PHY 102 Quiz #2 **Name** _____

Score _____

Instructions:
1. Do all of your work on this sheet.
2. **Show all of your steps** in problems for full credit.
3. **Be clear and neat** in your work. Any illegible work, or scribbling in the margins, will not be graded.
4. Place your **answers in a box**.
5. If you need more space, you may use the back of the page and write **On back** in the problem space.

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1. **Multiple Guess (3 pts)** Find the answer which best fits the question and write it in the space provided.

a. One connects a voltmeter in _____ with a resistor.
a) series. b) parallel. _____

b. The length, width, and the spacing between the plates of a parallel plate capacitor are doubled. The capacitance
a) increases by a factor of 2. b) increases by a factor of 4.
c) increases by a factor of 8. d) decreases by a factor of 4.
e) decreases by a factor of 2 _____

c. The resistance of a wire is directly proportional to the
a) length. b) emf. c) current. d) area. e) none of these.
_____

2. **AC Circuits (3 pts)** A voltage of $V = 25.0\sin(1256t)$ volts runs through a $75.0\,\Omega$ resistor. Including units, what is

a. The peak voltage? _____

b. The frequency? _____

c. The rms-current? _____

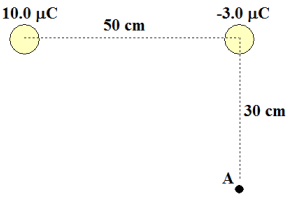
Bonus: A 24.0 V battery with an internal resistance of $5.0\,\Omega$ is connected to a $75.0\,\Omega$ resistor. How much energy is lost in the resistor in one second?

Constants:

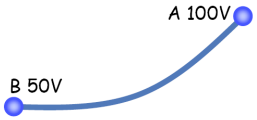
$\varepsilon_0 = 8.85\times10^{-12}$ C^2/N-m^2 $\quad m_e = 9.11\times10^{-31}$ kg

3. **Problems (14 pts)**

a. Find the total electric potential at point A.

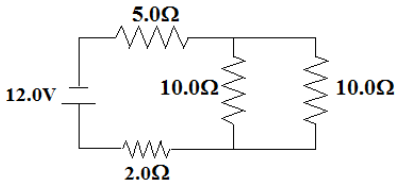


b. An electron at rest moves from point A (at 100.0V) to point B (at 50.0 V). How fast is it moving at point B?



c. The temperature of a 0.50 W resistor wire is increased by 30°C. If the coefficient of thermal resistance is 5.0×10^{-3} (°C)$^{-1}$, then what is the new resistance?

d. Use the circuit below for the remaining questions.



i. What equivalent resistance can replace the 4 resistors?

ii. Determine the currents in the $5.0\,\Omega$ and $10.0\,\Omega$ resistors.