A graphical method for calculating ammeter resistance

Objective of the experiment:

1- Calculating ammeter resistance.
2- Study the properties of series circuit.

Theory:

If you have a circuit as below:

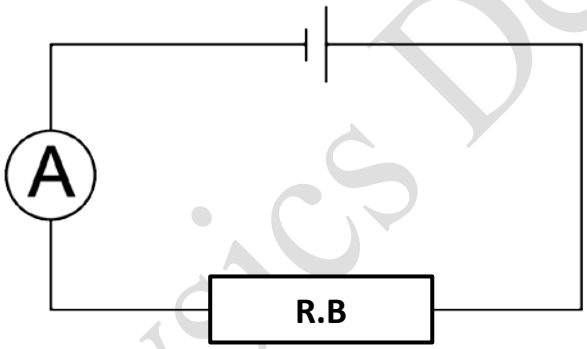

Figure (1). Practical experiment circuit.

Where $\boldsymbol{V}$ is total voltage in the circuit, $\boldsymbol{R}$ is the resistor, $\boldsymbol{I}$ ammeter reading current, $\boldsymbol{R_A}$ ammeter resistance.

So the current value passing in the circuit is:

$$\boldsymbol{I = \frac{V}{R + R_A}}$$

If we plot $\boldsymbol{R}$ vs. invers of current ($\boldsymbol{1/I}$) we get the graph in Figure 2. The resulted straight line intersects with y-axis at point C, where AB on x-axis represent ammeter resistance $\boldsymbol{R_A}$.

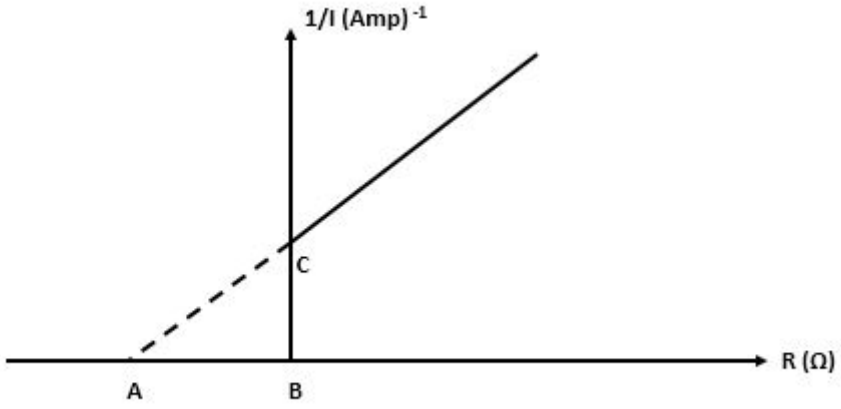

Figure 2. The graph of the experiment.

Instruments:

- DC power supply.
- Ammeter.
- Resistors box.
- Connection wires.

Methods:

1. Connect the circuit as shown in **Figure 1**.
2. Set a resistance value from resistance box, then record the current value from the ammeter.
3. Gradually reduce the resistance value from resistor box and record the current increasing from ammeter.
4. Organize a table for R and I as shown below:

No.	R.B (Ω)	I (A)	1/I (A^{-1})
1			
2			
3			
4			
5			
6			
7			

5. Calculate the current inverse.
6. Draw a graph for the resistance value R and current inverse as shown in Figure 2.
7. Find from the graph the ammeter resistance $\boldsymbol{R_A}$.

Discussion:

Q1) list the most error source in the experiment?

Q2) What is the ammeter operation principal? The idea of it?

Q3) Why the ammeter is always connected in series? What happen if it connected in parallel?