

## PREPARATORY PHYSICAL SCIENCE (PHSC - 001) Lab. Exercise No. 6

Name: \_\_\_\_\_

Student's ID \_\_\_\_\_, Section \_\_\_\_\_, Date \_\_\_\_\_

### Verification of Ohm's Law

#### Theoretical Background:

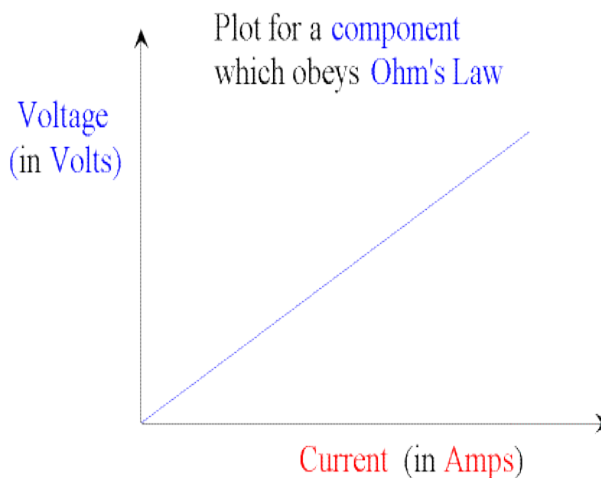
Voltage causes current. The current in a circuit depends on the resistance as well as the voltage that is causing the current. A good conductor with less resistance requires less voltage to push the electrons (current) through it. A conductor with more resistance requires more voltage to push the same current. The relationship between the voltage, resistance and current is called **Ohm's law**. This relationship can be written as:

$$V = IR$$

Or 
$$I = \frac{V}{R}$$

A plot of Voltage versus Current should look like this.

The table below shows the three basic electrical circuit quantities and their units of measurement



Quantity	Symbol	Unit of Measurement	Unit Abbreviation
Current	I	Ampere ("Amp")	A
Voltage	E or V	Volt	V
Resistance	R	Ohm	$\Omega$

## Materials and Equipments:

- Power source: 6-15 Volt DC battery, Connecting Wires, 2-Multi meter(Fluke digital meter), Resistors (No greater than  $1k\Omega$ ).



Figure1: Fluke Digital Multi meter



Figure 2: Resistors

## Experimental setup:

The experimental setup should show the elements of the circuit as shown in Fig. 3

## Procedure:

1. Connect the elements of the circuit as shown in the diagram above. The instructor must check the connections before the students start working.
2. A known resistance will be provided for use in this circuit (say 100 Ohm).
3. Adjust the DC adjustable power supply as instructed by the instructor, and obtain six to ten values for voltage and current.
4. Record the value of the resistor and the values for current and voltage in Table 1.
5. For each given resistor, plot 'V' versus 'I' and find the slope of the graph. The slope is  $R'$  (resistance).
6. Compare the given value of R to the value of the slope.

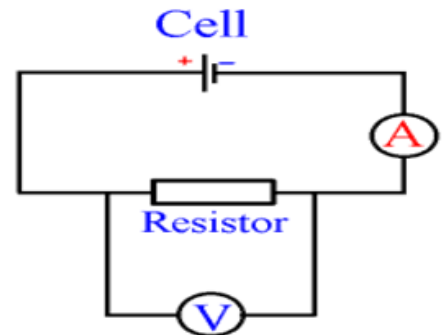
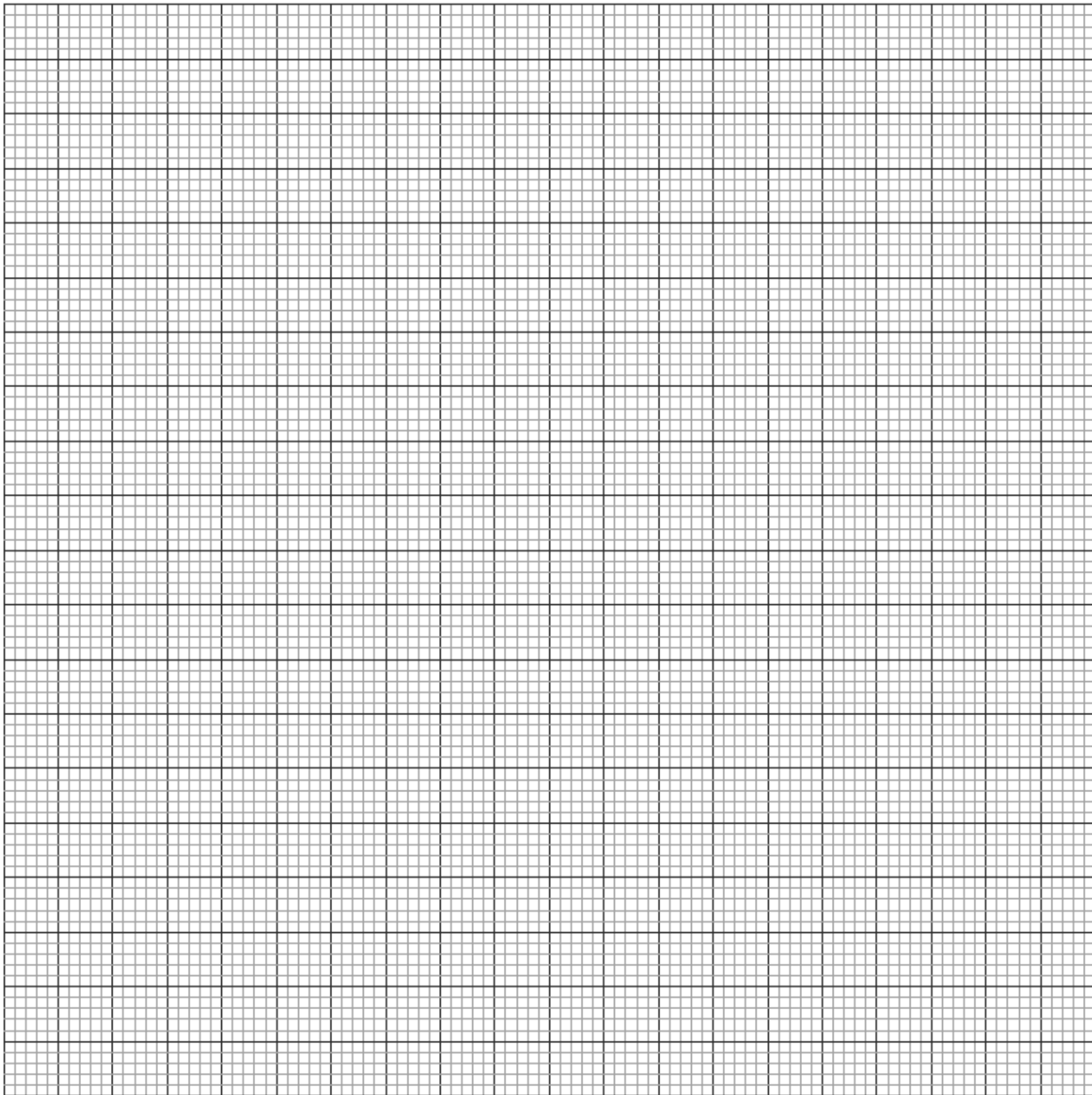


Figure 3: Circuit Diagram

**Table 1** $R_1 = \dots\dots\dots$  Ohm

Trial	Voltage (V) <i>volt</i>	Current (I) <i>ampere</i>	Current (I) <i>ampere</i>
<b>1</b>	0.5		
<b>2</b>	1.0		
<b>3</b>	1.5		
<b>4</b>	2.0		
<b>6</b>	2.5		
<b>5</b>	3.0		
<b>8</b>	3.5		
<b>7</b>	4.0		
<b>9</b>	4.5		
<b>10</b>	5.0		



## Results:

Compare the calculated value of the resistance (slope) with the accepted value of the resistance  $R$  in the circuit.

Value of given resistors ( $R$ ) ohms	Slope of the graph( $R'$ ) ohms

## Review Question

- Q.1** What current will flow through 1000 Ohm (1K Ohm) resistor with 15V applied?
- Q.2** What does the letter 'I' stand for in Ohm's Law?  
a) Induction  
b) Current  
c) Voltage
- Q.3** For what is Ohm's Law used?  
a) To calculate the third unknown, if you know the other two parameters  
b) To determine if it is an AC or DC circuit.  
c) To give Ohm credit for his good work.
- Q.4** If the resistance of a circuit is tripled, then the current through the circuit would be \_\_\_\_\_.  
a) one-third as much  
b) three times as much  
c) unchanged  
d) Nonsense! There would be no way to make such a prediction.

## End of Lab Exercise 6