SERIES CIRCUIT

**Battery voltage**
In a series circuit the battery voltage should be equivalent to and not greater than the **SUM** of the bulb voltages, providing all the bulbs are of the same voltage. E.g. Two 1.5V bulbs would need a 3V battery.

**NOTE** You cannot isolate a bulb in this type of circuit i.e. If one bulb blows, all the lights will go out (think Christmas lights...). This circuit is only useful for connecting a very small number of bulbs.

PARALLEL CIRCUIT

**Battery voltage**
In a parallel circuit the battery voltage should be equivalent to and never greater than the **voltage of an individual bulb** providing all bulbs are of the same voltage.

E.g. Any number of 1.5V bulbs can be connected in parallel, requiring only a 1.5V battery (useful for connecting a large number of bulbs in one circuit).

**NOTE** A higher voltage battery could potentially damage the bulbs. A lower battery voltage (than total bulb voltage) can be used - but may cause a slightly dimmer glow.

CONNECTING MES BULBS

Recommended:
In a parallel circuit 4 AA batteries will power the whole circuit.

LED - LIGHT EMITTING DIODE

Advantages over incandescent light sources:

- **Efficiency**: they emit more light per watt than with incandescent bulbs.
- **Longer lifetime**: they tend to slowly dim over time, rather than the abrupt failure of incandescent bulbs.
- **Size**: can be very small (smaller than 2mm).

**BASIC DEFINITIONS**

- **Voltage**: the force that pushes an electrical current. (E.M.F. Electro-motive force)
- **Current**: the flow of electrons around a closed circuit
- **Resistance**: the property of a material to restrict the flow of an electrical current

**UNITS**
- volts = V
- amps = I
- Ohms = Ω/R