NAME: ..... Index No: .....CLASS: .....

Candidate's signature: .....

232/3 PHYSICS PAPER 3: TIME: $2\frac{1}{2}$ HOURS

ALLIANCE HIGH SCHOOL

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

INSTRUCTIONS TO CANDIDATES

- *Answer ALL the questions in the spaces provided in the question paper.*
- *You are supposed to spend the first 15 minutes of the $2\frac{1}{2}$ hours allowed for this paper reading the whole paper carefully before commencing your work.*
- *Marks are given for clear record of the observations actually made, for their suitability and accuracy and the use made of them.*
- *Candidates are advised to record their observations as soon as they are made.*
- *Mathematical table and electronic calculators **may be** used*

FOR EXAMINER'S USE ONLY

	MAXIMUM SCORE	CANDIDATES'S SCORE
QUESTION 1	20	
QUESTION 2	20	
TOTAL	40	

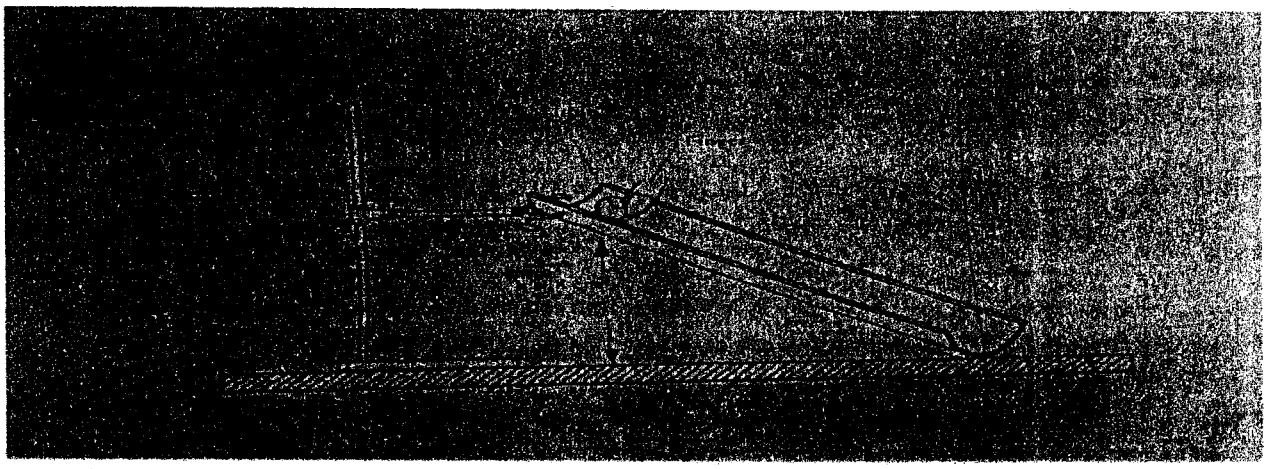
This paper consists of 9 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing

Question one (Part A)

You are provided with the following

- Stop watch
- A 105 cm plastic tube split open with a mark near one end
- A metre rule or half-metre rule
- Retort stand, one boss and one clamp.

The experiment involves timing a marble as it runs down the split tube as a runway. Clamp the marked end of the split tube with the inside uppermost. Ensure the end with the mark is on the greater slope. Raise this end such that the mark is at a height h = 7 cm above the bench level. The other end should rest on the bench as shown in figure 1



Place the marble at the mark on the runway and hold it in place gently with the finger as shown in the figure 2. By simultaneously releasing the ball and starting the stop watch measure and record in table 1, the time, **t**, taken by the marble to reach the lower end of the runway (***It is advisable to measure the time twice and record the average value***).Vary the height **h**, to other values as shown in table 1. Measure and record in the table the corresponding average values of t. complete the table 1

Table 1

height, **h** (m)	0.07	0.12	0.15
Average time, **t** (s)			
$\mathbf{2ht^{-2}}$			

Question 1 (Part B)

You are provided with the following apparatus:

- *A biconvex lens marked L*
- *A lens holder*
- 2 Optical pins, each fixed on a rubber stopper
- *A white screen*
- *A metre rule*
- *Some plasticine*

Proceed as follows:-

a) Set-up the apparatus as in figure 2: Focus a distant object; say a window, by letting the lens **L** position invariant. Meanwhile slide the white screen back and forth till a sharp image of the distant object; window, appears clearly on the white screen.

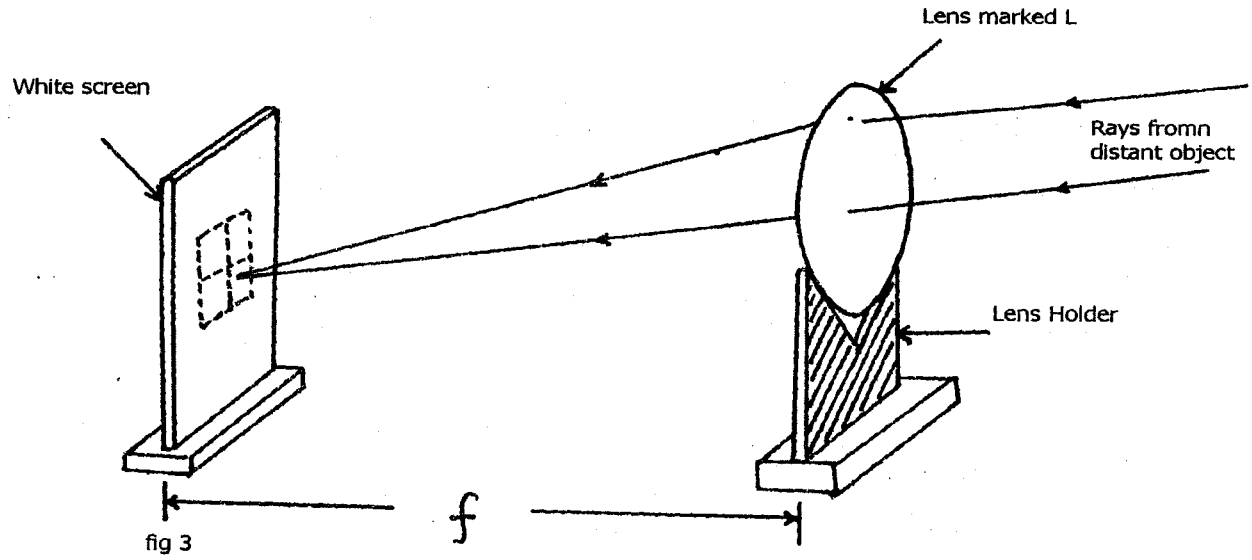


Figure 2

i) Describe the observation of the image focused on the screen (1 mark)

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ii) Measure and record the distance **f**.....m (1 mark)

ii) Determine f^{-1}=.....D (1 mark)

(b) Set-up the apparatus as shown in figure 3. Use the two optical pins on a stopper as object pin and search pins. Put the object pin near the lens **L**, that is, at **u = 8.0cm.**). Observe the object pin through the lens **L** and find the position of the image pin. Locate this image position by placing underneath the image a search pin such that there is no –parallax between the search pin and the image pin. Measure and record in table 2 the distance, **v** between the search pin and the lens.

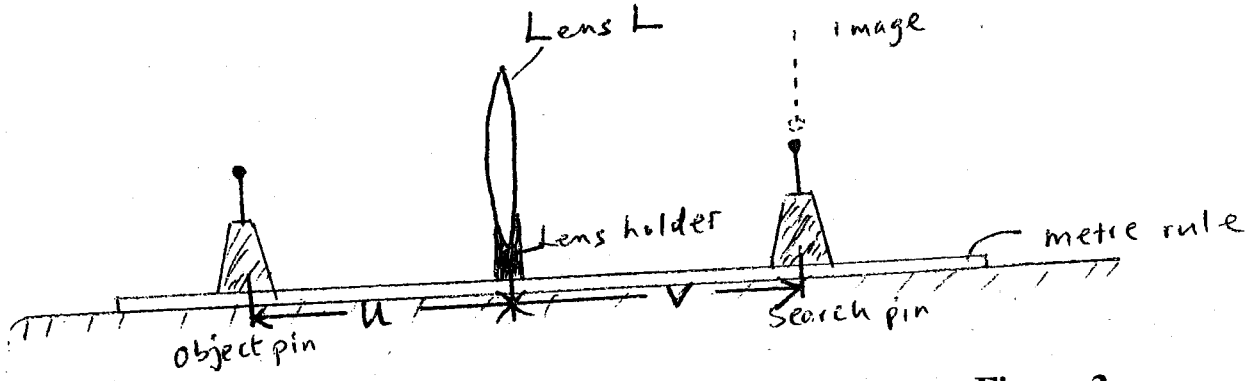


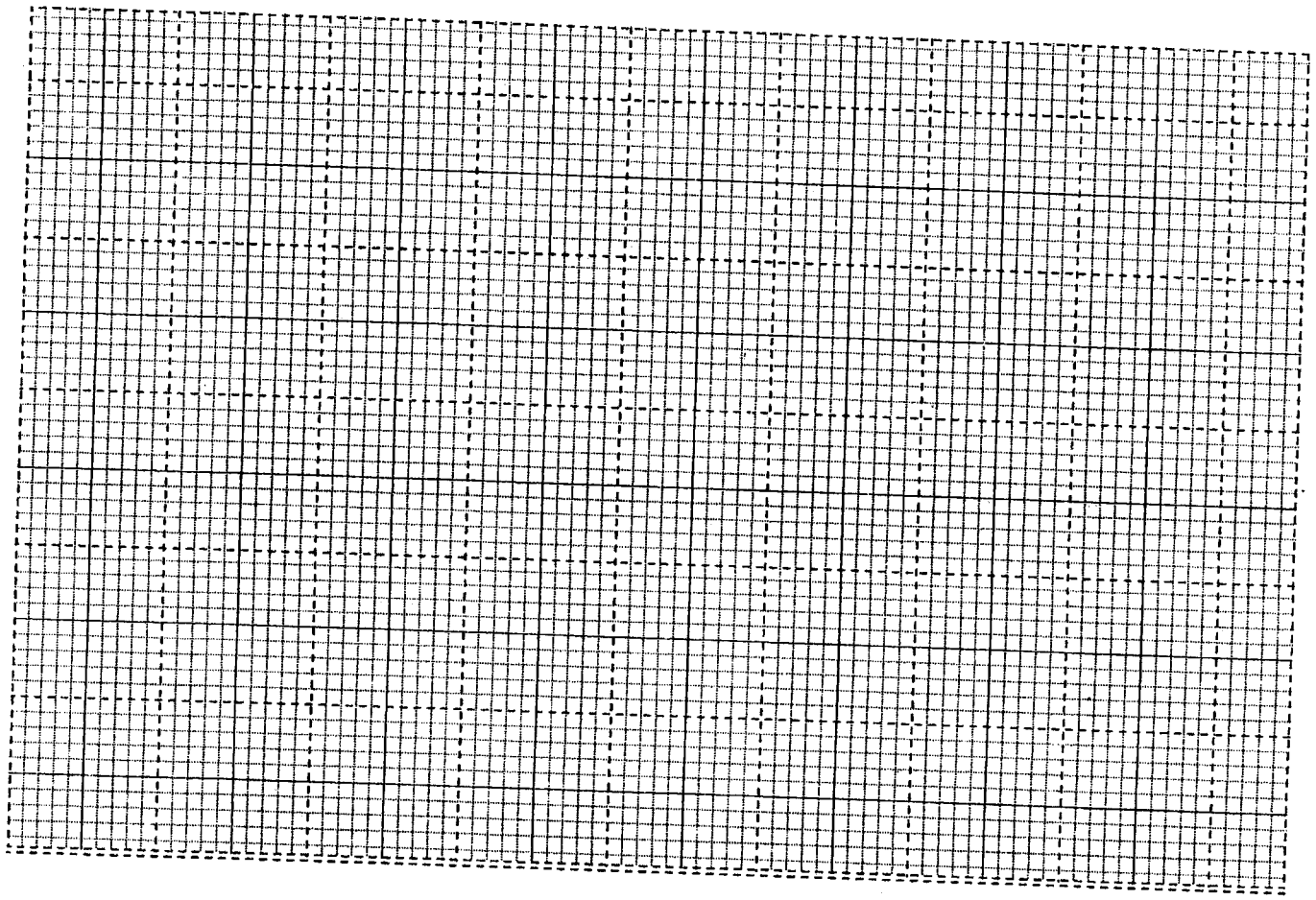
Figure 3

(c) Repeat the procedure using at least six different values of u as in table 2 complete the table 2. (7 marks)

Table 2

Object distance, **u** (cm)	8	10	12	14	16	18	20	22
Image distance , **v** (cm)								
m = v/u								

(d) Plot a graph of **m (y-axis)** against **u** (5 marks)



(e)From your graph, when $\dot{\mathbf{m}} = 1$

(i) Find the distance of the image from the lens **L** (1 mark)

.....

ii) Find the value of focal length, **f** (1 mark)

.....

iii) Find the power of the lens (1 mark)

.....

(f)State the application of this practical in real life experience . (1 mark)

.....

Question 2 (Part A)

You are provided with the following

- Watch glass
- A glass marble
- Plasticine
- Stop watch
- Vernier calipers (to be shared)
- A mass balance (to be shared)

a) Using the vernier calipers measure and record the diameter, **D** of the watch glass and the diameter **d** of the glass marble

i) **D** = ...m (½mark)

ii) **d** = ...m (½mark)

b) Using a mass balance measure and record in table 1 the mass, **m** of the marble

c) Place the watch glass on a flat table and hold it firmly using plasticine, as in figure 1. Roll the marble (radius, **r**) and measure and record in table1 the time, **t** for **10** oscillations. Complete table3 (4½mark)

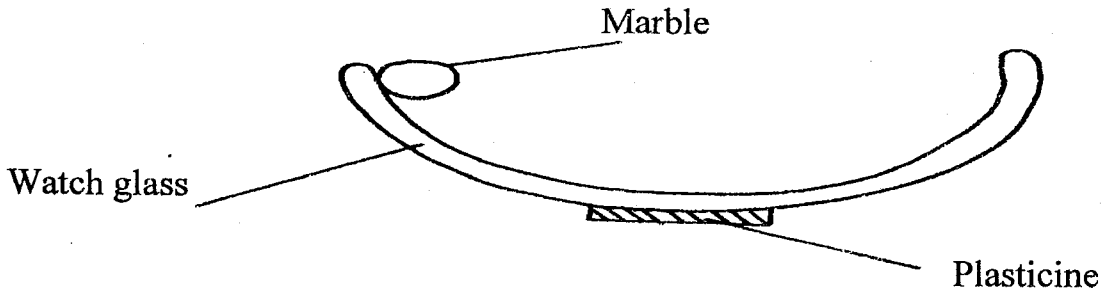


Figure 4

Table3

Radius,**r** =.....m	**A**=$4\pi r^2$ = ...m^2	V=$4\pi r^3/3$ = ...m^3
Mass,**m** =.....kg	**ρ** = **m**/**V** = ...(kgm^{-3})	**I**=0.4**m**r^2 =.....kgm^2
Time, **t** = ...s	**T**= **t**/10 = ...s	**f**= 1/**T** = ...Hz

(d) Given the equation $\mathbf{g = 5.6f^2\pi^2 (D-r)}$, determine the value of **g** (1mark)

.....

Question 2 (Part B)

You are provided with the following apparatus:

- *Potentiometer wire*
- *A jockey*
- **6** *carbon resistors, each of 5.1Ω*
- *A galvanometer*
- *A switch*
- **8** *connecting wires*
- **2** *dry cells*
- A *cell holder*
- *Unknown resistor P*

Proceed as follows:

i) Connect up the circuit as shown in the figure 5

Close the key and record the ammeter and voltmeter readings

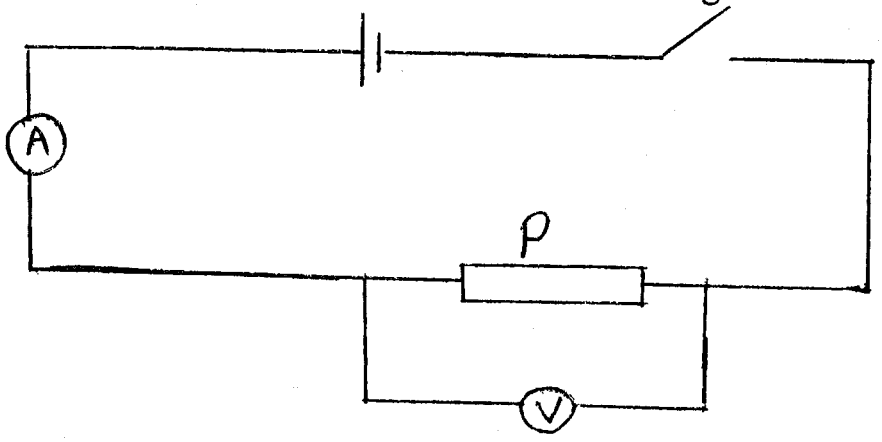


Figure 5

(b)Repeat the procedure in (a) but using two dry cells connected in series and in parallel. Record your results in table 4 and complete the table. (3 marks)

Table 4

Connection of emf source	Ammeter reading, I (A)	Voltmeter reading, V (V)	R = V/I (Ω)
1 cell			
2 cells in series			
2 cells in parallel			

c) Connect up the circuit as shown in figure 6. **P** is the unknown resistor and **Q** is a selection of standard resistors each of 5.1 Ω connected either in parallel or in series. Start with the resistance **Q** as 5.1Ω.Close the key **K** and move the jockey along the wire until a point of balance (i.e when the galvanometer shows a null deflection) is obtained at **C**

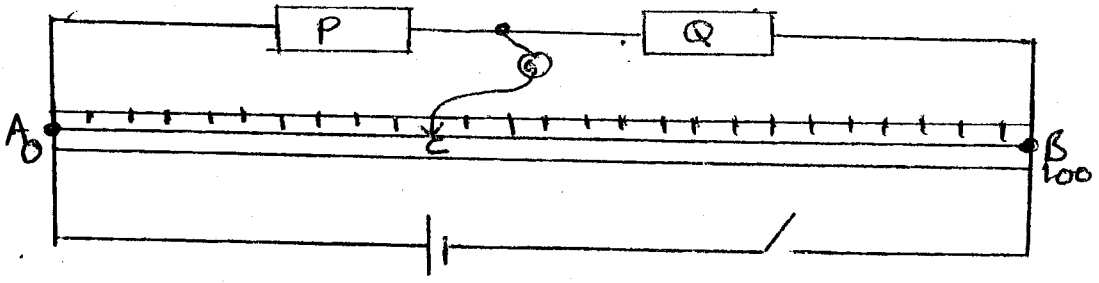


Figure 6

Measure and record the length **AC** and **BC** (½ mark)

AC=.....cm and **BC**=.....cm

(d) Determine the value of 5.1(AC/**BC**) (½ mark)

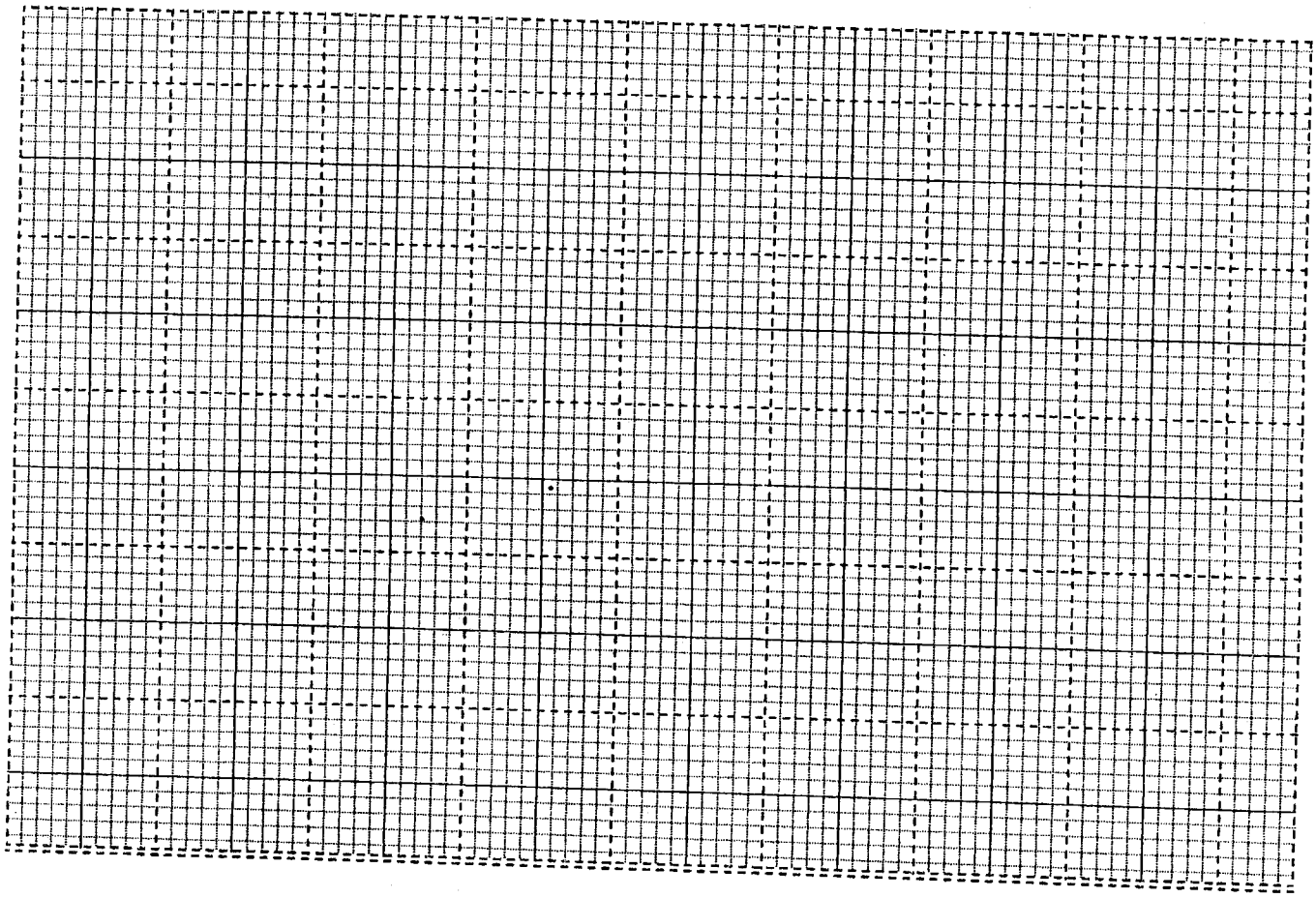
.....

e) Repeat the procedure in c) for the other values of Q shown in table 5
Complete table 5 (5marks)

Table 5

Resistance Q (Ω)	30.60	25.50	20.40	15.30	10.20	2.55	1.70
L_1 = **AC**(cm)							
L_2 =**BC**(cm)							
L_2/L_1							

Plot a graph of Resistance Q against the L_2/L_1 (5 marks)



From your graph, find the slope of the graph (3 marks)

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