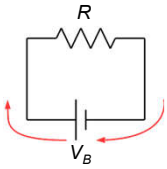
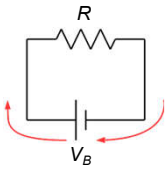
Simple Circuits



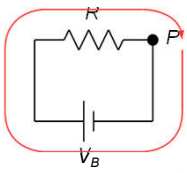
Simple Circuits



Charges leaving the battery have more energy than charges entering battery. Consider $V = \frac{U}{q}$

$$V_{\text{Leaving}} = V_{\text{Entering}} + V_B$$

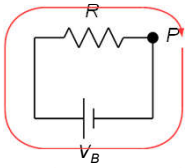
Simple Circuits



The sum of voltage changes around a loop is 0.

$$\Delta V = V_P - V_P = 0$$

Simple Circuits

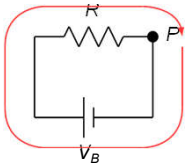


The sum of voltage changes around a loop is 0.

$$\Delta V = V_P - V_P = 0$$

Kirchhoff's Loop Rule, $\sum_i \Delta V_i = 0$

Simple Circuits



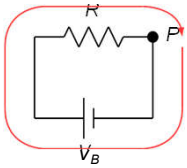
$V_B + V_R = 0$

V_R is negative.

From previous lecture, $|V_R| = IR$.

$V_R = -IR$

Simple Circuits



$V_B + V_R = 0$

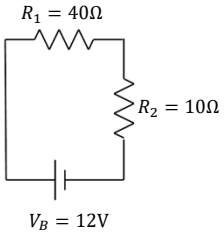
V_R is negative.

From previous lecture, $|V_R| = IR$.

$V_R = -IR$

We often write $V = IR$ when we mean $|\Delta V| = |IR|$, but one must be precise when adding around a loop in a circuit.

Example: Determine the current in the given circuit.



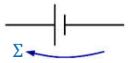
Strategy

Select and label a direction for current.

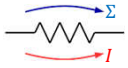
Select a direction for summation.

Add ΔV's.

- V_B is positive going from – to +



- V_R is negative going with current



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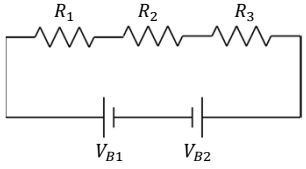
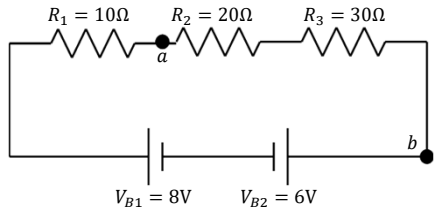


Example: For the given circuit, determine I, V_{ab} and V_{ba}.



$V_{ab} = \Delta V_{ab} = V_b - V_a$