

---

**GRADE 9**

**UNIT II**  
**ELECTRICITY**

---

**CHAPTER 5**

**DC VOLTAGE**

*Part 2/4: ELECTRIC CURRENT  
& VOLTAGE*

WATAD.me

**Prepared by: BARAKAT NASSER**

# CHAPTER

## **BUILDING PLAN**

---

1. **Conductors and Electric Circuits**
2. **Schematic Symbols of Circuit Elements**
3. **Types of Circuit Connections**
4. **Electric Current: Definition, Units, Measurement**
5. **Voltage: Definition, Units, and Measurement**
6. **The Oscilloscope**
7. **Laws of Connections: Voltage**
8. **Laws of Connection: Current**

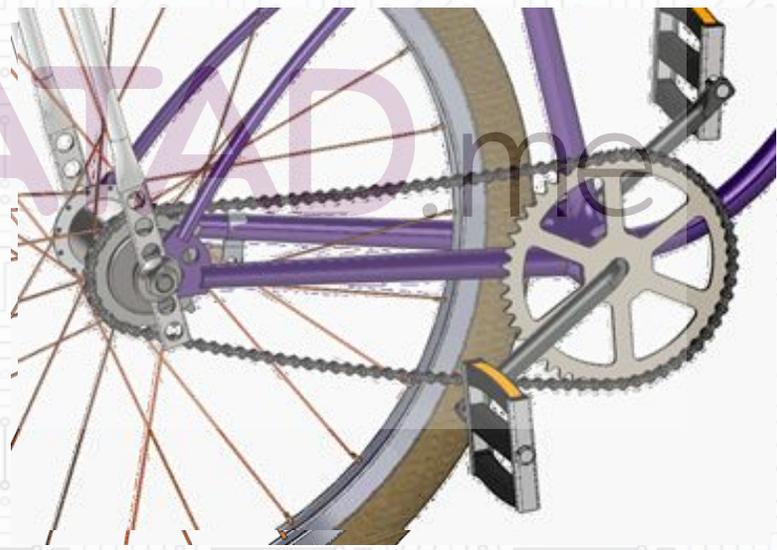
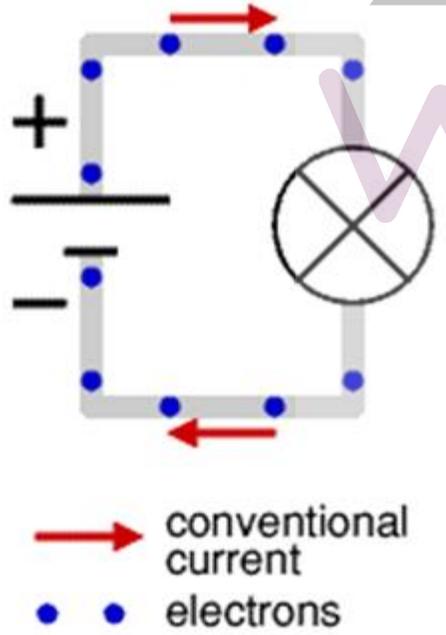
## 4- ELECTRIC CURRENT: DEFINITION

- The flow of charge in a circuit per a unit of time is defined as electric current. Its symbol is  $I$  and its unit is the **ampere (A)**.
- DC current means constant current (DC stands for **direct current**). It is a sort of agreement to use DC as “constant”.
- **DC current** is a type of electric flow with constant value and the same direction of flow always.

# 4- ELECTRIC CURRENT: DEFINITION

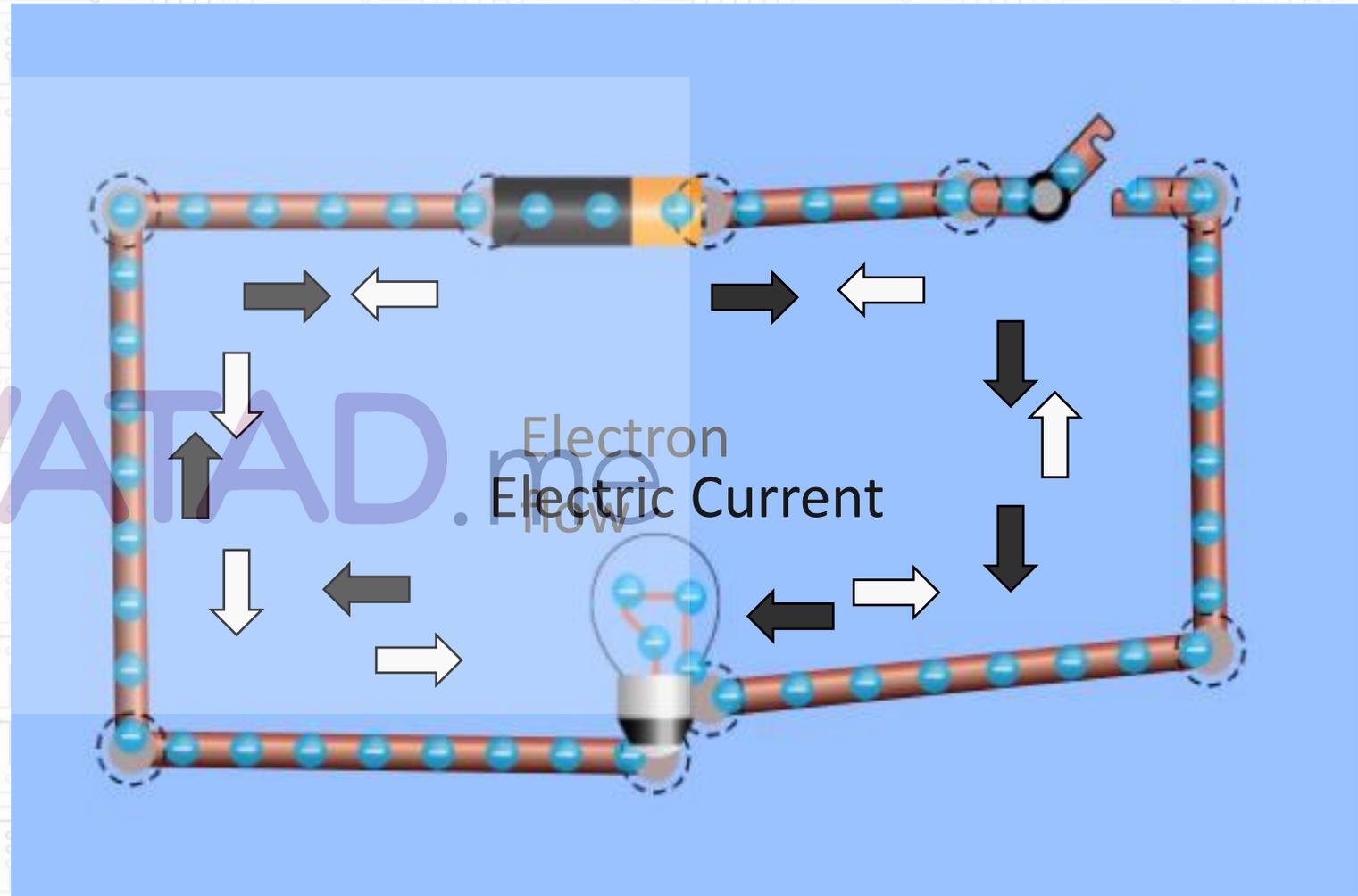
- In a **closed circuit** the current flows throughout the whole loop simultaneously and as 1 unit.

ATTENTION



> A generator drives electrons to flow from its negative pole towards its positive through the circuit.

> By convention, the current direction is chosen opposite to that of the electrons flow. Hence, in a **closed circuit**, **electric current is directed from the positive pole of the generator towards the negative pole through the circuit.**



## 4- ELECTRIC CURRENT: **UNITS**

Multiples	Sub-multiples
$kA = 1000 A = 10^3 A$	$mA = 0.001 A$ $= 10^{-3} A$
$MA = 10^6 A$	$\mu A = 10^{-6} A$

### Examples:

A 9000BTU air conditioner consumes around 5A.

A calculator functions using 2mA.

Our bodies contain current of around  $0.2 \mu A$ .

WATAD.me

# APPLICATION 3:

Convert to Amperes:

> 2500 mA

> 0.75 kA;



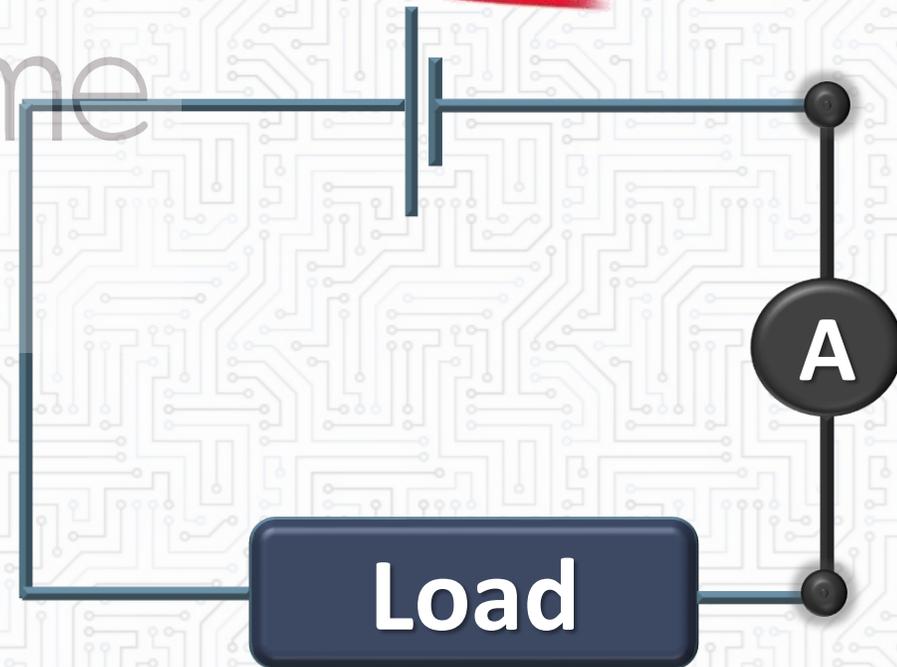
WATAD.me

# 4- ELECTRIC CURRENT: MEASUREMENT

- > An **ammeter** is a device that measures electric current.
- > It is connected in series with the studied device.
- > The ammeter has negligible resistance to current flow.
- > The “com” terminal is connected to the (-) pole of the generator.



Symbol:



## 4- ELECTRIC CURRENT: MEASUREMENT

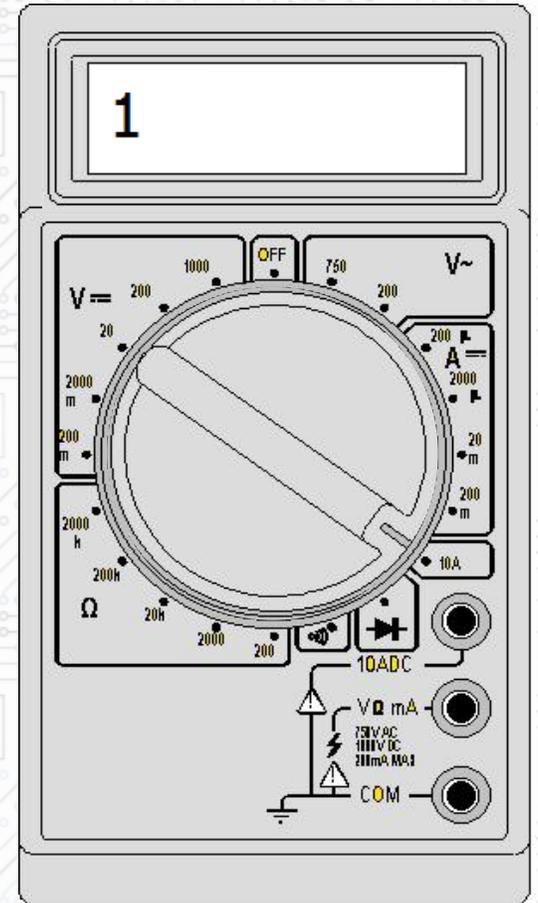
- > Another device is the multimeter, which is an instrument with many functions one of which is measuring current.
- > Use the outlets (A) and “com”.
- > The “com” terminal is to the negative side of the generator.



WATAD.me

# USING THE AMMETER

- > Choose highest **range**.
- > Start decreasing the range until you reach the most precise value which is achieved for the least **range** above the measured current.
- > If the range chosen is less than the measured value, the ammeter registers to the left-hand side.
- > If the com is connected closer to the (+) pole of the generator, the ammeter displays a negative value.



## 5- VOLTAGE: DEFINITION

- Voltage is the electric energy supplied by a generator or consumed by a device per a unit of charge.
- Its symbol is  **$U$**  or  **$V$**  and its unit in SI is the volt (V).
- Even though DC stands for direct current, but it is a sort of agreement to use DC as “constant”.
- **DC voltage** stands for constant voltage which is constant in value and keeping the same polarity.

# 5-1-VOLTAGE OF A BATTERY

- > A battery is characterized by its voltage.
- > It maintains, across its terminals, a constant voltage that is referred to as **voltage of the battery**.



**A 1.5V AA  
battery (dry cell)**



**A 9V  
dry cell**



**A 12V car  
accumulator**

WATAD.me

## 5-2- RATED VOLTAGE OF AN APPLIANCE:

- > At this level, we assume that the functioning of an appliance depends on its voltage. Thus, we define **rated voltage** as the voltage needed by a device to function normally.



**The router needs  
9V to function  
normally**



**This Toshiba Laptop  
has a rated  
voltage of 19V.**

## 5-3- VOLTAGE: UNITS

Multiples		Sub-multiples	
$kV = 10^3 V$		$mV = 10^{-3} V$	
$MV = 10^6 V$			

> Examples:

Convert to Volts:

$$1500 \text{ mV} =$$

$$2.5 \text{ kV} =$$

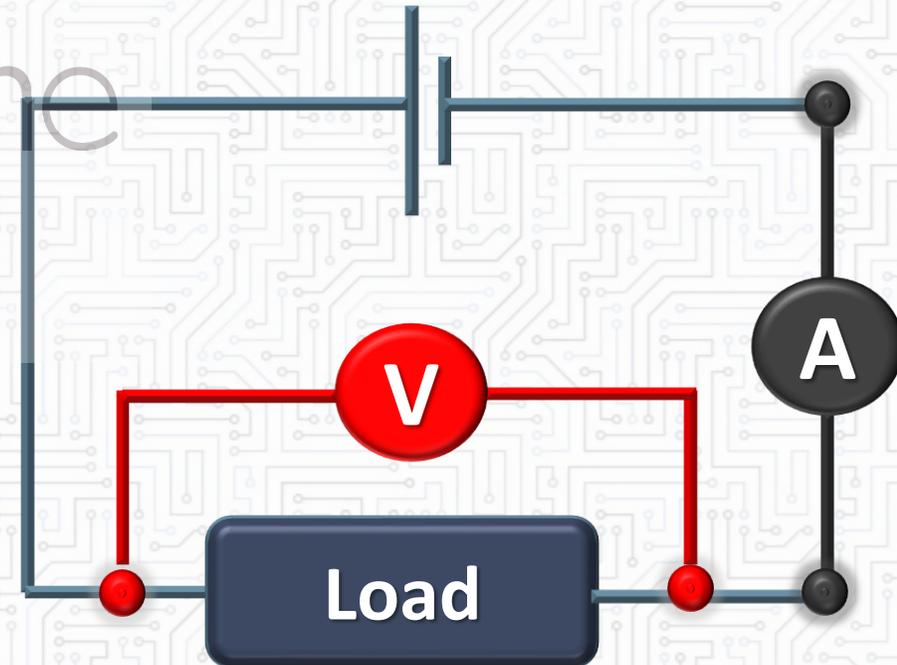
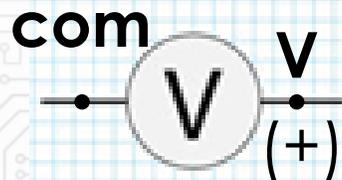
$$0.05 \text{ MV} =$$

WATAD.me

## 5-4- VOLTAGE: MEASUREMENT

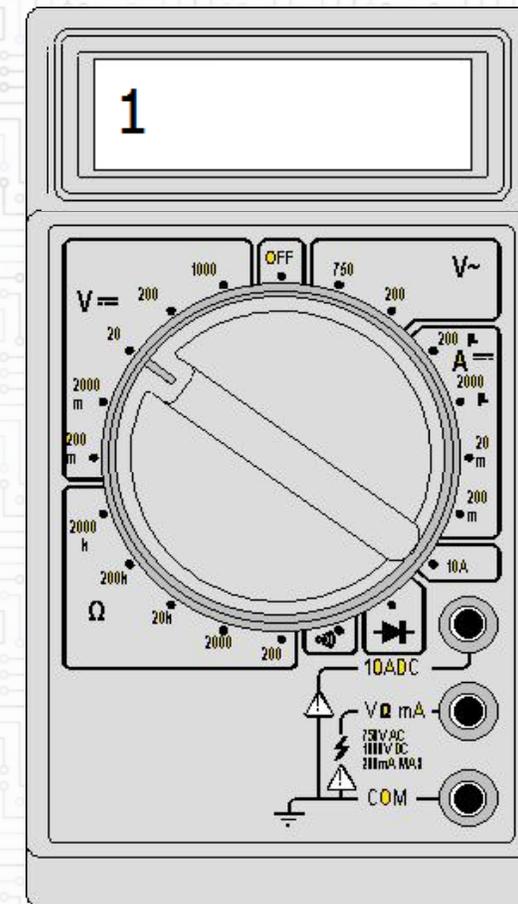
- > Voltage can be measured by a voltmeter or a multimeter functioning in the mode of a voltmeter (V, com).
- > It is connected in parallel across the terminals of the studied device.
- > The voltmeter has a very high resistance to current flow. Thus, upon connecting it to a device, we can safely assume that current flow is not affected.
- > The “com” terminal is connected closer to the (-) pole of the generator.

Symbol:



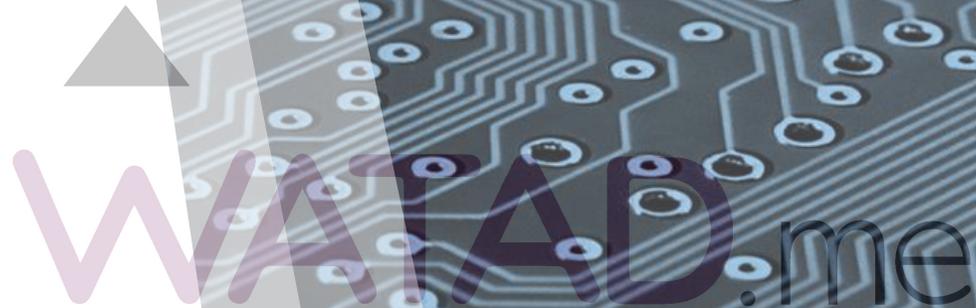
# USING THE VOLTMETER

- > Choose highest **range**.
- > Start decreasing the range until you reach the most precise value which is achieved for the least **range** above the measured voltage.
- > If the range chosen is less than the measured value, the voltmeter registers **1** to the left-hand side.
- > If the com is connected closer to the (+) pole of the generator, the voltmeter displays a negative value.



---

**GRADE 9**



**THANK  
YOU**

**Part 2/4: ELECTRIC CURRENT & VOLTAGE**

**Prepared by: BARAKAT NASSER**