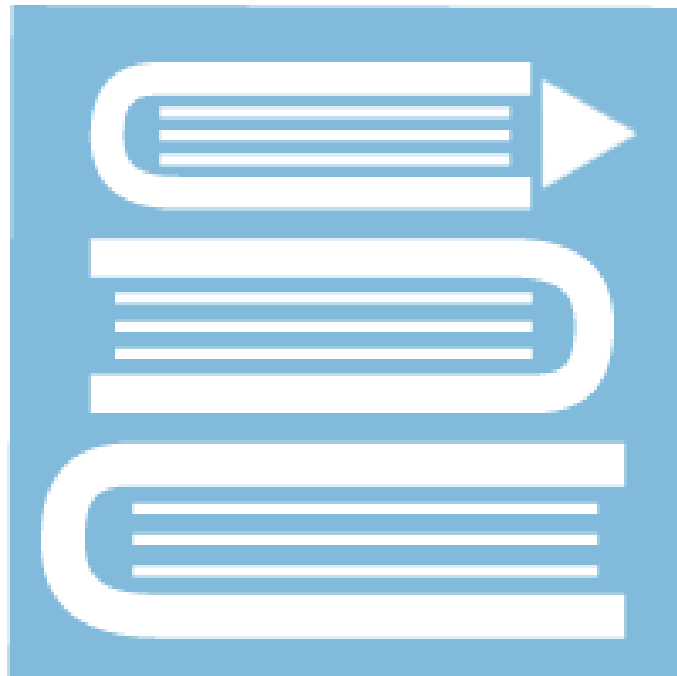


JC-Learn

Science Notes Electricity in the Home and Electronics



Electricity in the Home and Electronics

Mains supply and safety

The mains supply to the sockets in your house or school is at 230 V a.c. This voltage could push a big enough current through your body to kill you. There are two cables from mains supply to your home or school. One is called the live. The other is the neutral.

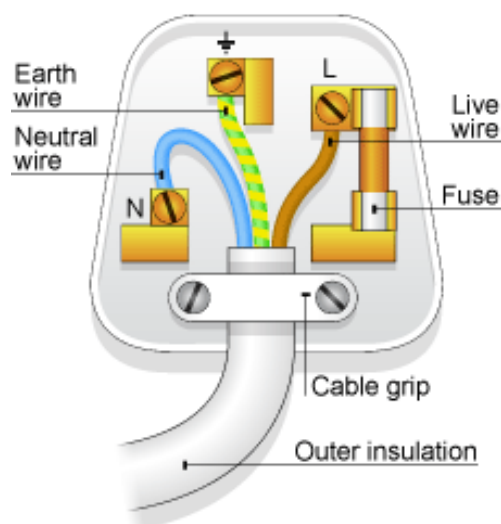
The Set-up

1. The main fuse is on live wire as it comes into homes
2. Then, both wires pass through electricity meter, which records number of units used.
3. Both wires then pass to distribution box/ fuse box.

Fuses and circuit breakers are safety components in electric circuits. Both cut off current in circuit if current becomes too big. Fuses work using heating effect of electric current. Circuit breakers use the magnetic effect of an electric current.

- Fuses of various ratings are available (1 A, 3 A etc.). A fuse, for example, will melt if a current of more than 5 A flows through it. When a fuse melts like this, it cannot be used again.
- Circuit breakers simply 'trip' off if the current goes above a certain value. The switch needs only to be closed again when the fault in the circuit has been corrected. The circuit breaker does not have to be replaced. A circuit breaker also acts quicker than a fuse.

Most appliances are connected to an electricity supply by pushing a plug into a wall socket. Most plugs have three terminals – live (brown in colour), neutral (blue) and earth (green/yellow). The earth terminal is connected to a metal plate buried in the earth. It is there purely as a safety device to protect the user of an appliance.



The cost of electricity

Power can be defined as the energy used per unit time. The unit of power is the watt. The ESB sell electricity in amounts, which they call 'units'. The normal unit of energy is the joule but is too small for costing purposes. So, the ESB use the kilowatt-hour (kW h).

- A kilowatt-hour is the electrical energy converted by a 1 kW appliance running for 1 hour.

If a power rating of an appliance is in watts (W), convert it to kilowatts (kW h) by dividing by 1000.

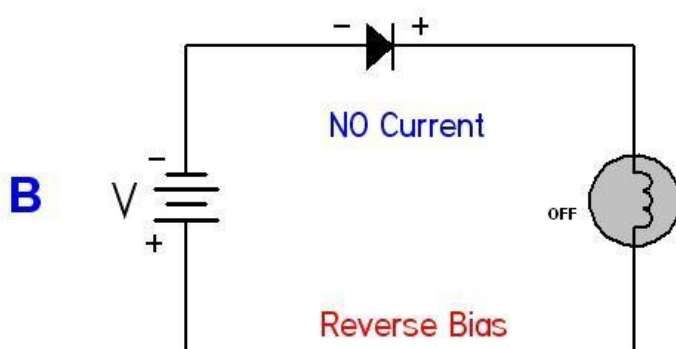
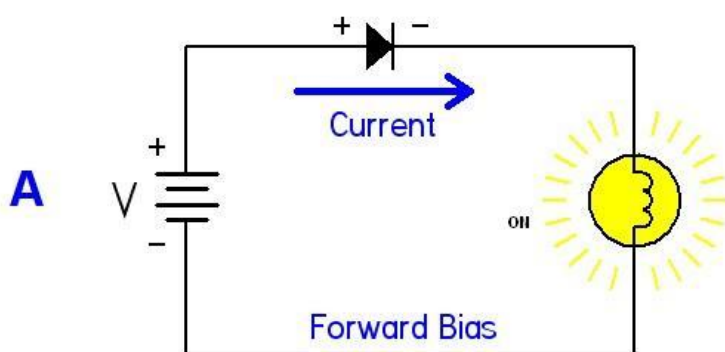
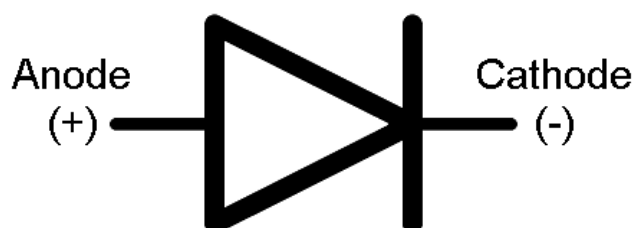
- Number of kilowatt-hours (or 'units') used = number of kilowatts \times number of hours
- Cost = (number of kilowatt-hours used) \times (price per kilowatt-hour)

Electronics

The key to most of the development in electronics was the microchip. Each circuit may have several electrical components or parts with various functions. Some of the components include the diode, the LED and the LDR.

1. The Diode – a diode is a device that allows current to pass through it in one direction only. One end of the diode is the cathode (-) and the other end is the anode (+).

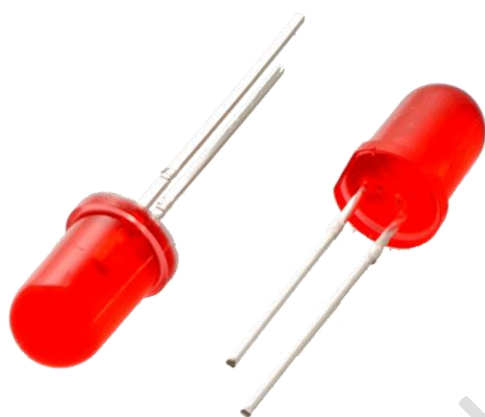
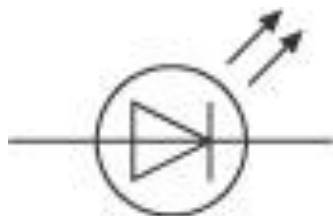
- If the cathode is connected to the negative terminal of the battery and the anode is connected to the positive terminal, the diode will conduct a current and is forward biased.
- If the cathode is connected to the positive of the battery and the anode is connected to the negative terminal, then the diode is reverse biased and will not conduct a current.
- Uses of a diode include a rectifier (changes alternating currents to direct currents) or to protect appliances that use direct current.



2. The Light Emitting Diode (LED) – An LED is a special diode, which gives out light when current passes through it. A lens at top of LED helps to focus the emitted light. The shorter cathode lead is near the flat edge at base of LED.

- A LED is a diode, so current will only flow through it when it is forward biased.

- A LED requires only a very small current, especially when compared to an ordinary bulb.
- Uses of LEDs make useful indicator lamps and many clocks use LEDs as digital displays.



3. The Light Dependent Resistor – The LDR is a special type of variable resistor. Its resistance varies with the amount of light shining on it.

- In dim light, the LDR has high resistance and allows little current through.
- In bright light, the resistance of the LDR is low, and it allows much more current through.
- Uses of LDRs include cameras and burglar alarms.

