

Assignment (10%)
Experiment I: Electrical Measurement

VIRTUAL LABORATORY

Objective:

To perform current and voltage measurements using electrical and electronics instruments using virtual instruments.

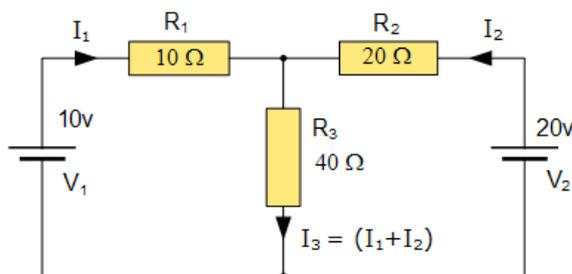
Instructions:

1. Please do your experiment based on group number.
Example: If you are in Group 1, please do question 1 (each group only solve one question)
2. **All measurement is using TINKERCAD.** If you are not familiar with TINKERCAD, please visit <https://www.youtube.com/watch?v=upuGkCdGEKA>
3. Please take a picture and short video during experiment. You have to upload it in e-portfolio.

At the end of this experiment:

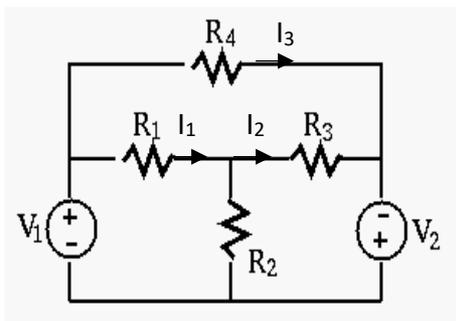
1. Write your reflection (INDIVIDUAL) based on what you have learn from this experiment in e-portfolio. You have to use **"PAGE"** in e-portfolio. You can include the picture as well.
2. Write **1-page** report (GROUP REPORT). Please refer to 'Template report' file.
3. Produce 1 minute's video (GROUP) based on this experiment.
4. Step 1-3 should be included in your e-portfolio.

GROUP 1



- a) Calculate and measure the current of I_1 , I_2 and I_3 .
- b) Calculate and measure the voltage across resistor R_1 , R_2 and R_3 .

GROUP 2



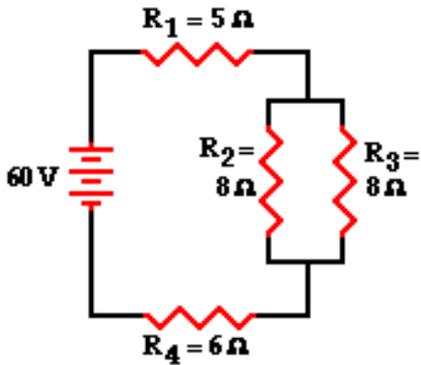
Given:

$V_1 = 12\text{ V}$, $V_2 = 6\text{ V}$, $R_1 = 3\Omega$,

- a) $R_2 = 8\Omega$, $R_3 = 6\Omega$ and $R_4 = 4\Omega$ Calculate and measure the current of I_1 , I_2 and I_3 .
- b) Calculate and measure the voltage across resistor R_1 , R_2 and R_3 .

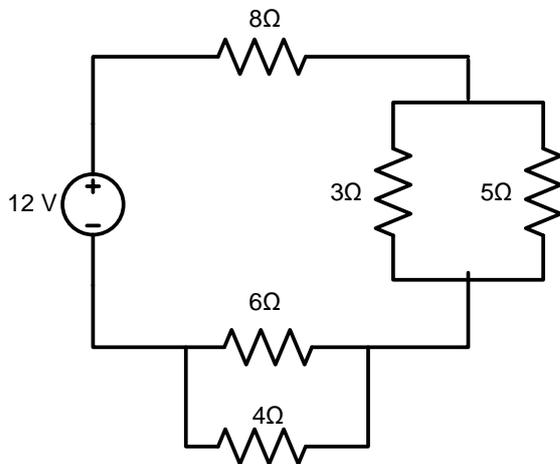
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GROUP 3



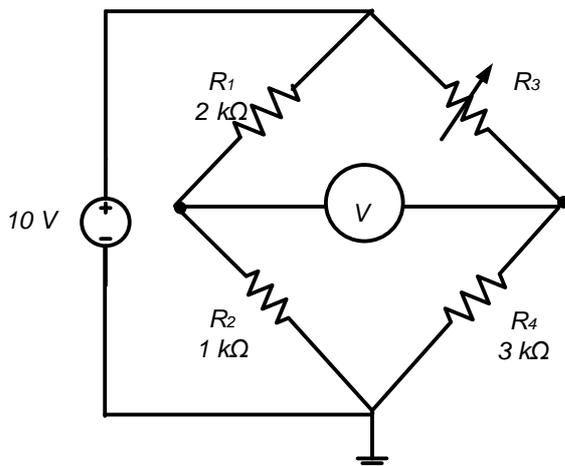
- Calculate and measure the current across resistor R_1 , R_2 , R_3 and R_4 .
- Calculate and measure the voltage across resistor R_1 , R_2 , R_3 and R_4 .

GROUP 4



- Calculate and measure the current across resistor $8\ \Omega$, $3\ \Omega$, $5\ \Omega$, $6\ \Omega$ and $4\ \Omega$.
- Calculate and measure the voltage across resistor $8\ \Omega$, $3\ \Omega$, $5\ \Omega$, $6\ \Omega$ and $4\ \Omega$.

GROUP 5

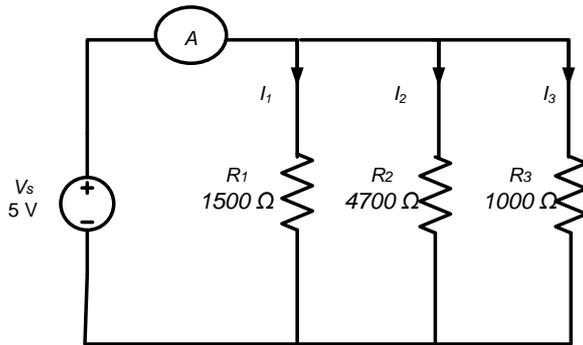


Using TINKERCAD,

- Adjust the potentiometer, R_3 till the value in meter reach to zero.
- Remove the potentiometer and replace it with a resistance having value in (a). Observe the meter reading
- Replace the resistor R_4 to $2\ \text{k}\Omega$, measure the voltage across R_2 and R_4 .

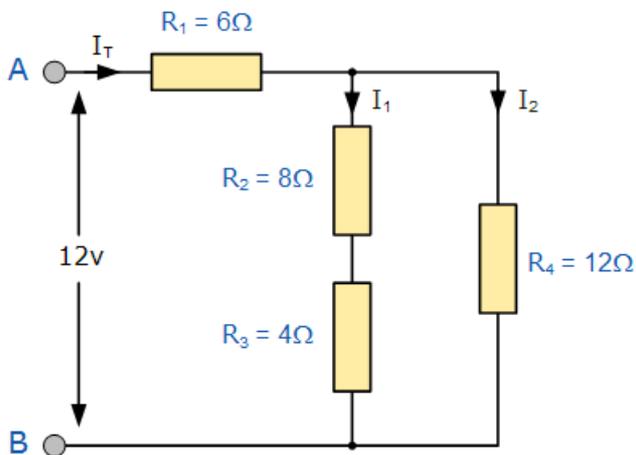
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GROUP 6



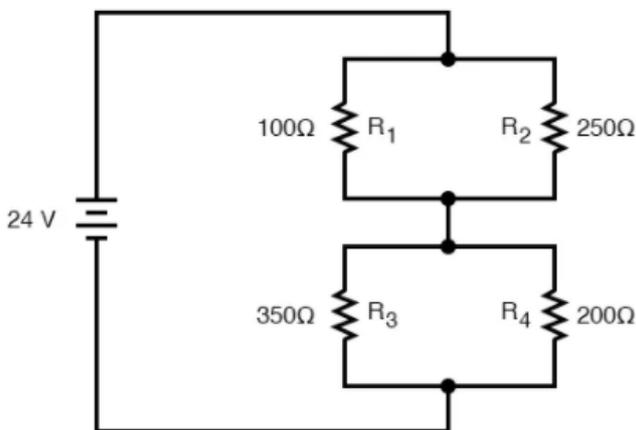
- Calculate and measure the current across resistor R_1 , R_2 , and R_3 .
- When an analog voltmeter with 20 V range is used to measure the voltage across R_1 , R_2 , and R_3 , the reading is 4.95V. Determine the internal resistance of voltmeter if the ammeter in the circuit shows the current reading of 9.4 mA.

GROUP 7



- Calculate and measure the current I_T , I_1 and I_2 .
- Calculate and measure the voltage across resistor R_1 , R_2 , R_3 and R_4 .

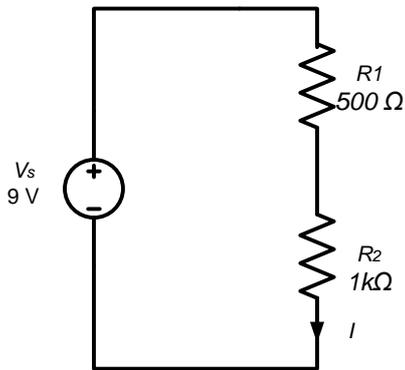
GROUP 8



- Calculate and measure the current I_T , I_{R1} , I_{R2} , I_{R3} , and I_{R4} .
- Calculate and measure the voltage across resistor V_{R1} and V_{R3} .

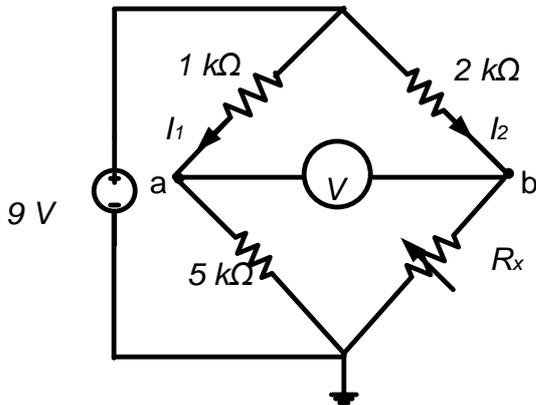
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GROUP 9



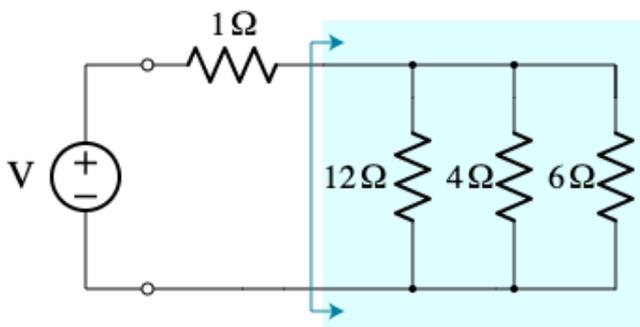
- Calculate and measure the current I , V_{R1} and V_{R2} .
- Load the circuit with the potentiometer across resistor R_2 . Calculate and measure the voltage across R_2 when R_{pot} is adjusted to $1\text{ k}\Omega$ and $3\text{ k}\Omega$?

GROUP 10



- Adjust R_x (Use a potentiometer) to get a balance bridge.
- Measure the current I_1 and I_2 .
- Adjust R_x to $5\text{ k}\Omega$, measure I_1 , I_2 , V_a and V_b .

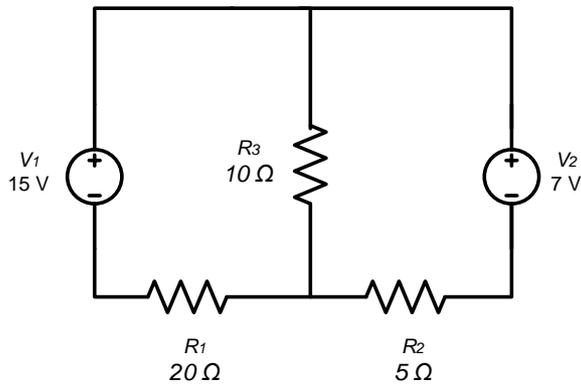
GROUP 11



- Calculate and measure the current across $12\ \Omega$, $4\ \Omega$ and $6\ \Omega$.
- Calculate and measure the voltage across resistor $1\ \Omega$ and $12\ \Omega$.

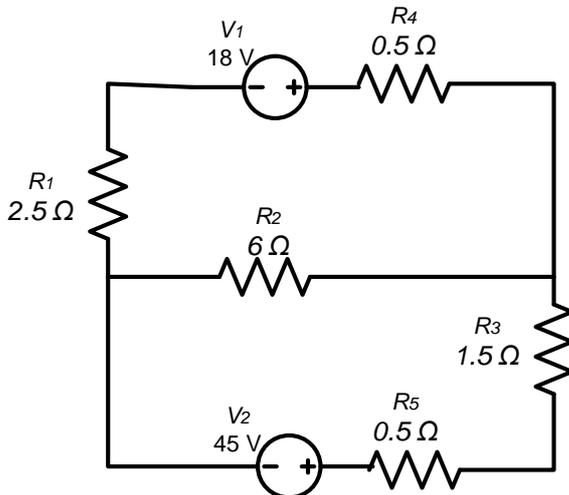
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GROUP 12



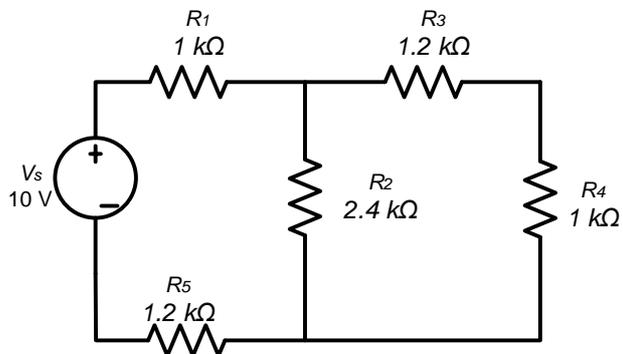
- a) Calculate and measure the current across resistor R_1 , R_2 , and R_3 .
- b) Calculate and measure the voltage across resistor R_1 , R_2 , and R_3 .

GROUP 13



- a) Calculate and measure the current across resistor R_1 , R_2 , and R_3 .
- b) Calculate and measure the voltage across resistor R_1 , R_2 , and R_3 .

GROUP 14



- a) Calculate and measure the current across resistor R_1 , R_2 , R_3 , R_4 and R_5 .
- b) Calculate and measure the voltage across resistor R_1 , R_2 , R_3 , R_4 and R_5 .