

## Ch 19 #2

The easiest way to think of this one is if you pretend it's just one 6V battery, and find its internal resistance, and then divide by 4 at the end. The only other part that could confuse you is that you aren't told  $V_{ab}$ . But you can find it easily when you realize that  $V_{ab}$  is the 'actual' voltage, pushing the current through only the  $12\Omega$  resistor.

## Ch 19 #11

The answer sheet only tells you the four different equivalent resistances, not the four different ways in which they can be connected. So if you can't figure them all out, here you go...

Series:  $720\Omega$

Parallel:  $80\Omega$

One resistor in parallel w/two in series:  $160\Omega$

One resistor in series w/two in parallel:  $360\Omega$

## Ch 19 #12

You need to begin by calculating the resistance of each bulb, based on their power info. Then calculate the current through the parallel circuit, when 11.8V is pushing charge through the equivalent resistance of the whole circuit. Lastly, use your emf ideas (like HW probs #1-4) to find internal resistance.

## Ch 19 #16

This one is just a backwards version of easy equivalent resistance problems. To solve it, just set up an equivalent resistance equation (for parallel circuits, since you want the resistance to *decrease*), but where you already know the equiv. res. ( $320\Omega$ ), and you're looking for one of the resistors in the parallel circuit.

## Ch 19 #17

Before you start, think about how the 3 resistors are really connected. (It can be helpful to picture detaching the resistors from the battery, and holding them out in a straight line, to see whether they're in series or parallel with each other.)

Once you're attempting to find voltage everywhere, remember that it's essentially a series circuit (where one 'resistor' is really two in parallel), so you've got to find current before you can find voltage.

## Ch 19 #18

To calculate equivalent resistance, you would need to know the individual resistance values of the two resistors. So begin by using power ideas to find individual R-values, and then finish by calculating  $R_{eq}$ .

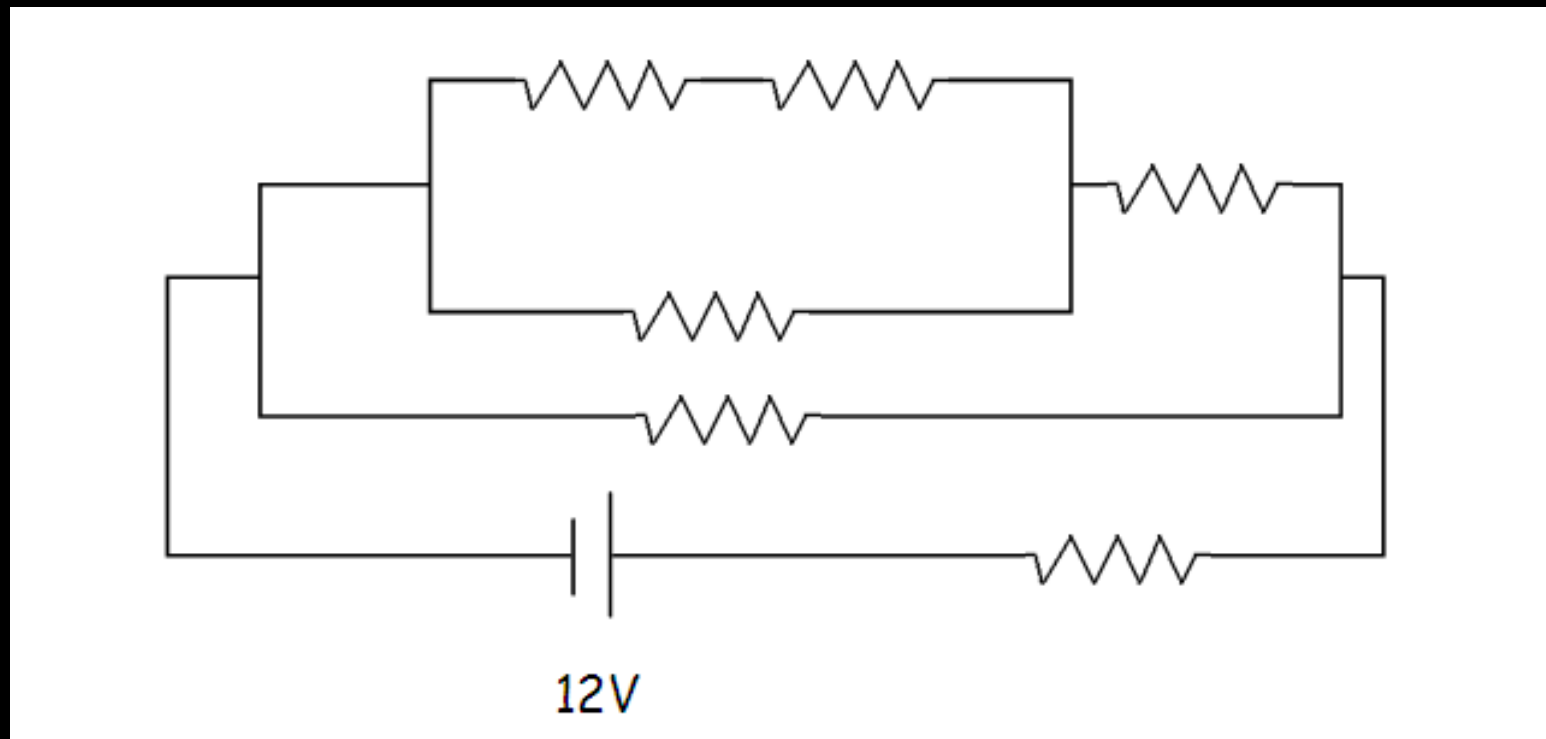
## Ch 19 #20

Like on #17, it can help to picture breaking the resistors off the battery, and then hold the resistors out 'straight'. Another way to think is to picture that you're a charge leaving one terminal of the battery, and as you move you'll pass through resistors and junction points (where you have a 'choice' of multiple paths). Every resistor you *must* pass through represents a resistor in series with the next part of the circuit, and every *choice* you pass through represents the beginning of a parallel portion of the circuit.

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## Ch 19 #20 (cont.)

If it helps you, here's an easier drawing that still represents the same exact circuit. (Try to make sure you understand *why* this drawing represents the same circuit.)



## Ch 19 #21

Remember the equation/ideas we use for terminal voltage type problems. You'll realize that you need to know the current flowing, in order to calculate  $V_{ab}$ , and so you must calculate the equiv. resistance (in each situation) to be able to calculate current.

## Ch 19 #52

A. To find the potential at point a, just think of the positive terminal of the battery being at a potential of 24V, and the negative terminal being at 0V. So point a would be at a potential equal to 24V minus whatever IR voltage drop occurs across the  $8.8\Omega$  resistor. (Notice that you don't even need to pay attention to the capacitors to answer this part of the question, since the resistor branch is in parallel with the capacitor branch.)

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## Ch 19 #52 (cont.)

B. Use similar thinking to part A, by calculating the voltage drop across the  $0.48\mu\text{F}$  capacitor, and then subtracting this from  $24\text{V}$ , while ignoring the resistor branch.

C. When the switch is closed, it doesn't really affect the current through the resistor branch. Instead, charges initially rearrange on the capacitor plates, to assure that points a and b are at the same potential once equilibrium is reached. So to answer this question, it's just that  $V_{b,\text{final}} = V_{a,\text{final}} = 8\text{V}$ .