





# Practical Electricity

Quantity	SI Unit	Formula	Definition
Resistance	Ohm, $\Omega$	$R = \frac{V}{I}$	Resistance is the ratio of potential difference across a component and the current flowing through the component.
Power	Watt, W	$P = VI$ $P = \frac{V^2}{R}$ $P = I^2R$	Power is the rate of work done / energy transferred.
Energy (Work done)	Joule, J	$E = Pt = Vit$ $E = \frac{V^2t}{R}$ $E = I^2Rt$	From Energy chapter: Energy is the capacity to do work.

## Safety Features

- **Fuse**
  - safety device added to an electric circuit to prevent excessive current flow
  - limits the amount of current, blowing at the rating value
  - Connected to live wire to isolate the rest of circuit from the high voltage source when fuse melts
- **Circuit Breaker**
  - safety device to prevent excessive current flow into household.
  - part of the main electrical wiring to an apartment or room
  - When current surge, circuit breaker will trip, causing a switch to flip to off.
  - Position of Switches, Fuses or Circuit breakers
  - Connected along the live wire to break circuit completely from "live" connection in event of fault.
- **Earth Wire**
  - Metal casing is grounded, connected to earth.
  - In the event of an electrical fault with live current passing to metal case, current flows to the ground instead, keeping user safe.
- **Double Insulation**
  - In absence of earth wire, double insulation is used instead.
  - Double insulation has two layers of insulation such that the live components never touch the case.

## Cost of Electricity

- 1 unit of Electrical Energy = 1 kWh

$$E = Pt$$

$$\langle \text{Joule} \rangle = \langle \text{watt} \rangle \times \langle \text{second} \rangle$$

$$\langle \text{Kilowatt-hour} \rangle = \langle \text{kilowatt} \rangle \times \langle \text{hour} \rangle$$

$$(\langle \text{kWh} \rangle = \langle \text{kW} \rangle \times \langle \text{h} \rangle)$$

- Cost of Electricity = No. of units  $\times$  Cost rate

## Renewable energy

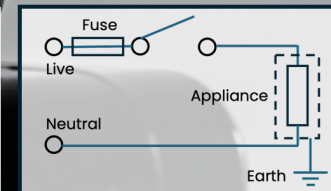
- Energy from sources that can be replenished naturally.

## Non-renewable energy

- Energy from natural sources that cannot be replenished at a sustainable rate.

## Electrical Hazards

- Damaged Insulation
- Overheating of cables
- Damp Environment



## Safety Features

### Three-pin plug

- **Live wire**
  - Brown
  - Carries high voltage
  - Connected to fuse
- **Neutral wire**
  - Blue
  - Zero voltage
  - Completes path of current
- **Earth wire**
  - Green and yellow
  - Safety wire
  - Connected to metal case

