

PHYSICS
FORM 5
ELECTRICITY

Current

Types of Current:

1. Conventional Current
2. Electric Current

Conventional Current

Long ago, it was believed that current was a flow of positive charges. The direction of conventional current therefore is from the positive terminal to the negative terminal.

Like charges repel each other while opposite charges attract each other. Hence the reason conventional current flows away from the positively charged terminal and towards the negatively charged terminal.

Electric Current

It was later discovered that current was actually a flow of negative charges (electrons). The direction of flow of electric current is from the negative terminal to the positive terminal.

Conventional current is still in use because many of the laws and rules created for electricity was based on conventional current. After it was discovered that electricity was a flow of negative charged, they still kept the concept of conventional current rather than change the laws and rules.

Conductors

Any substance that allows the passage of an electron current through it, examples include metals, electrolytes, graphite.

Semi-conductors are silicon, germanium.

Insulators

Any substance that does not allow the passage of an electric current through it, examples include rubber, plastics, ceramics,...

**PHYSICS
FORM 5
ELECTRICITY**

Circuit Symbols

Device	Symbols
Wires crossed (not joined)	
Wires joined at a junction	
Fixed Resistor	
Variable Resistor (Rheostat)	
Filament	
Diode	
Transformer	
Cell	
Battery of Cell	
Ammeter	
Voltmeter	
Switch	
A.C. Supply	
Fuse	

**PHYSICS
FORM 5
ELECTRICITY**

Classification of Current

Current can be classified into two groups:

1. Direct Current (DC) – This is the current which has only one direction of flow eg. Battery
2. Alternating Current (AC) – This is the current in which the flow changes direction eg. Current from mains.

For I/V or I-V graphs, direct current is denoted by a line graph that does not cross the x-axis. Alternating current will have a line graph that is on either side of the axis, ie, it crosses the x-axis.

The negative I-axis means amperes in the opposite direction. (there is no such thing as negative amps.)

PHYSICS
FORM 5
ELECTRICITY

Calculating Resistance in a Circuit

Resistance – the ability of a substance to prevent the flow of an electric current through it.
Resistance is measured in Ohm and is denoted by the symbol Ω .

Note: A high resistance means that an electric current does not readily flow.

Resistance in Series

$$\text{Total Resistance } (R_T) = R_1 + R_2 + R_3 + \dots$$

Resistance in Parallel

$$\text{Total Resistance} = R_T$$

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$$

PHYSICS
FORM 5
ELECTRICITY

Cells

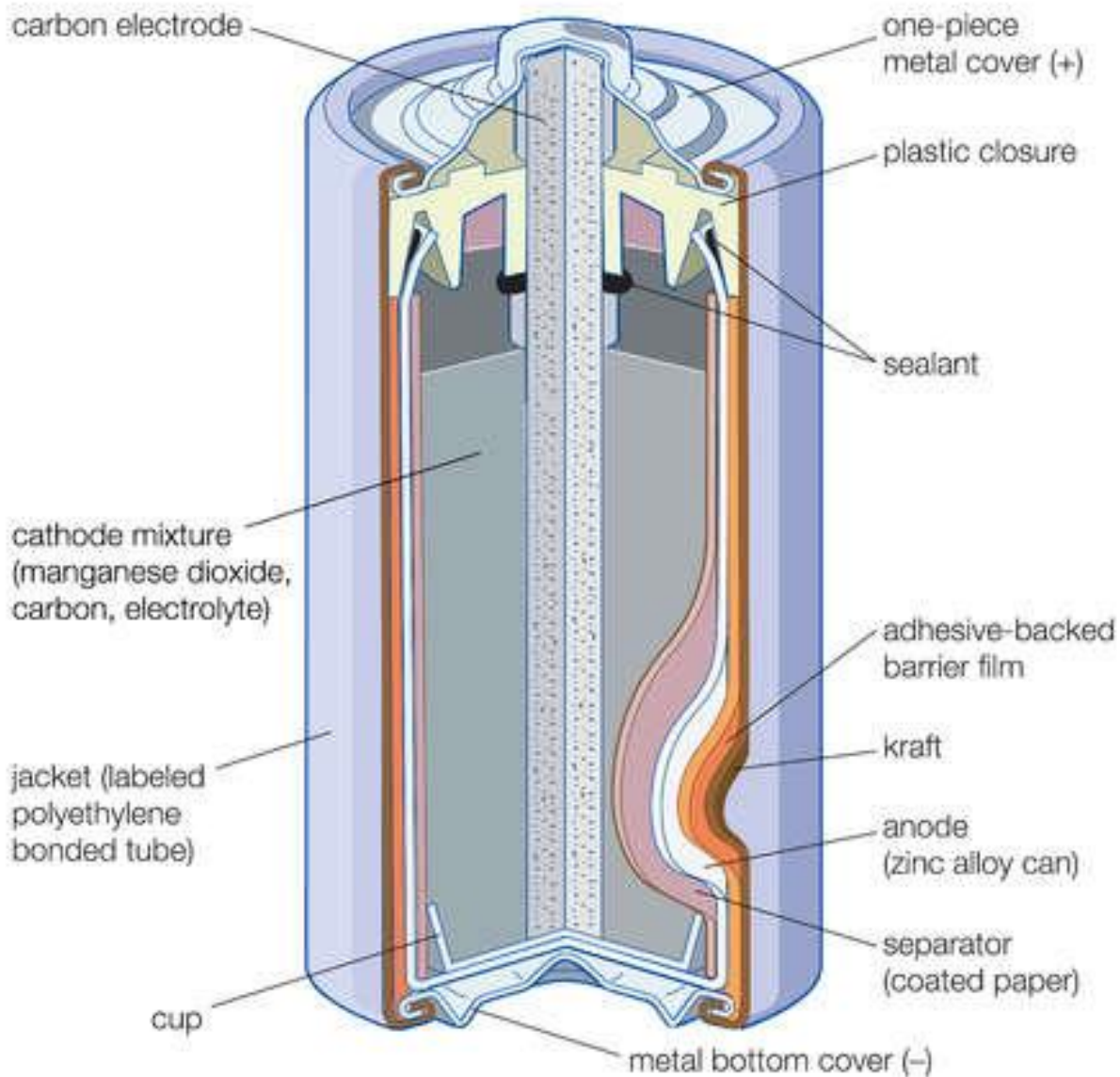


DIAGRAM OF A ZINC CARBON CELL

**PHYSICS
FORM 5
ELECTRICITY**

A primary cell is one which must be thrown away when its chemicals have been used up.

A secondary cell is one that has first to be charged up by forcing a current 'backwards' through it.

TABLE SHOWING ADVANTAGES AND DISADVANTAGES OF A PRIMARY CELL

Advantages	Disadvantages
Cost Less	Can be used until its chemicals have been used up
Saves on electrical energy	Cannot be recharged

TABLE SHOWING ADVANTAGES AND DISADVANTAGES OF SECONDARY CELLS

Advantages	Disadvantages
Can be used continuously	Costs plenty
Can be recharged	If overcharged, can be dangerous to environment

**PHYSICS
FORM 5
ELECTRICITY**

Diagram Showing How A Battery Can Be Charged

The transformer steps the mains voltage down to a little above the voltage of the battery. Alternating current is converted into direct current. The current travels by means of conventional current. The ammeter is there to check that the current is a small enough one and the variable resistor is there to reduce if it is not.