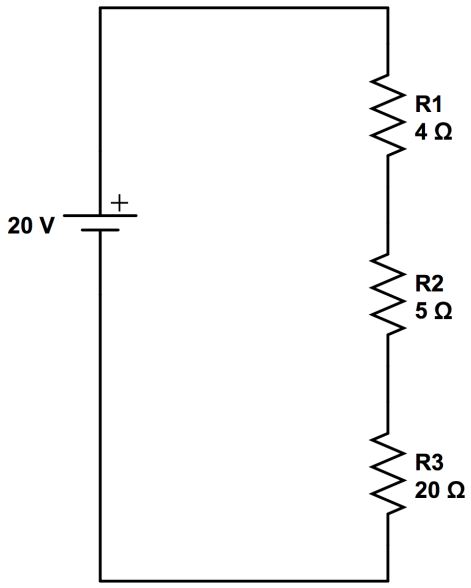
Quantitative Problems
(Given, Find, Solution REQUIRED)

1. **Consider a three-bulb series circuit below.**



Calculate the following:

a. **The current in R1.**
b. **The current in R2.**
c. **The current in R3.**

d. **The voltage across R1.**
e. **The voltage across R2.**
f. **The voltage across R3.**

g. **The power consumption of R1.**
h. **The power consumption of R2.**
i. **The power consumption of R3.**
j. **The power supplied by the 20 V battery.**

k. **The energy consumption of the circuit if left on for 24 hours a day for 31 days in [J],**
l. **The energy consumption of the circuit if left on for 24 hours a day for 31 days in [kWh],**
m. **The cost of operating the entire circuit for 24 hours a day for 31 days. The price of electricity is $0.15/kWh.**

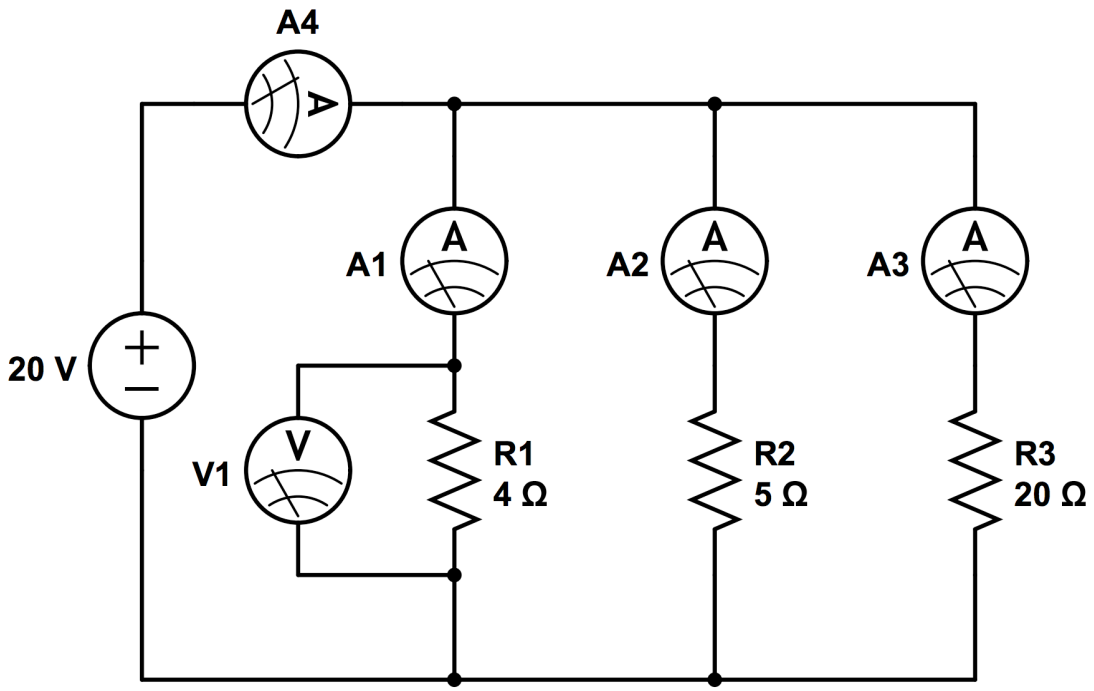
2. Consider the three-bulb parallel circuit below. Calculate the following:

a. The current reading in A1.
b. The current reading in A2.
c. The current reading in A3.

d. The voltage across R1.
e. The voltage across R2.
f. The voltage across R3.

g. The power consumption of the bulb 1.
h. The power consumption of the bulb 2.
i. The power consumption of the bulb 3.
j. The power supplied by the 20 V battery.

k. The energy consumption of the entire circuit on for 24 hours a day for 31 days in [J].
l. The energy consumption of the entire circuit on for 24 hours a day for 31 days in [kWh].
m. The cost of operating the entire circuit for 24 hours a day for 31 days. The price of electricity is $0.15/kWh.

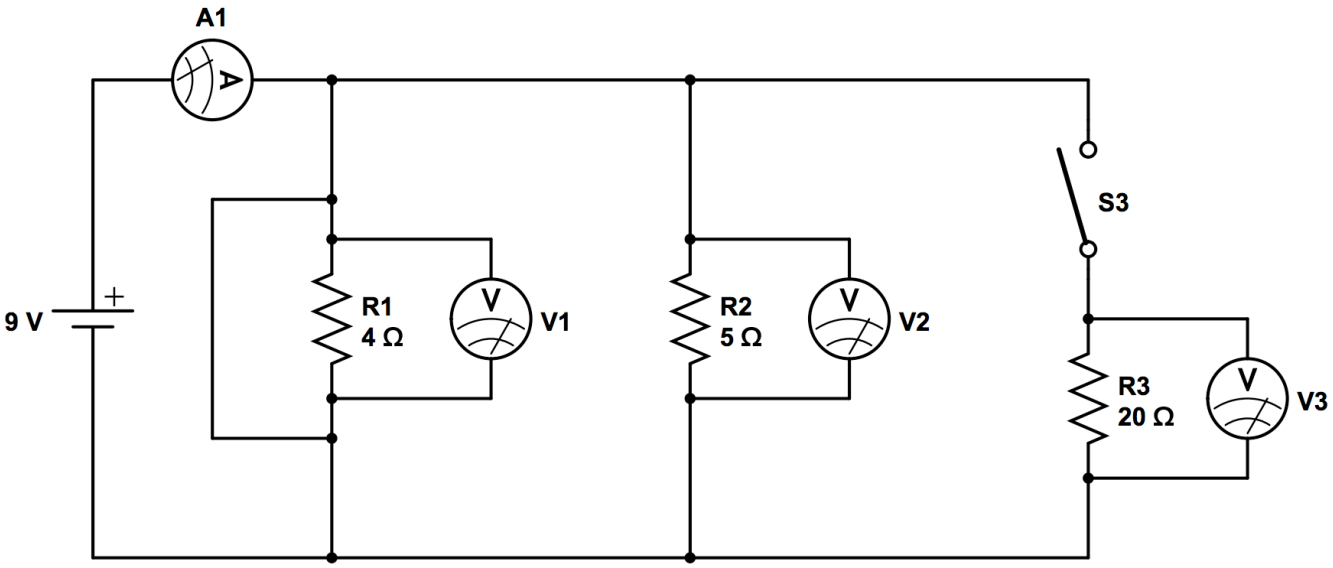


Qualitative Problems

Short answer (in a complete sentence) or a fully labeled graph
(Given, Find, Solution NOT required)

3. Consider the three-bulb parallel circuit below. Answer each of the following questions and give a brief justification for your answer.

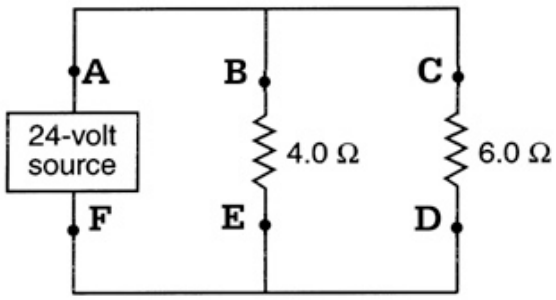
a. What is the reading in voltmeter V1?
b. What is the reading in voltmeter V2?
c. What is the reading in voltmeter V3?
d. What is the reading in ammeter A1 if the resistance of the short circuit wire across R1 is 1 [Ω]?



4. Draw a <u>series</u> circuit with three bulbs, labeled bulb 1, bulb 2, and bulb 3, INCLUDING a switch that can turn bulb 2 "on" and "off". What happens to the light intensity of bulbs 1 and 3 when bulb 2 is turned off?

5. Draw a <u>parallel</u> circuit with three bulbs, labeled bulb 1, bulb 2, and bulb 3, INCLUDING a switch that can turn bulb 2 "on" and "off". What happens to the light intensity of bulbs 1 and 3 when bulb 2 is turned off?

Consider the following circuit for questions 6-8 below.



6. At what location(s) could a switch be placed in order to turn off both light bulbs?

7. At what location(s) could a switch be placed in order to turn off the 4 [Ω] light bulb?

8. At what location(s) could a switch be placed in order to turn off the 6 [Ω] light bulb?

1a. 0.689 [A]
1b. 0.689 [A]
1c. 0.689 [A]

1d. 2.76 [V]
1e. 3.45 [V]
1f. 13.78 [V]

1g. 1.90 [W]
1h. 2.38 [W]
1i. 9.49 [W]
1j. 13.77 [W]

1k. 3.68×10^7 [J]
1l. 10.26 [kWh]
1m. $ 1.53

2a. 5 [A]
2b. 4 [A]
2c. 1 [A]

2d. 20 [V]
2e. 20 [V]
2f. 20 [V]

2g. 100 [W]
2h. 80 [W]
2i. 20 [W]
2j. 200 [W]

2k. 5.36×10^8 [J]
2l. 148.8 [kWh]
2m. $ 22.32

3-8. Will discuss in class