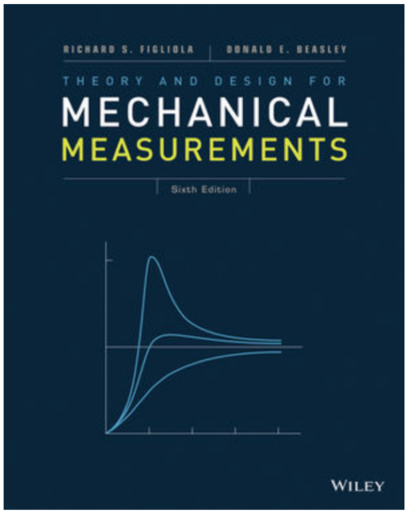



# Circuits Review

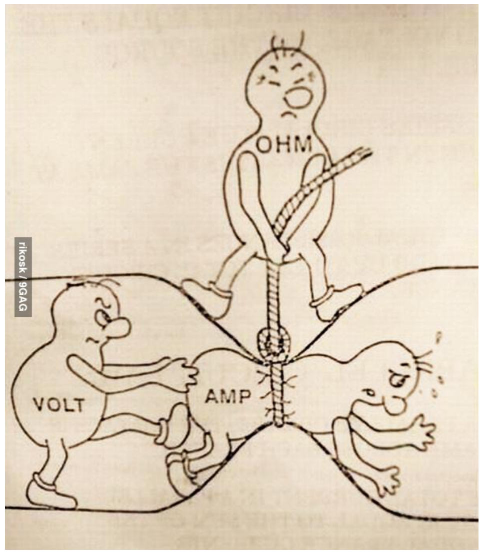
Engr325

Instrumentation

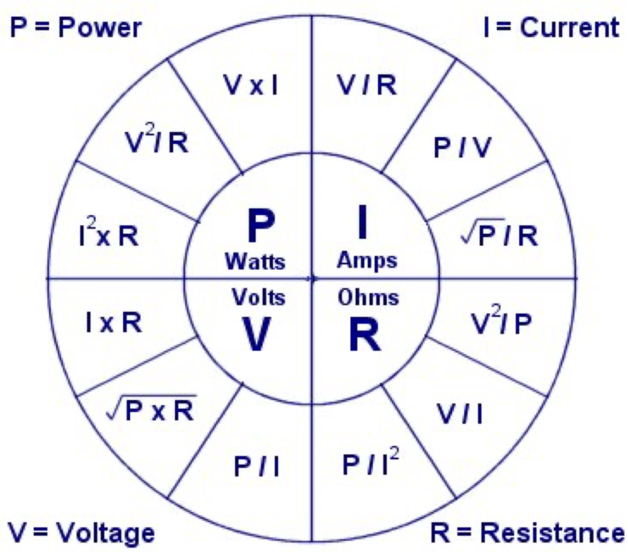
Dr Curtis Nelson

## Voltage, Current, and Resistance

## Ohm's Law

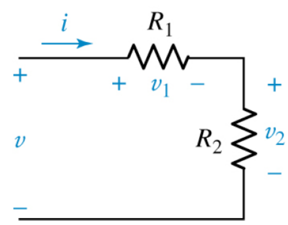



## Circuits Pie Chart



## Voltage Division

Resistors in series "share" the voltage applied to them.




$$i = \frac{v}{R_1 + R_2}$$

$$v_2 = i R_2 = \left(\frac{v}{R_1 + R_2}\right) R_2$$

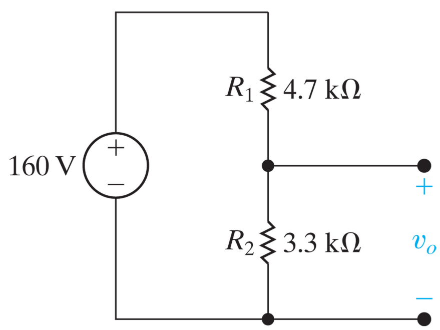
$$v = v_1 + v_2$$

$$= i(R_1 + R_2)$$

$$v_2 = \frac{R_2}{R_1 + R_2} v$$

## Voltage Divider Example

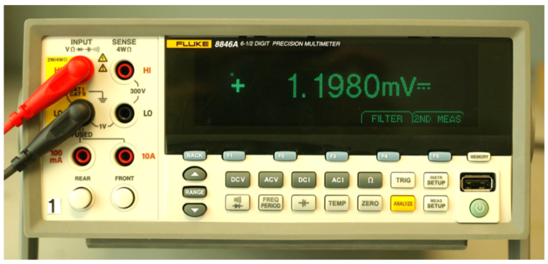
Find the voltage $v_0$ and the power dissipated in both resistors.




*$v_0 = 66V$*
*$P_{R1} = 1.88W$*
*$P_{R2} = 1.32W$*

# Instrument Loading

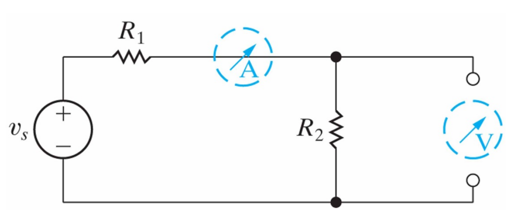
- The concepts of Input and Output Impedance ($Z_{in}$ and $Z_{out}$)
- Fluke 8846A Specs:
  - Fluke 8846A Specifications





# Measuring Voltage, Current, and Resistance

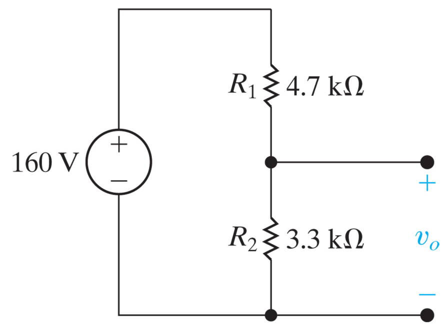
- An ideal meter has no effect on the circuit variable being measured.
- That means when an ideal *ammeter is placed in* ***series*** to measure the current through an element, it should have an equivalent resistance of 0 Ω.
- That means when an ideal *voltmeter is placed in* ***parallel*** to measure the voltage across an element, it should have an equivalent resistance of ∞ Ω.



## Instrument Loading - Example

Find $v_0$ if the meter placed in parallel with $R_2$ has an input resistance of:

a) 10M Ω.
b) 100k Ω.
c) 1k Ω.




$v_{0a} = 65.87V$
$v_{0b} = 64.75V$
$v_{0c} = 22.46V$