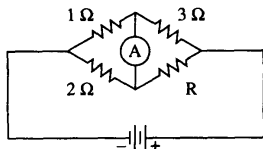


AP Physics C: E & M - Unit II/III Review

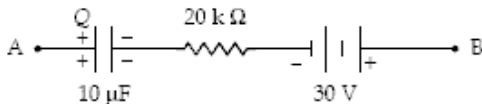
Multiple Choice

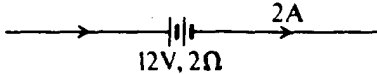
Identify the choice that best completes the statement or answers the question.

- _____ 1. An isolated capacitor with air between its plates has a potential difference V_0 and a charge Q_0 . After the space between the plates is filled with oil, the difference in potential is V and the charge is Q . Which of the following pairs of relationships is correct?
 a. $Q = Q_0$ and $V > V_0$ c. $Q > Q_0$ and $V = V_0$ e. $Q > Q_0$ and $V > V_0$
 b. $Q = Q_0$ and $V < V_0$ d. $Q < Q_0$ and $V < V_0$
- _____ 2. Into the gap between the plates of a parallel plate capacitor of capacitance C_0 a slab of metal is inserted halfway between the plates filling one fourth of the gap between the plates. What is the resulting new capacitance?
 a. $\frac{9}{16} C_0$ b. $\frac{4}{3} C_0$ c. $\frac{3}{4} C_0$ d. $\frac{5}{4} C_0$ e. $\frac{16}{9} C_0$

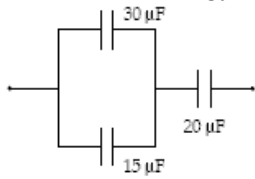


- _____ 3. If the ammeter in the circuit above reads zero, what is the resistance R ?
 a. 1.5Ω b. 2Ω c. 4Ω d. 5Ω e. 6Ω
- _____ 4. A conductor of radius r , length L and resistivity ρ has resistance R . It is melted down and formed into a new conductor, also cylindrical, with one fourth the length of the original conductor. The resistance of the new conductor is
 a. $\frac{1}{4} R$ b. $\frac{1}{16} R$ c. $16R$ d. R e. $4R$
- _____ 5. If $Q = 400 \mu C$ and the potential difference $V_A - V_B = -10 V$ in the circuit segment shown below, what is the current in the resistor?

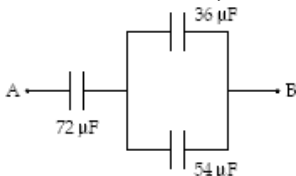


- a. 1.0 mA right to left c. 3.5 mA right to left e. None of the above
 b. 1.0 mA left to right d. 3.5 mA left to right
- _____ 6. 
 A 12-volt storage battery, with an internal resistance of 2Ω , is being charged by a current of 2 amperes as shown in the diagram above. Under these circumstances, a voltmeter connected across the terminals of the battery will read
 a. $4 V$ b. $8 V$ c. $10 V$ d. $12 V$ e. $16 V$
- _____ 7. If i is current, t is time, E is electric field intensity, and x is distance, the ratio of $\int i dt$ to $\int E dx$ may be expressed in
 a. coulombs b. joules c. newtons d. farads e. henrys

- _____ 8. What is the energy stored in the group of capacitors if the charge on the $30\text{-}\mu\text{F}$ capacitor is 0.90 mC ?



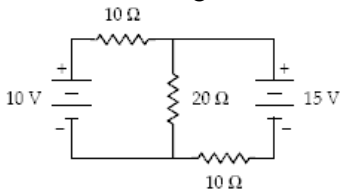
- a. 29 mJ b. 61 mJ c. 21 mJ d. 66 mJ e. 32 mJ
- _____ 9. If $V_A - V_B = 50\text{ V}$, how much energy is stored in the $36\text{-}\mu\text{F}$ capacitor?



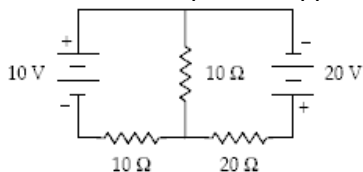
- a. 50 mJ b. 28 mJ c. 13 mJ d. 8.9 mJ e. 17 mJ
- _____ 10. A parallel plate capacitor has a capacitance C_0 . Into the gap a slab of dielectric material with $\kappa = 2$ is placed, filling the bottom half of the gap between the plates. What is the resulting new capacitance?
- a. $\frac{2}{5}C_0$ b. $\frac{3}{4}C_0$ c. $4C_0$ d. $\frac{5}{2}C_0$ e. $\frac{4}{3}C_0$

- _____ 11. When a 20-V emf is placed across two resistors in series, a current of 2.0 A is present in each of the resistors. When the same emf is placed across the same two resistors in parallel, the current through the emf is 10 A. What is the magnitude of the greater of the two resistances?
- a. 7.2 Ω b. 7.6 Ω c. 6.9 Ω d. 8.0 Ω e. 2.8 Ω

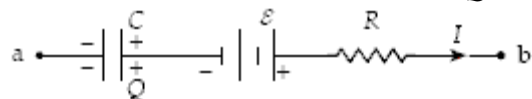
- _____ 12. What is the magnitude of the current in the 20- Ω resistor?



- a. 0.75 A b. 0.00 A c. 0.25 A d. 0.50 A e. 1.00 A
- _____ 13. At what rate is power supplied by the 10-V emf shown below?



- a. -10 W b. +10 W c. zero d. +20 W e. -20 W
- _____ 14. If $R = 3.0\text{ k}\Omega$, $C = 5.0\text{ mF}$, $\mathcal{E} = 6.0\text{ V}$, $Q = 15\text{ mC}$, and $I = 4.0\text{ mA}$, what is the potential difference $V_b - V_a$?



- a. -3.0 V b. +9.0 V c. -15 V d. +21 V e. -6.0 V
- _____ 15. A $15\text{-}\mu\text{F}$ capacitor is charged to 40 V and then connected across an initially uncharged $25\text{-}\mu\text{F}$ capacitor. What is the final potential difference across the $25\text{-}\mu\text{F}$ capacitor?
- a. 12 V b. 18 V c. 15 V d. 21 V e. 24 V

**AP Physics C: E & M - Unit II/III Review
Answer Section**

MULTIPLE CHOICE

1. B
2. B
3. E
4. B
5. A
6. E
7. D
8. D
9. D
10. E
11. A
12. D
13. B
14. A
15. C