# *Analyzing a complex circuit by the "seat of your pants"*

- First step will almost always be to find the equivalent resistance of the circuit
  - This allows you to find the current through the battery, e.g. the total current in the circuit
  - Remember to break down internal pieces step by step, redrawing the circuit if necessary, to find total resistance
  - Also remember that ammeters and voltmeters are irrelevant to the behavior of the circuit! They merely measure what's going on.
- Then, use Ohm's Law on as many segments as needed to find the current through a particular branch and/or the voltage across a resistor. Repeat!
- *There is a more formal way to do this we will learn in a bit. This is the "seat of your pants" way that can work for moderately complex circuits.*

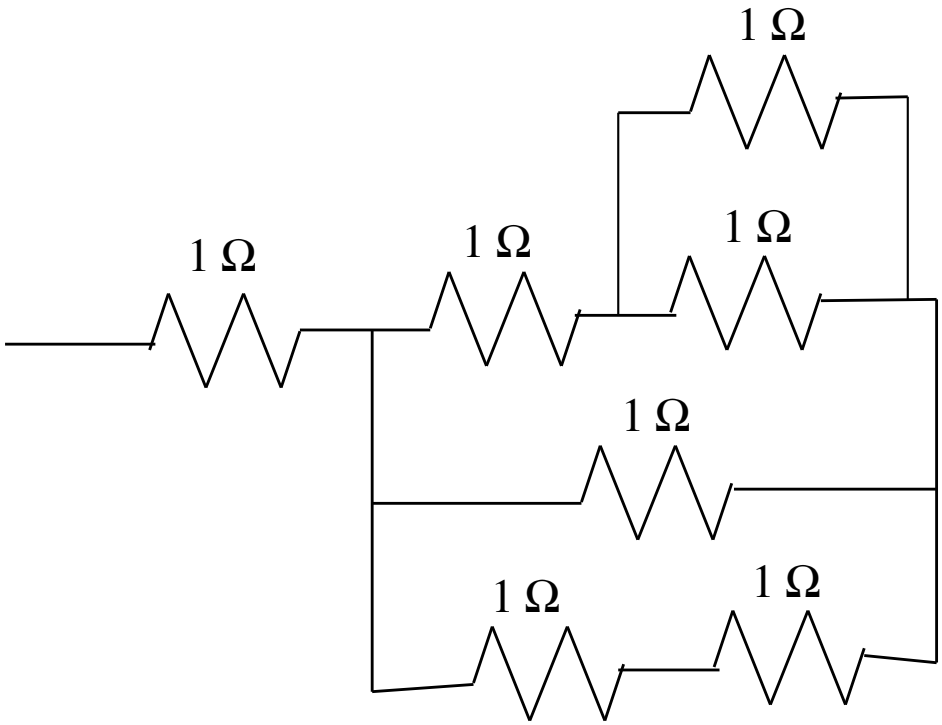
# Quick conceptual warm-up

**13.27)** Using as many 12 Ω resistors as you need, produce a resistor circuit whose equivalent resistance is:

**a.)** 18 Ω; and

**b.)** 30 Ω.

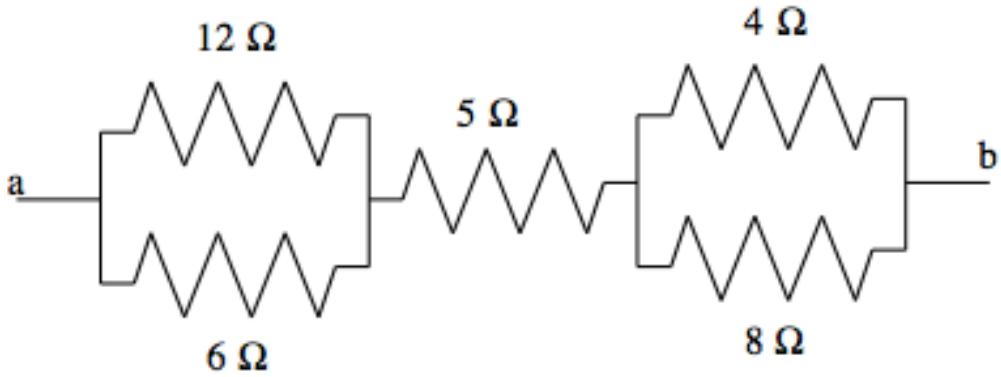
Where are we going with this? Complex circuits - like this one! How would you go about finding the equivalent resistance of this circuit?



# Problem 18.6

## Problem 18.6

a.) Equivalent resistance?




b.) If the voltage between “a” and “b” is 35 volts, what are the currents through each branch.

# *Reminders about power*

- Power is how much electrical energy is being turned into heat/light/etc. each second:

$$P = IV$$

  - Using Ohm's law, we can also substitute:

$$P = I^2R = V^2/R$$

- What does the power rating of a bulb or resistor really mean?
  - A "100 W" rated resistor means that when plugged into a standard voltage outlet (120 V, in the US), it dissipates 100 W of power. Knowing that, we could figure out, say, its resistance…or the current when plugged into that outlet by itself…