# Measuring DC Voltage & AC Voltage with a Multimeter

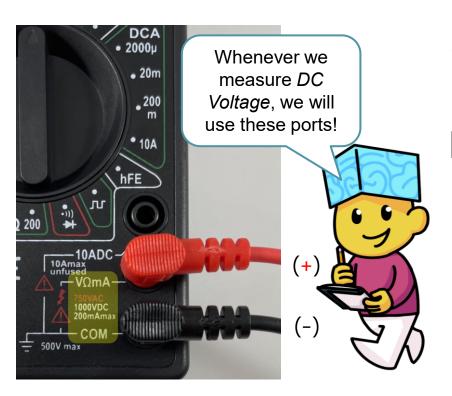








### Ports Used to Measure DCV



Whenever DC Voltage is being measured, always have the probes plugged into these ports:

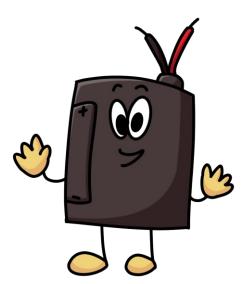
red probe → VΩmA port black probe → COM port



## Direct Current Voltage (DCV)

When testing *Direct Current Voltage* set the dial to the DCV area on the Face of the multimeter.





On the next page, we will show how to measure voltage from a **9V battery.**To do this, set the dial to the DCV area and the "20" position because this most accurately measures up to 20 Volts!



## Determine Battery Voltage and Polarity

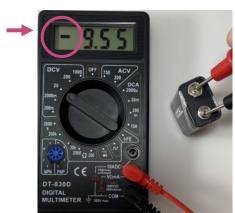


Touch the red probe to the positive (+) terminal of the battery and the black probe to the negative (-) terminal of the battery.

The display will indicate the voltage the battery can supply.

If you are not sure which terminal is the (+) or (-) that's ok! Just connect the probe leads to either battery terminal!

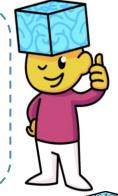






If the number on the display is negative, the positive (red) probe and negative (black) probe are connected to the wrong battery terminals.

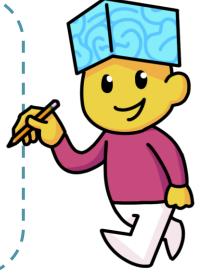
You just figured out where the positive (+) and negative (-) terminals of the battery are. This is the battery *polarity*.



TECHNICAL

If the approximate voltage to be measured is known, position the dial to the first number above the expected voltage range.

In the case of the 9V battery we turned the dial to the 20V position.



If the voltage to be measured is unknown, set the range at the highest position and reduce it until an accurate measurement is displayed.



### Measuring Direct Current Voltage (DCV)

**Dial Position** 

There are *five range positions* on the DC Voltage (DCV) section of the dial:

1000 - measure up to 1000 volts

- measure up to 200 volts

- measure up to 20 volts

2000m - measure up to 2 volts

200m - measure up to 0.2 volts





### Best Dial Position to Measure DCV

Let's see what this looks like with a 9V battery. If we are measuring an unknown value, set the dial to the highest range value and work our way down.

Notice each time we move down to a lower range value, the accuracy increases until we reach a range value that is too low (2000mV). The most accurate measure of battery voltage is when the dial is at the 20V mark.

#### Displays 9 Volts



Displays 9.5 Volts



200V

Displays 9.56 Volts

**20V** 



2000mV (2V)

#### Too high for the selected setting

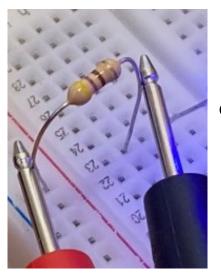


200mV (0.2V)



## Measuring Direct Current Voltage (DCV)

Measuring voltage at different parts of a circuit is done in the same way voltage is measured on a battery.



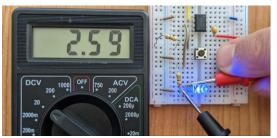
Place the (+) and (-) probes from the multimeter at either end of a resistor, component, or group of components.

The voltage difference between the two probes is shown on the display.



Place the red probe on the long leg (anode) of the LED and the black probe on the short leg (cathode) of the LED. The multimeter will show the voltage drop across the LED in the circuit. This is usually between 1.7V and 4.0V.

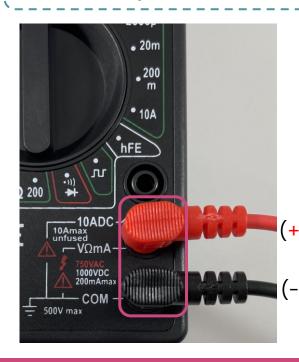






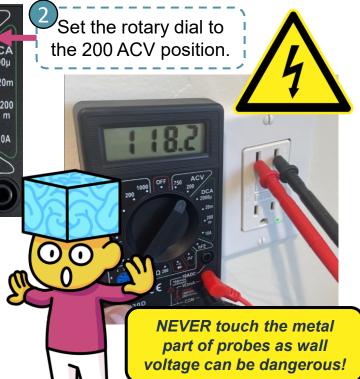
## Measuring AC Voltage from a Wall Outlet

Connect the **red probe** to "VΩmA" jack and the **black probe** to the "COM" jack.



DCV 200 OFF 750 ACV 200 DCA 2000μ 2000m 2000 m 2000 m 2000 m 10A hFE

With an adult's supervision, insert the probes into a wall socket to measure the AC voltage. The voltage value will be shown on the digital display.



# SQUARE BRAIN

Measuring DC & AC Voltage with a Multimeter



