

## EXPERIMENT #2

### Kirchhoff and Ohm's Laws

The purpose of this experiment is to test a few of the basic laws governing electric circuits, at the same time giving you more practice at setting up circuits and operating the instruments.

#### 1. Ohm's Law

Ohm's law states that the current flowing through a resistor is proportional to the voltage applied across it,  $V=IR$ , where the constant relating the 2 is the resistance  $R$ , measured in Ohms. Pick a resistor and use the same configuration as used at the end of experiment #1:

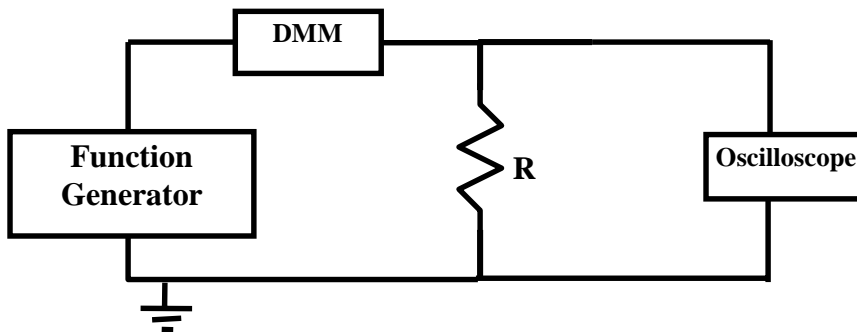


Fig. 2.1

Test Ohm's law not just at one value of the applied AC voltage, but at several voltages to show that the  $I - V$  relationship is linear. You'll eventually do a linear least squares fit of your data, so be sure to take enough points and to include errors.

#### 2. Kirchhoff's Voltage Law

Assemble the circuit below using three resistors of your choice. Use the DMM to test Kirchhoff's voltage law around the loops in the circuit.

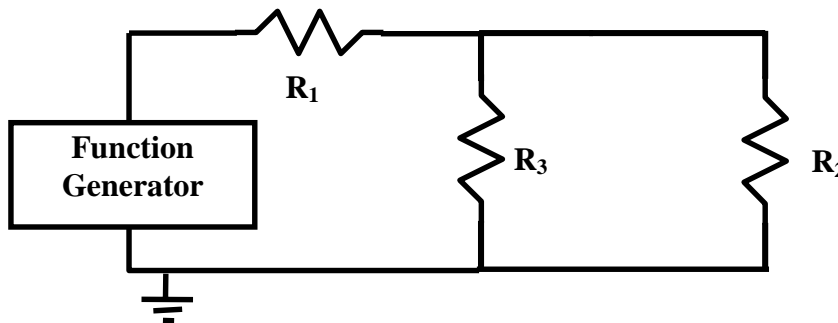


Fig. 2.2

### 3. Kirchoff's Current Law

Assemble a circuit with a 100 Ohm and a 1000 Ohm resistor connected in parallel. Connect the combination to the function generator and then insert the DMM into the circuit in various places in order to test Kirchoff's current law at the nodes in the circuit.

### 4. Kirchoff's Voltage Law and Phase

Assemble a resistor capacitor series combination as shown below and set the function generator to 16 kHz. Use your DMM to once again check Kirchoff's voltage law around the loop. If you see a serious discrepancy, check the actual AC signals on the oscilloscope. In particular, look at the voltage across the capacitor and the voltage supplied by the generator simultaneously to compare the phases of the voltages.

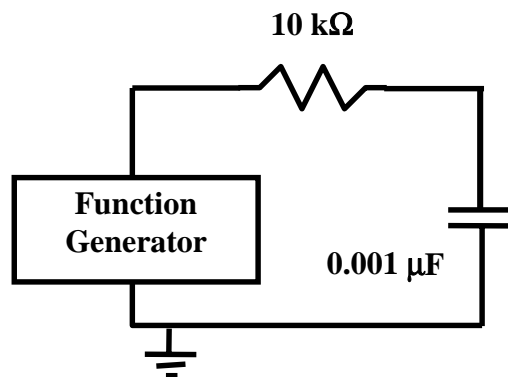


Fig. 2.3