**Power Calculations problems**

NOTE: This assignment is now on Canvas. Use the worksheet below, but enter your answers in Canvas.

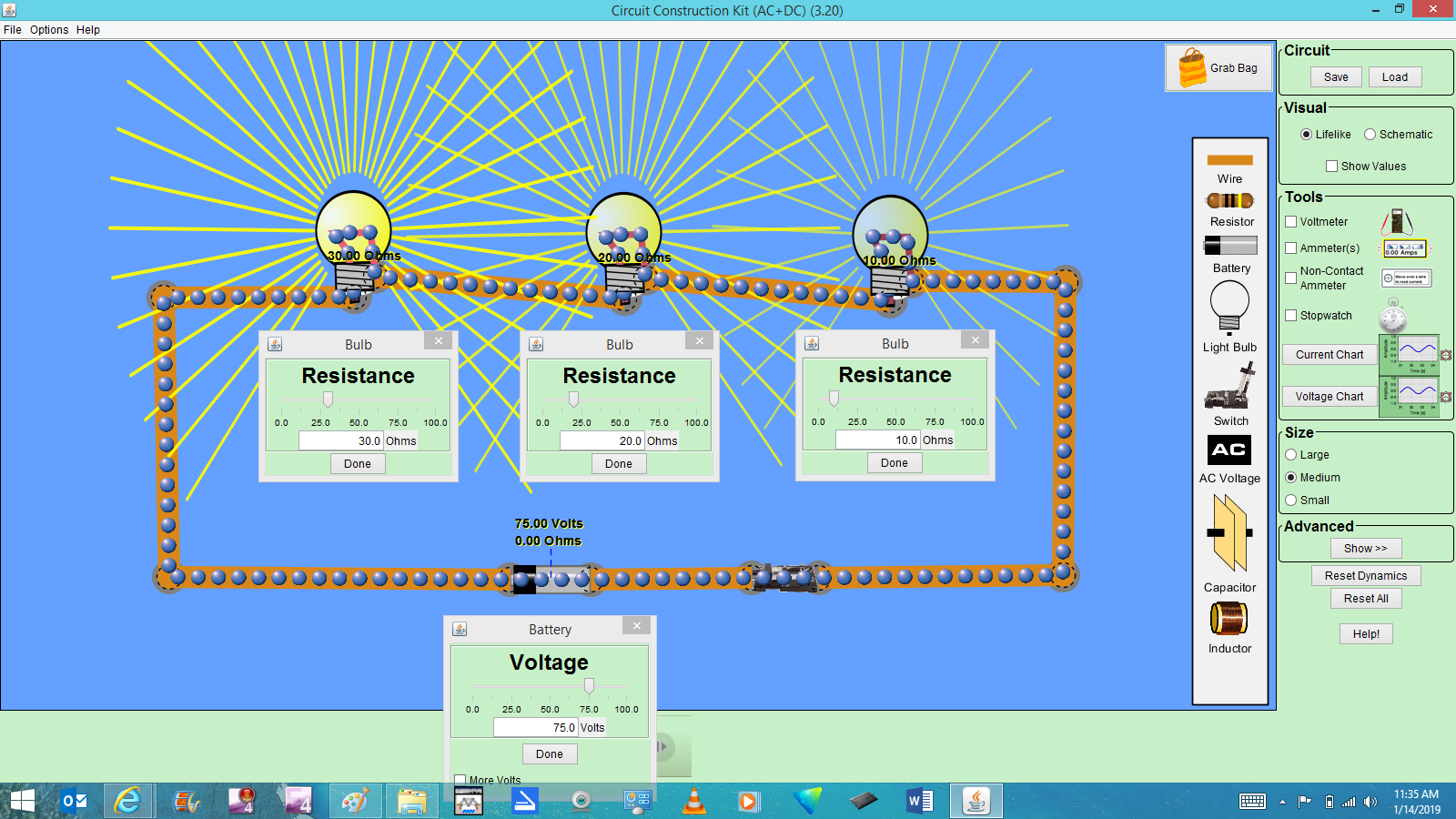
(28 questions)

Ohm’s Law V = IR

Power equation P=VI

Power equation P=I2R

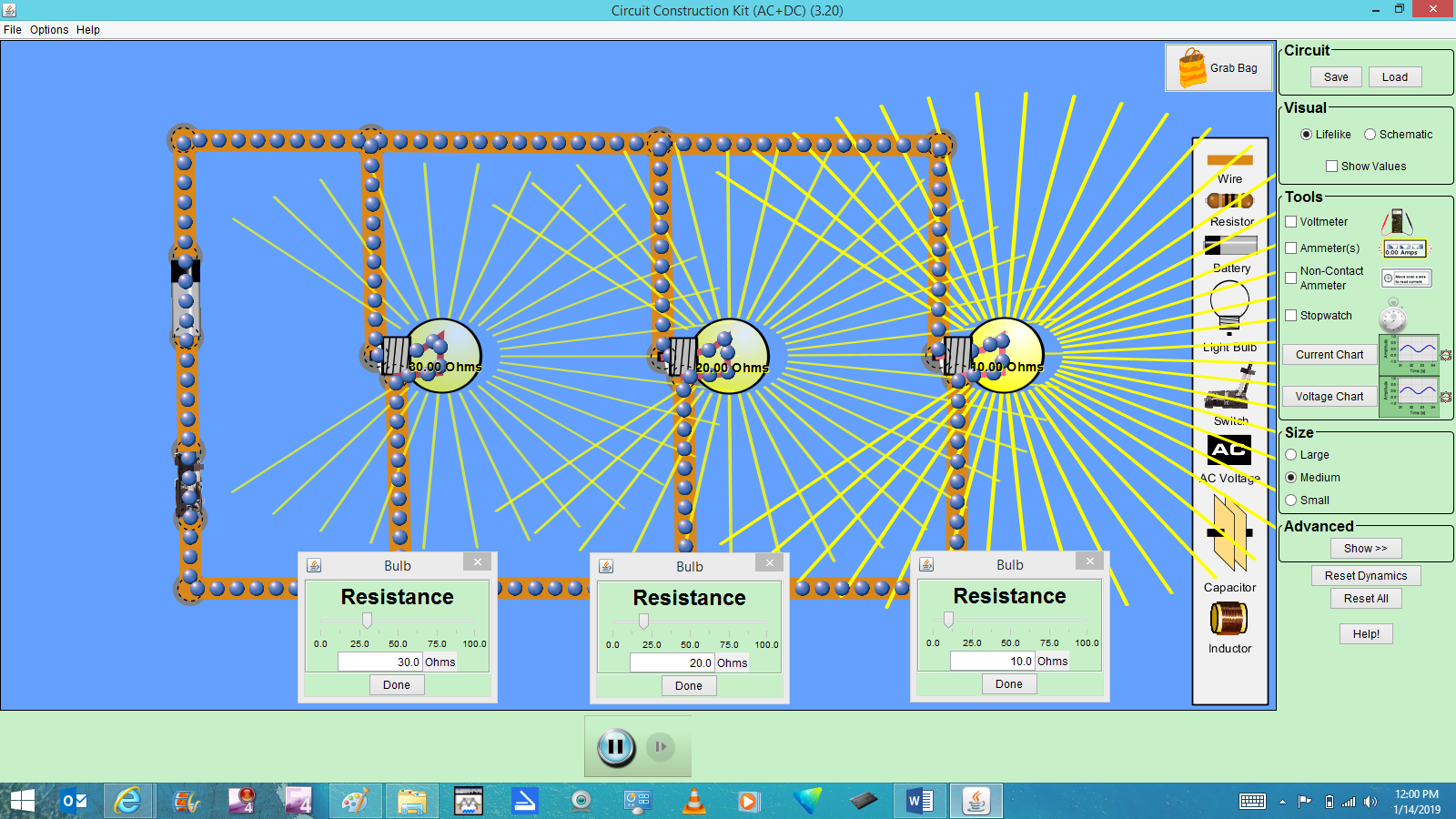
1. Series Circuit. The battery is set at 75.0 volts, and the Ohms ratings are shown.



* 1. Total current in the circuit? (Amps)
  2. Voltage drop across Bulb10? (Volts)
  3. Voltage drop across Bulb20?
  4. Voltage drop across Bulb30?
  5. Is Kirchhoff’s Voltage Law satisfied? Show work…
  6. What is the Power drawn by Bulb10? (Watts)
  7. What is the Power drawn by Bulb20?
  8. What is the Power drawn by Bulb30?
  9. Assuming an electricity price of $.14 per kW-hr, what is the cost of lighting this circuit for 24 hours?

1. Parallel Circuit

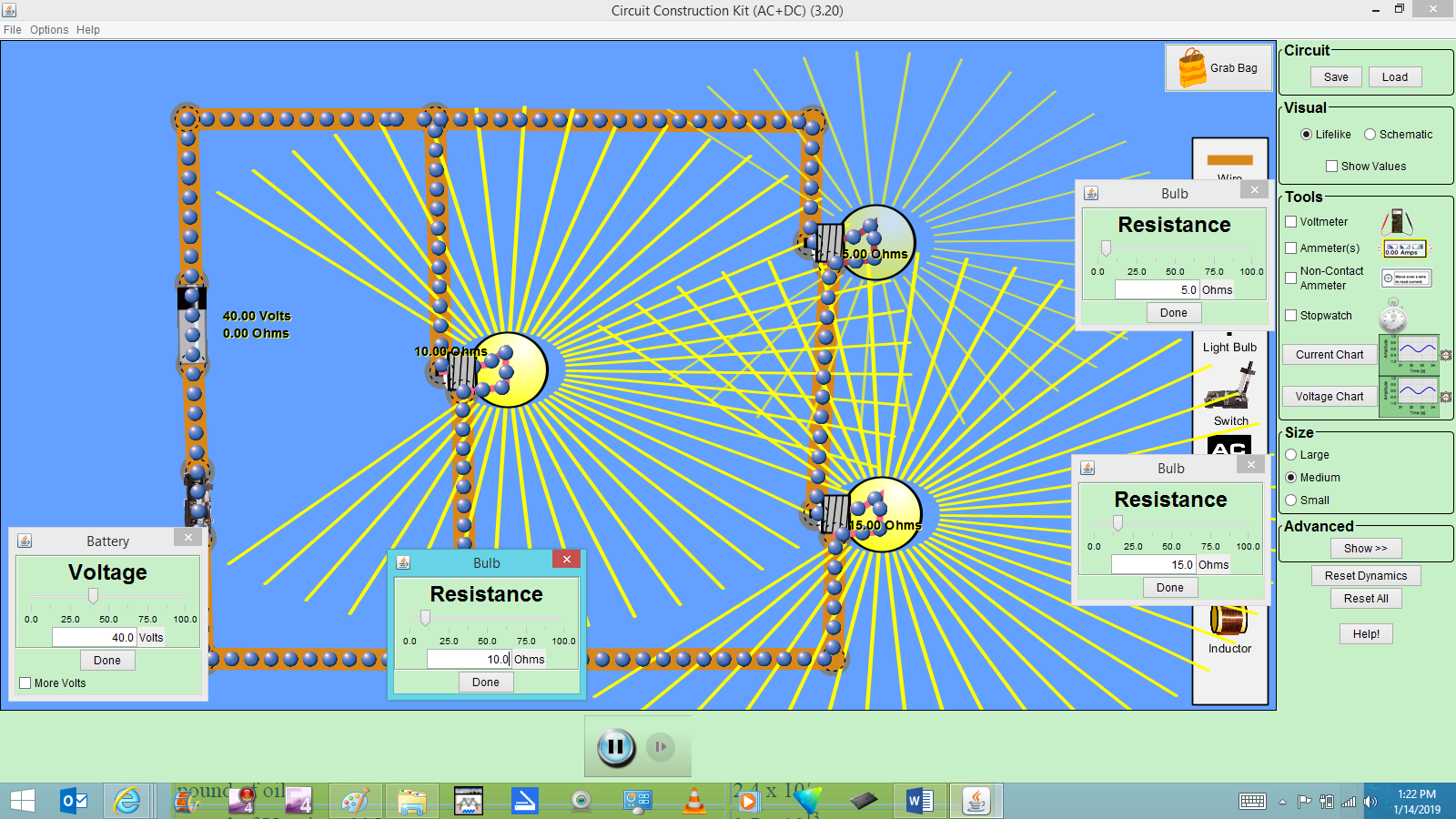
Note: the battery is set at 50 volts, and the Ohms ratings are shown.



* 1. Voltage drop across Bulb10? (Volts)
  2. Voltage drop across Bulb20?
  3. Voltage drop across Bulb30?
  4. Current through Bulb10? (Amps)
  5. Current through Bulb20?
  6. Current through Bulb30?
  7. What is the Power drawn by Bulb10? (Watts)
  8. What is the Power drawn by Bulb20?
  9. What is the Power drawn by Bulb30?
  10. You have a gasoline-powered, portable generator, with an overall efficiency of 20% (it converts 20% of the energy-content of the gasoline into usable electricity). The energy content of the gasoline is 1.3 x 108 J/gal, and it costs $3.50 per gallon. 1 W = 1 J/sec.

How much will it cost to power this circuit for 24 hours?

1. Series-Parallel (Combination) Circuit. The battery is set at 40 volts, and the Ohms ratings are shown.



1. Voltage drop across Bulb10? (Volts)
2. Voltage drop across Bulb5 AND Bulb15 combined?
3. Current through Bulb10? (Amps)
4. Current through Bulb5?
5. Current through Bulb15?
6. What is the Power drawn by Bulb10? (Watts)
7. What is the Power drawn by Bulb5?
8. What is the Power drawn by Bulb15?
9. You have a portable, gas-fired turbine, with its output shaft connected to a generator. The gas turbine is 30% efficient, and the generator is 95% efficient. The natural gas is priced at $1.25/therm. 1 therm = 100,000 Btu’s.

How much will it cost to power this circuit for 24 hours?