Using the Multimeter to Measure Voltage and Resistance

Multimeters are commonly used to measure voltage and resistance between two points. Current is rarely measured because you must alter the circuit to measure the current. Since we don't really want to alter the circuit, we measure voltage and resistance and calculate the current using Ohm's law (I = DV / R).

Voltage and resistance are always measured between two points.

Voltage is the easiest and most common measurement. To measure voltage you set the multimeter to either DC or AC voltage and choose the range based on what you estimate the voltage to be. Then you touch the black (negative) probe to ground (the most negative point in the circuit) and then touch the red (positive) probe to a point in the circuit where you want to know the voltage (while keeping the black probe touching ground.) If you want to know the voltage difference (DV) between one side of a resistor and the other side you can simply put the black probe on one side and the red probe on the other. If the meter has an analog scale (a needle) and the needle goes the wrong way, reverse the red and black probes so the needle will go the other way and give you the voltage difference between those two points.

To measure resistance in a circuit, first turn off (or disconnect) the power supply. You may damage the multimeter if the circuit is still powered.) Next, select a range on the multimeter and touch two metal points in the circuit. If the needle doesn't move or goes all the way to the end of the scale, select another range. You can not use this method to measure the resistance of a resistor in the circuit because there may be other paths between the nodes of a resistor. One leg of a resistor must be disconnected from the circuit to make sure that the only path between the two probes is through that resistor. To measure the resistance of a resistor, select the range on the meter that you think is closest to the right value and use the probes to touch either side of the resistor. If you have selected the right range, the needle will be somewhere between the left and the right end of the scale. To find the value of the resistor, read the number from the scale that matches the range you are using.

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