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2 YL Physics (S3), 2024-2025

PW N° 2 : Law of meshes and laws of knots

I) Voltage measurement and voltage laws:

The electrical state of a point X is characterized by its electric potential denoted VX. It is measured in volts (V). An electrical voltage between two points reflects a difference in electrical states between these two points: The U_{XY} voltage between the X and Y points of a circuit is $U_{XY} = V_X - V_Y$.

Reminder: A voltmeter plugs into ..... to measure the voltage between 2 points X and Y of an electrical circuit denoted U_{XY}. The V terminal of the voltmeter is connected to point X and the COM terminal to point Y.

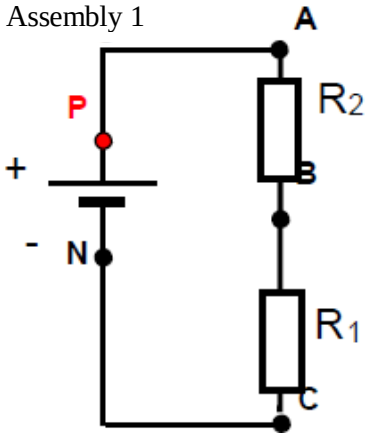
Carry out the assembly 1.

With $R_1 = 1000\ \Omega$

$R_2 = 470\ \Omega$ and a switch

A DC generator set to 6 V.

Assembly 1



Measure successively:

• U_{PN}= ……, U_{NP}= ……..……

1st conclusion: Tension is a quantity .....

• U_{AB}= ……, U_{BC}= ……, U_{AC}= ……..……

2nd conclusion: Law's.....':

……..……..……..……

• U_{PA}= ……. U_{CN}= ……. ≈ ……. V

3rd conclusion: The voltage across a wire is .....

• Calculate $U_{NP} + U_{PA} + U_{AB} + U_{BC} + U_{CN}$ = ...: This is the law of meshes.

II) Measurement of intensities and associated law

The intensity of the current is defined as the electric charge carried by electrons passing through a section of circuit for one second. It is measured in amperes denoted A. It is an algebraic quantity.

Reminder: Outside a generator, the current flows from the pole .... to the pole .... An ammeter is connected to .....: To make the measurement, a wire must be removed from the circuit. The A (or mA) and COM terminals are used. The value indicated by the ammeter is positive if the current actually enters through the A terminal (or mA) and exits through the COM terminal (negative otherwise).

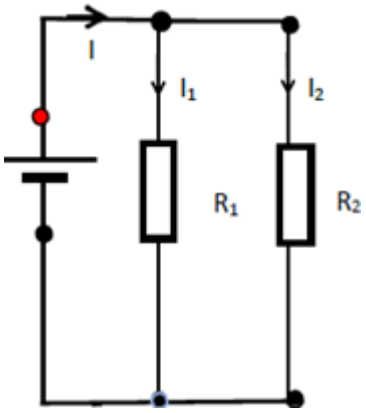
Carry out the assembly 2.

with: $R_1 = 1000\ \Omega$ I

$R_2 = 470\ \Omega$

a switch

a DC generator set to 6 V.



If you don't make a mistake, the intensities to be measured will be less than 100 mA; We will therefore be able to use the inputs mA and COM of the ammeter.

Measure the currents of the I-rated currents in the branch I_1 and I_2:

• I = ... I_1 = ... I_2 = ...

Conclusion: law of .....: