Exp 4 : DC Circuits

The aim :

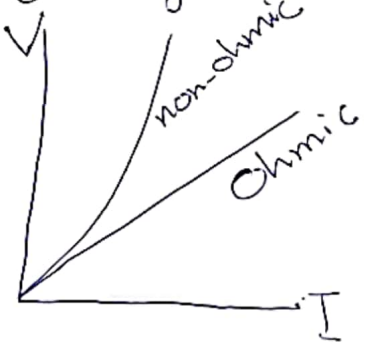
is to test a material and determine if it's an ohmic material or non-ohmic.

Theory :-

* The resistance R of a metallic conductor defined by

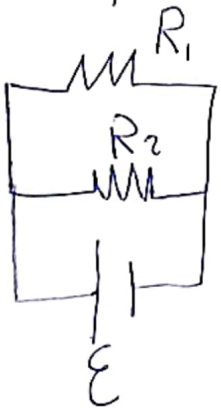
$$R = \frac{V}{I} = \frac{\text{Voltage}}{\text{Current}}$$

- if V depend linearly on I : then the material is ohmic



* Resistors :-

A. in parallel

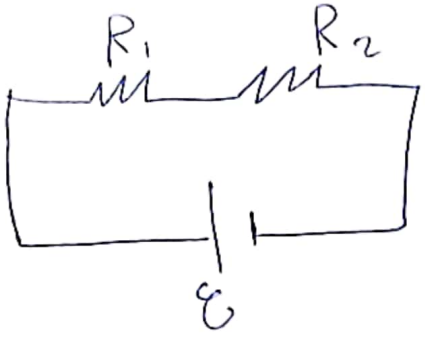


$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$$

or

$$R_p = \frac{R_1 R_2}{R_1 + R_2}$$

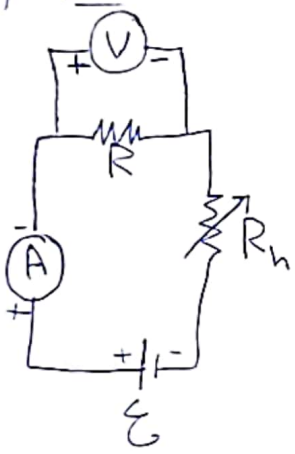
B. resistors in ~~parallel~~ series :-



$R_s = R_1 + R_2$

* Procedure :-

part A : one-resistor, DC-circuit

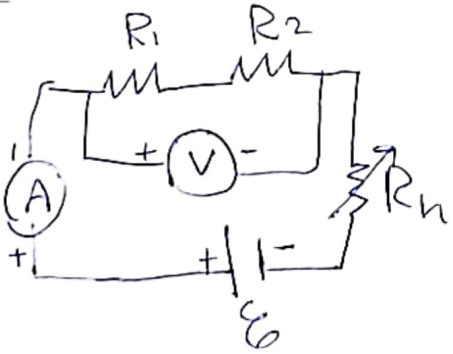


No	1	2	3	4	5	6	Avg
I(mA)							
V(Volts)							

ΔI = التغير في التيار

ΔV = التغير في الجهاز

part B : two-resistors in series

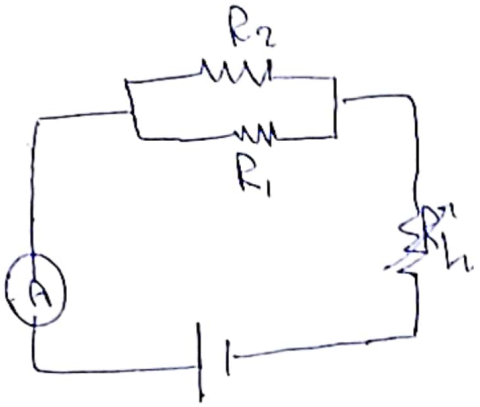


- write down the readings of the I_s and V_s only once

Same ΔI

ΔV

Part C: Two resistors in parallel



- write down the readings of the I_p and V_p only once

Same ΔI
ΔV

Calculations:-

(A)

1. find R from the graph V vs I $\Rightarrow$ R: slope.

2. $\frac{\Delta R}{R} = \frac{\Delta V}{V} + \frac{\Delta I}{I}$

The true value

$R, \Delta R \Rightarrow$ color code

(B)

$(R_s)_{exp} = \frac{V_s}{I_s}$

true value $\Rightarrow R_s = R_1 + R_2$ color code

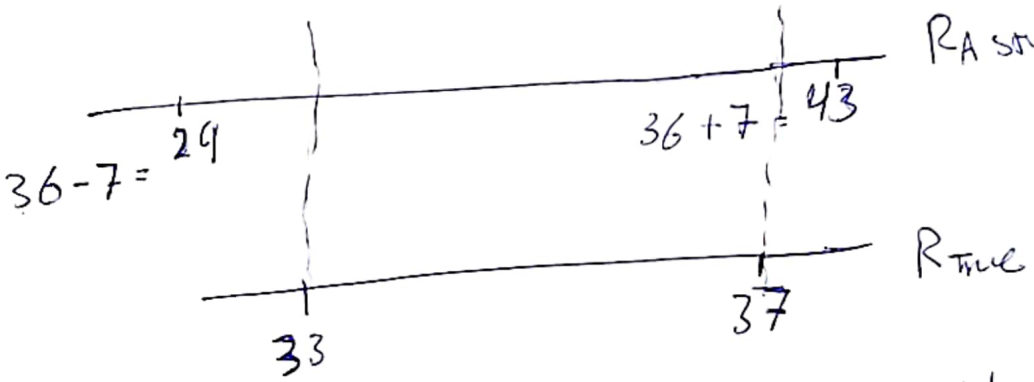
Conclusions :-

Range test :-

Example : A student has the following measurement

$R = 36 \pm 7\ \Omega$

and the true value $R = 35 \pm 2\ \Omega$



→ the value accepted since there is common area.