Name: …… **Index No.** ……

School: …… **Candidate's Sign.** ……

Date: ……

232/3

PHYSICS

PAPER 3

2021

TIME: 2 ½ HOURS

MARKING SCHEME

PAVEMENT NATIONAL EXAMINATION

TRIAL 2

Kenya Certificate of Secondary Education (K.C.S.E.)

Physics

Paper 3

INSTRUCTIONS TO CANDIDATES:

- *Write your **name** and **index number** in the spaces provided above.*
- *Sign and write the **date** of the examination in the spaces provided above.*
- *You are supposed to spend the first **15** minutes of the **2 ½** hours allowed for this paper reading the whole paper carefully before commencing your work.*
- *Marks are given for a clear record of the observation actually 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 and that no questions are missing.*

For Examiner's Use Only.

Question	Maximum score	Candidate's score
1	20	
2	20	
Total	40	

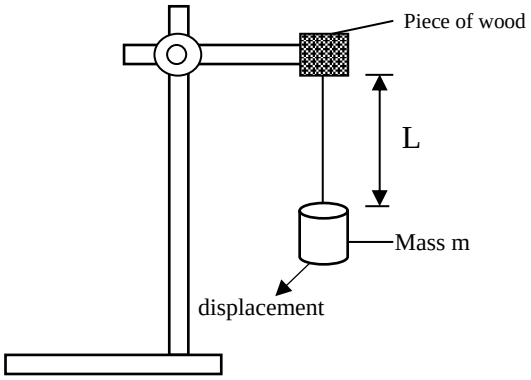
This paper consists of 6 printed pages candidates should check the questions to ascertain that all pages are printed as indicated and that no questions are missing

Question1

You are provided with the following apparatus

- One stand with the clamp and the boss
- One 100g mass
- 100cm long thread
- Two pieces of wood
- Stop watch

a) Set up the apparatus as shown below.



b) Adjust the length L of the thread so that $L = 70cm$. Give the mass m a slight displacement and release so that it oscillates freely. Measure the time t for twenty oscillations and record in the table below.

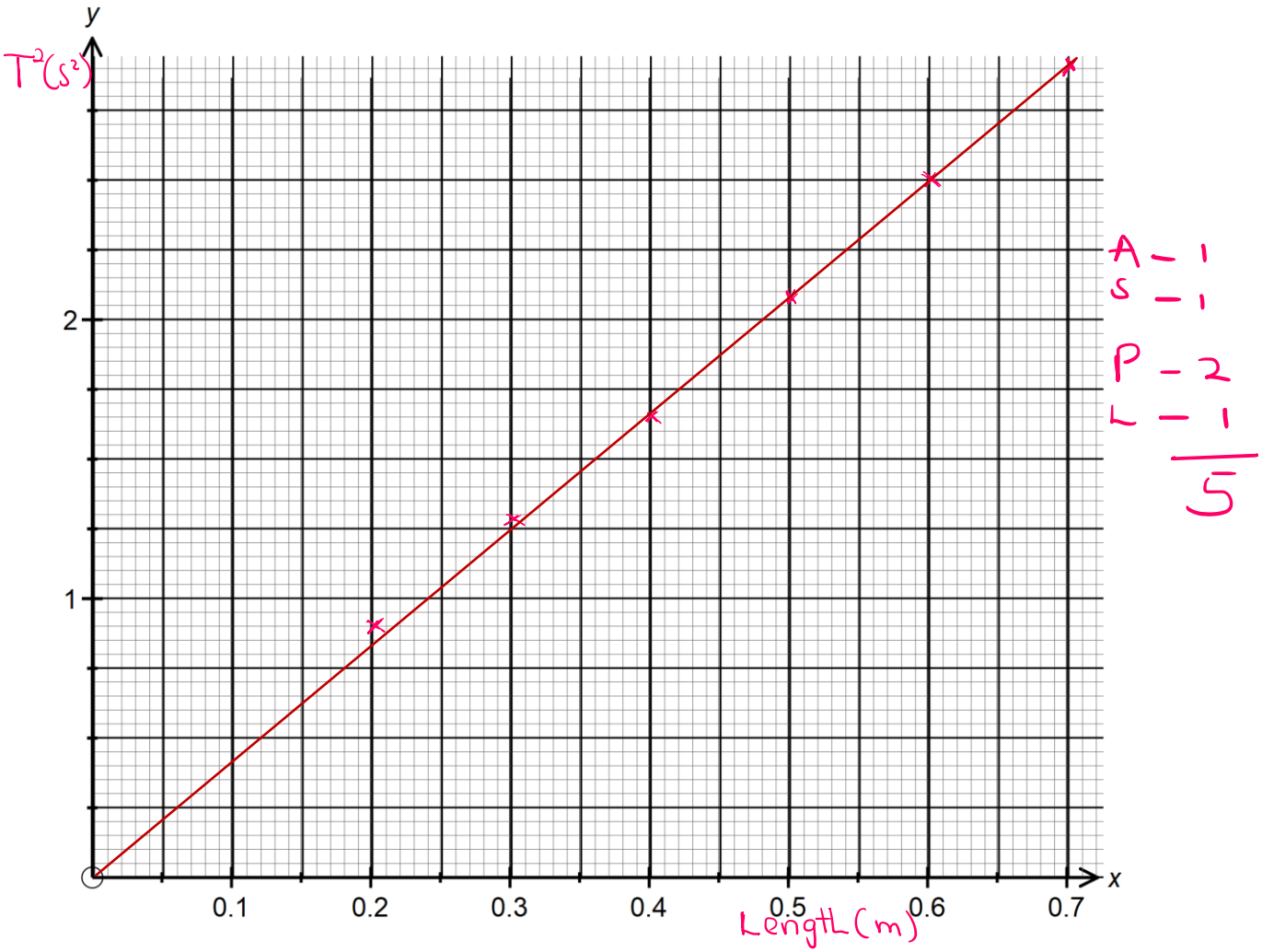
c) Repeat the procedure above for other values of L as shown and complete the table.

Length L (cm)	70	60	50	40	30	20
Length L(m)	0·70	0·60	0·50	0·40	0·30	0·20
Time for 20 oscillation Range (30 – 15)	34·07	31·57	29·16	26·25	22·78	18·61
Period T(s) 4SF (a must)	1·704	1·579	1·458	1·313	1·139	0·9305
$T^2(s^2)$ 4SF (a Must)	2·902	2·492	2·126	1·723	1·286	0·8658

✓ (1) (2dp)
✓ 1 for each (2dp)
✓ (1)
✓ (1)
9

(9 marks)

d) On the grid provided plot a graph of $T^2(s^2)(y-axis)$ against L(cm) **(5 marks)**



A – 1
S – 1
P – 2
L – 1
5

i. Determine the slope of the graph **(3 marks)**

Slope = $\frac{\Delta T^2}{\Delta L}$ ✓

= $\frac{2.5-1.25}{0.6-0.3}$ ✓½ ✓½

= 4.1667 s^2/m ✓

wrong unit – denie 1 mk
no unit – denie ½ mk

ii. Given that $T^2 = \frac{4\pi^2 l}{g}$ determine the value of the constant **g** **(3 marks)**

slope = $\frac{4\pi^2}{g}$ ✓

$g = \frac{4\pi^2}{4.1667}$ ✓

= 9.475 m/s^2 ✓

denie 1 mk for wrong units
½ mk No units

. **QUESTION 2**

You are provided with the following apparatus

- A wire mounted on a mm scale
- A voltmeter (0-3 or 0- 5.v)
- An ammeter
- A switch
- Two dry cells and a cell holder.
- Six connecting wire with at least two crocodile clips.
- A micrometer screw gauge

Procedure.

(a) Using the micrometer screw gauge, determine the diameter d of the wire at three different points.
d_1=……0.35……mm, d_2=……0.34……mm,
d_3……0.36…… mm,
Average d = $\frac{0.35+0.34+0.36}{3}$ ……m **(2 marks)**

$= 0.35mm = 3.5 \times 10^{-4} m$

Concept of averaging a mark (± 0.00002 m)

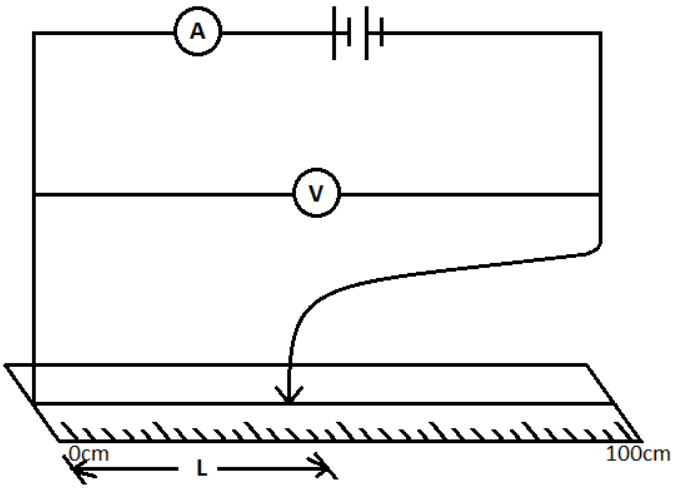
(b) Calculate the cross- sectional area A of the wire in m^2 **(2 marks)**

$A = \pi r^2$

$= 3.142 \times \left(\frac{3.5 \times 10^{-4}}{2}\right)^2$ ✓

$= 9.625 \times 10^{-8} m$ ✓ (2)

(c) Set up the circuit as shown below.



(d) Vary the length by using the crocodile clip along the wire from (when L =0). Record the voltmeter and ammeter readings in the table below. **(5 marks)**

I ⇒ 0.15 ← → 0.25

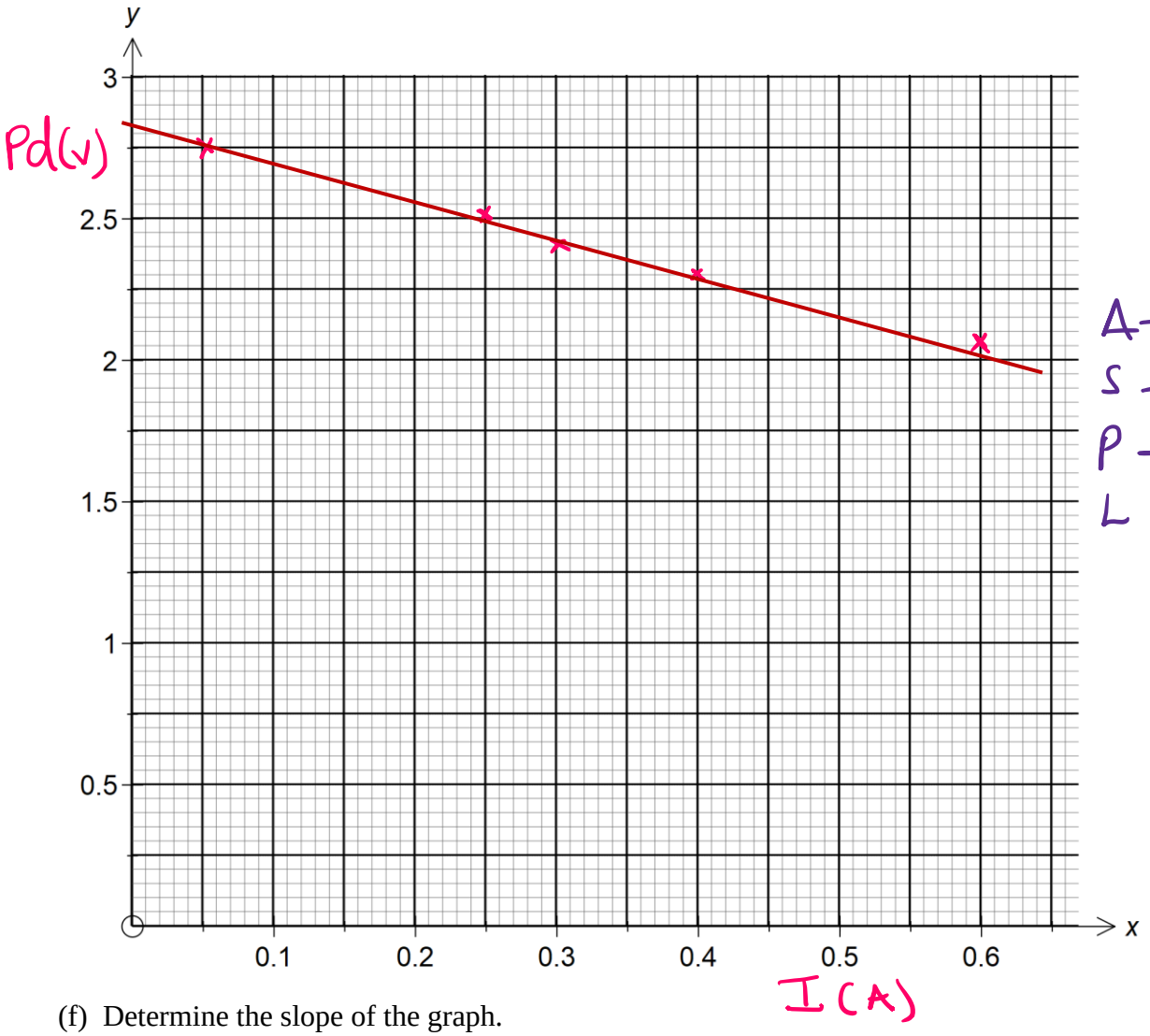
Length L (cm)	80cm	60cm	40cm	20cm	0cm
Current I (A)	0.25 ✓	0.30 ✓	0.40 ✓	0.60 ✓	2.0 ✓
Voltage (V)	2.5 ✓	2.4 ✓	2.3 ✓	2.2 ✓	0.2 ✓

V ⇒ 3.0 ← → 0

(6)

✱ each correct a ½ mark

(e) Plot the graph of voltage V against current I **(A)** **(5 marks)**



A-1 (labelled with units)
S-1 (Uniform simple Accomodated)
P-2
L-1

(f) Determine the slope of the graph. **(2 marks)**

Slope $= \frac{\Delta V}{\Delta I}$ ✓

$= \frac{2.0 - 2.75}{0.65 - 0.05}$ ✓

$= \frac{-0.75}{0.6}$

$= -1.25\,\Omega$ ✓

* No mark for gradient if the line is not a graph
is zero
*No units deduct ½ mark
(*Wrong units deduct - 1 mark)

(g) Given that $\boldsymbol{V = -Ir + E}$,

(i) calculate the internal resistance of the cell. **(2 marks)**

$V = -Ir + E$

Gradient $= -r$ ✓

$-r = -0.125$

$r = 1.25\,\Omega$ ✓

(2)

(ii) determine the emf (E) of the battery. **(2marks)**

Emf E = V - intercept ✓

= 2.8 V ✓

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