Placing a Digital Meter in Circuits
Series Circuits

\[ V_s \quad R_1 \quad R_2 \quad R_3 \]
Measure Total Resistance, $R_T$

Make sure the power is removed from the circuit when measuring resistance! \[ 3 + 5 + 3 = 11 \, \Omega \]
Measure Resistance of $R_1$

Remember; always open the circuit when measuring resistance. This means remove one lead of the resistor from the circuit.
Measure Resistance of R2

Remember; you do not have to worry about the meter’s lead polarity when measuring resistance.
Measure Resistance of $R_3$

You can place the open on either side of the resistor you are measuring.
Series Circuit with Polarities

Many times it is helpful to mark the polarities around the circuit. This works whether you are using electron or the conventional current flow.
Measure Voltage Source, $V_S$

Notice the polarity of the meter leads.
Measure Voltage across Resistor 1, $V_{R1}$

5 V

1.3636 V
Measure Voltage across Resistor 2, $V_{R2}$
Measure Voltage across Resistor 3, $V_{R3}$

Pay attention to the polarity of the probes.

5 V

1.3636 V

2.2727 V

1.3636 V
Measure Total Current, $I_T$

You must open the circuit to place the meter. Notice the polarity of the meter leads.

\[ \text{.4545A, 454.5mA} \]
Measure Current through $R_1$, $I_{R1}$

You can place the meter on either side of the resistor. Notice the polarity of the meter leads are opposite from where they would be measuring voltage.

$.4545\text{A, 454.5mA}$
Measure Current through $R_1$, $I_{R1}$

You can place the meter on either side of the resistor. Notice the polarity of the meter leads are opposite from where they would be measuring voltage.

$.4545A, 454.5mA$
Measure Current through $R_2$, $I_{R2}$

Notice the polarity of the meter leads are opposite from where they would be measuring voltage.

$5.0V$

$3 \Omega$

$.4545A$, $454.5mA$
Measure Current through $R_3$, $I_{R3}$

You can place the meter on either side of the resistor. Current stays the same in a Series Circuit.
Parallel Circuits
Measure the Resistance of $R_1$

Make sure power is off and you open the circuit in the branch of $R_1$. 
Measure the Resistance of $R_2$

Make sure power is off and you open the circuit in the branch of $R_2$. 

10kΩ
Measure the Resistance of $R_3$

Make sure power is off and you open the circuit in the branch of $R_2$. 
Measure Total Resistance, $R_T$

Make sure power is off and you open the circuit.
Measure the Voltage across $R_1$, $V_{R1}$
Measure the Voltage across $R_2$, $V_{R2}$
Measure the Voltage across $R_3$, $V_{R3}$
Measure Total Supply or Source Voltage, \( V_T \) or \( V_s \)
Measure Current flowing through $R_1$, $I_{R1}$

Make sure polarity is observed and you open the circuit and place the meter in series with the branch.
Measure Current flowing through $R_2$, $I_{R2}$

Make sure polarity is observed and you open the circuit and place the meter in series with the branch.
Measure Current flowing through $R_3$, $I_{R3}$

Make sure polarity is observed and you open the circuit and place the meter in series with the branch.
Measure Total Current, $I_T$

Make sure polarity is observed and you open the circuit and place the meter in series with the branch.
The End

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