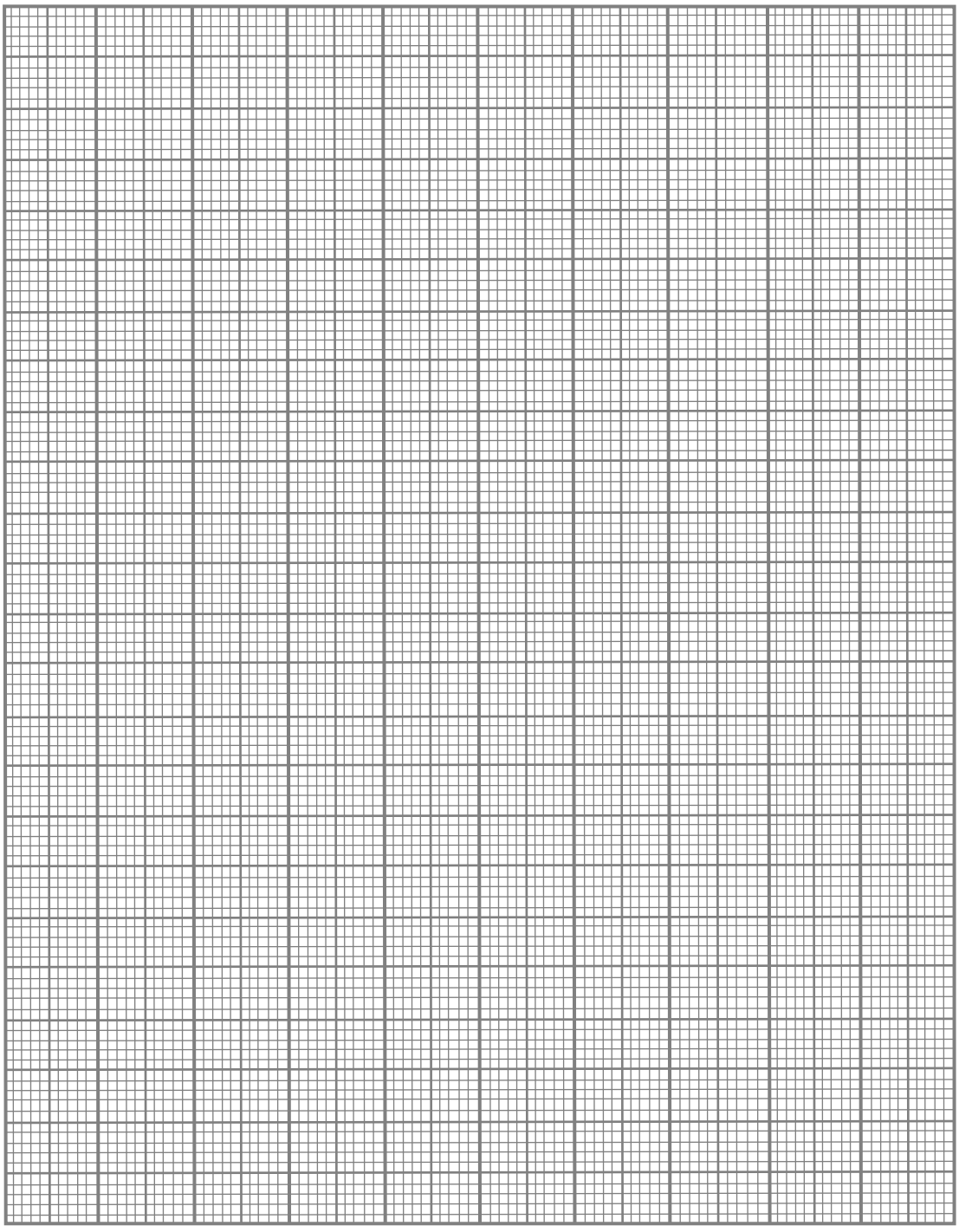
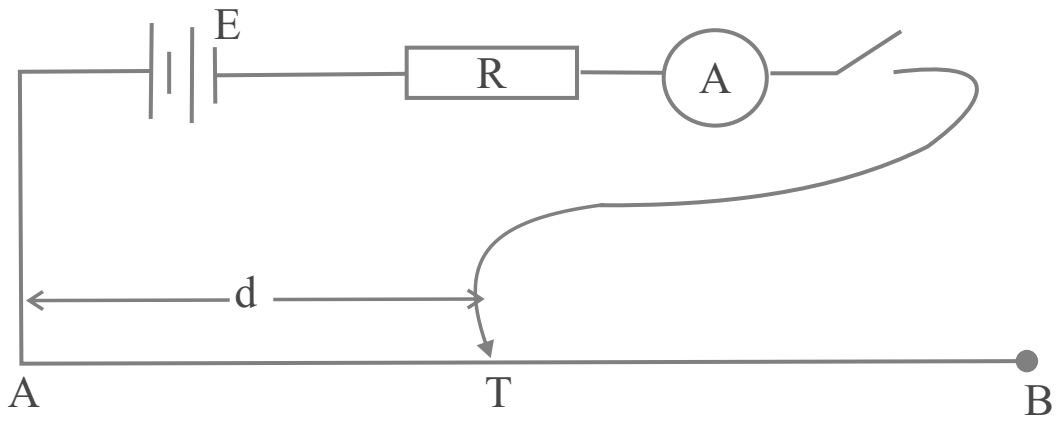
GRAPH SHEET



WASSCE JUNE 2011 *(Class Activities 4)*

(a)



You are provided with a potentiometer, an ammeter, a standard resistor, cells and other necessary materials.

(i) Connect the circuit as illustrated in the diagram above.

(ii)Use the jockey to make contact with the wire at a point **T** such that **AT** = **d** = 20cm.

(iii)Close the key, take and record the ammeter reading **I**.

(iv)Evaluate $\mathbf{I}^{-1}$.

(v)Repeat the procedure for the values of d = 30, 45, 60, 70 and 85cm.

(vi)Tabulate your readings.

(vii)Plot a graph with $\mathbf{I}^{1}$ on the vertical axis and **d** on the horizontal axis.

(viii) Determine the slope, s, and the intercept, ***c***, on the vertical axis.

(ix)Evaluate $\frac{s}{c}$

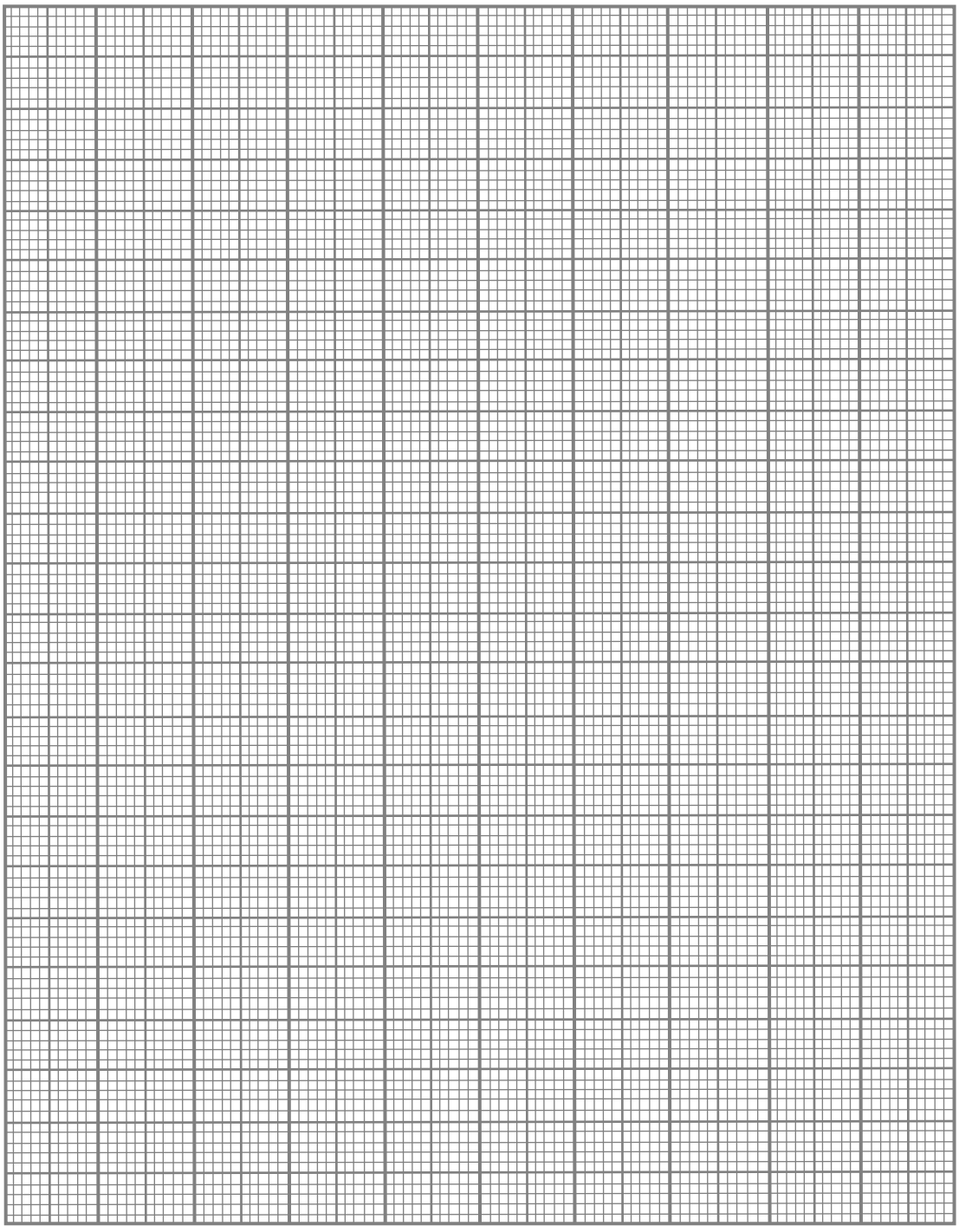
(x)State two precautions taken to ensure accurate results.

(b)(i) From the experiment above, suppose **E** = 2V, determine the value for **R** using your intercept, ***c***, on the graph.

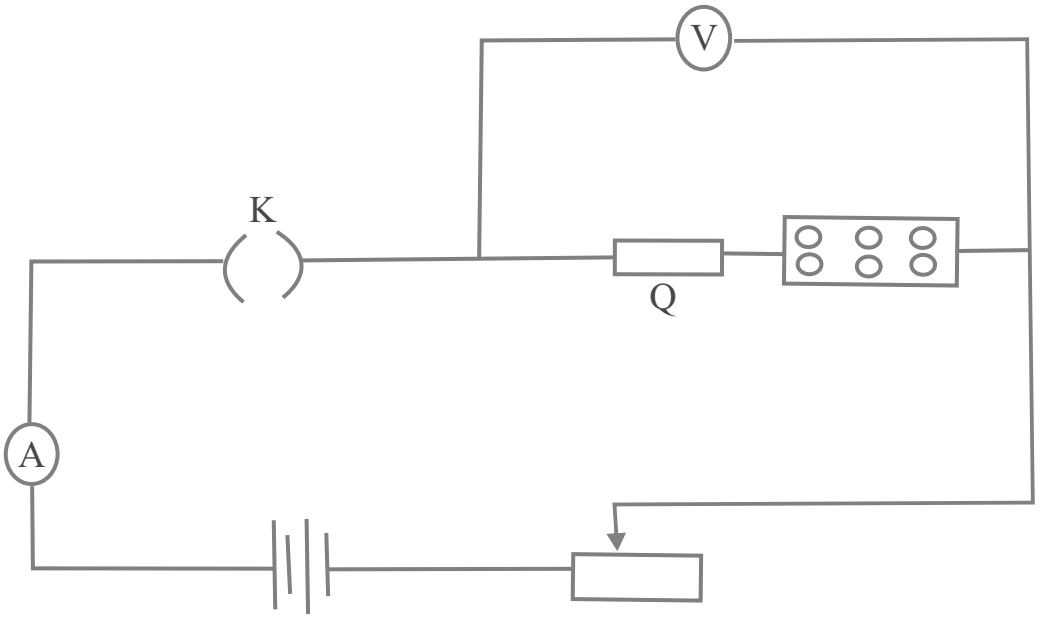
(ii)From the graph, determine the value of **I** when **d** = 90cm

.

GRAPH SHEET



NECO JULY 2011 *(Class Activities 5)*



(i) Connect the circuit as shown in the diagram above.

(ii) With zero resistance in the resistance box, close the key and adjust the rheostat until the current passing through the ammeter is maximum. Read and record the ammeter reading I_0. Also read and record the corresponding voltmeter reading V_0. Do not adjust the rheostat throughout the experiment. Open the key.

(iii) Setting R = IΩ, close the key. Read and record the ammeter reading I. Also read and record the corresponding voltmeter reading V. Evaluate P = V/I.

(iv) Repeat the procedure for R = 2, 4, 6 and 8Ω respectively. In each case, read and record I and the corresponding value of V. Also evaluate P. Tabulate your readings.

(v) Plot a graph of P on the vertical axis and R on the horizontal axis, starting both axes from the origin (0,0).

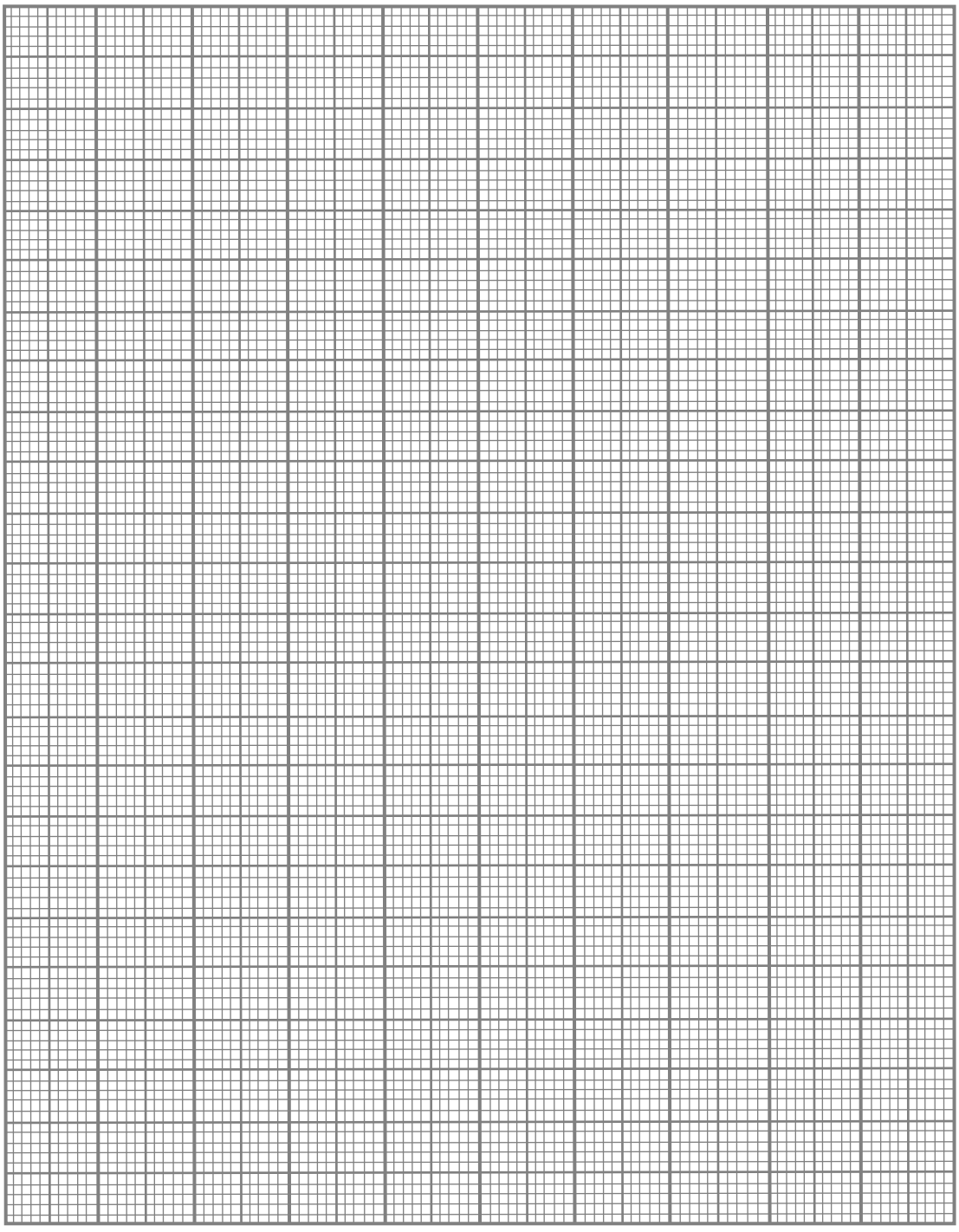
(vi) Determine the slope S of the graph and the intercept C on the vertical axis.

(vii) State two precautions taken to ensure accurate results.

(b)(i) If the potential difference across the load in the circuit above is measured, it would be observed that its value is less than the electromotive force of the battery. Explain the reason for this difference.

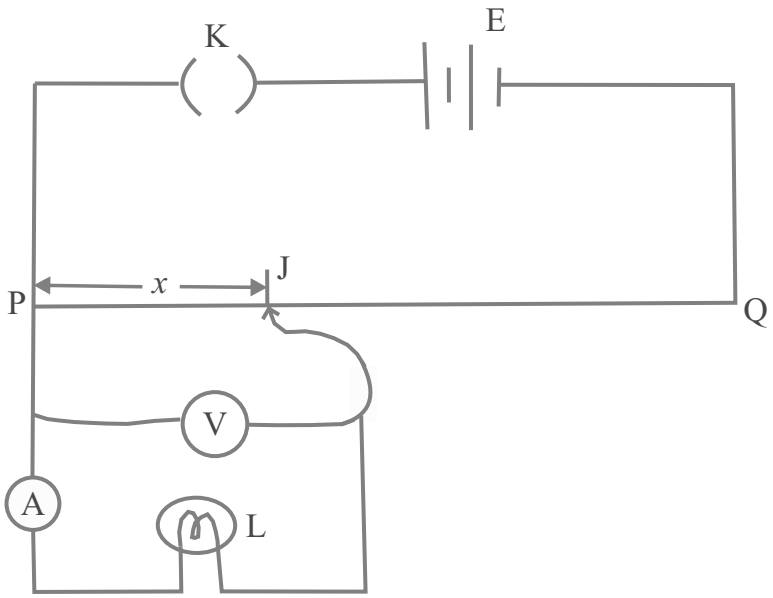
(ii) A cell of e.m.f. 3V and internal resistance 1.5Ω passes current round a circuit through an external load of 10.5Ω. Calculate the potential drop across the cell.

GRAPH SHEET



WASSCE JUNE 2011 *(Class Activities 6)*

(a)



You are provided with cells, a potentiometer, an ammeter, a voltmeter, a bulb, a key, a jockey and other necessary materials.

(i) Measure and record the *emf* **E** of the battery.

(ii)Set-up a circuit as shown in the diagram above.

(iii) Close the key **K** and use the jockey to make a firm contact at **J** on the potentiometer wire such that **PJ** = x = 10cm.

(iv)Take and record the voltmeter reading ***V*** and the corresponding ammeter reading ***I***.

(v)Evaluate log **V** and log **I**.

(vi)Repeat the procedure for other values of ***x*** = 20, 30, 40, 50 and 60cm.

(vii) Tabulate your readings.

(viii) Plot a graph with log **I** on the vertical axis and log **V** on the horizontal axis.

(ix)Determine the slope, ***s***, of the graph.

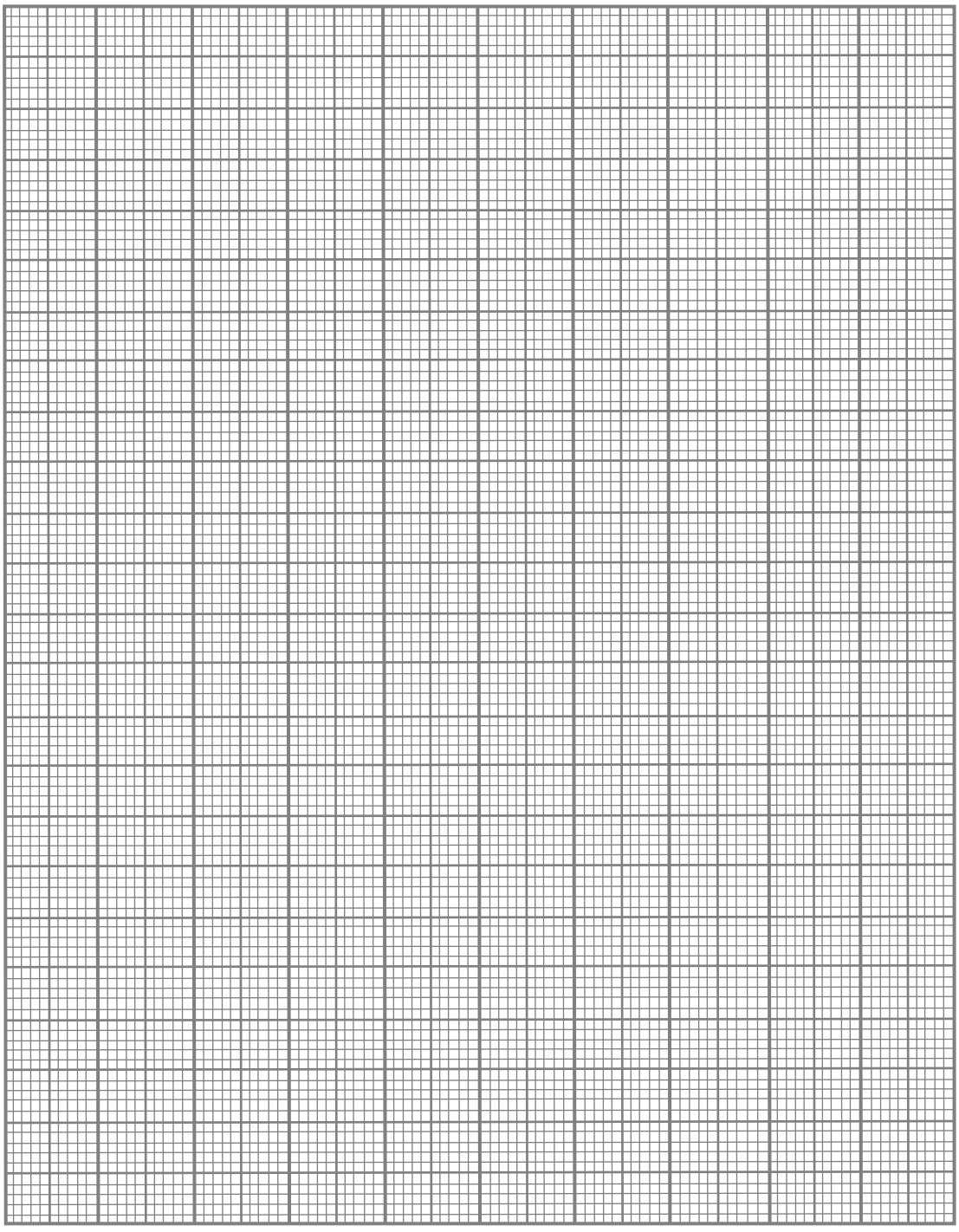
(x)Determine the intercept, ***c***, on the vertical axis.

(xi)State two precautions taken to ensure accurate results.

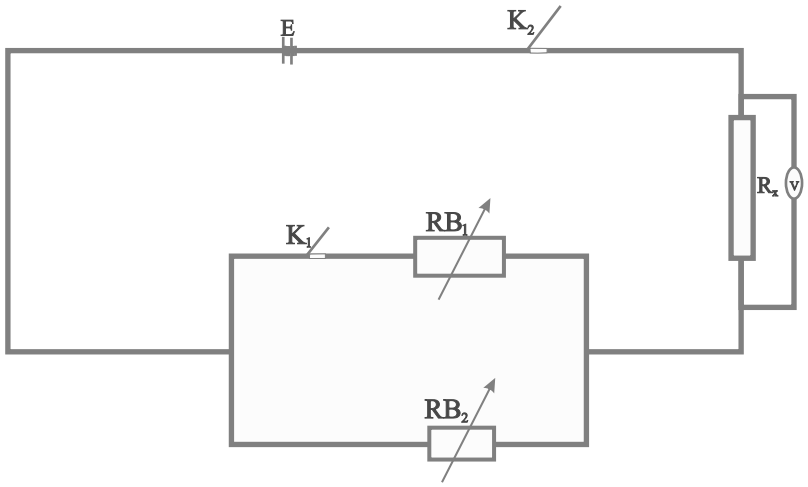
(b)(i) How is the brightness of the bulb affected as ***x*** increases? Give a reason for your answer.

(ii)List two electrical devices whose actions do not obey ohm's law.

GRAPH SHEET



WASSCE JUNE 2007 *(Class Activities 7)*

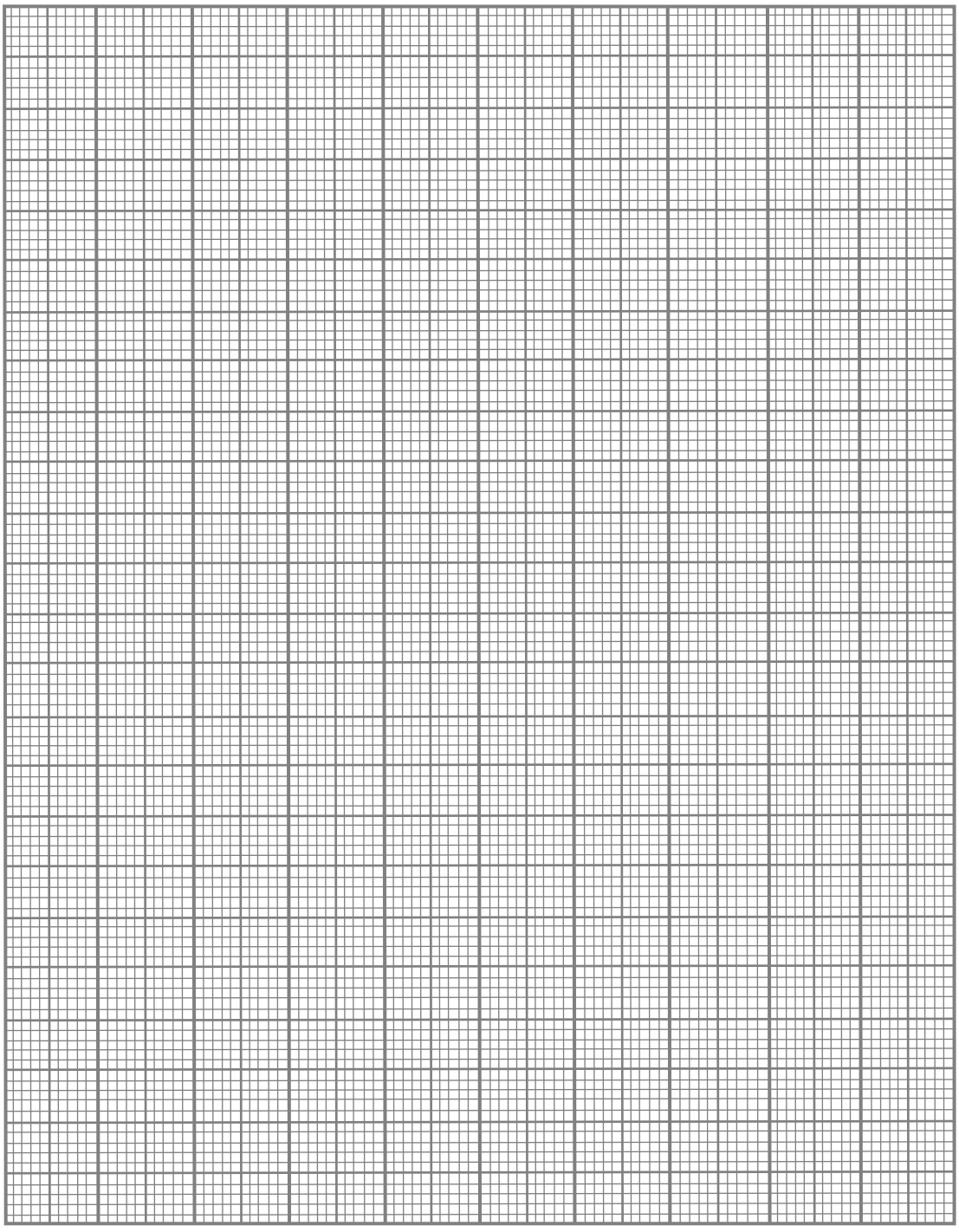


You have been provided with an accumulator E, a standard resistor Rx, two resistance boxes RB1 and RB2 two keys k1 and k2 and other necessary apparatus.

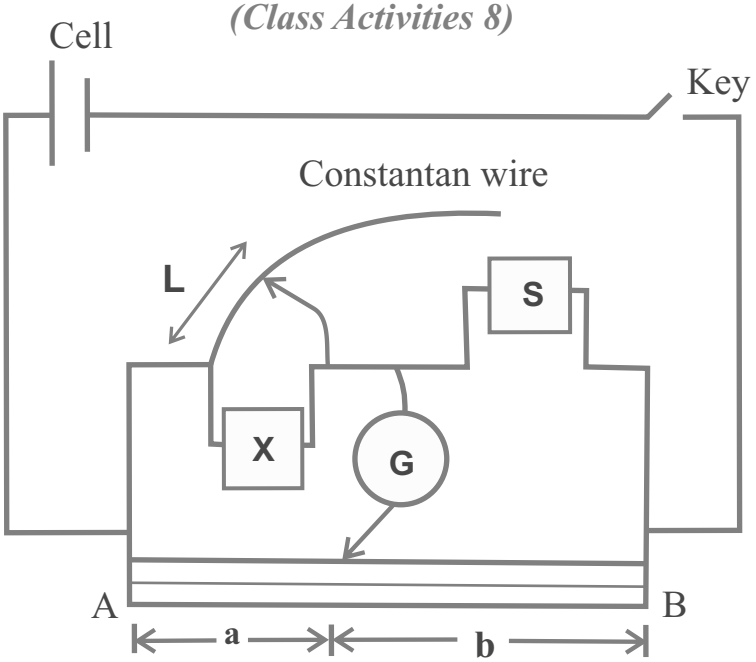
(i) measure and record the e.m.f of the accumulator.
(ii)Connect a circuit as shown above.
(iii) Set the resistance R, in the resistance boxes such that R in RB1 = RB 2 = 1Ω.
(iv) With K1 open and K2 closed, measure and record the potential difference Vo across the standard resistor R*x*.
(v)Close K1 and K2. Read and record the potential difference V1 across R*x*.
(vi) Evaluate V1
(vii) Repeat procedure (v) for four other values of R = 2, 3, 4 and 5 respectively. In each case, ensure that the value of R in RB1 is equal to the value of R in RB2.
(viii) Evaluate V1 in each case. Tabulate your readings.
(ix) Plot a graph of V1 on the vertical axis against R on the horizontal axis starting both axes from the origin (0,0).
(x) Determine the slope, s, of the graph and the intercept I on the vertical axis.
(xi) Evaluate y = *l*/s
(xii) State two precautions taken to ensure accurate results. [21 marks]

(b)(I) Explain what is meant by the potential difference between two points in an electric circuit.
(ii) A cell has an e.m.f of 3 V. When it is connected across a resistor of resistance 4Ω, a current of 0.5A passes through the circuit. Calculate the internal resistance of the cell.

GRAPH SHEET



WASSCE JUNE *(Class Activities 8)*



(a)Connect the metre bridge circuit as shown below. AB is the bridge wire and S is the known resistor. Connect the resistor X in parallel with a length l = 100cm of the wire W in the left hand gap of the bridge. Determined the balance point C on the bridge and record the value I, a, and B.

Evaluate $\frac{1}{L}$ and $\frac{1}{R} = \frac{bxS}{a}$

Repeat the experiment with L taking values of 80, 70, 60, and 50cm. Tabulate your readings for the values of L, a, b, $\frac{1}{L}$ and $\frac{1}{R}$

Plot a graph with $\frac{1}{L}$ as ordinate and $\frac{1}{R}$ as abscissa.

Calculate the slope of the graph and find its intercept on the horizontal axis.

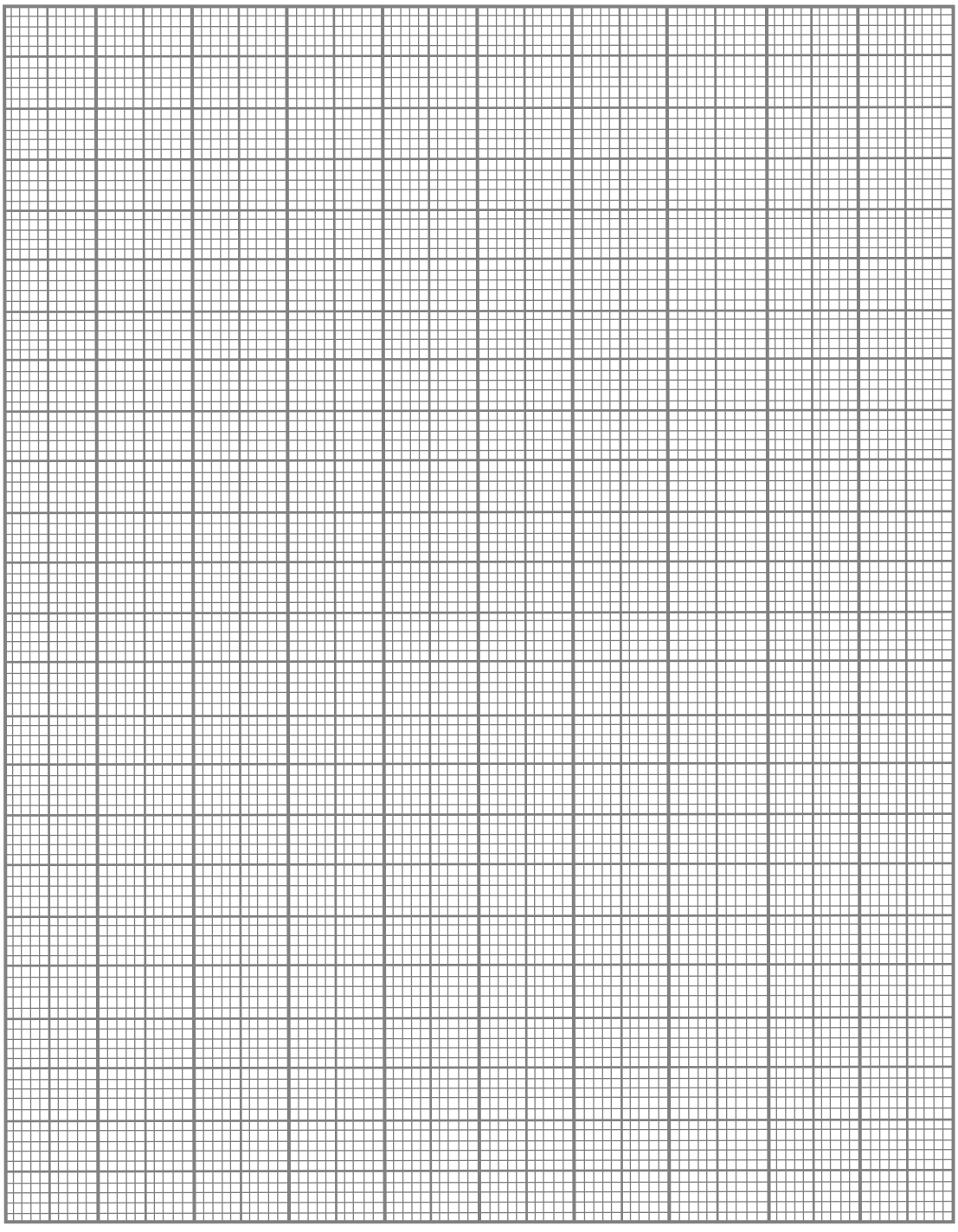
State two precautions in this experiment.

(b)(I) Two resistors with resistance 4Ω and 5Ω are connected in parallel. Calculate the effective resistance.

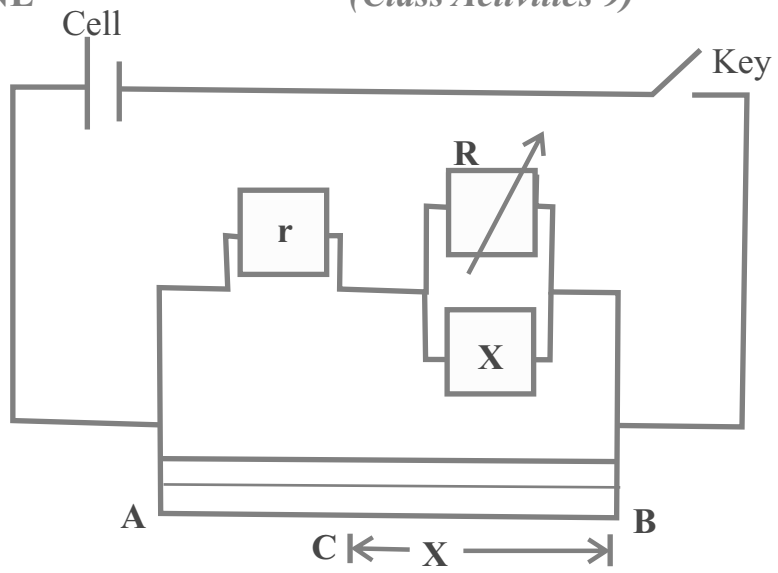
(ii) If the two resistors in (i) above are now connected in the two arms of a metre bridge, find the point of balance along the metre wire where the galvanometer gives no deflection.

(iii) Suppose a protective resistor were provided, why should it be used and where best in the circuit should it be placed? Give a reason for its location.

GRAPH SHEET



WASSCE JUNE *(Class Activities 9)*



(a)Connect up the circuit as shown in the diagram in which AB is the resistance wire of a metre bridge and G is a galvanometer. R is a galvanometer. R is a resistance box while r is a 2Ω resistor. See the value of R = 60Ω after closing the key, find a balance point C on the wire AB with the jockey. Read and record the length BC = X. Repeat the experiment with R = 40Ω, 20Ω, 10Ω, 5Ω and 1Ω. In each case, find the corresponding value of the wire AB.

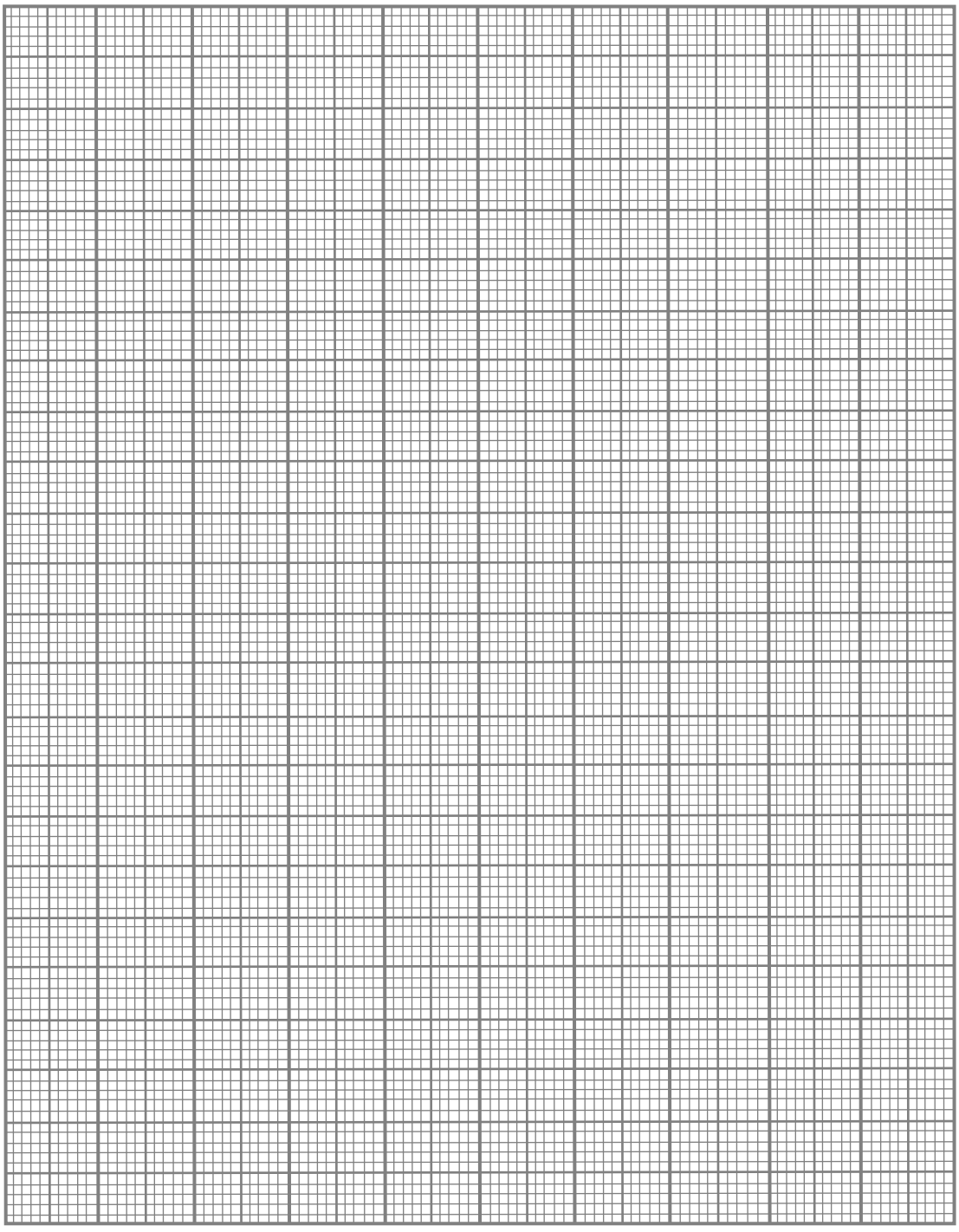
Determine $\frac{1}{R}$ and $\frac{1}{X}$ in each case. Tabulate your results. Plot a graph $\frac{1}{R}$ along the vertical axis and $\frac{1}{X}$ along the horizontal axis. Determine the slope of the graph. Remove the resistance box R from the circuit and determine the corresponding length X. State two precautions in this experiment.

(b)(i) A parallel combination of 4Ω and 6Ω resistors is connected in series with a resistor of 5Ω, a key and a cell. Draw the circuit diagram and calculate the effective resistance in the circuit.

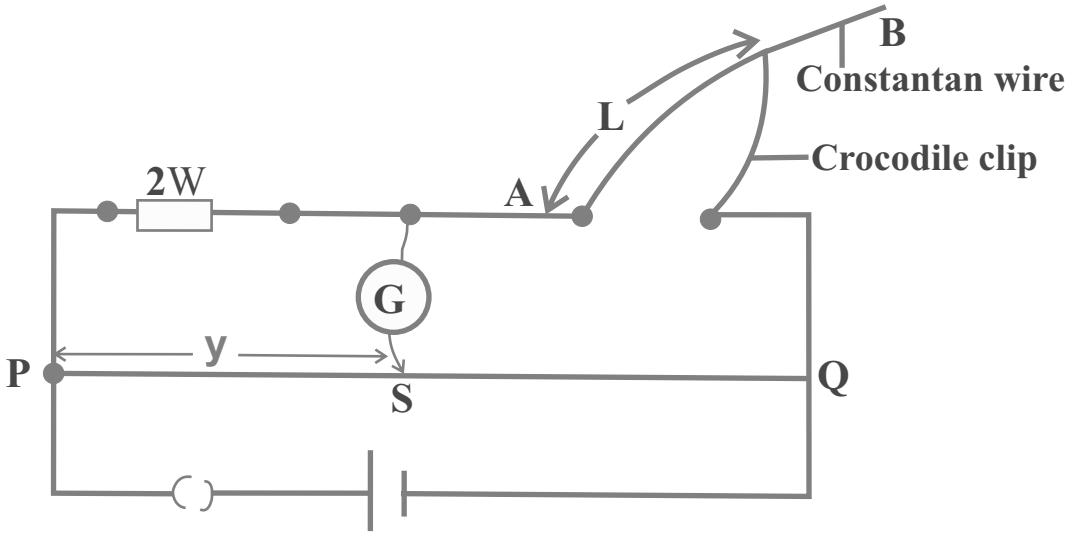
(ii) State two advantages of a lead-acid accumulator over a dry Leclanche cell for use in laboratory experiments.

(iii) The resistance of 1.6m of a constant wire is 3.2Ω. What length of the constant wire twice as thick will give a resistance of 4Ω?

GRAPH SHEET



WASSCE JUNE *(Class Activities 10)*



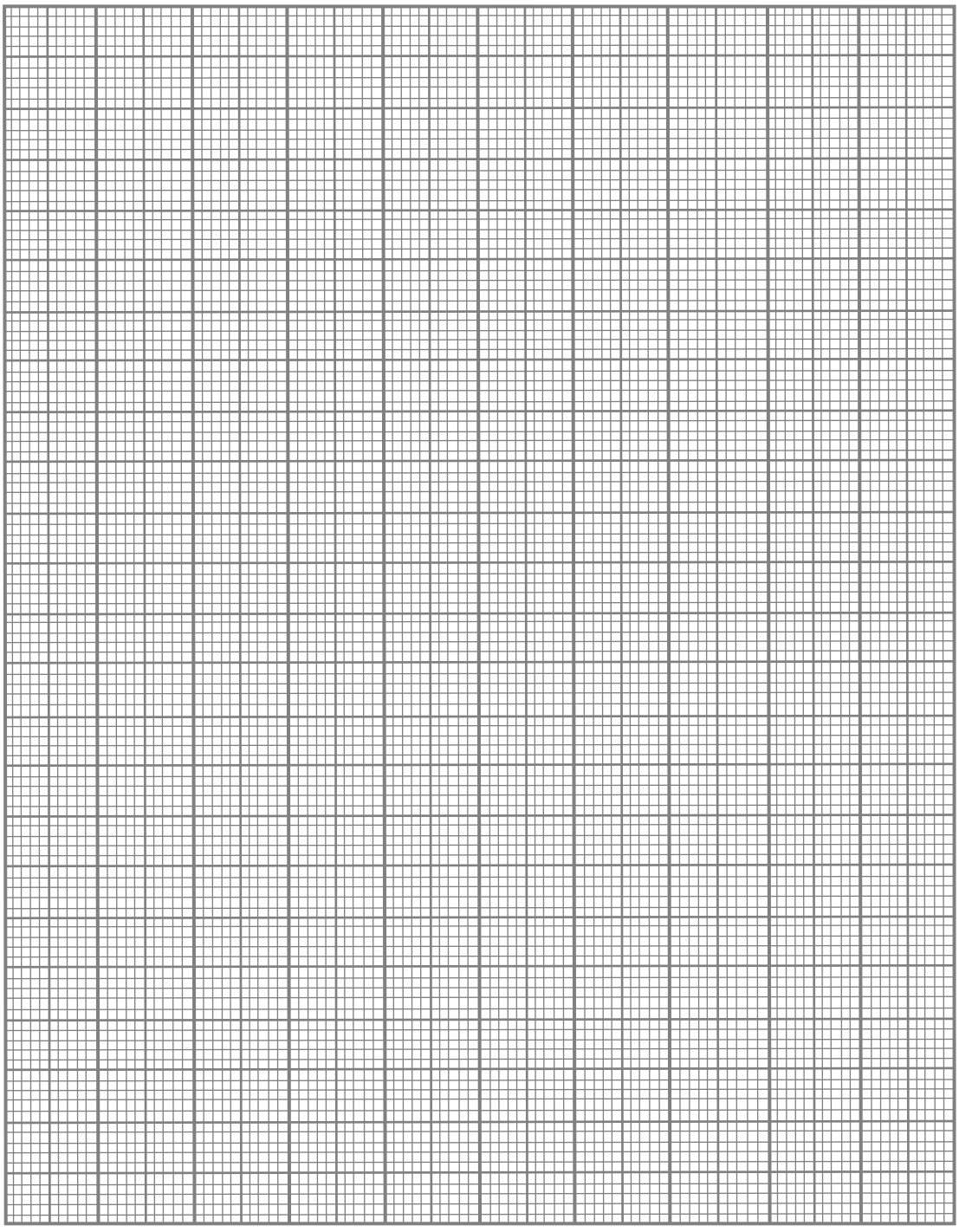
(a)Connect the metre bridge as shown in the diagram above. AB is a bare constantan wire. For a length L = 20cm of the wire, connect the circuit and locate a balance point S on the wire PQ. Record the value of y and evaluate y. Repeat the experiment with L = 40, 60, 80 and 100cm. In each case, determine and record the corresponding values of y and y^{-1}. Tabulate your readings.
Starting both axes from the origin, plot a graph of L against y^{-1}. Determine the slope s of the graph and the intercept I on the vertical axis. State two precautions you took to obtain accurate result.

(b)(I) Given that $L = \frac{200\ y^{-1}}{r} - \frac{2}{r}$ in the experiment above, use your graph to determine the value of r.

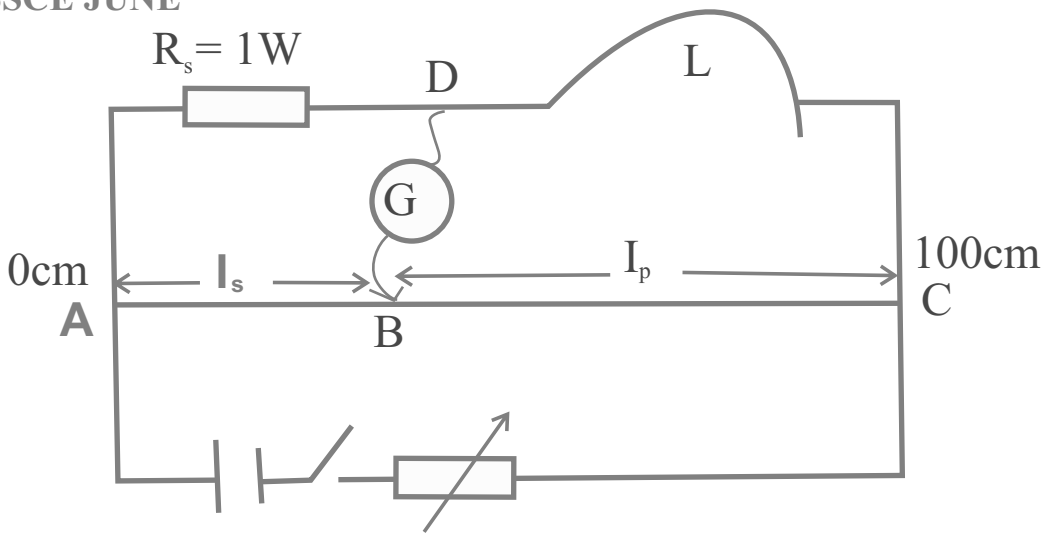
(ii) State two advantages of using a potentiometer over a voltmeter for measuring potential differences.

(iii)State four factors on which the resistance of a wire depends.

GRAPH SHEET



WASSCE JUNE *(Class Activities 11)*



You are provided with two wires marked P and Q, a resistor R_s= 1Ω and other necessary apparatus.

Connect R_s in the left hand gap of the metre bridge, a length L = 100cm of wire P in the right hand gap and the other apparatus as shown in the diagram above.

Determine the balance point, B, on the bridge wire AC. Measure and record AB I_s and BC = I_p.

Evaluate $R_1 = \left(\frac{l_p}{l_s}\right) R_s$. Repeat the procedure for four other values of L = 90, 80, 70 and 60cm. Ineach case, obtain and record the values of I_s and I_p and evaluate $R_1 = \left(\frac{l_p}{l_s}\right) R_s$

Repeat the experiment with the second wire, Q. Obtain values of I_s and I_Q for equal lengths of wire as used in wire P

Evaluate $R_2 = \left(\frac{l_Q}{l_s}\right) R_s$ in each case.

Tabulate your readings. Plot a graph of R_2 on the vertical axis against R_1 on the horizontal axis.

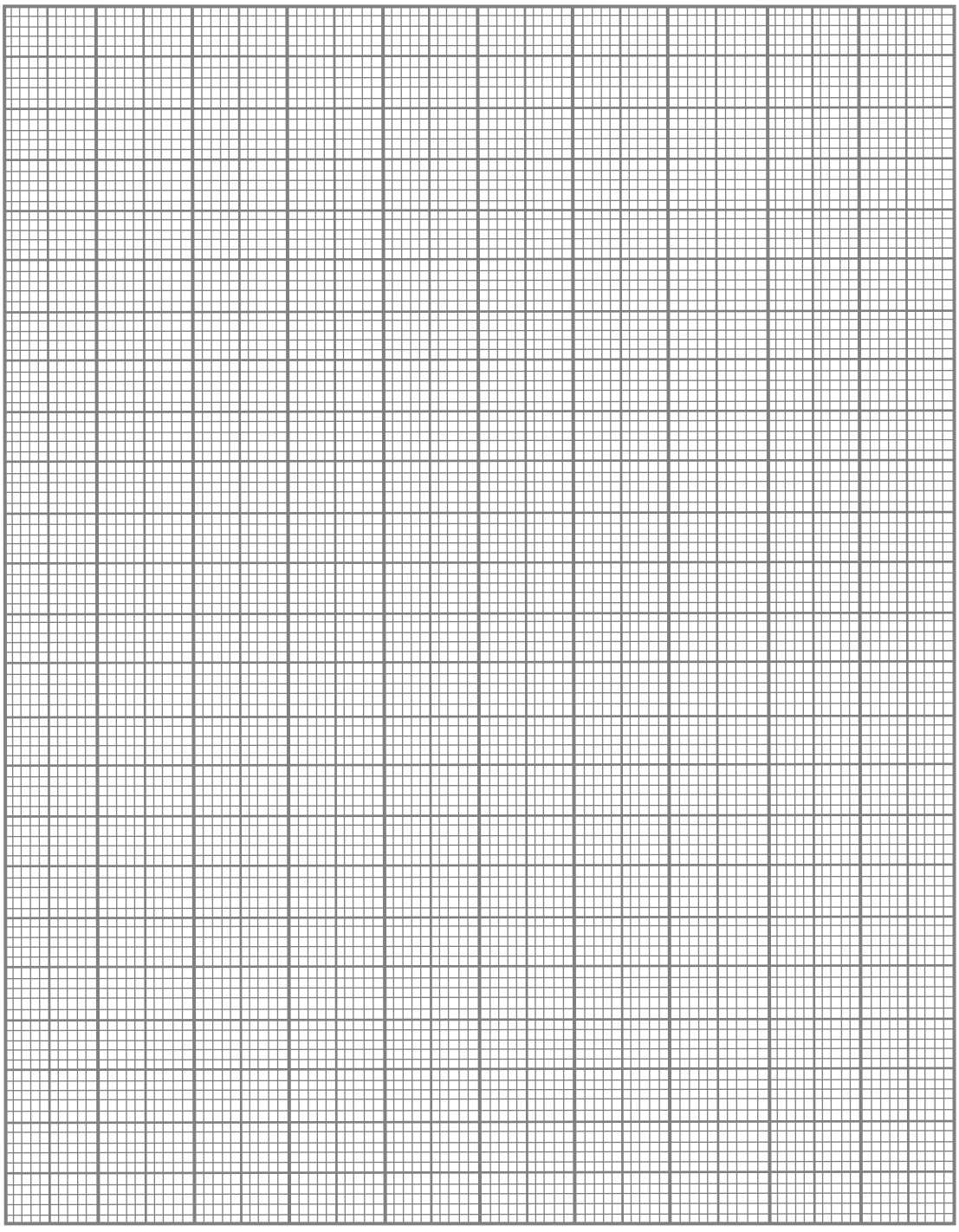
Determine the slope S, of the graph. Evaluate k $\sqrt{S}$

State two precautions taken to ensure accurate results

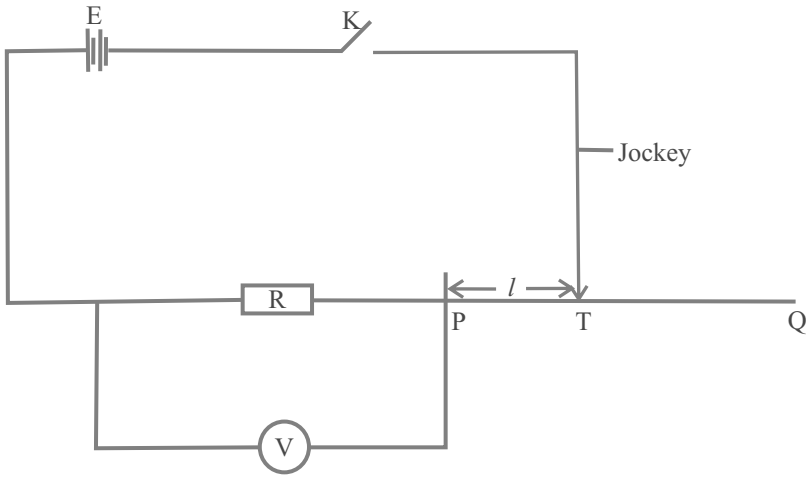
(b)(i) Define resistivity of the material wire

(ii) A galvanometer with a full-scale-deflection of 15×10^{-3}A has a resistance of 50Ω. Determine the resistance required to convert it into a voltmeter reading up to 1.5V

GRAPH SHEET



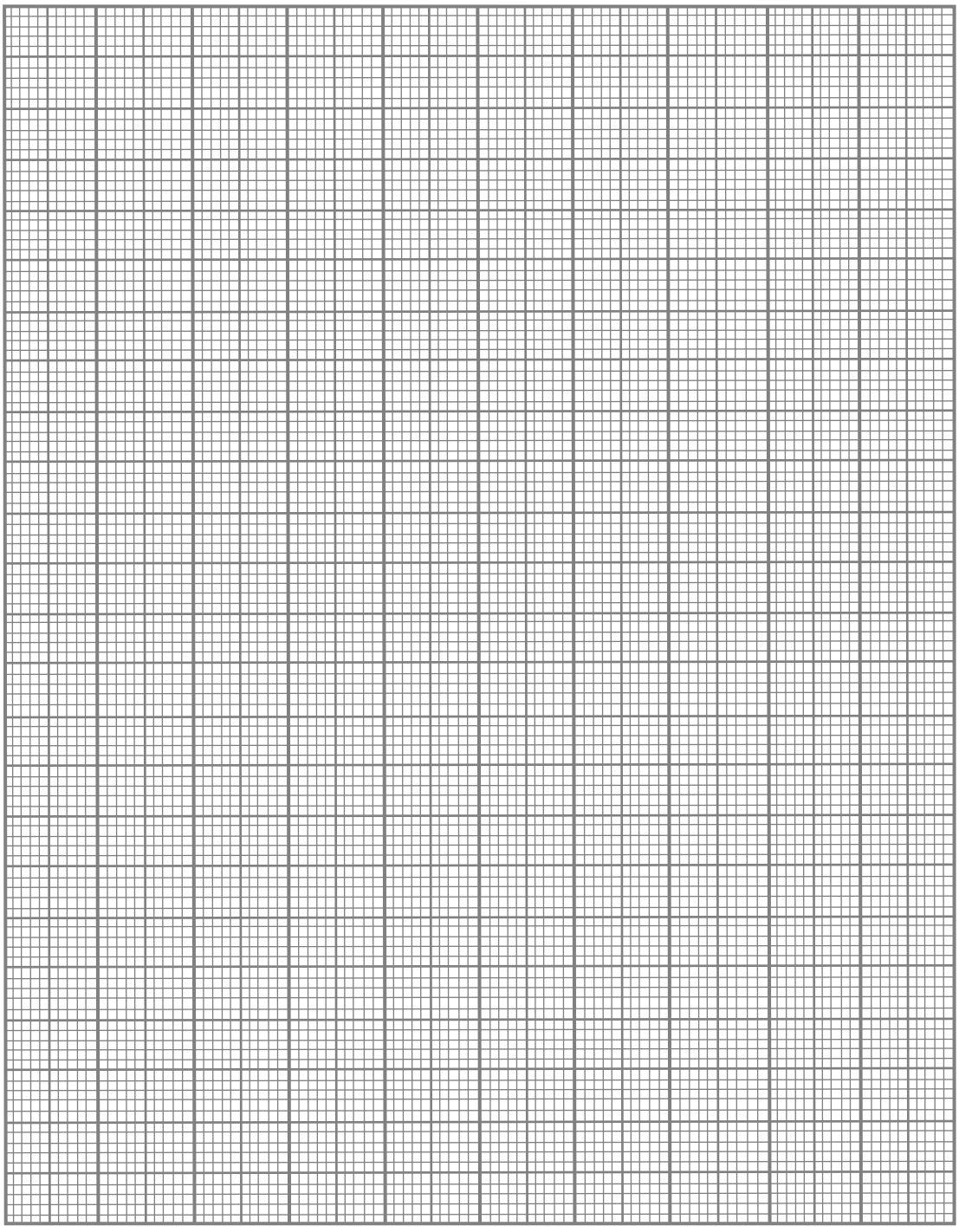
NECO JULY, 2008 *(Class Activities 12)*



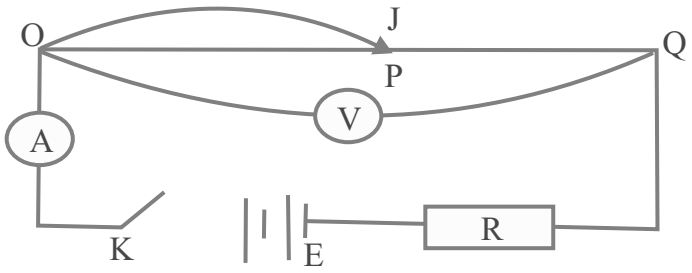
(I) Measure and record the electromotive force E of the accumulator provided.
(ii)Connect the circuit as shown in the diagram above.
(iii) Close the key and use the jockey to make contact with the potentiometer wire PQ at a point T such that PT = l = 10cm
(iv)Read and record the value of the potential difference V on the voltmeter.
(v)Evaluate V^{-1}
(vi)Repeat the procedure for FIVE other values of l = 20.0, 30.0, 40.0, 50.0 and 60.0cm. In each case, read and record the corresponding values of V and evaluate V^{-1} Tabulate your readings.

(vii) Plot a graph of V^{-1} on the vertical axis and l on the horizontal axis, starting both axes from the origin (0, 0).
(viii) Determine the slope S of the graph and the intercept Y on the vertical axis.
(ix) Evaluate $K = \frac{1}{Y}$
(x)State TWO precautions taken to ensure accurate results.
(b)(I) Define resistivity and state its unit.
(ii)Draw a circuit diagram to show how an ammeter is used to measure the current through a resistor.

GRAPH SHEET



WASSCE JUNE 2012 *(Class Activities 13)*

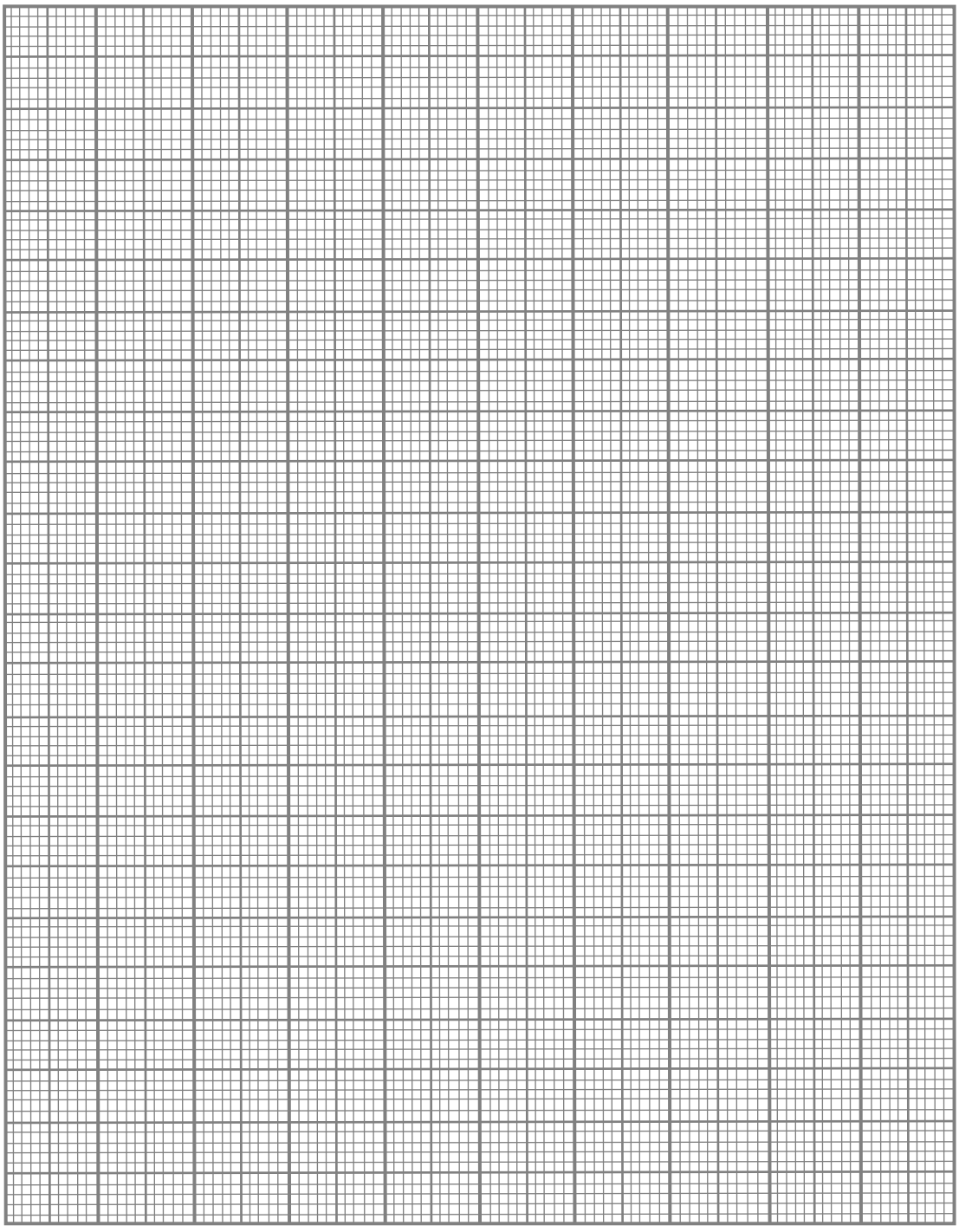


You are provided with a potentiometer, an ammeter, a voltmeter, standard resistor and other necessary apparatus. Using the circuit diagram above as a guide, carry out the following instructions.

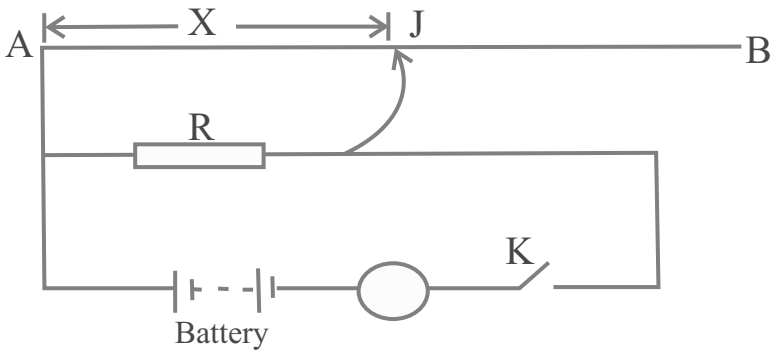
(I) Set up a circuit as illustrated in the diagram above
(ii) Close the key, **K**
(iii) Read and record the ammeter reading $\mathbf{I}_o$ and the voltmeter reading $\mathbf{V}_o$ when jockey **J** is not making contact with the potentiometer wire **OQ**.
(iv) Using **J**, make a contact with the potentiometer wire **OQ** at a point **P** such that **OP** = 10cm.
(v) Read and record the current I and the corresponding value of the voltage **V**.
(vi) Repeat the procedure for other values of **OP** = 20cm, 30cm, 40cm, 50cm and 60cm.
(vii) Tabulate your readings.
(viii) Plot a graph with **V** on the vertical axis and **I** on the horizontal axis, starting both axes from the origin (0,0).
(ix) Determine the slope, s, of the graph.
(x) Determine the value of **V** when **I** = 0
(xi) State two precautions taken to obtain accurate results.

b(I) State two advantages of a lead-acid accumulator over a dry Leclanche cell.
(ii) A cell of emf **2*V*** and internal resistance of **1Ω** passes current through an external load of **9Ω**. Calculate the potential drop across the cell.

GRAPH SHEET



WASSCE JUNE 2014 *(Class Activities 14)*



You are provided with a potentiometer **AB**, a 10Ω standard resistor **R**, a battery of *emf* 4.5, a jockey **J** and other necessary materials.

(I) Connect a circuit as shown in the diagram above.

(ii) Close key **K**. Without **K** making contact with **AB**, read and record the ammeter reading **I**. Open the key.

(iii) Use the jockey to make contact with **AB** at the 20m mark such that **AJ** = x = 20cm. Close the key, read and record the ammeter reading I_i.

(iv) Evaluate x^{-1}

(v) Repeat the procedure for values of x = 35cm, 45cm, 60c, and 80cm respectively.

(vi) Tabulate your readings.

(vii) Plot a graph with x^{-1} on the vertical axis and I_i on the horizontal axis, starting both axes from the origin (0,0)

(viii) Determine the slope, s, of the graph.

(ix) From your graph, determine the value $\mathbf{I}_o$ of I_i for which $x^{-1} = 0$.

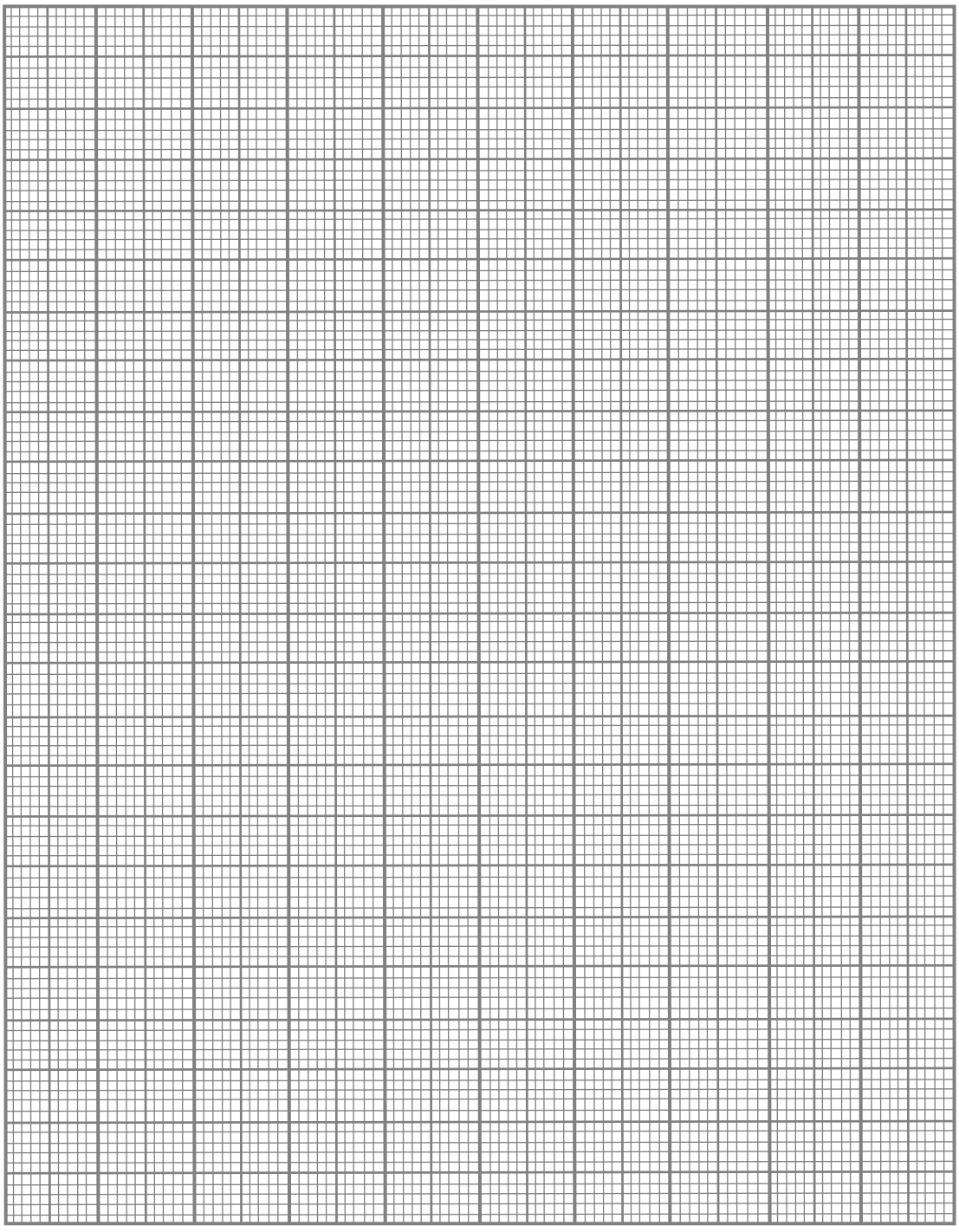
(x) Evaluate $\frac{I_o}{I}$

(xi) State two precautions taken to obtain accurate results.

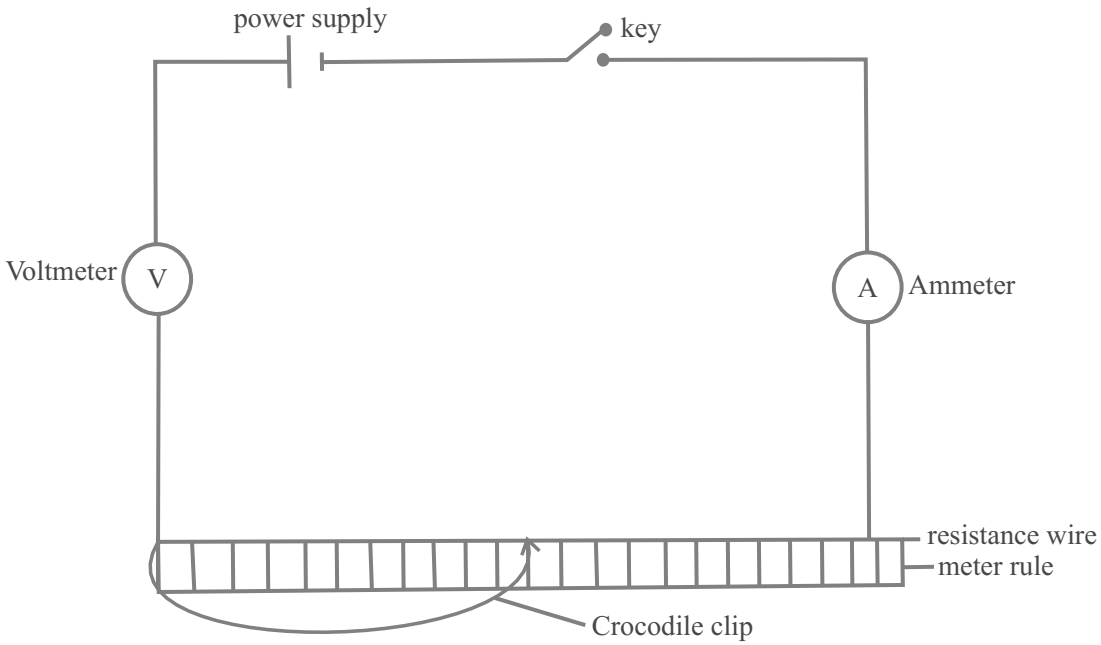
b(i) Define emf of a battery.

(ii) A cell **X** of *emf* 1.018 *V* is balanced by a length of 50.0cm on a potentiometer wire. Another cell **Y** is balanced by a length of 75.0cm on the same wire. Calculate the *emf* of **Y**.

GRAPH SHEET



CAMBRIDGE MAY/JUNE, 2004 (*Class Activities 15)*



In this experiment, you will investigate how the resistance of a length of wire depends on its diameter.

You have been provided with a power supply, a voltmeter, an ammeter, a switch, some connecting leads, two crocodile clips and two lengths of resistance wire that are attached to a metre rule.

(a)Draw a diagram of the circuit that has been set up by the Supervisor.

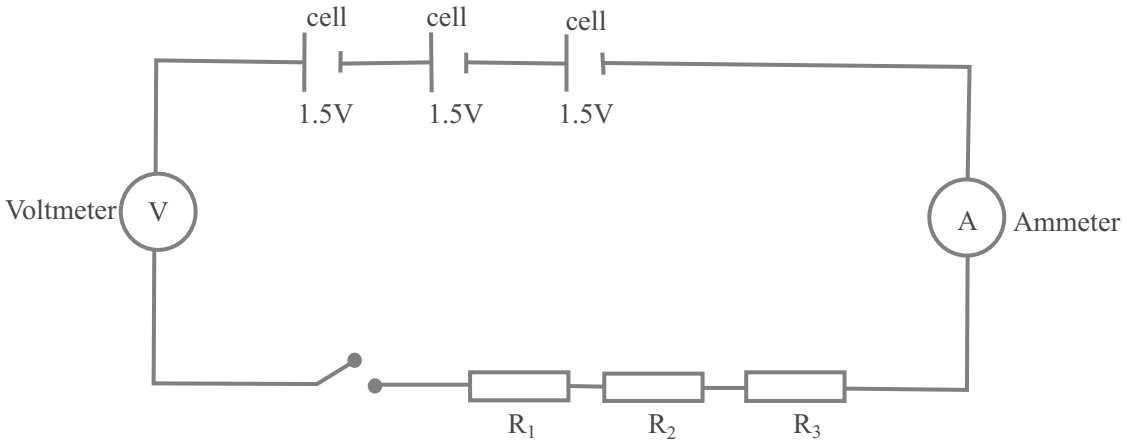
(b)Connect a 1.00m length fo the thinner wire between the two crocodile clips. Close the switch and record the current I in the circuit and the potential difference V across the length of wire. Open the switch after you have taken your readings.

(c)Calculate the resistance R_1 of the length of wire, given that $R_1 = V/I$.

(d)Repeat part (b) with a 1.00m length of the thicker wire connected between the two crocodile clips. Hence calculate the resistance R_2 of the thicker wire, given that $R_2 = V/I$.

(e)The two wires are made of the same material. Write a conclusion that indicates how the resistance of a length of wire is related to its diameter.

CAMBRIDGE OCT/NOV. 2004 *(Class Activities 16)*



In this experiment, you will investigate the relationship between the potential difference across a battery and the current in it.

You have been provided with three dry sells connected in series to form a 4.5V battery, a voltmeter, an ammeter, a switch, come connecting leads and three fixed resistors whose values are marked on them.

(a)On your answer booklet, draw a diagram of the circuit that has been set up by the Supervisor.

(b)Connect the 15Ω resistor in the gap between points A and B. Close the switch to complete the circuit. Record the potential difference *V* across the cell and the current I in the circuit. Open the switch as soon as you have taken your readings.

(c)Using the resistors singly and in series combinations between points A and B, obtain a series of readings for the potential difference *V* across the cell and the corresponding current *I* in the circuit. Tabulate your results on your answer booklet. Include in your table a column for values of the resistors used in the gap between A and B. Open the switch as soon as you have taken your readings for each resistance value.

(d)Using the grid on your answer booklet, plot a graph of *V/V* on the y-axis against *I/A* on the x-axis.

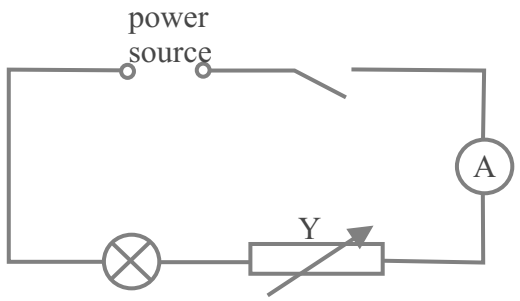
(e)Draw the best fit smooth curve through your points. Draw a tangent to the curve to find the greatest slope *S* of the graph.

(f) Write down the value for the internal resistance r of the battery, wherever = $-S$

· and *S* has units of

CAMBRIDGE MAY/JUNE 2003 *(Class Activities 17)*

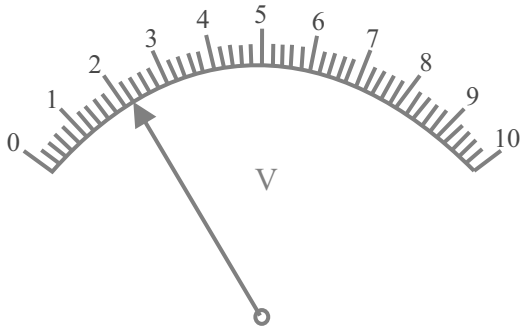
In an electrical experiment, a student set up a circuit to measure current and potential difference. Part of the circuit is shown below.



(a)(I) Complete the circuit diagram by drawing in a voltmeter connected across the lamp.

(ii)Name the component labelled Y.

(b)The first reading on the voltmeter was 2.2V. On the voltmeter face shown in the figure below.



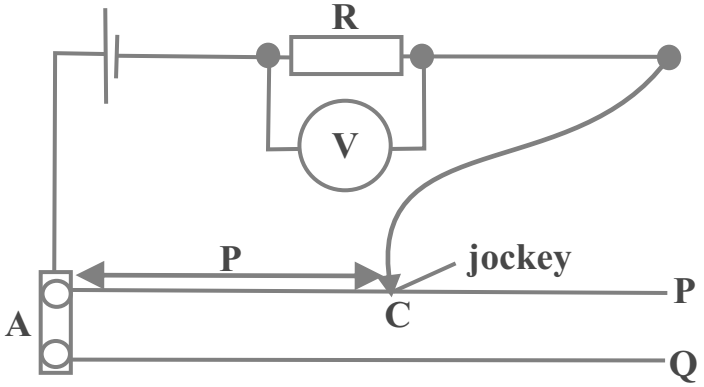
(c)The readings of V and I obtained by the student are given in the table below.

V/	*I/*	*R/*
2.2	0.36	
4.1	0.62	
6.0	0.86	
7.9	0.98	
9.8	1.20	

(I) Calculate the resistance R of the lamp filament for each set of *V* and *I* readings and write the values in the table. Use the equation $R = \frac{V}{I}$

(ii)Complete the column headings in the able.

CAMBRIDGE MAY/JUNE, 2000 (*Class Activities 18)*

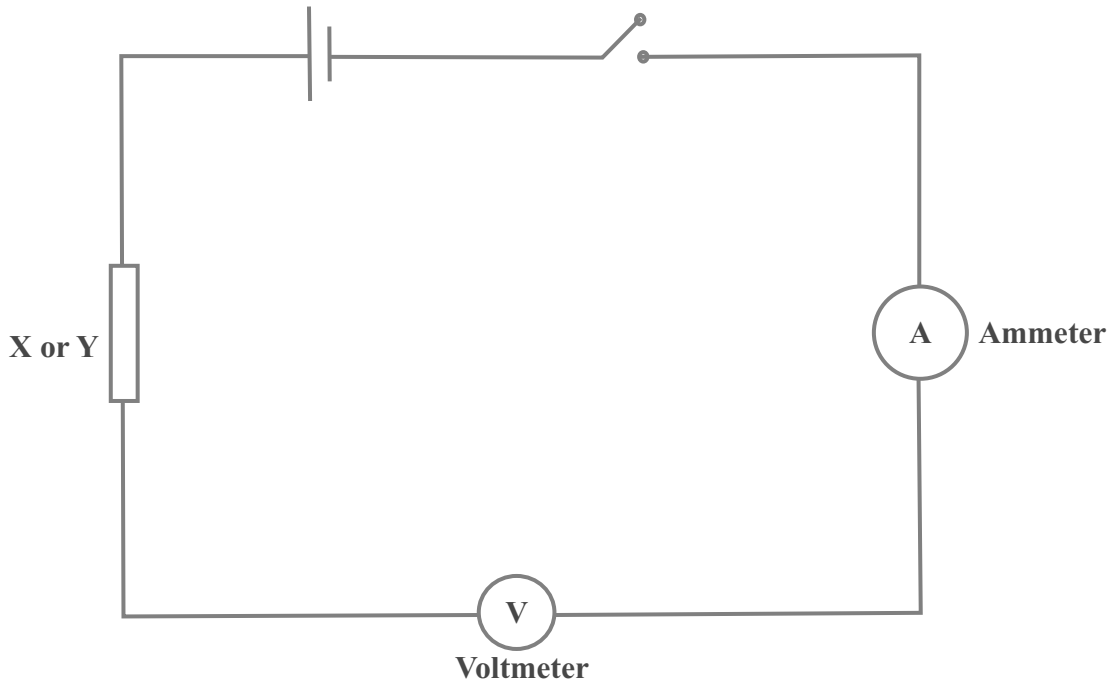


The circuit shown above is set up to investigate how the potential difference across the fixed resistor R varies when extra resistance is included in the circuit. The extra resistance is obtained from different lengths of two resistance wires P and Q. From the results, the resistance of the two wires is to be compared.
The resistance wires P and Q are both connected to the same terminal block A. Each wire is made from the same material but their diameter differ.
In the experiment, the jockey (sliding contact) is placed on wire P at a point C so that AC (= *p*) is 120mm. The reading *V* of the voltmeter is recorded. The jockey is now placed on wire Q. The jockey is moved along Q to find the length q that gives the same reading on the voltmeter. The experiment is then repeated so as to obtain a set of readings, using values of *p* between 100mm and 800mm.

V/*V*	1.73	1.43	1.20	1.10	0.98
p/mm	120	300	505	625	790
q/mm	80	190	325	395	500

(a)From the table, it can be seen that *V* decreases as *p* increases. How do the results show that *V* is **not** inversely proportional to p?
(b)(i) Plot the graph of *p*/mm (y-axis) against *q*/mm (x-axis)
(ii)Determine the gradient *G* of the line. Mark your graph to show clearly what values you have used.

CAMBRIDGE OCT/NOV. 2005 *(Class Activities 19)*



In this experiment you will make some measurements on an electrical circuit that contains various combinations of resistors.
You have been provided with a resistor labelled X, a resistor labelled Y, a power supply, a switch, an ammeter, a voltmeter and some connecting leads.

(a)The Supervisor has set up a circuit with a resistor X connected into the circuit.
Close the switch and record the current I in the circuit and the potential difference V across the resistor X. Record your readings on your Answer Booklet.
Open the switch.

(b)Repeat the experiment using the resistor Y instead of the resistor X. Record your readings of *I* and *V*.

(c)State and explain which resistor has the higher resistance.

(d)(I) Connect X and Y in parallel and repeat the experiment. Record your readings of *I* and *V*.

(ii)Comment on the results you have obtained in comparisons to your results from parts **(a)** and **(b)**.