December 7th NBMS Invitational Test

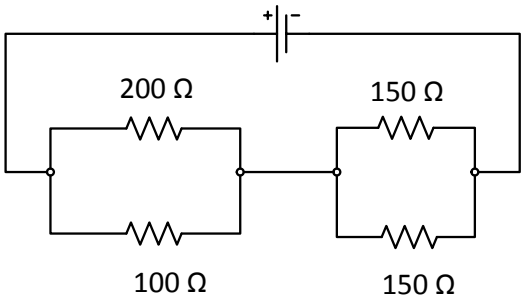
1. Please draw the symbols for the following devices (3 points):

Cell	Battery	Voltmeter	Variable Resistor
Bulb	Inductor	Switch	AC Power Source

2. Please define each of the following terms (4 points):
   - Electrical Circuit: _____
     _____
   - Current: _____
     _____
     - Direct Current: _____
       _____
     - Alternating Current: _____
       _____
   - Voltage: _____
     _____
   - Resistance: _____
     _____

3. A circuit has <u>two</u> 1.5V AAA batteries placed in series with a 150 kΩ resistor. What is the current that will flow through the circuit? _____ (1-point)

4. What is the equivalent resistance of the circuit below (1-point)?

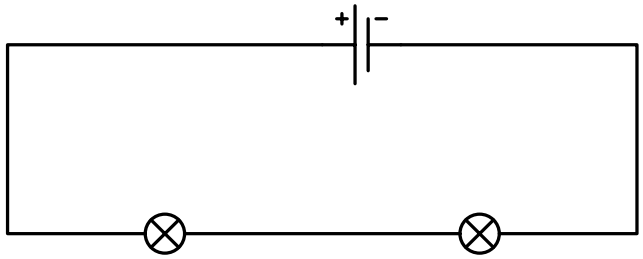


= _____ Ω

5. In the circuit above, a current of 900mA is measured by adding an Ammeter into the circuit. What is the potential difference generated by the battery? (1-point)
   Answer: _____

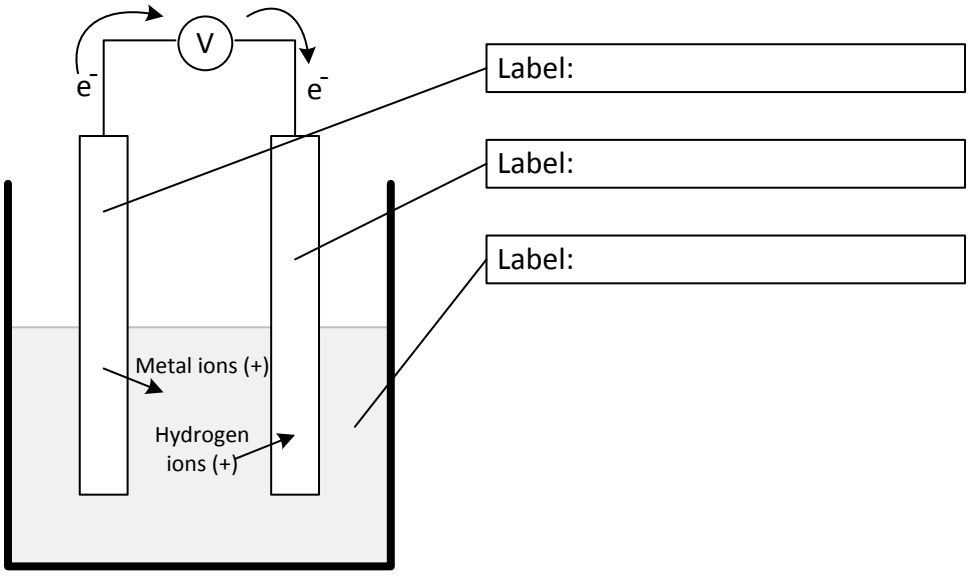
6. Describe the difference between a **primary battery** and a **secondary battery** (1-point):
   Answer: _____
   _____

7. Draw the direction of current flow in the following circuit (1-point):



8. If the direction of current flow is reversed, how will the brightness of the bulbs change?
   Answer: _____
   _____(1 point)

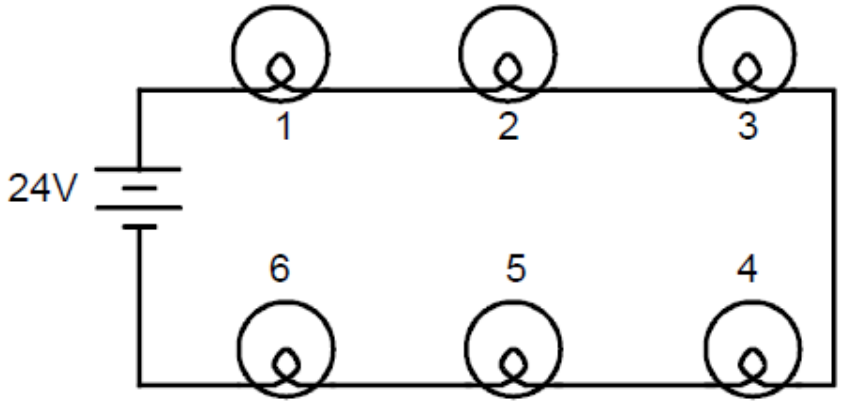
9. In the following kitchen-built battery (e.g. lemon battery), please add the missing labels (2 points):



10. A bird decides to land on some high voltage (25kV) power lines. Explain why the bird is not electrocuted (1 point): _____

11. You have created an electromagnet by wrapping some copper wire around a large metal nail. You pass in the current through the copper wire and the electromagnet attracts the North pole of a nearby compass. What happens to the compass if you change the direction of current flowing through the wire (1-point)?
    Answer: _____
    _____

12. The short string of Christmas lights below is made up of three different types of bulbs. If bulbs 1 and 4 each have X resistance, bulbs 2 and 5 each have 2X resistance, and bulbs 3 and 6 each have 3X resistance, what is the voltage drop across each bulb (3-points)?



V1= _____ V4= _____
V2= _____ V5= _____
V3= _____ V6= _____