructions

1. This paper consists of two questions.

2. Answer all questions.

Prepared by: Maria Marco for TETEA

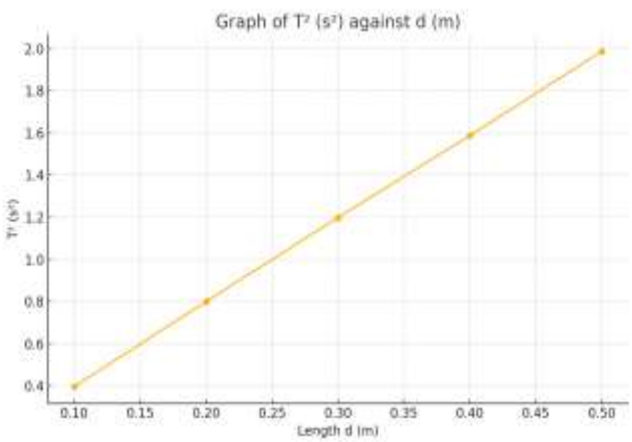
1. This experiment aims to determine the acceleration due to gravity using a simple pendulum setup.

(a–d) A pendulum is made using thread and a bob, suspended from a retort stand. For each length d, the time t for 20 oscillations is measured, then period $T = t/20$ is calculated, followed by T^2.

Tabulated data:

d(cm)	d(m)	t (s)	T (s)	T^2 (s^2)
10	0.10	12.6	0.63	0.397
20	0.20	17.9	0.895	0.801
30	0.30	21.9	1.095	1.199
40	0.40	25.2	1.26	1.588
50	0.50	28.2	1.41	1.988

(f) Plot a graph of T^2 against d (in meters)



(g) The graph is a straightline confirming $T^2 \propto d$

(h) Slope = $\Delta T^2 / \Delta d = (1.988 - 0.397) / (0.50 - 0.10) = 1.591 / 0.4 = 3.978$

(i) From $T = 2\pi\sqrt{(d/g)}$, $T^2 = 4\pi^2 d / g \rightarrow$ slope $= 4\pi^2 / g$
So, $g = 4\pi^2 / \text{slope} = 39.478 / 3.978 \approx 9.92\ m/s^2$

(j) Sources of error:
- Inaccurate timing due to human reaction
- Swinging in non-vertical plane

(k) Aim: To determine gravitational acceleration using the time-period of a simple pendulum

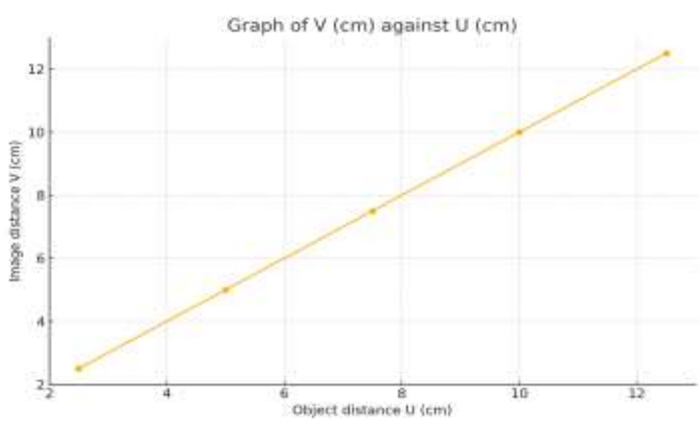
2. The aim is to verify image formation by a plane mirror and study the linear relationship between object distance U and image distance V.

(d) Measurements of U and V:

U (cm)	V (cm)
2.5	2.5
5.0	5.0
7.5	7.5
10.0	10.0
12.5	12.5

(e) Nature of image: Virtual, upright, same size, laterally inverted

(g) Plot graph of U against V



(h) From graph, V when U = 6 cm is 6 cm (linear graph with slope 1)

(i) Slope M = ΔV / ΔU = 12.5 / 12.5 = 1

(j) Reciprocal = 1 / 1 = 1 → meaning U = V

(k) Relationship: U = V

(l) Equation: U = MV, with M = 1 → U = V

(m) Laws:
- The image distance equals the object distance from the mirror
- Image formed by plane mirror is virtual and laterally inverted

(n) Possible error:
- Incorrect pin alignment with the reflected image

(o) Minimize error:
- Use sharp pins and ensure vertical placement

(p) Aim: To verify laws of reflection using a plane mirror