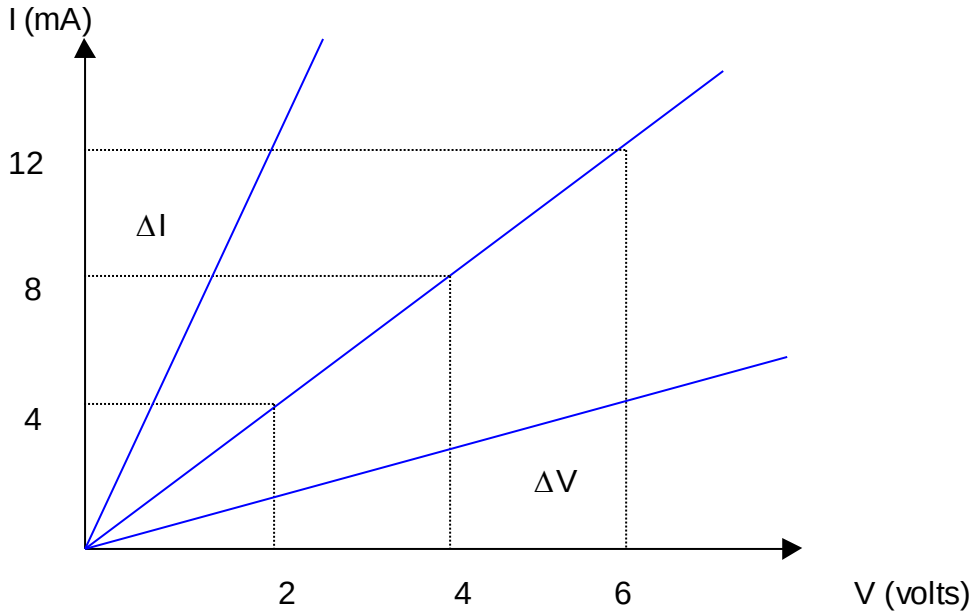
Plotting Ohm's Law

- If we write Ohm's Law in the manner of a straight line equation we get:

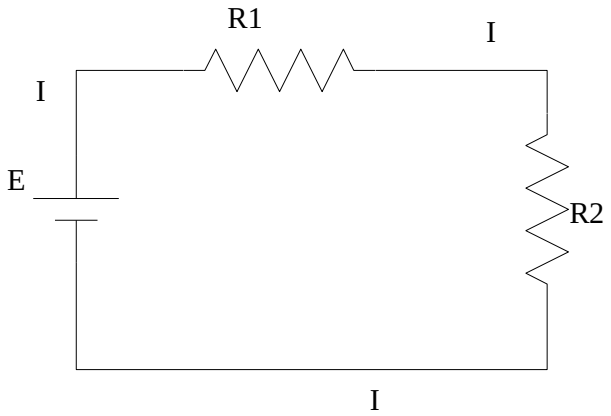
  $I = (1/R).E + 0$ - Ohm's Law

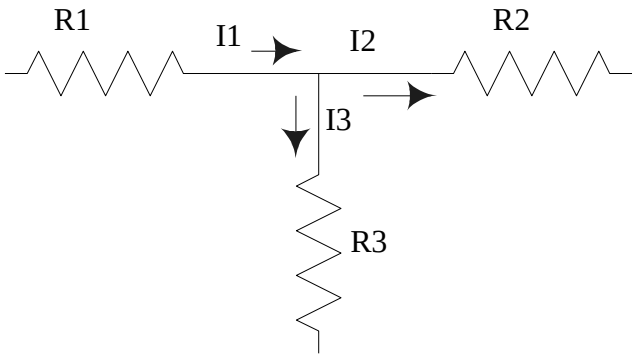
- This shows that the slope of the line is equal to 1/R or that $R = \Delta V/\Delta I$



Series Circuits

- A circuit is any number of components joined at terminal points. Providing at least one closed path which charge can flow through.
- Two components are in series if they have only one point in common that is not connected to other current carrying components.
- In a series circuit, the current is the same through each series component.





Series Resistors

- To find the total resistance of N resistors in series use:

  $R_T = R_1 + R_2 + R_3 .... + R_N$

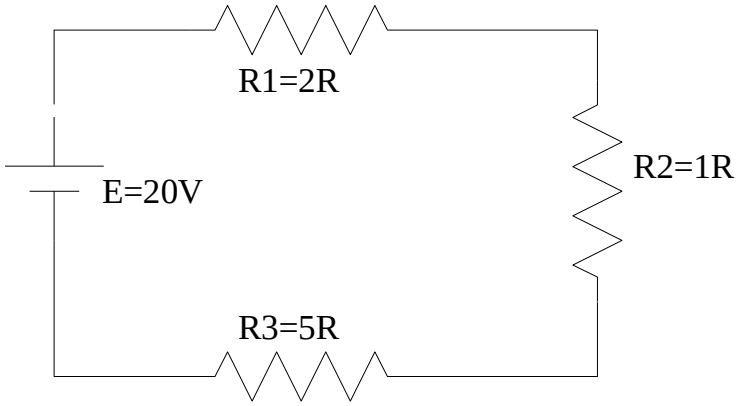
- Once the total resistance is known, the current is:

  $I = E/R_T$

- and the voltage across each resistor is:

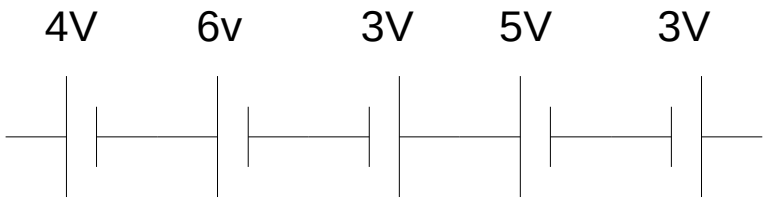
  $V_1 = IR_1$, $V_2 = IR_2$, $V_3 = IR_3$ etc.

- Find the total resistance, total current and the voltages V_1, V_2 and V_3.



Voltage Sources in Series

- Voltage sources CAN be connected in series
- Simply add the sources with the same polarity and subtract the sources with the opposite polarity.
- $E_T = E_1 + E_2 + E_3$

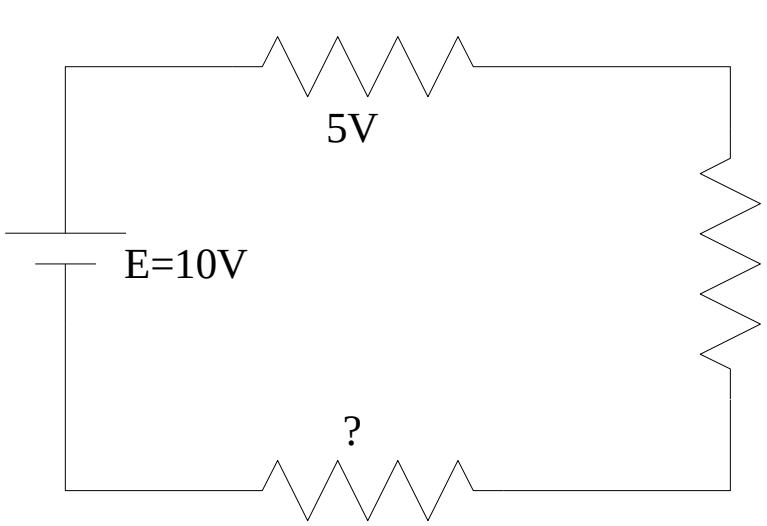


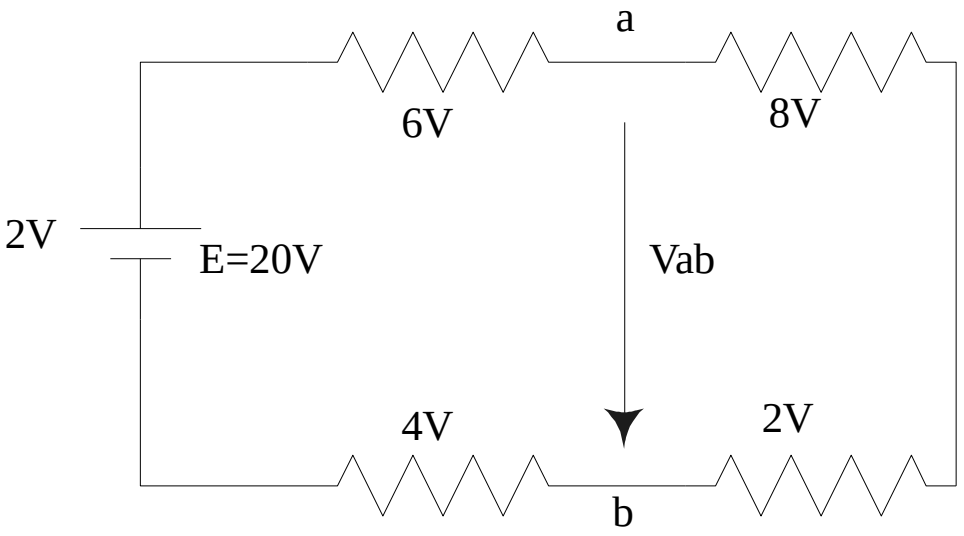
Kirchhoff's Voltage Law (KVL)

- KVL states that the sum of the potential rises and drops around a closed loop is zero.

$$\Sigma_o V_{rises} + \Sigma_o V_{drops} = 0 \qquad \text{or} \qquad \Sigma_o V_{rises} = \Sigma_o V_{drops}$$

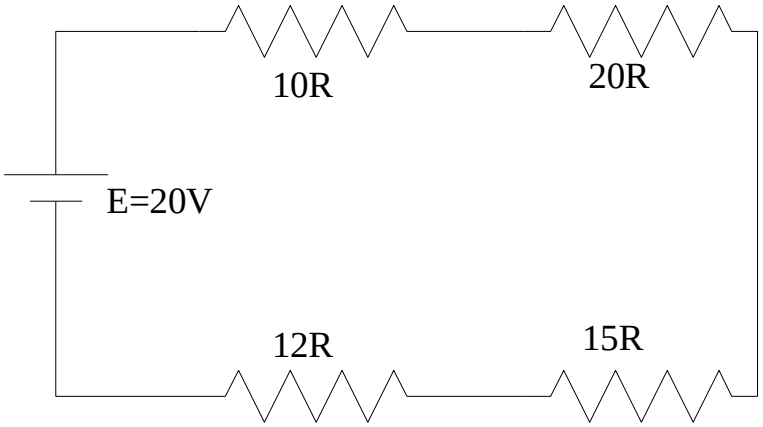
- Determine the unknown voltages for these circuits using KVL.

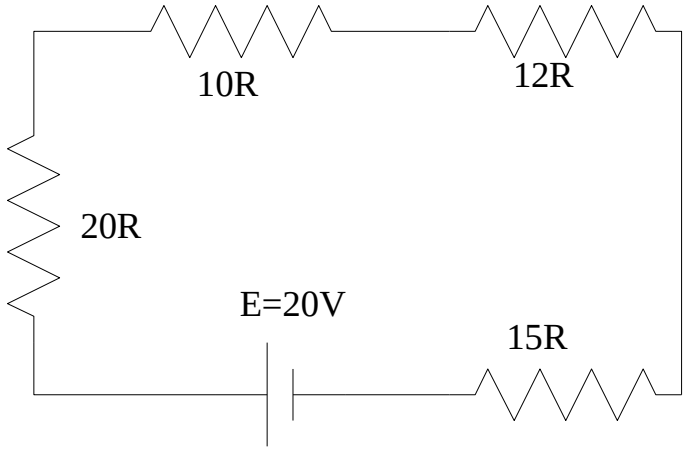




Interchanging Components

- The components of a series circuit can be interchanged without affecting the total resistance, current or power to each component.





Voltage Divider Rule

- $R_T = R_1 + R_2$
- $I = E/R_T$
- $V_1 = IR_1 = (E/R_T).R_1 = E.R_1/R_T$
- $V_2 = IR_2 = (E/R_T).R_2 = E.R_2/R_T$
- $V_x = R_x.E/R_T$
- The voltage divider rule states that the voltage across a resistor in a series circuit is equal to the value of that resistor times the total voltage across the series components divided by the total resistance of the series components.