

## Operation of DC Voltmeters, Ohmmeters, etc.



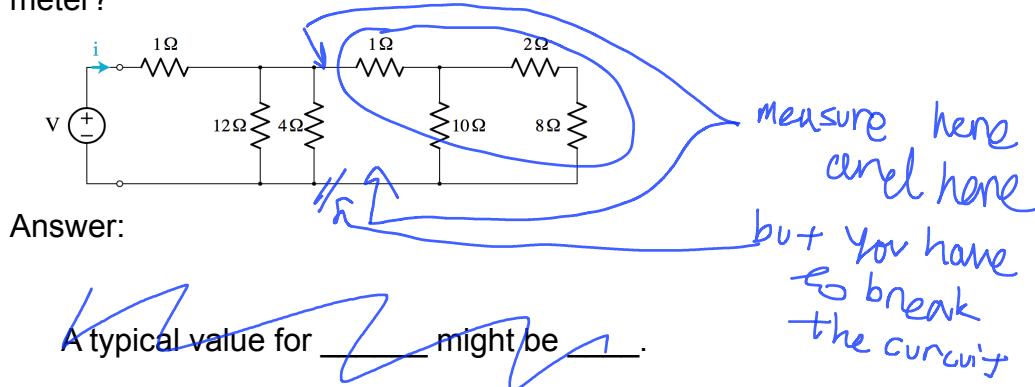
1. In order to measure *resistance*, meter must behave somewhat like a Battery (V is "known", I is measured, so R can be calculated).

You will only get reliable results if ...

$$\Delta V = IR$$

A typical value for V might be 0.1.

Example: You want to measure the resistance of the third main parallel branch in the network below (1 plus [10 and (8+2) in parallel]). How exactly do you do that with your meter?

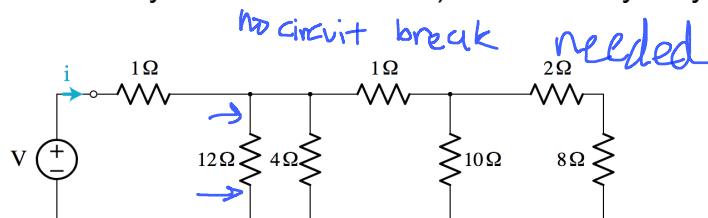


2. In order to measure *voltage*, meter must behave somewhat like a resistor (R is known, I is measured, so  $\Delta V$  can be calculated).

Can you measure reliable voltage differences around a circuit with current actively flowing? Under what circumstances / limitations? when resistors are large

A typical value for R might be MΩ.

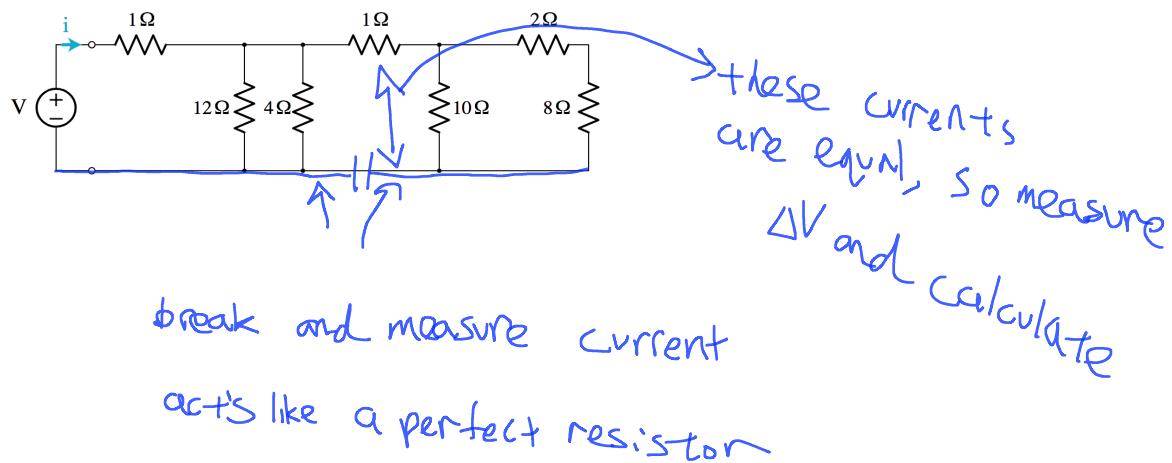
Example: You want to measure the voltage drop across the 12 ohm resistor (when connected to a 9 V battery in the circuit below). How exactly do you do that?



Answer:

3. In order to measure *current*, meter must behave something like A perfect conductor. This makes it dangerous in the sense that it is extremely easy to create a "short circuit," draw too much current, blow a fuse, etc. **Please do not try to measure current unless the teacher approves exactly what you plan to do.**

Example: You want to measure the current flowing through the 12 ohm resistor (when connected to a 9 V battery in the circuit below). How exactly do you do that?



# Solderless Breadboards

numbers & letter labels just for reference

All connected, a "bus"

groups of 5 connected

not connected

5V

3V

LED

Switch

Battery

Resistor

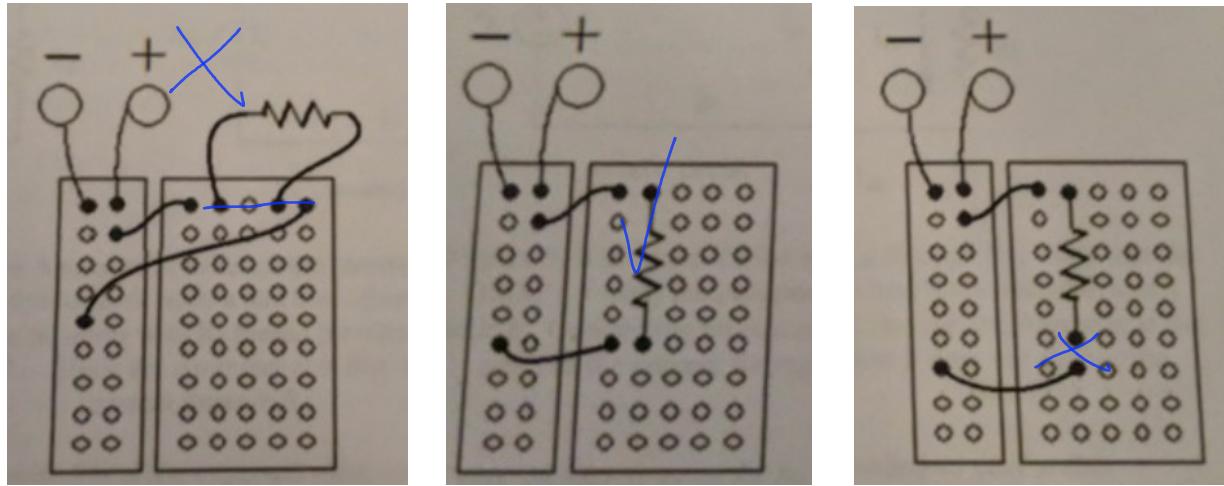
Breadboard

Hi-waote  
GENERAL PURPOSE  
6F2P 6V  
BATTERY  
TRANSISTOR  
RADIOS

Create diagrams of all four circuits

???

## Correct or Not?



No                  Yes                  No  
 Illustrate the Circuit at Left on  
 the Breadboard

