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: 2016**

Instructions

1. This paper consists of two questions.

2. Answer all questions.

1. The aim of this experiment in Figure 1 is to determine the mass M of the solid using a balancing method.

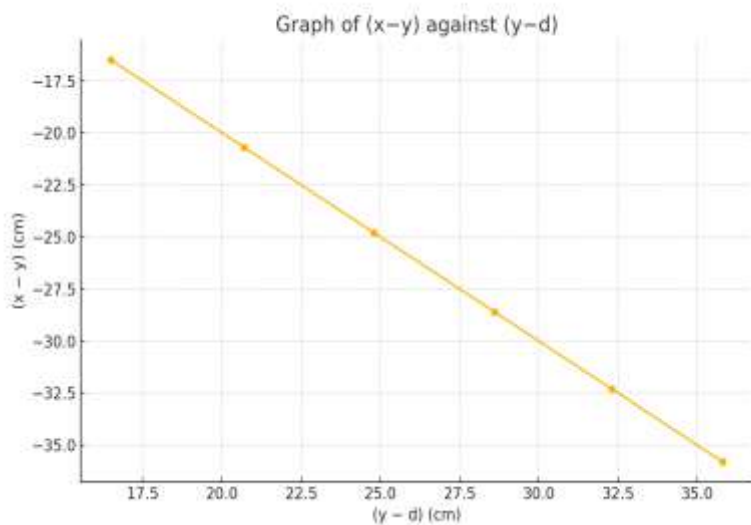(a) Knife edge placed under a meter rule of about 70 g.
A solid of unknown mass M is suspended at x = 10.0 cm.
Measure and record y = 45.8 cm when balanced.

(b) Vary a = x from 15 to 35 cm and record y:

x (cm)	y (cm)	x−y (cm)	y−d (cm)
10	45.8	−35.8	35.8
15	47.3	−32.3	32.3
20	48.6	−28.6	28.6
25	49.8	−24.8	24.8
30	50.7	−20.7	20.7
35	51.5	−16.5	16.5

(d) Plot (x − y) against (y − d)

Graph of (x−y) against (y−d)

(e) Slope s = Δ(x−y) / Δ(y−d)
Using points (−35.8, 35.8) and (−16.5, 16.5):
s = (−16.5 + 35.8) / (16.5 − 35.8) = 19.3 / (−19.3) = −1
Take magnitude |s| = 1

(f) M = (s / (2 − s)) × 70 = (1 / (2 − 1)) × 70 = 1 × 70 = 70 g

(g) Aim: To determine unknown mass using torque balance.
(h) If apparent mass in water = 42.5 g,

2

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Relative density = 70 / (70 − 42.5) = 70 / 27.5 ≈ 2.55
Principle: Archimedes' Principle

(i) Possible source of error:
- Friction at the knife edge or parallax in reading y

2. The aim of this experiment is to determine the resistivity of a wire Z using a meter bridge.
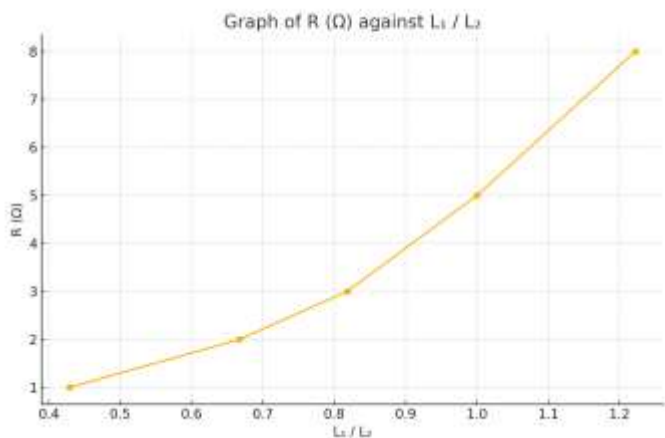
(a) Connect circuit as shown.
(b) Balance point found at L_1 = 30 cm, L_2 = 70 cm when R = 1 Ω

(d) Repeat for R = 2, 3, 5, and 8 Ω:

R (Ω)	L_1 (cm)	L_2 (cm)	L_1 / L_2
1	30.0	70.0	0.429
2	40.0	60.0	0.667
3	45.0	55.0	0.818
5	50.0	50.0	1.000
8	55.0	45.0	1.222

(f) Plot R against L_1 / L_2

Graph of R (Ω) against L_1 / L_2

(g) Gradient G = (1.222 − 0.429) / (8 − 1) = 0.793 / 7 ≈ 0.1133

(h) Length of wire Z = 100 cm, Diameter D = 0.40 mm = 0.040 cm

(i) Resistivity ρ = (πD²G) / 4 = (3.142 × 0.040² × 0.1133) / 4

ρ = (3.142 × 0.0016 × 0.1133) / 4 ≈ 0.00057 / 4 ≈ 0.0001425 Ω·cm

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