Doon Public School Bhuj

Sub - Robotics

Class: VI **Date: 27/04/2020**

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What is Electronics?

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What is Electronics?

Electronics is a field of science in which we study about electric currents generated due to the movement of electric charges that flow in circuits that store and handle information, and how to control these currents.

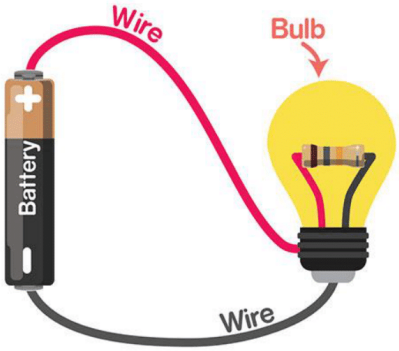
Name 10 electronic device you know

Electronic Devices

- Smartphone
- Laptop
- Microwave
- Washing Machine
- Camera
- Water pump
- Speaker
- Projector
- AC
- Fridge, etc.

What is electronic circuit?

- The arrangement of components in the form of a closed path for the charge to flow is known as a **circuit**.
- A circuit made of electronic components and wires is known as an **electronic circuit**.
- The simplest circuit can consist of just a power source and one component.



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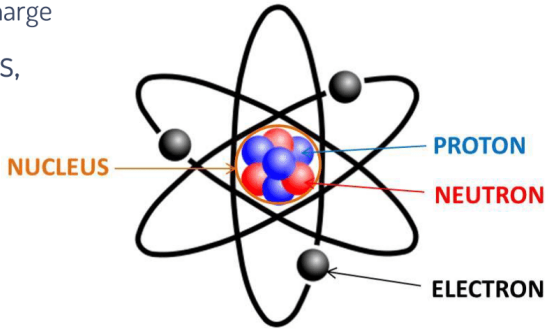
Basics of Electronics

Atom

- An atom is the smallest constituent unit of ordinary matter.
- It has
  - Protons – positively charged particle
  - Electron – negatively charged particle which is free
  - Neutrons – no charge
- Movement of electrons, or the charge, create electricity.

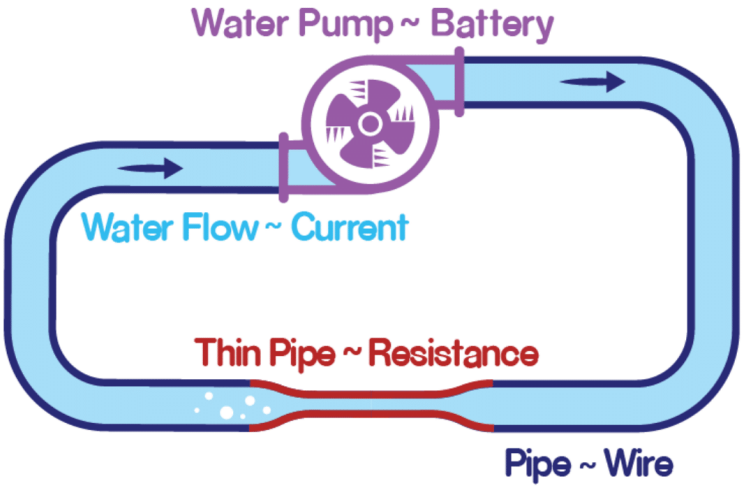


Basic Terms

- **VOLTAGE (V)** – The reason for the charge to flow, defined as 'potential difference' between two points in a circuit.
- **CURRENT (I)** – The rate of at which the charge flows. More the amount of charge passing through a given point in a circuit, more the current.
- **RESISTANCE (R)** – The one standing against the flow, defined as a material's tendency to resist the flow of charge. It is basically a measure of the difficulty to pass an electric current through something, say a wire.

Pump Water System

Imagine a piece of rubber pipe full of water placed on a table with both of its ends glued together, forming a closed loop.



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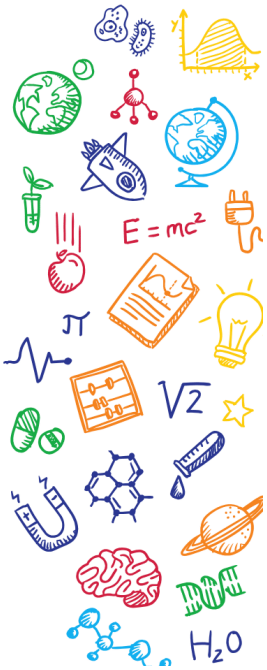
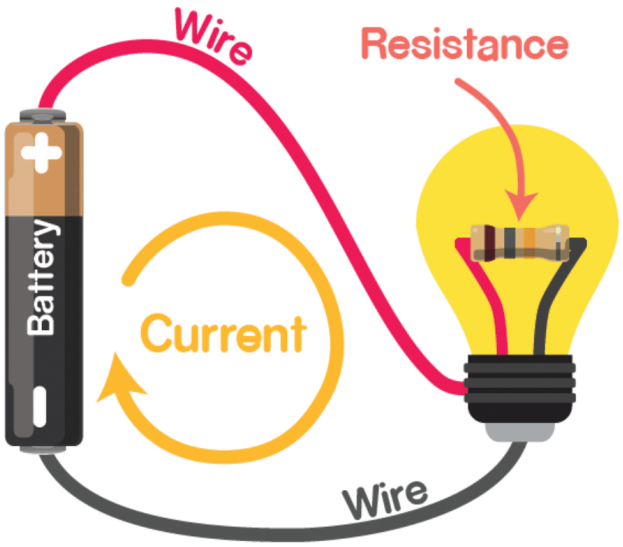


Electric Circuit



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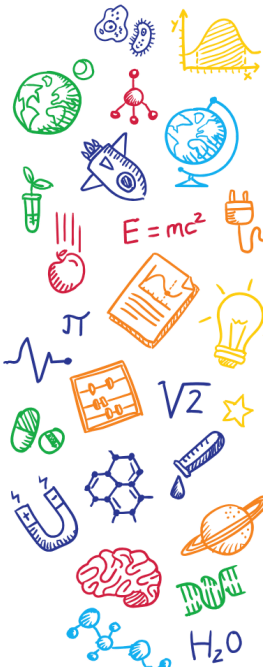

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Voltage

- **Pump** pulls water from one of its sides and pushes it from the other, resulting in circulation or flow of water in the pipe.
- **Voltage** is nothing but a type of pressure difference that a power source creates at its two ends. This difference makes the charge flow around the circuit.
- In electronics,
  - **water** would be analogous to **charge**,
  - the **pipe** would be analogous to a **wire**,
  - the **pump** to a **battery**,
  - the **pressure difference** to **voltage**
  - the complete **pump-pipe system** to an **electronic circuit**.

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Battery

- **Battery** is the power source of the circuit which provide voltage.

Polarity

- **Polarity** is the property of having two poles that have opposite physical properties:
  - Positive
  - Negative
- Polarity is important because it decides the direction in which the charge in the circuit will flow.
- If the polarity is reversed the direction of flow of charges is also reversed.
- The positive pole or the positive terminal is said to have a higher voltage as compared to the negative terminal in a battery.

Measuring Voltage

- In a circuit, we measure the voltage using a device known as a **voltmeter.**
- A voltmeter is always connected across the component whose voltage we are measuring.

Activity
Measuring Voltage

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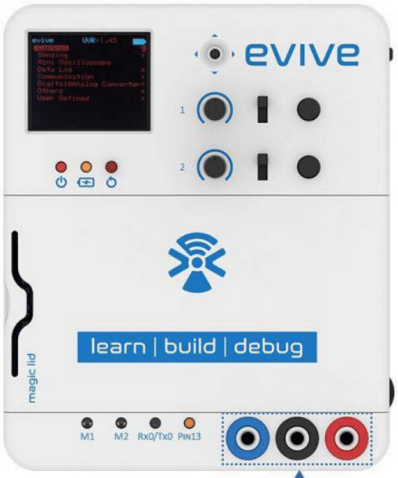
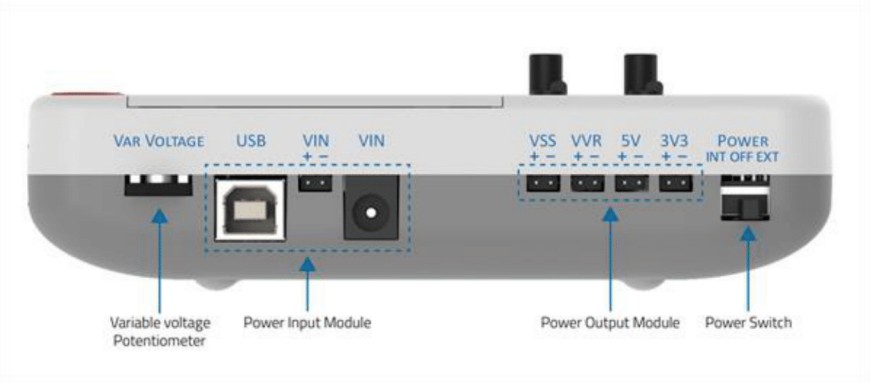
Activity – Measuring Voltage

- We will use evive to measure the voltage.



Powering evive

- There is a switch labeled POWER.
- It will be in the center, under OFF. Flip it to its left, i.e. to INT; this will power up the evive with its internal battery.



evive Menu

- There is a menu on the TFT screen. If not, center press on navigation key.

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Navigating to Sensing

- In the menu, the second option is **Sensing**; select this option using the navigation button by pushing it once towards its right.
- Then, navigate through the menu as follows: **Sensing > ProbeV (30V) & I/V (5V)**.

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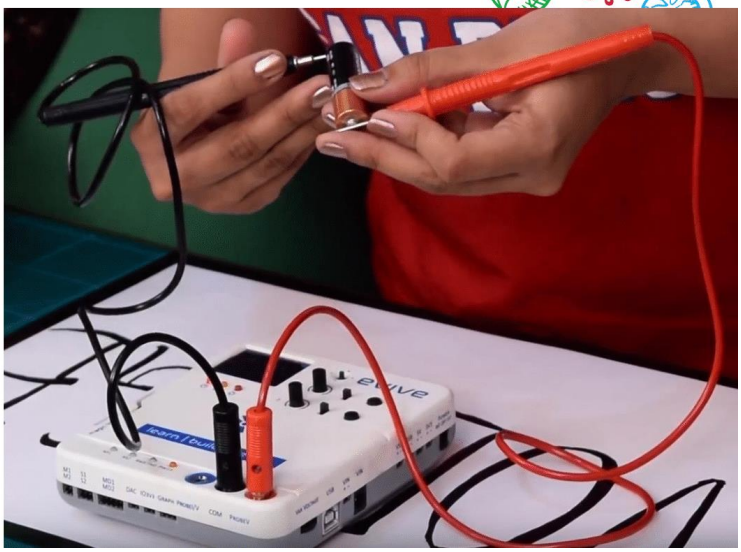
Measuring Voltage

- Connect red wire to red channel & black wire to black channel.
- Take the free end of the channel connected to PROBE V and touch the positive terminal of the battery with it. similarly, take the free end of the other channel and touch the negative terminal with it.



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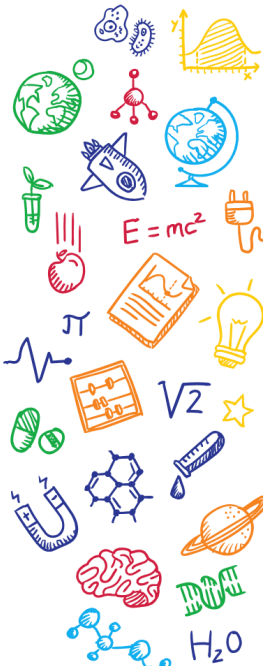
Current

- If water was analogous to charge, the flow of water would be analogous to flow of charge.
- The rate of flow of charge is defined as **current**.
- In **conductors**, there are a lot of free charges, i.e. charges that can move easily whenever we connect a power source.
- A wire is also a conductor; that is why charges easily flow through it.



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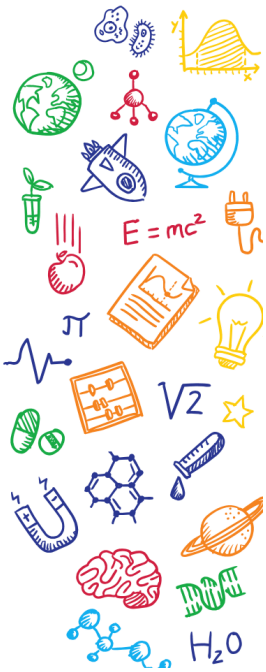
Resistance

- The water in the piper flows at a constant rate.
- The rate of flow also depends on how easily the pipe is allowing the water to flow, or how much is the pipe resisting against the flow.
- Similarly, if you change the wire in a circuit, the current will change.
- The property of any material to resist the flow of charge is called **resistance**.
- More the resistance, slower the flow i.e. lesser the current.

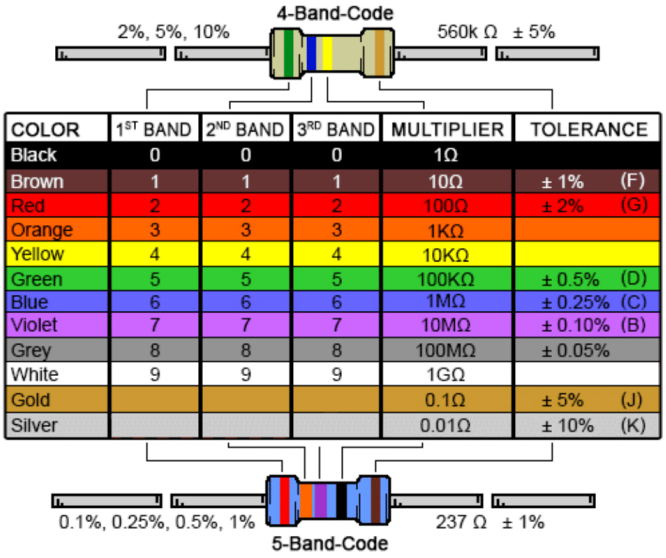


Units and Symbols

Property	Symbol	Unit	Symbol
Voltage	V	Volts	V
Current	I	Ampere	A
Resistance	R	Ohm	Ω

Resistor

- A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element.



COLOR	1ST BAND	2ND BAND	3RD BAND	MULTIPLIER	TOLERANCE
Black	0	0	0	1Ω	
Brown	1	1	1	10Ω	± 1% (F)
Red	2	2	2	100Ω	± 2% (G)
Orange	3	3	3	1KΩ	
Yellow	4	4	4	10KΩ	
Green	5	5	5	100KΩ	± 0.5% (D)
Blue	6	6	6	1MΩ	± 0.25% (C)
Violet	7	7	7	10MΩ	± 0.10% (B)
Grey	8	8	8	100MΩ	± 0.05%
White	9	9	9	1GΩ	
Gold				0.1Ω	± 5% (J)
Silver				0.01Ω	± 10% (K)

Measuring Resistor – 220 Ohm

- First Band – Red, that means 2
- Second Band – Red, that means 2
- Multiplier – Brown, that means 10
- Hence by calculation it is 22 x 10 = 220 Ohm
- Tolerance Band – Gold, that means ±5% variation in the value.
- Do it for all other resistors in the kit.

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