Amps

Amps measure the flow of electricity as an electric current. You should think of electric current as the flow of water through a hosepipe. The more water flowing through the hosepipe, the stronger the current is.

Volts

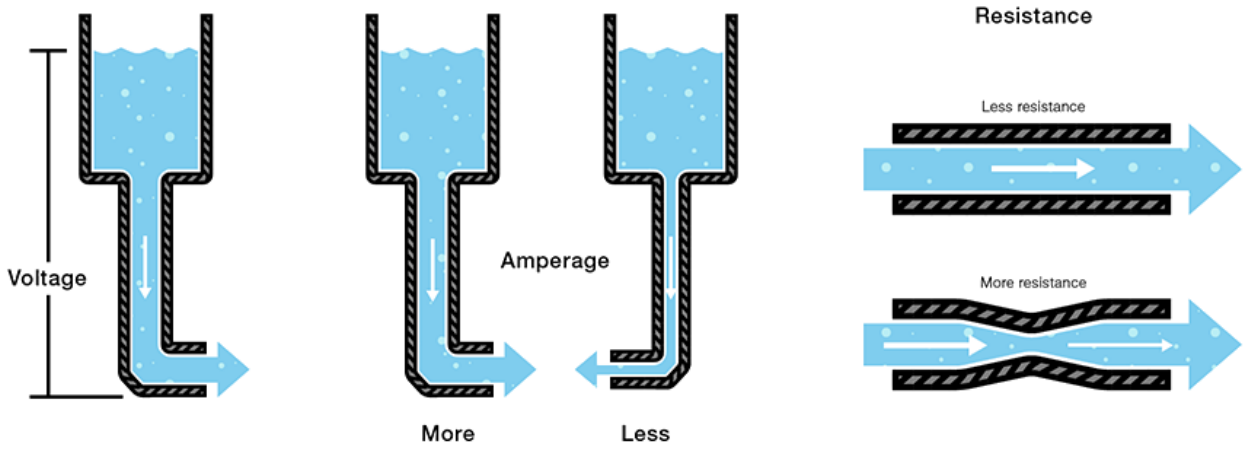
Volts are the measurement used to determine how much force is needed to cause the electric current to flow. In keeping with the earlier example, you could think of volts as the water pressure in the hosepipe, which makes the water flow.

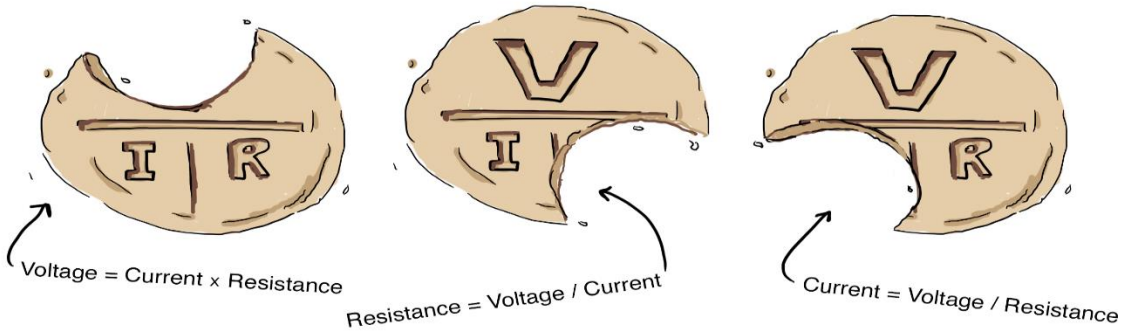
Watts

Amps multiplied by Volts equals Watts, which is the measurement used to determine the amount of energy. The higher the wattage is, the more power and output from the appliance. In terms of the hosepipe example, this would refer to the amount of water being released.

Resistance:

Is an electrical quantity that measures how the device or material reduces the electric current flow through it.
The resistance is measured in units of ohms (Ω).
If we make an analogy to water flow in pipes, the resistance is bigger when the pipe is thinner, so the water flow is decreased.





- **Supply voltage:** This is how much power you're putting into the circuit. Batteries and wall warts will have the output voltage printed on them somewhere. If you're using multiple batteries*, add the voltage together.
- **LED Voltage:** Sometimes "Forward Voltage" but usually just abbreviated "V".
- **LED Current:** Sometimes "Forward Current". This is listed in milliamps or "mA".

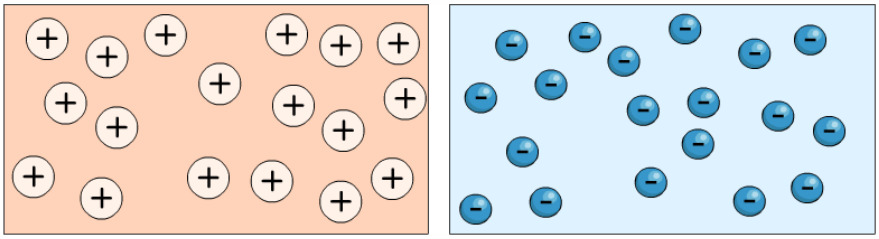
Both of these last two can be found on the packaging for your LEDs or on your supplier's web site. If they list a range ("20-30mA") pick a value in the middle (25 in this case). Here are some typical values, but *use your own values to be sure you don't burn out your LEDs!:*

Red LED: 2V 15mA
Green LED: 2.1V 20mA
Blue LED: 3.2V 25mA
While LED: 3.2V 25mA

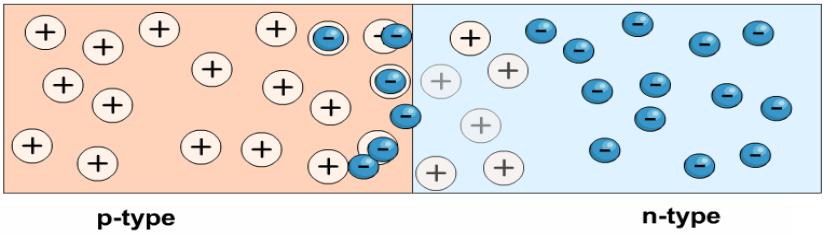
Example: R=5V−2V / 25mA= 120 (approx 150Ω)

3 / 0.025 = 120 (approx. 150 ohms)

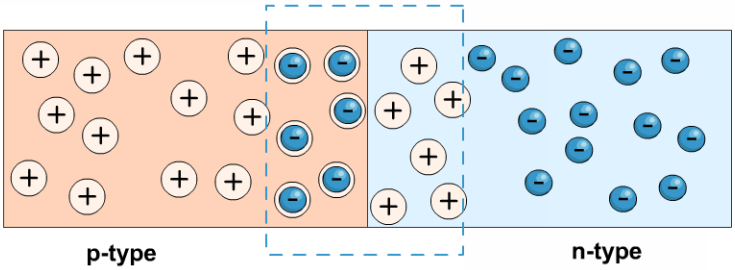
Diodes:



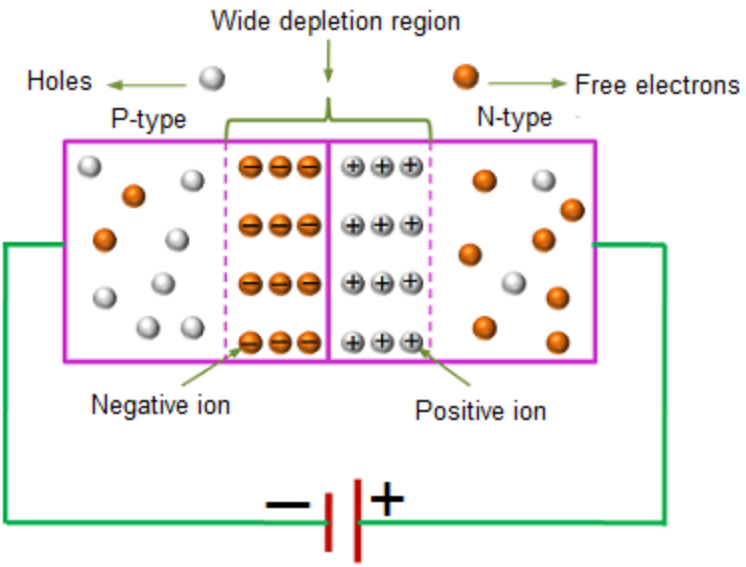
-Semiconductors n-type and p-type are brought together



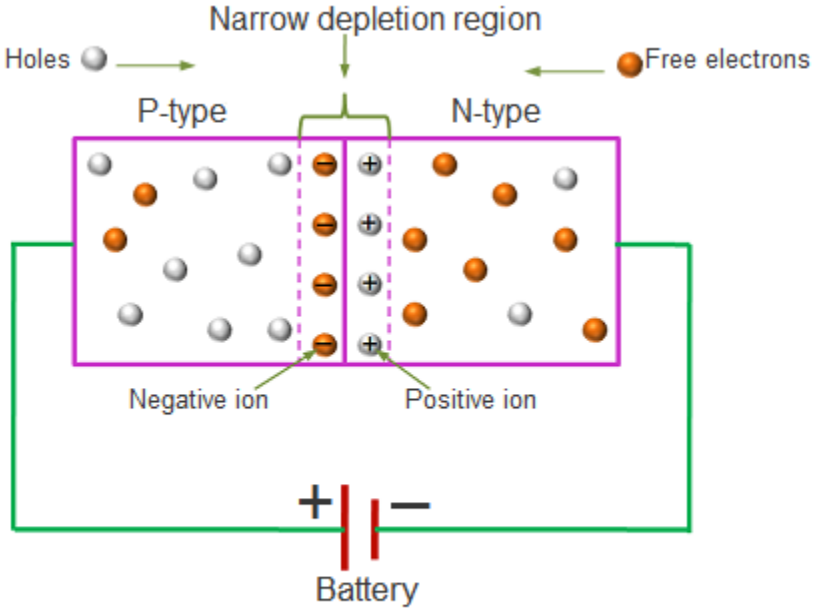
-Semiconductors n-type and p-type are brought together
-Electrons and holes migrate across the junction



-Semiconductors n-type and p-type are brought together
-Electrons and holes migrate across the junction
-The depletion layer is formed



Reverse bias



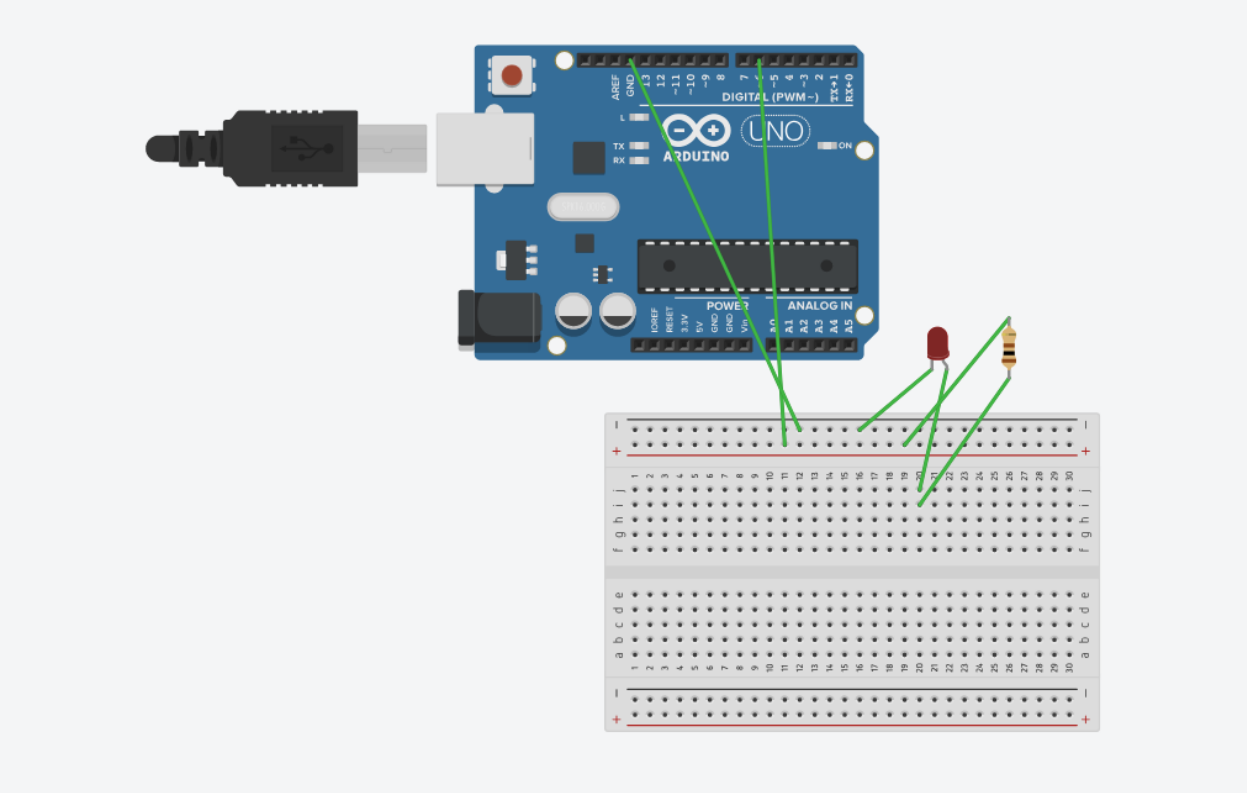
Forward bias

LED ： Light Emitting Diode

The “**Light Emitting Diode**” or LED as it is more commonly called, is basically just a specialised type of diode as they have very similar electrical characteristics to a PN junction diode. This means that an LED will pass current in its forward direction but block the flow of current in the reverse direction.

Light emitting diodes are made from a very thin layer of fairly heavily doped semiconductor material and depending on the semiconductor material used and the amount of doping, when forward biased an LED will emit a coloured light at a particular spectral wavelength.

LED Lesson:



```
void setup()
{
  pinMode(6, OUTPUT);
}

void loop()
{
  digitalWrite(6, 1);
  delay(1000); // Wait for 1000 millisecond(s)
  digitalWrite(6, 0);
  delay(1000); // Wait for 1000 millisecond(s)
}
```

Step by step circuit configuration:

1) Connect a wire from GND on Arduino to negative (marked -) on the bread board

2) Connect a wire from 5V on Arduino to positive (marked +) on the bread board

3) Connect LED's shorter PIN (-ve) to any free negative slot on the bread board (same row as the GND wire)

4) Connect LED's longer PIN to one of the bread boards rows that is not marked + or –

5) From the slot vertically next to the LED PIN connect a resistor to the + (same row as 5 volts) on the bread board

This completes the LED circuit

TIP : A 220 Ohm Resistor will work good for most of LEDs : Code first four colors are RED RED BLACK BLACK