FORM FOUR TERM ONE EXAM 2017

PHYSICS PAPER 3
TIME: 2 ½ HOURS

1. *You are provided with the following apparatus:*
    -   A metre rule, two pieces of wood, mass labeled M.
    -   A wire of length at least 100 cm (1.5 single-cable copper wire)
    -   A retort stand, boss and clamp
    -   A stop watch or stop clock and plasticine.
    -   A micrometer screw-gauge and vernier calipers.
    -   A marble and a watch glass.

    Proceeds as follows:

    (a) Set up the apparatus as shown in the figure below. Ensure that the wire is free of kinks and the end tied to the hook is firm and the hook does not move.

    .
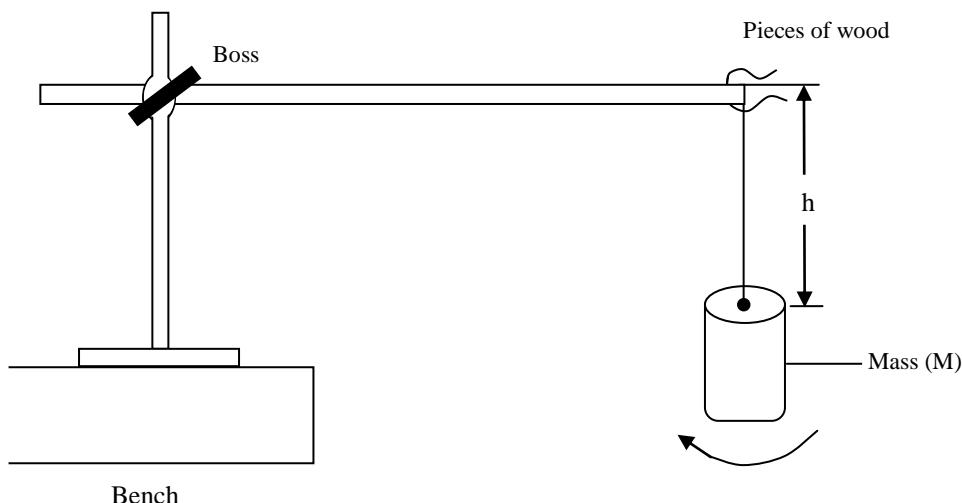
    (b) Adjust the length, **L**, of the wire so that L = 70cm, give the mass, M, a slight twist such that when released it oscillates about the vertical axis as shown by the arrow. Measure the time for twenty oscillations and record in the table below.

    (c) Repeat the procedure in (b) above for other values of L as shown in the table. Complete the table below.

Length (L cm)	70	60	50	40	30	20
Length (L m)						
Time for 20 oscillations (s)						
Period (T(secs))						
T^2 (Sec^2)						

(5 mks)

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Geo p3
Form 4
F 4232312016

(d) On the grid provided, plot the graph of T^2 (S^2) (y-axis) against L (M) *(5 mks)*
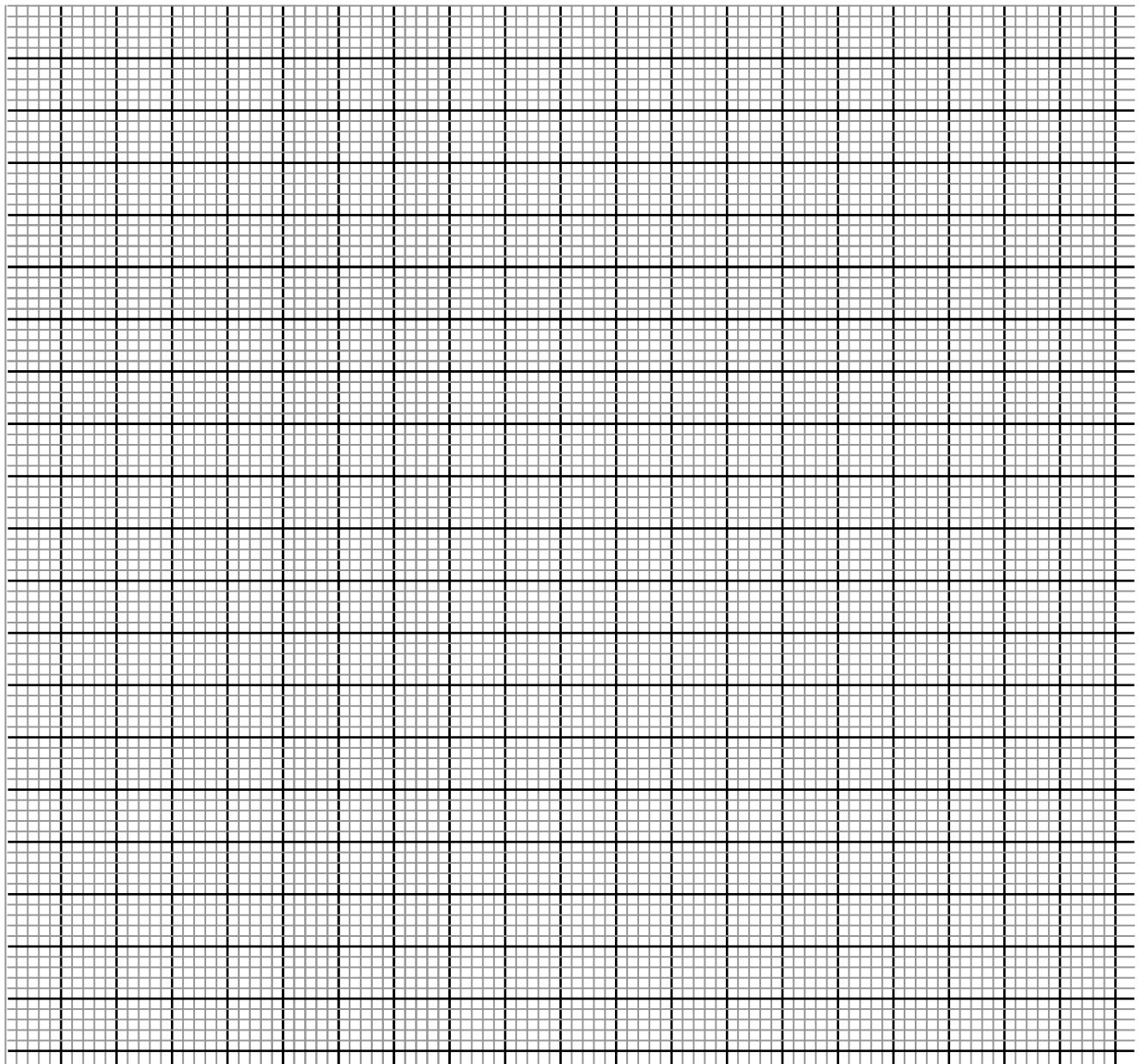
(e) Measure the diameter, d, of the wire using the screw gauge.

d = _____ metres *(1 mk)*

(f) (i) Determine the slope of the graph. *(2 mks)*

(ii) Given that $T^2 = \dfrac{32\Pi^2 L}{Gd}$ where G is a constant, use the graph to determine the value

of G. *(2 mks)*

(g) Place the watch glass flat on the table with a

(i) Small piece of plasticine to fix it firmly to the bench at the one place it touches. Release the marble from one end of the of the watch glass and time 5 complete oscillations with a stop watch. Repeat this, three times, and fill the table below.
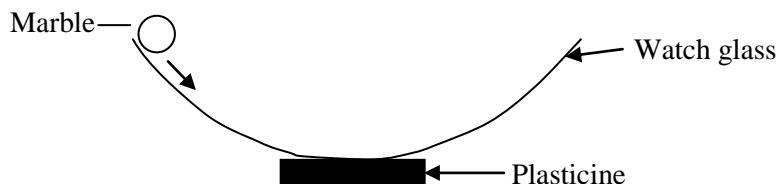
	Time for 5 oscillations	Periodic Time (s)
1.		
2.		
3.		

(2 mks)

Find the average periodic time (T) secs

T = _____

(ii) Determine the Diameter and Radius (r) of the marble using the vernier calliper provided.

Diameter = _____ m

Radius (*r*) = _____ m   *(1 mk)*

(iii) Calculate the radius of curvains of the watch glass R from the formula   *(2 mks)*

R - r = $\dfrac{5gT^2}{7(2\Pi)^2}$ where g = 9.8 m/s^2; Π = 3.142.

2. *You are provided with the following:*
   ▪ A wire 'W' mounted on a mm scale.

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Geo p3
Form 4
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- 2 dry cells and a cell holder
- A voltmeter
- Six connecting wires (at least one with crocodile clip)
- A switch

(a) Set up the apparatus as shown in the figure below:
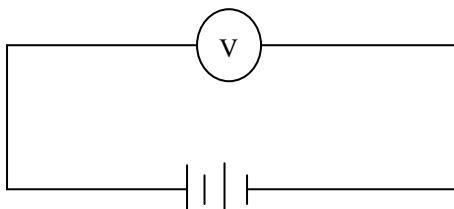
Determine the voltmeter reading E

E = _____ volts   *(1 mk)*

(b) Set the apparatus again as shown in the figure below. Use the crocodile clip to fix the length, L, of wire 'W' at 10 cm.

Crocodile Clip
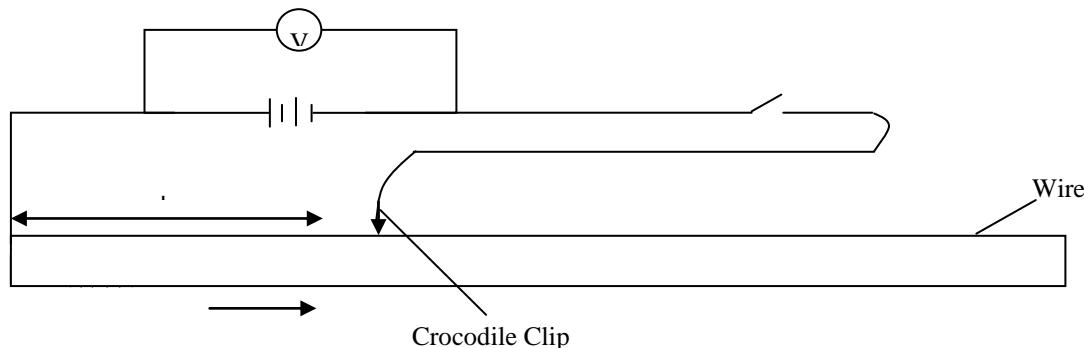
(c) Close the switch. Record the voltmeter reading '**V**' in the table below.

(d) Adjust the length '**L**' to 20 cm and repeat step (c) above. Repeat for other values of '**L**' in the table. Complete the table.   (6mks)

L (cm)	V (volts)	E - V (volts)	$\dfrac{V}{E-V}$
10			
20			
30			
40			
50			
60			

(e) Plot a graph of $\dfrac{V}{E-V}$ against **L** on the grid provided.   *(5 mks)*
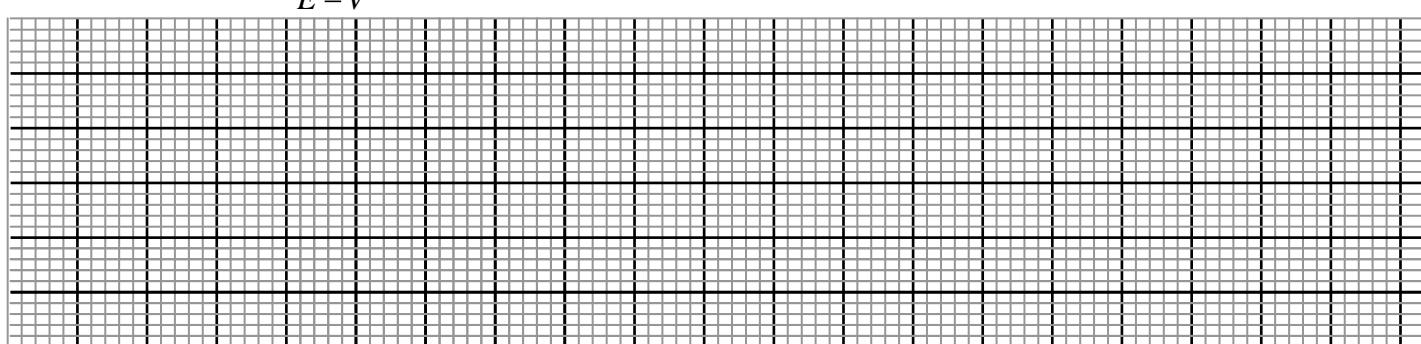
(f) Determine the slope of the graph   *(3mks)*

(g) The equation of the graph is given by $\dfrac{V}{E-V}$ = K$_1$L + K$_2$. Determine the value of K$_1$ and K$_2$.

(2 mks)

(h) Given that 4K$_2$r = 10 where r, is the internal resistance of the cells. Determine the value of r.

(2 mks)

(i) State one precaution taken when performing the experiment.   *(1 mk)*

Kenya Certificate of Secondary Education
Geo p3
Form 4
F 4232312016