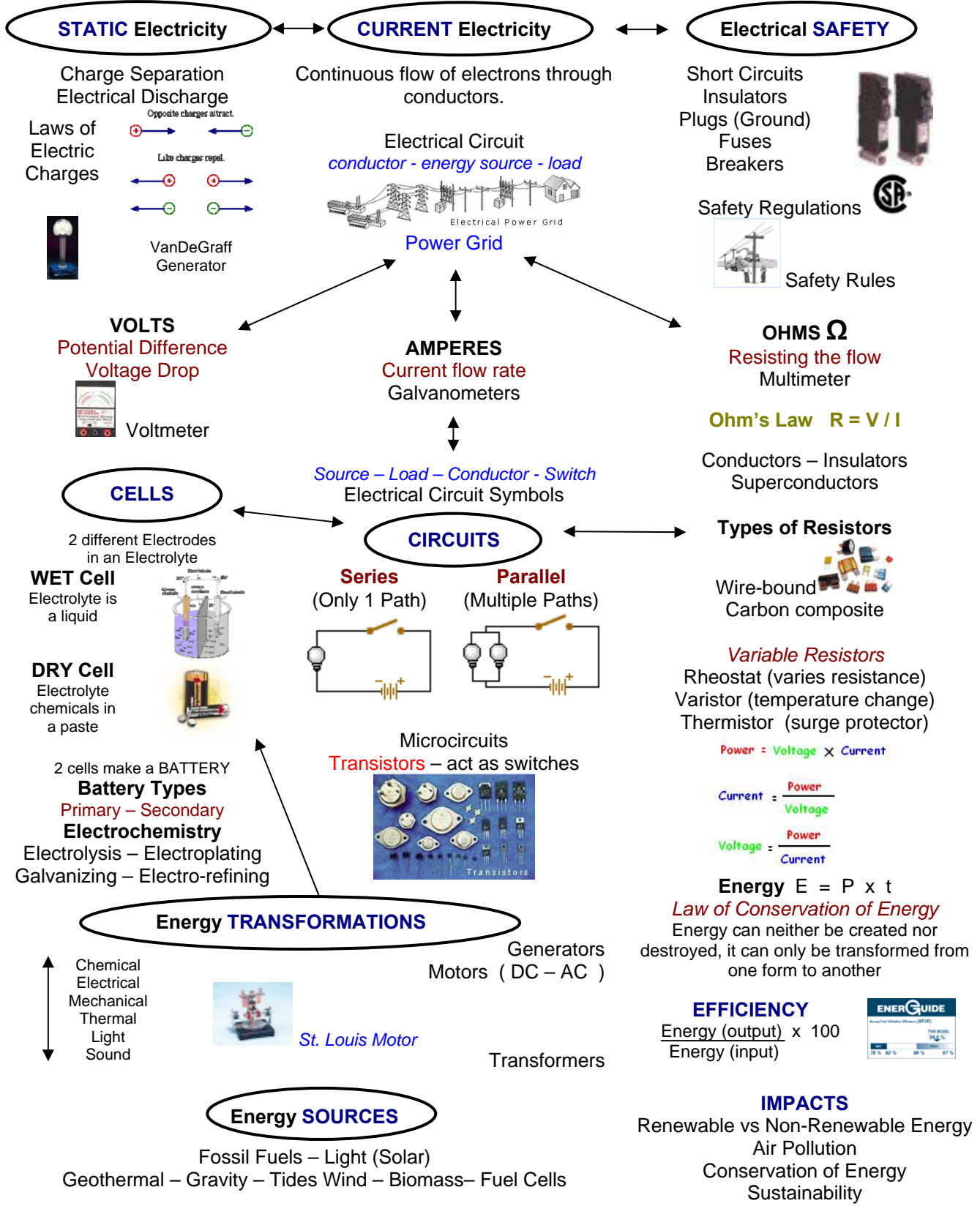


# Grade 9 - Unit 4 –Electrical Principles & Technologies Concepts



## STATIC Electricity

Charge Separation  
Electrical Discharge

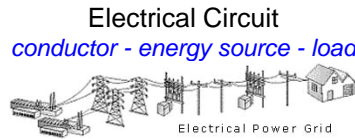
Laws of Electric Charges

Opposite charges attract.  
Like charges repel.

VanDeGraff Generator

## CURRENT Electricity

Continuous flow of electrons through conductors.



## Power Grid

## Electrical SAFETY

Short Circuits  
Insulators  
Plugs (Ground)  
Fuses  
Breakers

Safety Regulations

Safety Rules

## VOLTS

Potential Difference  
Voltage Drop

Voltmeter

## AMPERES

Current flow rate  
Galvanometers

## OHMS Ω

Resisting the flow  
Multimeter

Ohm's Law  $R = V / I$

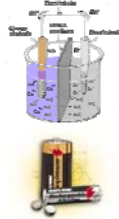
Conductors – Insulators  
Superconductors

## CELLS

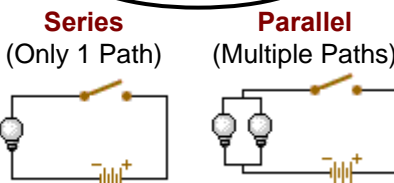
2 different Electrodes in an Electrolyte

**WET Cell**  
Electrolyte is a liquid

**DRY Cell**  
Electrolyte chemicals in a paste



## CIRCUITS



## Types of Resistors

Wire-bound  
Carbon composite

*Variable Resistors*  
Rheostat (varies resistance)  
Varistor (temperature change)  
Thermistor (surge protector)

$$\text{Power} = \text{Voltage} \times \text{Current}$$

$$\text{Current} = \frac{\text{Power}}{\text{Voltage}}$$

$$\text{Voltage} = \frac{\text{Power}}{\text{Current}}$$

$$\text{Energy } E = P \times t$$

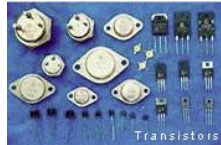
*Law of Conservation of Energy*  
Energy can neither be created nor destroyed, it can only be transformed from one form to another

2 cells make a BATTERY

**Battery Types**  
Primary – Secondary

**Electrochemistry**  
Electrolysis – Electroplating  
Galvanizing – Electro-refining

Microcircuits  
Transistors – act as switches



## Energy TRANSFORMATIONS

Chemical  
Electrical  
Mechanical  
Thermal  
Light  
Sound



St. Louis Motor

Generators  
Motors ( DC – AC )

Transformers

## EFFICIENCY

$$\frac{\text{Energy (output)}}{\text{Energy (input)}} \times 100$$



## Energy SOURCES

Fossil Fuels – Light (Solar)  
Geothermal – Gravity – Tides Wind – Biomass – Fuel Cells

## IMPACTS

Renewable vs Non-Renewable Energy  
Air Pollution  
Conservation of Energy  
Sustainability