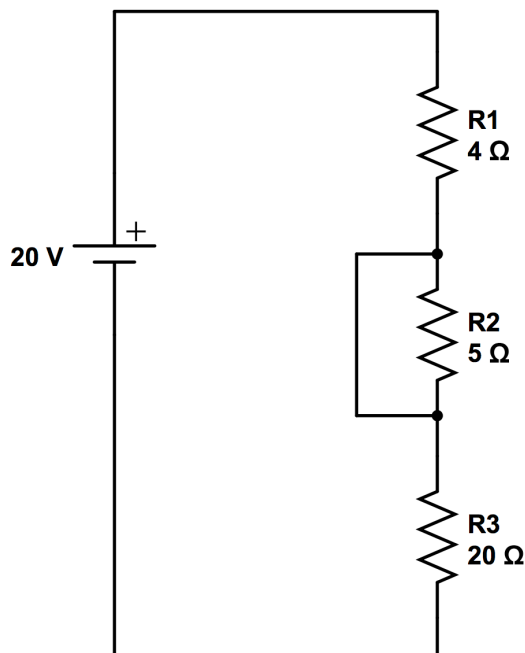


**Quantitative Problems**  
(Given, Find, Solution REQUIRED)

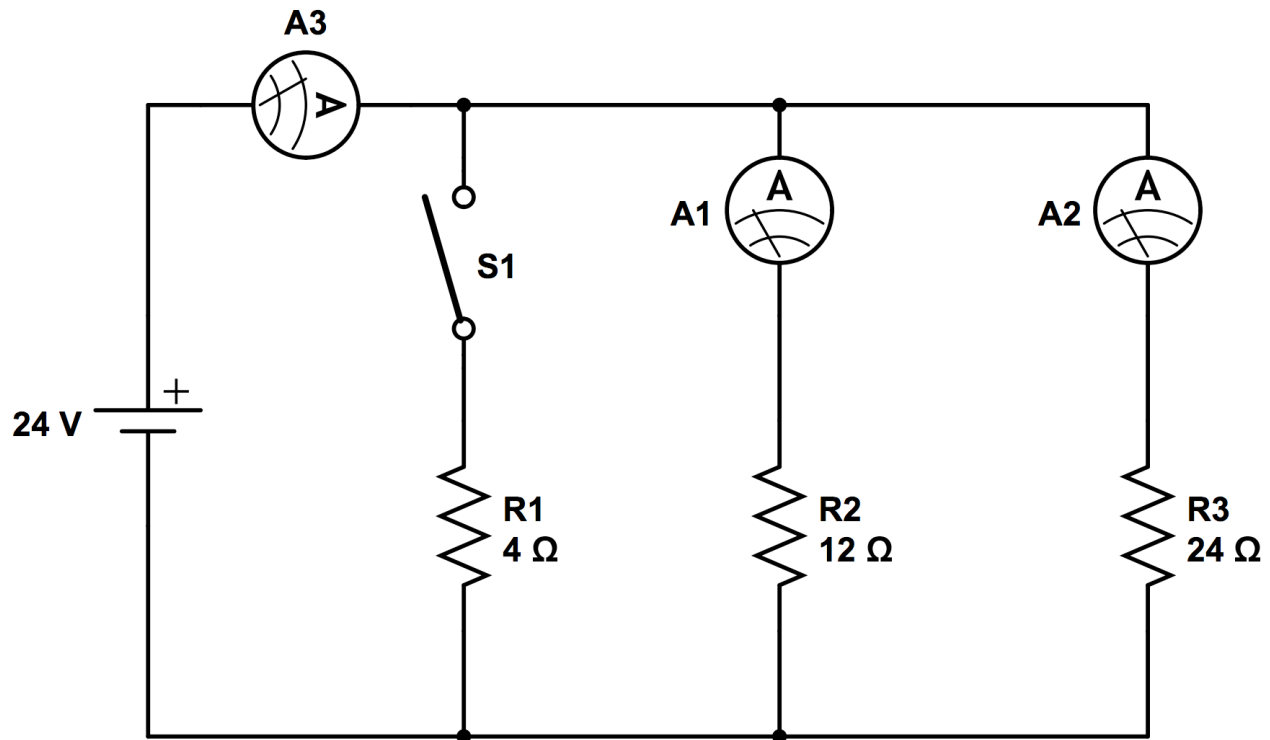
1. Consider the three-bulb series circuit below.



Calculate the following:

- The current that flows through the 4 [Ω] bulb.
- The voltage across the 20 [Ω] bulb.
- The power consumed by the 20 [Ω] bulb.
- The energy consumption of the circuit if left on for 24 hours a day for 31 days in [kWh],
- The cost of operating the entire circuit for 24 hours a day for 31 days. The price of electricity is \$0.25/kWh.

2. Consider the three-bulb parallel circuit below.



Calculate the following:

- The current that flows through ammeter A3.
- The voltage across the 12[Ω] bulb.
- The power consumed by the 24 [Ω] bulb.
- The energy consumption of the circuit if left on for 24 hours a day for 31 days in [kWh],
- The cost of operating the entire circuit for 24 hours a day for 31 days. The price of electricity is \$0.25/kWh.

## Qualitative Problems

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

3. Draw the magnetic field lines that exist between two magnets with LIKE poles facing each other. Make sure to draw arrowheads on the magnetic field lines that represent the direction of the magnetic field.
4. Draw the magnetic field lines that exist between two magnets with OPPOSITE poles facing each other. Make sure to draw arrowheads on the magnetic field lines that represent the direction of the magnetic field.
5. Draw a “side view” of the earth.
  - a. Write “N” and “S” for GEOGRAPHICAL north and south at the appropriate locations on the earth.
  - b. Write “N<sub>geomagnetic</sub>” and “S<sub>geomagnetic</sub>” for the locations of the GEOMAGNETIC north and south poles on the earth.
6. Draw the top view of a magnetic compass. Draw “loops” of wire that are wrapped around the compass as done in class. Draw an arrow that represents the magnetic field created by the loop of wire.
7. Explain the operation of your cell phone’s speaker in terms of electric current and magnetic fields. Include a diagram in your explanation.
8. Explain the operation of an electric motor in terms of electric current and magnetic fields. Include a diagram in your explanation.
9. The unit of the MAGNETIC field is the [T] or “Tesla”. However, the name of the popular ELECTRIC car is the “Tesla” as opposed to the “Ampere” or “Ohm”. Is the name “Tesla” appropriate for an “ELECTRIC” car?

## HW Set 5 Answers

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- 1a. 0.833 [A]
- 1b. 16.67 [V]
- 1c. 13.88 [W]
- 1d. 12.39 [kWh]
- 1e. \$3.10

- 2a. 3[A]
- 2b. 24 [V]
- 2c. 24[W]
- 2d. 53.56 [kWh]
- 2e. \$13.39

- 3-9. Will discuss in class