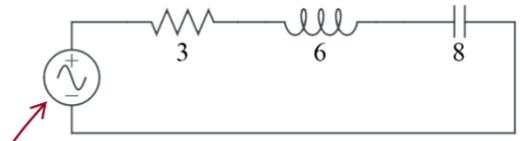# USER MANUAL—DEFINITIONS

The Basics

- **Circuit**: a closed loop that carries electricity
- **Current**: the flow of electrons in a circuit (like the flow of a river current); measured in amps
- **Voltage**: the "push" that causes the current to flow; measured in volts

Just like a river when there is too much water flowing downstream, an electrical current can become dangerous. Electronics are designed with several components that keep the current safe for us and our devices. Complex numbers help us perform these component calculations.

- **Circuit components**: help regulate the current
    - **Source**: supplies the voltage (like a battery or wall outlet)
    - **Resistor**: opposes the current
    - **Inductor**: reacts to the current with a magnetic field
    - **Capacitor**: reacts to the current with an electric field
- **Impedance**: the resistance of each component; measured in ohms
- **Total impedance**: the sum of the resistance of all components; measured in ohms

Component	Symbol	Variable	Impedance
Resistor		R	R
Inductor		L	Li
Capacitor		C	$-Ci$

Calculating Total Impedance	
Example 1	**Example 2**

Voltage (Power) Source

Example 1:

$$Total\ Impedance = R + Li + (-Ci)$$
$$= 3 + 6i + (-8i)$$
$$= (3 - 2i)\,ohms$$

Example 2:
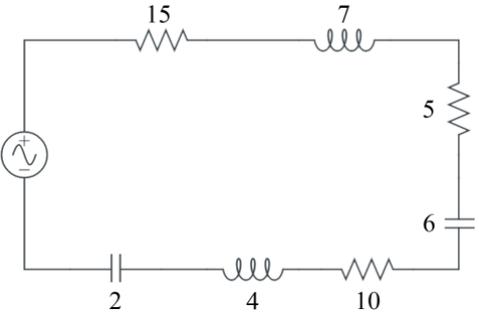
$$Total\ Impedance = 15 + 7i + 5 - 6i + 10 + 4i - 2i$$
$$= (30 + 3i)\,ohms$$