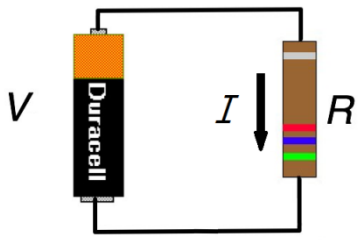
TechResort Cheat Sheet

Resistors - Basics

- Resistors are very simple components we use in our circuits. They're called 'Resistors' because they resist the flow of electric current.
- The higher the value of resistance, the less current will flow.
- We use them principally to make sure that we get the right voltage and current at various points in our circuit.
- We'll usually tell you what value of resistor to use in a circuit: you won't have to work it out for yourself just yet.
- Here are some values of resistance and how they might be referred to:

	Also written
120R	120 Ohms, 120Ω, 120
1k	1,000 Ohms, 1000Ω, 1 kilOhm, 1 kΩ, 1k0
5k6	5600 Ohms, 5600Ω, 5.6 kΩ
1M	1,000,000 Ohms, 1 MegOhm, 1 MΩ, 1M0
3M3	3,300,000 Ohms, 3.3 MΩ

- You can tell the value of your resistor from the coloured bands on it or by measuring it with a multimeter, there are separate cheat sheets for that!
- To use a resistor, its leads are simply plugged into two different rows of a solderless breadboard. You can connect it any way round you want.
- Sometimes a resistor's lead will have a small amount of glue stuck to its legs from its packaging. If your circuit doesn't work as you expect, have a look to see if that might be the case. The legs can be shortened if necessary.



- Here's a very simple circuit. A battery is attached to a resistor so a current flows through it.
- The battery voltage is *V* (volts)
- The resistor value is *R* (ohms)
- The current that flows is *I* (amps)
- Some maths!!

$$V = I \times R \qquad I = V \div R \qquad R = V \div I$$

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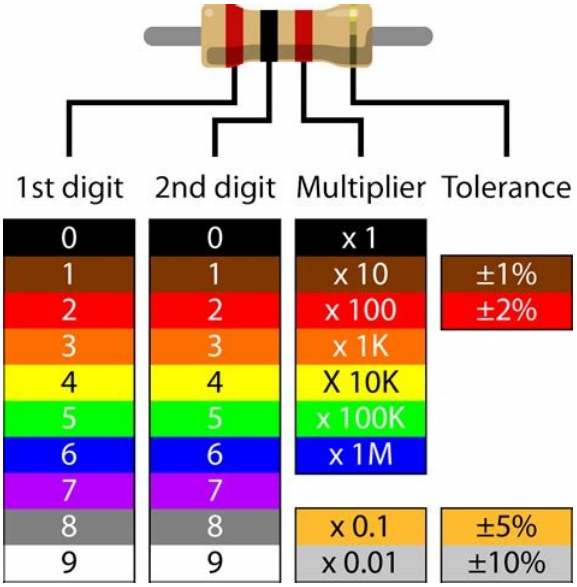
Resistors – The Coloured Bands

- Most of the time we'll use resistors like this that have four coloured bands. We use the bands to determine the value of resistance.



- The fourth band (on the right above) is usually a silver or gold colour and is often slightly separated from the other here. This denotes the Tolerance but we can ignore that for now!
- To determine the value of resistance:
    - First, combine the digits corresponding to the first two coloured bands e.g.
        - Brown-Black = 10
        - Green-Blue = 56
    - Add to that the *number of zeros* indicated by the colour of the third band e.g.
        - Brown-Black-Brown = 100 Ohms (i.e. 10 and one zero)
        - Green-Blue-Orange = 56000 Ohms or 56k (i.e. 56 and three zeros)

	Some Common Values
68R	Blue – Grey – Black
120R	Brown – Black – Brown
390R	Orange – White – Brown
1k	Brown – Black – Red
10k	Brown – Black – Orange
1M	Brown – Black – Green

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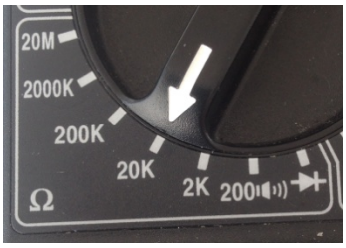
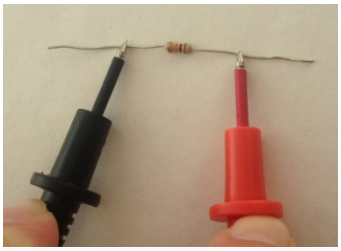
Resistance Measurement

- If you're worried you might have the wrong value of resistor, you can measure it using a Multimeter!
- Make sure the black lead is plugged into the 'COM' or '0V' socket of your Mulitmeter
- Make sure the red lead is plugged into the socket labelled 'Ω' (amongst other things)



- Rotate the central dial to the 'Ω' or 'DC Resistance' section. Point the arrow towards a value greater than the resistance you want to measure. The value shown above is 20kΩ
- The letter at the end also shows you the units your measurement will be displayed in. In the above setting our result will be shown in kΩ
- Hold the ends of the probes against the two wires of your resistor. If you are measuring a very large value of resistance (>100k), the resistance of your body may affect the result!




- The display above using the '20K' range is showing a measured value of 9.86kΩ. Allowing for measurement error and tolerance there is a good chance that this is a 10kΩ resistor!

- If you are seeing an output something like that shown here it means that either:
  - Your resistor value is greater than the maximum measurable using your chosen range. Try a higher range. *OR*
  - Your probes are not making proper contact with your resistor leads!