This document is to allow you to work out the concept of the question before answering them online. You will need to submit your answer via Quizzes on Canvas.

The variable inside the [ ] in each question are generated randomly and it is different for each student and at each attempt. You need to make sure you use the correct value provided by your question in your answers.

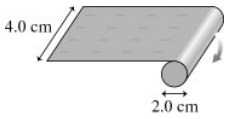
Questions

Points 100

Show Question Details

L07-01 5 pts

The figure shows a 2.0-cm diameter roller that turns at 90 rpm. A 4.0-cm wide plastic film is being wrapped onto the roller, and this plastic carries an excess electric charge having a uniform surface charge density of [C] mC/cm^2. What is the current of the moving film in mA to 1 decimal places?



L07-2 5 pts

If a current of [I] μA is flowing in a cylindrical wire of diameter [D] mm, what is the average current density in this wire in A/m^2 answer to 3 decimal places?

L07-03 10 pts

A proton beam that carries a total current of [I] mA has 10.0 mm diameter. The current density in the proton beam increases linearly with distance from the center. This is expressed mathematically as $J(r) = J_0\,(r/R)$, where R is the radius of the beam and J_0 is the current density at the edge. Determine the value of J_0 in $\frac{A}{m^2}$ to 1 decimal place. (Hints: The question is similar to L07-slide 16. You may find the integration formula $\int_a^b x^n dx = \left[\frac{1}{n+1}x^{n+1}\right]_a^b$ useful.)

L07-04 8 pts

The diameter of a 12-gauge copper wire is 0.206 cm. The maximum safe current it can carry (in order to prevent fire danger in building construction) is [I] A. At this current, what is the drift velocity of the electrons in cm per second $\frac{cm}{s}$ to 3 decimal places? The number of electron carriers in 1.0 cm^3 of copper is 8.5×10^{22} and $1.60 \times 10^{-19} C$.

L07-05 5 pts

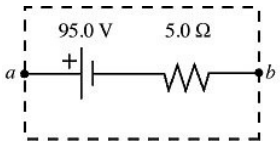
A silver wire with resistivity $1.59 \times 10^{-8} \Omega \bullet m$ and diameter of 2.0 mm carries a current density of [J] A/mm^2 . What is the magnitude of the electric field in V/m inside the wire to 3 decimal places?

L07-6 5 pts

Nichrome wire, often used for heating elements, has resistivity of 1.0 × 10^{-6} Ω • m at room temperature. What length in m to 1 decimal place of No. 30 wire (of diameter 0.250 mm) is needed to wind a resistor that has [R] ohms at room temperature?

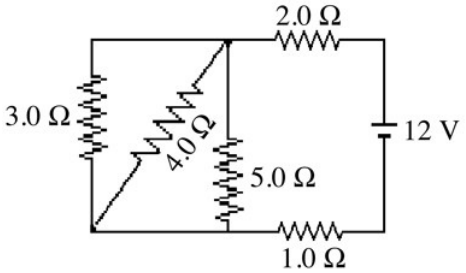
L07-07 7 pts

The emf and the internal resistance of a battery are as shown in the figure. If a current of [I] A is drawn from the battery when a resistor *R* is connected across the terminals *ab* of the battery, what is the power P dissipated by the resistor *R*, express P in W?



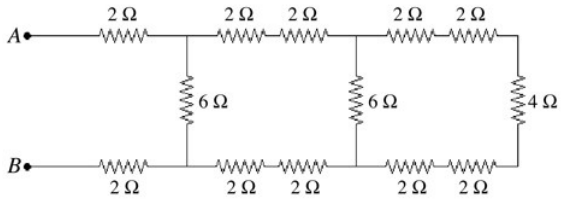
L08-01 **8 pts**

For the circuit shown in the figure, determine the current in the 4.0-Ω resistor.



L08-02 **6 pts**

Thirteen resistors are connected across points *A* and *B* as shown in the figure. If all the resistors are accurate to 2 significant figures, what is the equivalent resistance between points *A* and *B*?

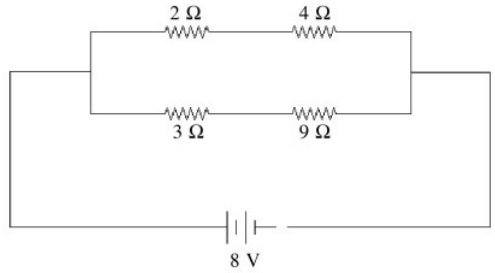


L08-03 **8 pts**

Three resistors having resistances of 4.0 Ω, 6.0 Ω, and 12.0 Ω are connected in parallel. If the combination is connected in series with an ideal 12-V battery and a [R1] Ω resistor, what is the current through the 12.0-Ω resistor to 2 decimal places?

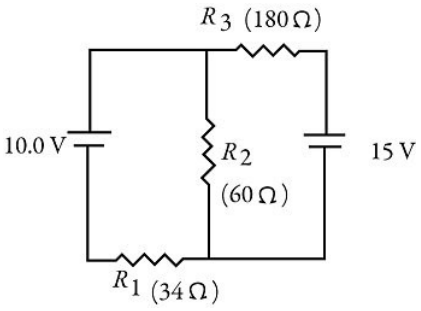
L08-04 **8 pts**

Four resistors are connected across an 8-V DC battery as shown in the figure. Determine the current through the 9-Ω resistor



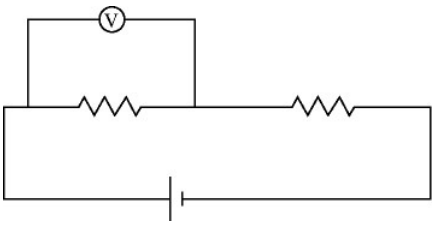
L08-05 10 pts

For the circuit shown in the figure, what is the current through resistor R_3 in A?



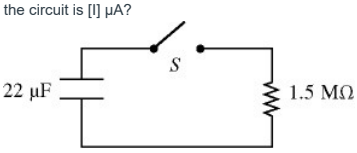
L08-06 5 pts

In the circuit shown in the figure, two 360.0-Ω resistors are connected in series with an ideal source of emf. A voltmeter with internal resistance of 6350 Ω is connected across one of the resistors and reads [V] V. Find the emf of the source to 1 decimal place.



L08-07 10 pts

For the circuit shown in the figure, the switch S is initially open and the capacitor voltage is 80 V. The switch is then closed at time t = 0. What is the charge in μC on the capacitor when the current in the circuit is [I] μA?



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