Name: Marking Scheme Admn No.....Class.....

Index No.....

232/3
Physics Practical
August 2022
Time: 2½ Hours

ALLIANCE HIGH SCHOOL

TRIAL EXAMINATION

PHYSICS PRACTICAL

Paper 3
August 2022
Time: 2½ Hours

INSTRUCTIONS TO CANDIDATES

- Write your name and index number in the spaces provided above.
- Answer **ALL** the questions in the spaces provided.
- You are supposed to spend the first 15 minutes of the 2½ hours allowed for this paper reading the whole paper carefully before commencing your work.
- Marks are given for a clear record of the observations made, their suitability, Accuracy and the use made of them.
- Candidates are advised to record their observations as soon as they are made.
- Non-programmable silent electronic calculators may be used.
- Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing

Questions	Max score	Candidates score
1	20	
2	A 7	
	B 13	

This paper consists of 10 printed pages

Question 1

Apparatus

- Two retort stands
- Two pieces of strings(about 70cm long)
- Cello tape
- Half-meter rule
- Stop watch
- Meter rule

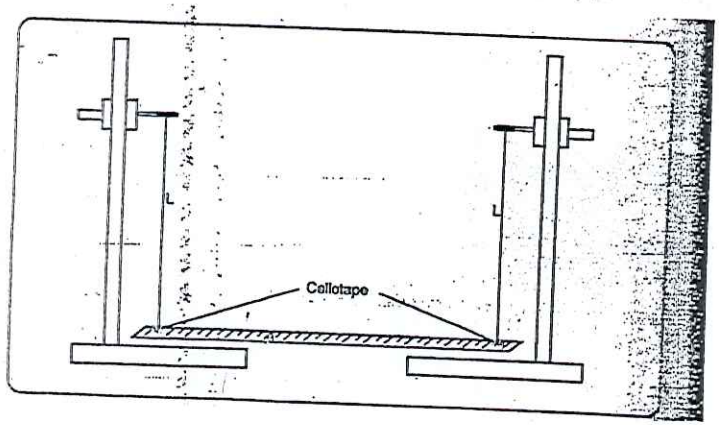


Fig 1

Proceed as follows:

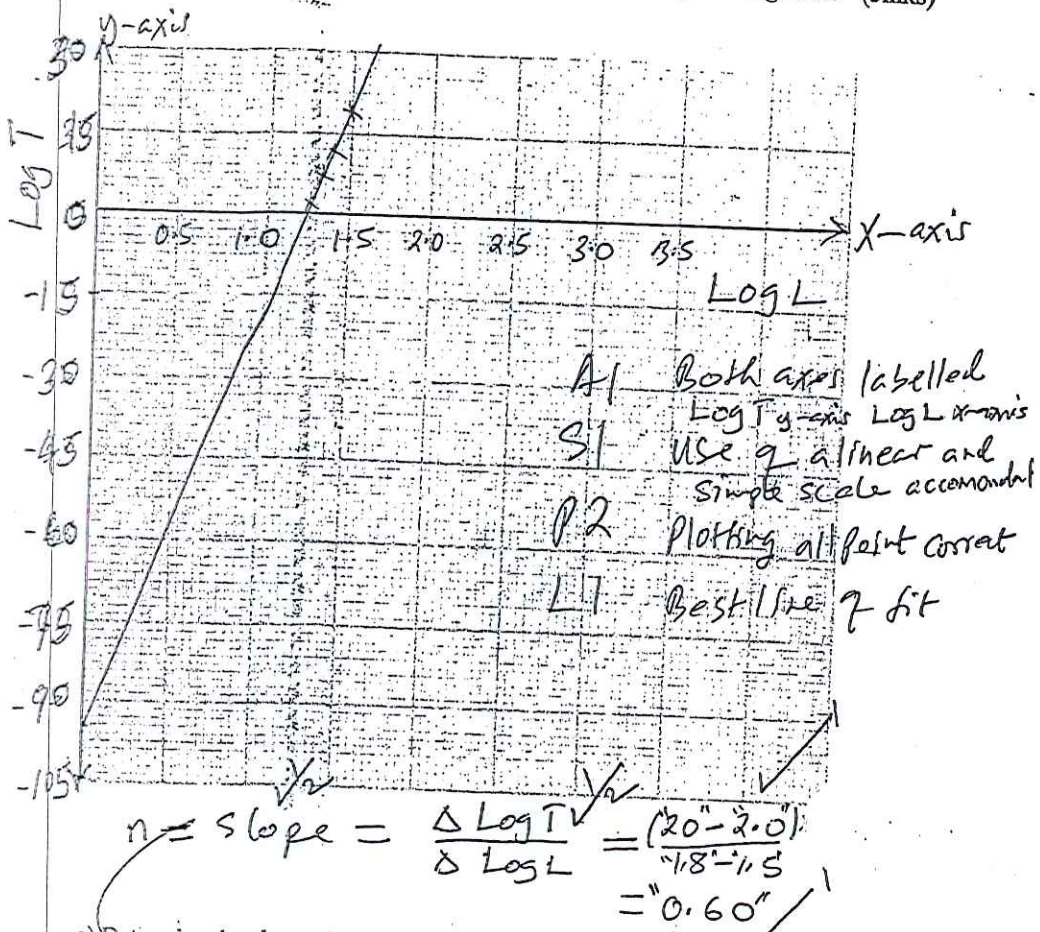
i. Set the apparatus as shown in the figure1, with the suspending length L of the threads being 60 cm and the points of suspension of the threads on the rule at 5 cm from either end. The threads should be fixed firmly at the knots using cello tape, so that the rule rests on a horizontal plane.

ii. Displace the two ends of the rule through a small angle along the horizontal, so that the rule performs oscillations along the horizontal plane. Determine and record the time t for 10 oscillations.

iii. Adjust the suspending lengths L of the threads to L=55.0cm, and repeat step (ii) above.

iv. Repeat step (iii) for the other values of L and complete the **table 1** of results.

b) In the grid provided, Plot a graph of log $Tx10^{-2}$ against log $Lx10^{-2}$ (5mks)



A1 Both axes labelled Log T y-axis Log L x-axis

S1 Use of a linear and simple scale accomodating

P2 Plotting all point correct

L1 Best line of fit

$n = \text{slope} = \frac{\Delta \text{Log T}}{\Delta \text{Log L}} = \frac{(-2.0)-(-20)}{-1.5-(-1.8)}$

$= 0.60$

c) Determine the slope of the graph. (3mks)

d) Given that $T = \log k + n\log L$, Find the value of

i) $n = 0.60$ (1mk)

a) *Table 1* (6mks)

L (cm)	Time for 10 oscillations t (s) must (2 d.p)	Periodic time T(s) must (3 d.p)	Log L must 4 SF	Log T x10^{-2} must be 4 SF
0.60	15.00 ✓ 16.00	1.600	1.7782	20.41
0.55	14.00 ✓ 15.00		1.7404	
0.500	13.00 ✓ 14.00		1.6990	
0.450	12.00 ✓ 13.00		1.6532	
0.400	11.00 ✓ 12.00		1.6021	
0.350	10.00 ✓ 11.00		1.5441	
0.300	9.00 — 10.00	1.050	1.4771	2.119

max 3 — at least 3 correct max 1 — at least 3 correct max 1

6

K = antilog of y-intercept

$k = 10^{-1.0}$ ✓½ $= \frac{1}{10} = 0.1$ ✓½ ✓½ (3mks)

$0.1090 \leq n \leq 1.5$

T when L = 70cm

$\log T = \log K + n \log L$ ✓ Substitution

1.2555 ✓ 1

n 2 ±0.2

OR (2mks)

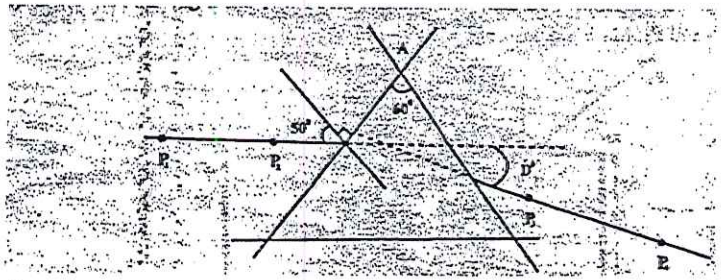
By interpolation ✓

Antilog of value ✓

provided with the following apparatus

. triangular prism
our optical pins
oft board
lain sheet of paper
rotractor
. piece of masking tape

eed as follows



2

a) Attach the plain sheet of paper on a soft board using the masking tape. Place the triangular prism at the middle of the sheet of paper as shown.
b) Draw the outline of the prism. Remove the prism.
c) At a point about a third way along one side of the outline from angle A, draw a normal
d) Draw a line at angle I= 50° to the normal. Stick two pins p1 and p2 vertically on this line. Place the prism accurately on the outline. By viewing through the opposite side, stick two other pins P3 and P4 vertically such that they are in line with the two images of pins P1 and P2.
e) Remove the prism and the pins. Draw a line joining the marks made by P3 and P4. Extend the lines P1P2 and P3 and P4 to intersect. Hence measure the angle of deviation

D= 38° ✓ 42° ✓ (1mk)

For student to score his plain paper must be seen. The normal line drawn

f) For one other value of angle, i shown in the table below locate and measure the corresponding angle of deviation. Complete the table.2 (2mks)

Table 2

i	50°	60°
D	40° ✓±2°	42° ✓±2°

g) (i) Determine the average value D_m of D

$\frac{40° + 42°}{2}$ ✓ $= 41°$ ✓ 1

(2mks)

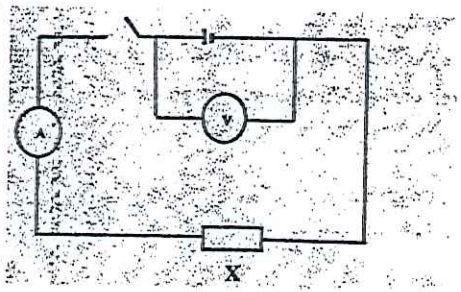
(ii)Determine the constant K using the equation

$K = \frac{\sin\frac{A+Dm}{2}}{\sin\frac{A}{2}}$ (2 marks)

$\frac{\sin\frac{60 + 41}{2}}{\sin\frac{60}{2}} = \frac{\sin 50.5}{\sin 30} = 1.543$ ✓ 1 substitution

i) Set up the following circuit.

Fig 3



j) i. Record the voltmeter reading when the switch is open.

E= 1.4 ——— 1.6 (at least 1dp) V (1mk)

(ii)Close the switch and record the voltmeter and ammeter readings V and I

V= 1.3 ——— 1.5 (at least 1 d.p a must) V (1mk)

I= 0.11 ——— 0.13 (2 dp) A (1mk)

(iii) Account for the difference of E and V. (1mk)

E is the pd across the cell which is not in use

In use, V, pd across the cell in use

k) Now connect the voltmeter across the carbon resistor X and record the voltmeter reading V_1

V_1 1.1 ——— 1.3 V (1mk)

PART B

You are provided with the following:

- **A carbon resistor marked X**
- **Resistance wire marked R**
- **Micrometer screw gauge(to be shared)**
- **Voltmeter**
- **Ammeter**
- **Resistance wire mounted on a mm scale belled L**
- **A cell, cell-holder**
- **Centre-zero Galvanometer**
- **8 connecting wires**
- **Jockey**

Proceed as follows

h) Using the micrometer screw gauge, measure and record the diameter D of the resistance wire R provided

D. 0.0220 ——— 0.0320 m (1mk)

(at least 4 dp a must)

(l) Calculate X given that $X=\frac{V1}{I}$ = "1.2" / "0.12" ✓ substitution (2mk)

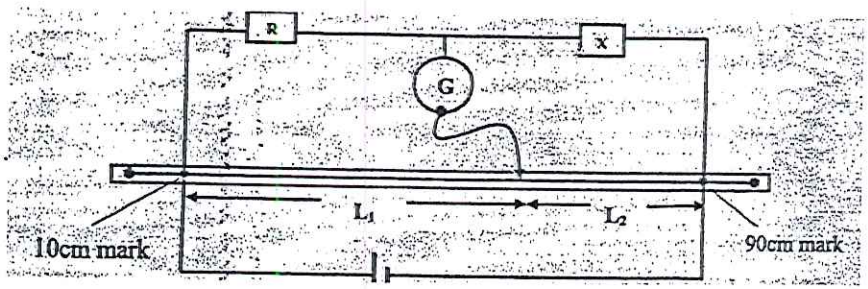
..... = 10Ω ✓ 1

.....

.....

(vii) Connect another circuit as shown below:

Fig 4



(i) Move the sliding pointer along the resistance wire until the galvanometer reading comes to zero. Record L_1 and L_2

(ii) Obtain the value of the unknown resistance R given that: $\frac{R}{X}=\frac{L1}{L2}$

Interchange the position of R and X and repeat the procedure in (i) above and calculate the value of R.

$\frac{X}{R}=\frac{L1}{L2}$ let it be R_2

M) i) Complete the table below with the values L_1, L_2, R_1 and R_2. (4mks

Table 3

Trial 1	L_1(cm)	51.0 ½ — 61.0 ½	$R_1=\frac{X L1}{L2}$ = "23.53" ✓2 ✓1
	L_2(cm)	19.0 ½ — 29.0 ½	
Trial2(after interchanging)	L_1(cm)	21.0 ½ — 31.0 ½	R_2= "20.76" ½ ✓1
	L_2(cm)	19.0 ½ — 59.0 ½	

ii) Calculate the average value of R. ½ (1mk)

"23.33" + "20.76" / 2 ½ = "22.045" Ω ½

.....

.....

iii) given that, $R=\frac{3SS}{100\pi D2}$ determine the value of S. (2mks)

"22.045" = 358 ✓2

100 × π × 0.027

S = 0.1448 ✓1 (ignore the units)