Batteries


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What is a Battery?

A **battery** is a device that converts chemical energy contained within into electric energy

Types of Batteries

Lithium-Ion Battery

Ni-Cd Battery

Zinc Carbon Battery

Alkaline Battery

Ni-MH Battery

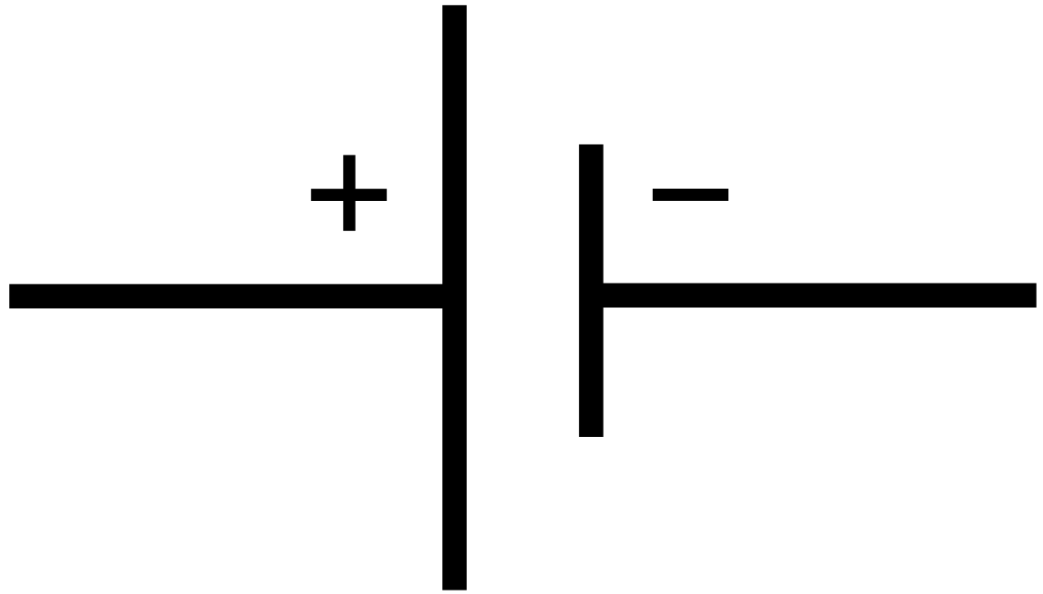
Coin Cell Battery

Lead-acid Battery

Sealed Battery

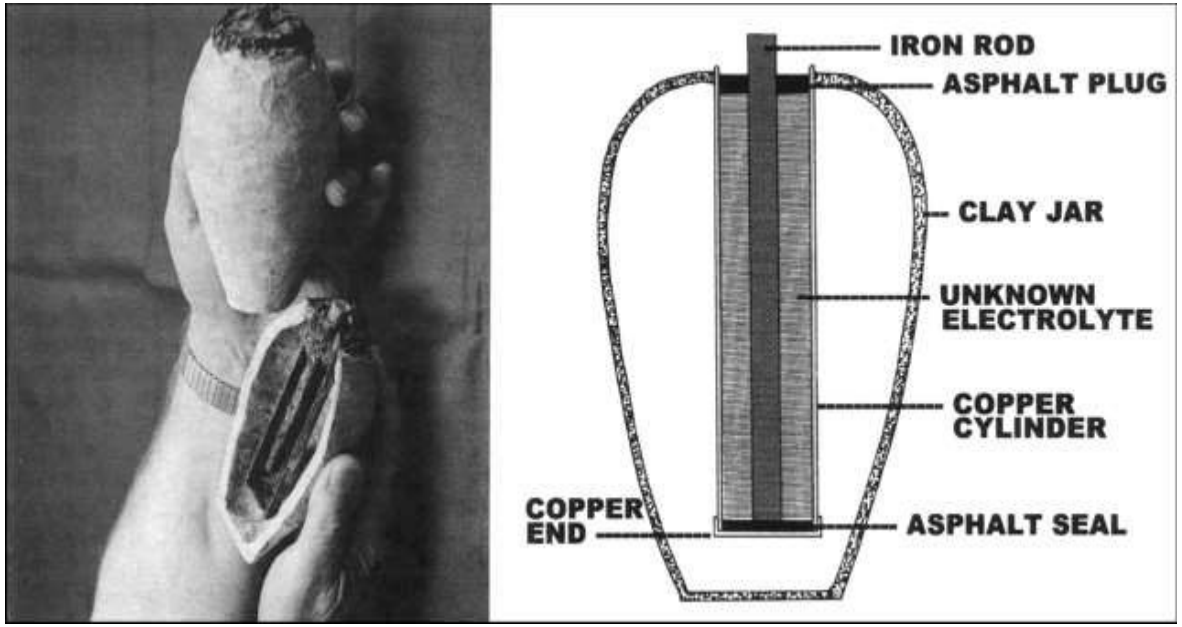
Battery Schematic

This is the schematic for a battery.



The First Battery?

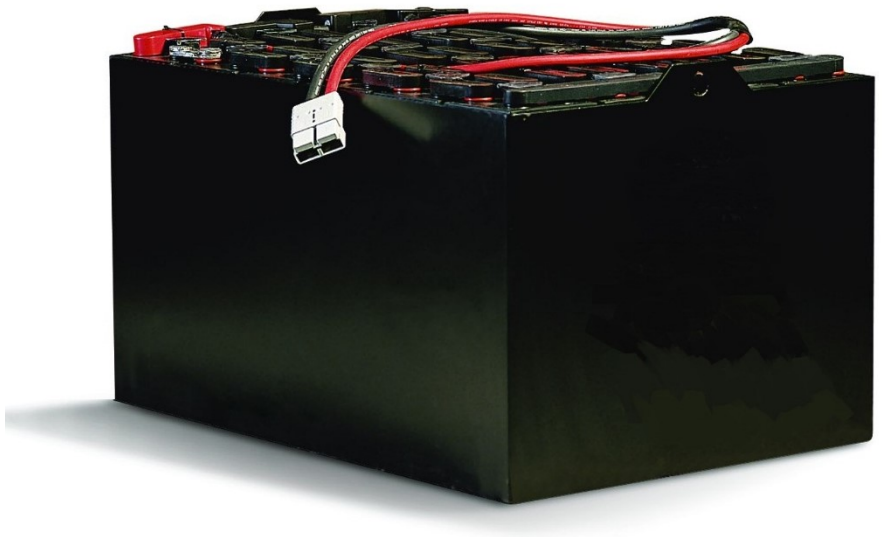
The first batteries may have been invented over 2,000 years ago. A clay pot contained copper plates, tin alloy, and an iron rod were discovered at a dig near Baghdad, Iraq.

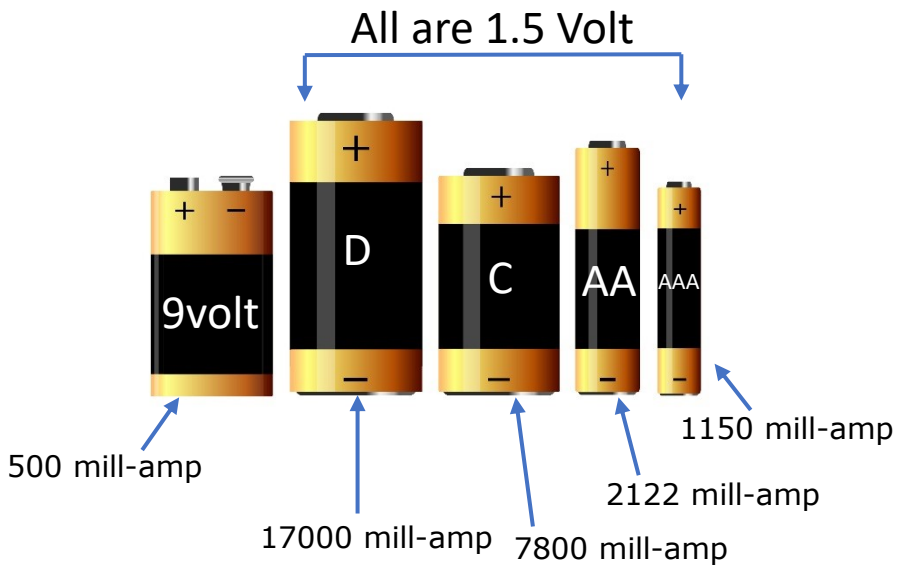


Wonderopolis.org Universetoday.com

Characteristics of a Battery

When looking at a battery, we look at 2 characteristics: **Voltage** (how much force is pushing the electrons) and **Amperage** (how many electrons will flow).





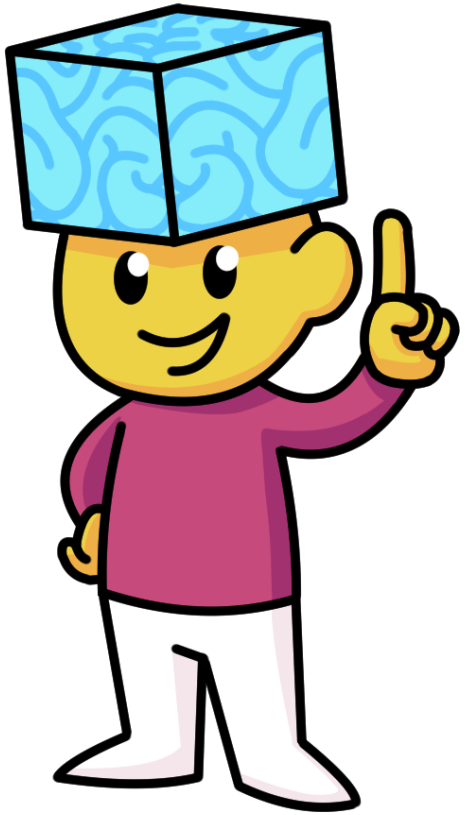
Who Invented Batteries?

Voltaic Pile

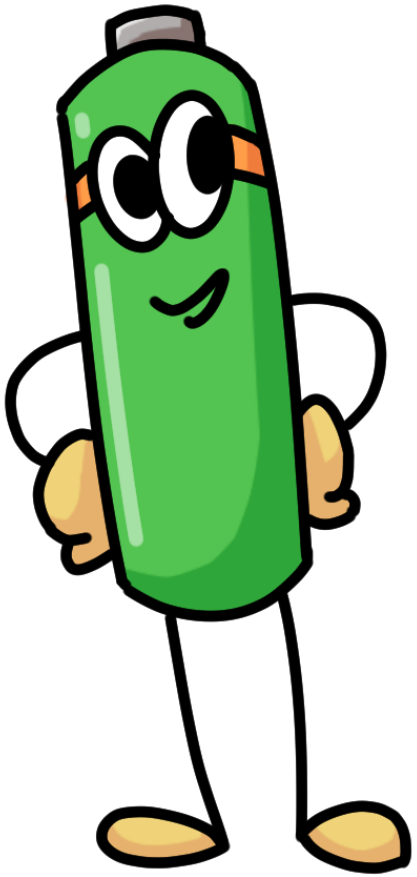
The volt is named in honor of the 18th–19th century Italian physicist Alessandro Volta who invented the modern battery.

Alessandro Volta
1745-1827

FUN FACT



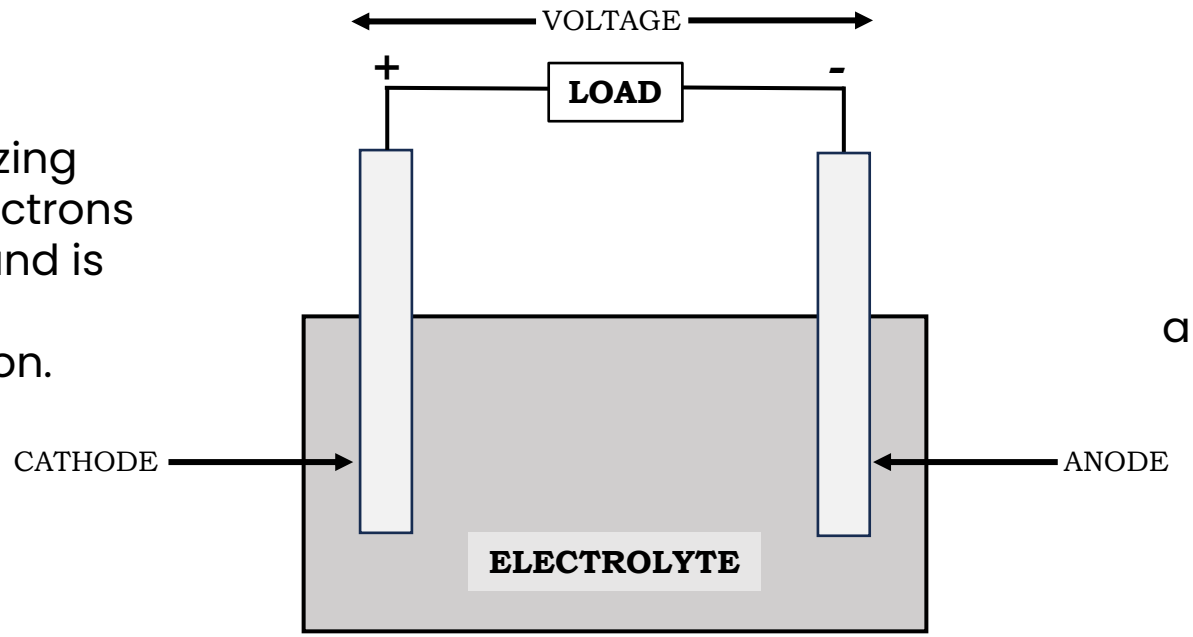
We sometimes measure how much capacity a battery has in Amp-hours. This measures how long a battery can output a charge of 1 Ampere.



Parts of a Battery

Cells are comprised of 3 essential components.

The Cathode is the oxidizing electrode that acquires electrons from the external circuit and is reduced during the electrochemical reaction.



The Anode is the reducing electrode that releases electrons to the external circuit and oxidizes during and electrochemical reaction.

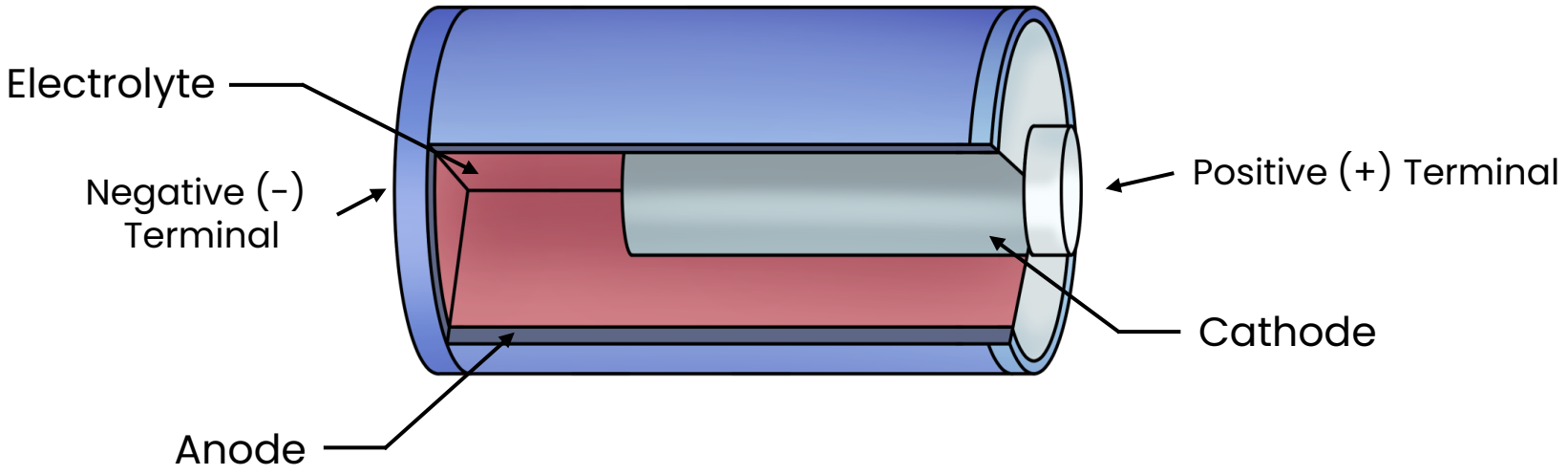
The Electrolyte is the medium that provides the ion transport mechanism between the cathode and anode of a cell. Electrolytes are often liquids, such as water or other solvents, with dissolved salts, acids, or alkalis that are required for ionic conduction.

How Batteries Work?

The chemical reactions in batteries involve atoms gaining and losing electrons. The electrochemical cells in a battery consist of two electrodes where these reactions occur. These are known as the anode (-) and cathode (+). The chemical reaction only happens when we use the battery, so it can store the electrons for a long time.

https://youtu.be/9OVtk6G2TnQ
Great TED-Ed video about how batteries work

Parts of a Battery

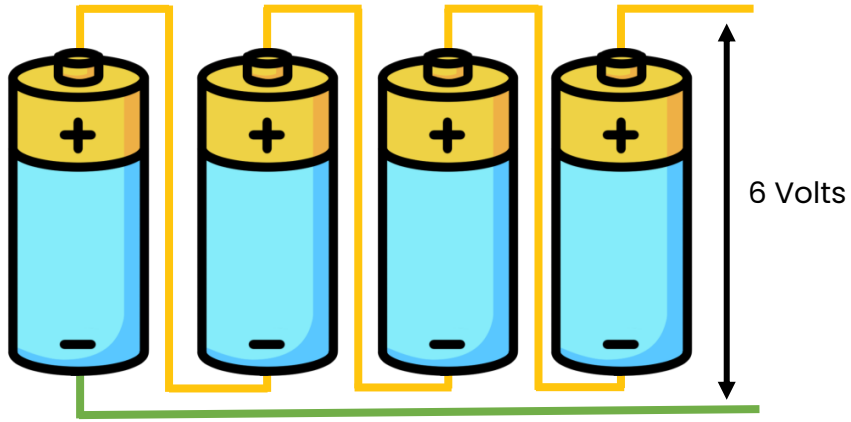


In an actual battery, the different parts of the cell are moved around to form the cylindrical shape that we recognize as a battery today!

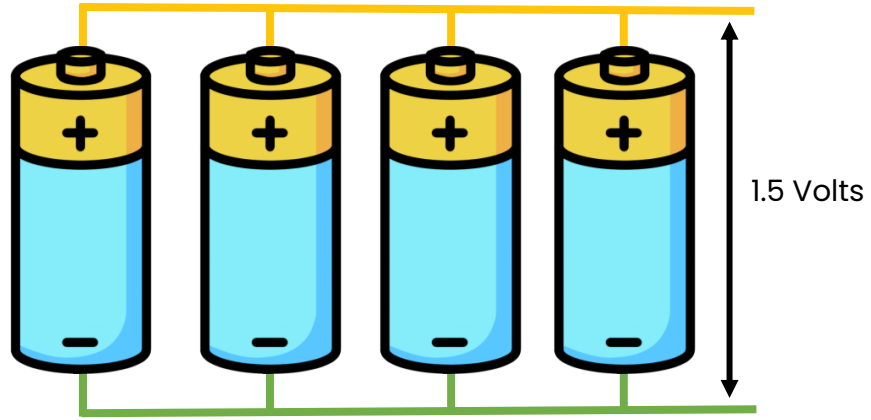
It should however be noted that many batteries including the conventional (AA/AAA/D) batteries, like the one depicted, contain solid electrolytes that act as ionic conductors at room temperature.

How to Arrange Batteries?

When connecting batteries in a row, we have two choices in how to arrange them: **Serial** or **Parallel**.



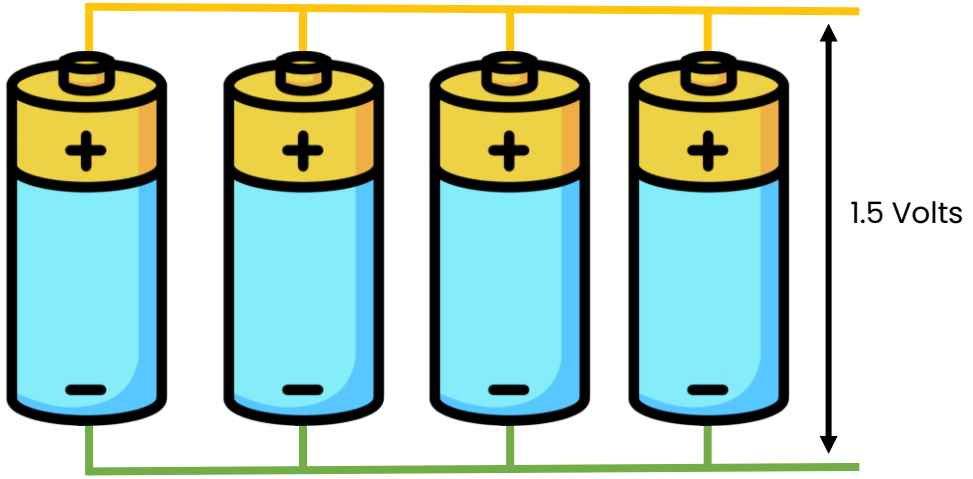
Serial Arrangement



Parallel Arrangement

How to Arrange Batteries?

Parallel combines batteries to provide more amperage.

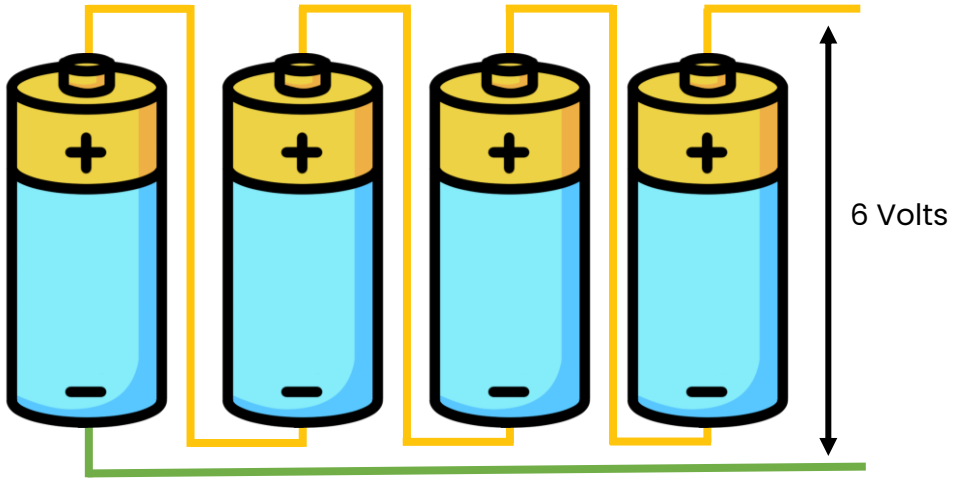


Parallel Arrangement

Same voltage as one battery but the device will run much longer.

How to Arrange Batteries?

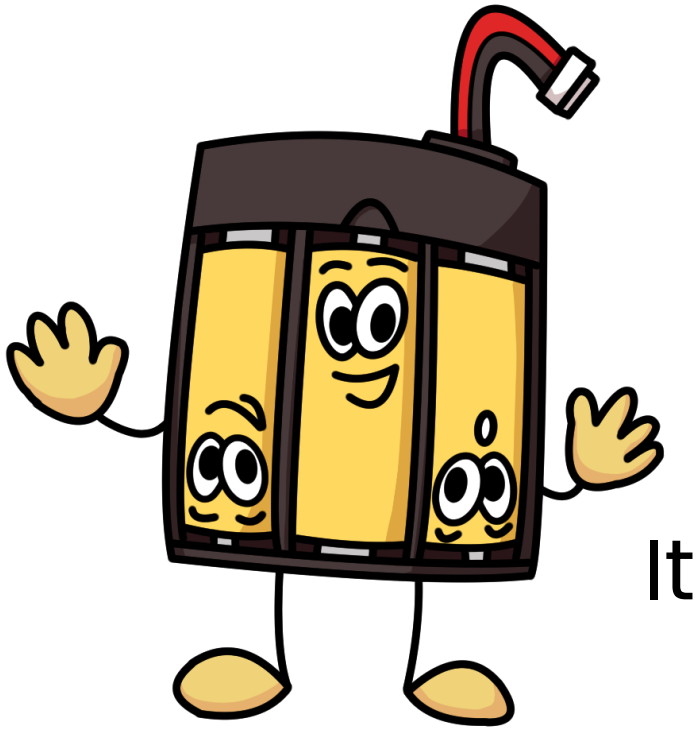
Serial combines batteries in a row to give more voltage.
This is also known as putting the batteries in series!



Serial Arrangement

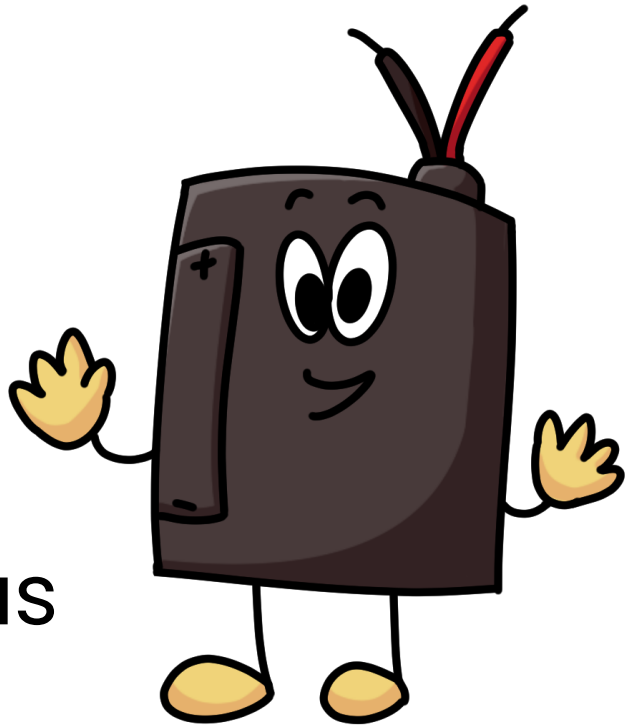
More voltage than one battery but the device will run the same length of time as one battery.

How to Arrange Batteries?



The 4.5V battery pack provided in your kit is three 1.5V batteries connected in series.

It performs the same job as a 4.5V battery!



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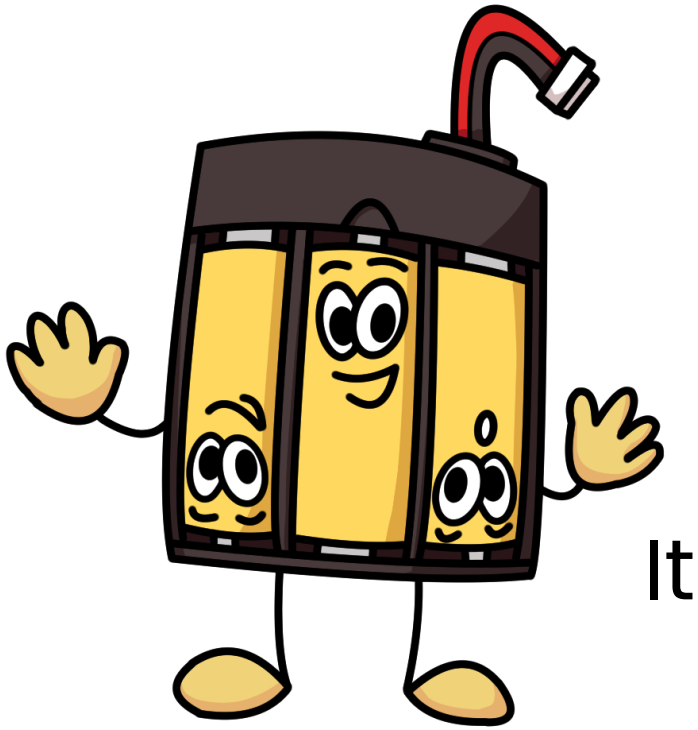

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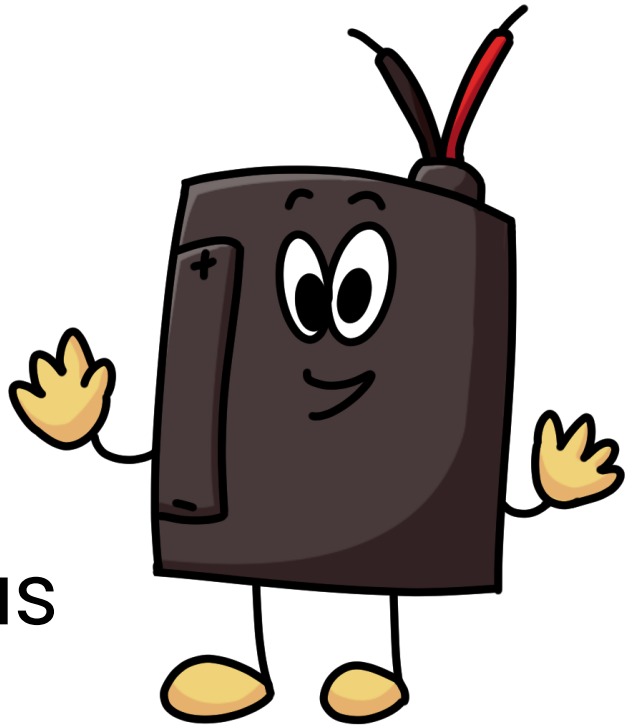
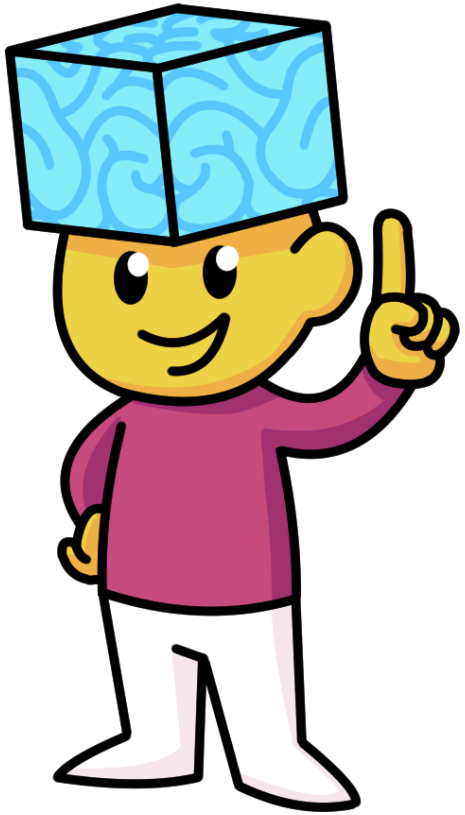
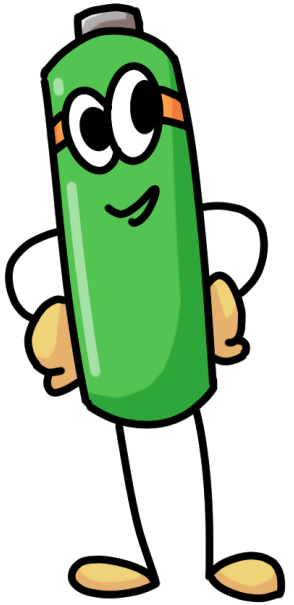


FUN FACT



The actual sign of an anode is negative, not positive. This is because electricity flows from the anode and electricity is the flow of electrons. Electrons have a negative charge and so does the anode!



SQUARE BRAIN Batteries