

STATION 1 VOCABULARY

Make sure you know what each of these words mean. If you know, check the box. If you don't, ask someone in your group and write down the definition

- Potential energy: *stored energy*
- Kinetic energy: *energy of motion*
- Law of electric charge: *Opposite charges attract ; like charges repel*

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- Source: *provides electrical energy*

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- Conductor: *a material that allows electrons to flow*

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- Load/Resistor: *a material that changes electrical energy into another form of energy*

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- Switch: *controls the flow of current (open switch → stops current flow)
closed switch → current will flow*

I (A)

- Current: *rate where electric charge flows past a certain point*

V (V)

- Electrical Potential Difference: *amount of potential energy between two points of the cell*

R (Ω)

- Resistance: *degree where the flow of current is slowed down by a load*

- Short circuit: *When the current is too high due to not enough resistance in the circuit*

- Insulator: *a material where electrons cannot flow through*

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- Series Circuit: *a circuit with only one pathway for current to flow*

- Parallel Circuit: *a circuit with multiple pathways for current to flow*

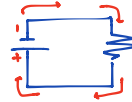
- Phantom load: *When appliances draw out energy even if it's not on*

- Generating electrical energy: *When one type of energy is transformed into electrical (usually through a generator system)*

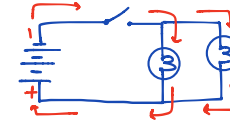
STATION 2 DRAWING CIRCUIT DIAGRAMMS

Draw a circuit diagrams for the following circuits. Be sure to identify the direction that current is travelling for each scenario.

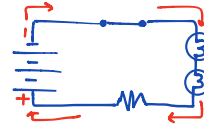
1. A circuit with a **cell** that runs a **buzzer**. *(load)*



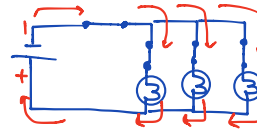
2. A circuit with a **battery** where an **open switch** has turned off **two lights** placed in **parallel** to each other.



3. A circuit with a **battery**, a **closed switch**, **two light bulbs**, and a **clock** all in **series** with each other. *(load)*



4. A circuit with an **electrochemical cell**, a **closed master switch**, and **three light bulbs** all in **parallel** with each other. Each light bulb has its own switch that turns it on and off.



STATION 3
CALCULATING OHM'S LAW



| | Symbol | Unit |
|------------|--------|-------------------|
| Current | I | amperes (A) |
| Voltage | V | volts (V) |
| Resistance | R | ohms (Ω) |

1. What is the resistance of a toaster if a current of 12.5 A flows through it when it is connected to 120 V?

$$I = 12.5 \text{ A} \quad R = \frac{V}{I} = \frac{120 \text{ V}}{12.5 \text{ A}}$$

$$V = 120 \text{ V} \quad = 9.6 \Omega$$

$$R = ?$$

2. A light bulb has a resistance of 90 Ω . What current flows through the bulb when it is connected to 120 V?

$$R = 90 \Omega \quad I = \frac{V}{R} = \frac{120 \text{ V}}{90 \Omega}$$

$$I = ? \quad = 1.3 \text{ A}$$

$$V = 120 \text{ V}$$

3. The current through a load in a circuit is 2.5 A. If the voltage is 75 V, what is the resistance of the load?

$$I = 2.5 \text{ A} \quad R = \frac{V}{I} = \frac{75 \text{ V}}{2.5 \text{ A}}$$

$$V = 75 \text{ V} \quad = 30 \Omega$$

$$R = ?$$

4. How much electrical potential difference is necessary to generate 9.5 A in a circuit with 2.0 Ω ?

$$V = ? \quad V = I \times R = 9.5 \text{ A} \times 2.0 \Omega$$

$$I = 9.5 \text{ A} \quad = 19 \text{ V}$$

$$R = 2.0 \Omega$$

STATION 4
ENERGY SOURCES AND TRANSFORMATIONS

Identify the **type of energy** associated with each of the following sources:

- a. The Sun solar & thermal
- b. River flow mechanical
- c. A battery chemical & electrical potential
- d. Uranium nuclear
- e. Food chemical

| | ORIGINAL ENERGY FORM | FINAL ENERGY FORM |
|---------------------|----------------------|-------------------|
| Photosynthesis | solar | chemical |
| Nuclear power plant | nuclear | electrical |
| An oven | electrical | thermal |

List the three **key parts of a generator system**. Briefly describe their functions

1. Turbine : steam/water/wind causes the turbine to spin
2. Shaft : connects the turbine to the generator
3. Generator : kinetic energy from the shaft is transformed to electrical energy in the generator

What is the difference between a **renewable** and **non-renewable** energy source? Provide at least 2 examples for each.

Renewable Energy is energy from renewable resources (can be naturally replenished)
ex. Sunlight (solar panels), Wind (windmill), water (dam)

Non-renewable Energy is energy from sources that will run out or will not be replenished in our lifetimes

ex. Fossil fuels (coal, gasoline), nuclear (nuclear fission reactions in power plants)