Name: _____ **Class:** _____ **Date:** _____ **ID: A**

AP Physics C: Unit II/III Practice

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

____ 1. A 0.25-μF capacitor is connected to a 400-V battery. Find the charge on the capacitor.
a. 1.2×10^{-12} C b. 1.0×10^{-4} C c. 0.040 C d. 0.020 C

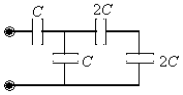
____ 2. A parallel-plate capacitor has a capacitance of 20 μF. What potential difference across the plates is required to store 7.2×10^{-4} C on this capacitor?
a. 36 V b. 2.2×10^{-2} V c. 1.4×10^{-8} V d. 18 V

____ 3. A 20-μF capacitor has a 1000-V power supply. What is the charge on the capacitor?
a. 10 mC b. 20 mC c. 40 mC d. 80 mC

____ 4. Two capacitors with capacitances of 1.5 and 0.25 μF, respectively, are connected in parallel. The system is connected to a 50-V battery. What charge accumulates on the 1.5-μF capacitor?
a. 100 μC b. 75 μC c. 50 μC d. 33 μC e. 25 μC

____ 5. Two capacitors with capacitances of 1.0 and 0.50 μF, respectively, are connected in series. The system is connected to a 100-V battery. What charge accumulates on the 1.0-μF capacitor?
a. 150 μC b. 100 μC c. 50 μC d. 33 μC e. 25 μC

____ 6. If $C = 36$ μF, determine the equivalent capacitance for the combination shown.



a. 36 μF b. 32 μF c. 28 μF d. 24 μF e. 20 μF

____ 7. Two capacitors, 1.5 μF and 0.25 μF, respectively, are connected in parallel. The system is connected to a 50-V battery. What electrical potential energy is stored in the 1.5-μF capacitor?
a. 0.5×10^{-3} J b. 1.2×10^{-3} J c. 1.9×10^{-3} J d. 10×10^{-3} J e. 19×10^{-3} J

____ 8. Two capacitors, 1.0 μF and 0.50 μF, are connected in series. The system is connected to a 100-V battery. What electrical potential energy is stored in the 1.0-μF capacitor?
a. 0.065×10^{-3} J b. 4.3×10^{-3} J c. 0.80×10^{-3} J d. 5.6×10^{-4} J

____ 9. A "sandwich" is constructed of two flat pieces of metal (2.00 cm on a side) with a 2.00-mm-thick piece of a dielectric called Rutile ($\kappa = 100$) in between them. What is the capacitance?
a. 177 pF b. 885 nF c. 8.85 μF d. 100 μF e. 177 μF

____ 10. Two cylindrical resistors are made of the same material and have the same resistance. The resistors, R_1 and R_2, have different radii, r_1 and r_2, and different lengths, L_1 and L_2. Which of the following relative values for radii and lengths would result in equal resistances?

a. $r_1 = r_2$ and $L_1 = 2L_2$
b. $2r_1 = r_2$ and $L_1 = 2L_2$
c. $r_1 = r_2$ and $4L_1 = L_2$
d. $2r_1 = r_2$ and $4L_1 = L_2$

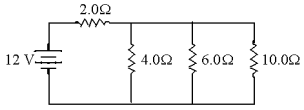
____ 11. A 500-W heater carries a current of 4.0 A. How much does it cost to operate the heater for 30 min if electrical energy costs 6.0 cents per kWh?

a. 1.5 cents b. 9.0 cents c. 18 cents d. 36 cents e. 95 cents

____ 12. When a 24.0-Ω resistor is connected across a 12.0-V battery, a current of 482 mA flows. What is the power output delivered by the emf of the battery?

a. 0.21 W b. 5.57 W c. 5.78 W d. 6.00 W e. 7.19 W

____ 13. Three resistors connected in parallel have values of 4, 6 and 10 Ω, respectively. If this combination is connected in series with a 12V battery and a 2 Ω resistor, what is the current in the 10 Ω resistor?



a. 0.59 A b. 1.0 A c. 11 A d. 16 A e. 23 A

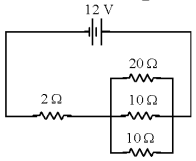
____ 14. Two resistors of values 6.0 and 12.0 Ω are connected in parallel. This combination in turn is hooked in series with a 2.0-Ω resistor and a 24-V battery. What is the current in the 2-Ω resistor?

a. 2.0 A b. 4.0 A c. 6.0 A d. 12 A e. 20 A

____ 15. Two resistors of values 6.0 and 12.0 Ω are connected in parallel. This combination in turn is hooked in series with a 4.0-Ω resistor and a 24-V battery. What is the current in the 6-Ω resistor?

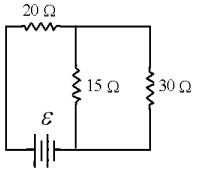
a. 2.0 A b. 3.0 A c. 6.0 A d. 12 A e. 21 A

____ 16. How much power is being dissipated by one of the 10-Ω resistors?



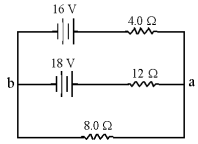
a. 24 W b. 9.6 W c. 16 W d. 6.4 W e. 8.2 W

____ 17. If ε = 9.0 V, what is the current in the 15-Ω resistor?



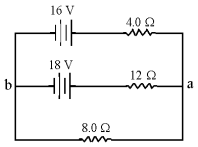
a. 0.20 A b. 0.30 A c. 0 10 A d. 0.26 A e. 0.15 A

____ 18. What is the current through the 8-Ω resistor?



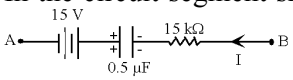
a. 1.0 A b. 0.50 A c. 1.5 A d. 2.0 A e. 2.5 A

____ 19. What is the potential difference between points a and b?



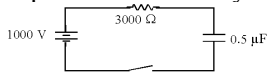
a. 6 V b. 8 V c. 12 V d. 24 V e. 27 V

____ 20. In the circuit segment shown if I = 7 mA and Q = 50 μC, what is the potential difference, $V_A - V_B$?



a. –40 V b. +40 V c. +20 V d. –20 V e. –15 V

____ 21. A 1000 V battery, a 3000 Ω resistor and a 0.5 μF capacitor are connected in series with a switch. The capacitor is initially uncharged. What is the value of the current the moment after the switch is closed?



a. 0.39 A b. 0.33 A c. 0.84 A d. 2 000 A e. 1.0 A

____ 22. A series *RC* circuit is made from a battery, a switch, a resistor, and a 3 μF capacitor, and has a time constant of 9 ms. If a 6 μF is added in series to the 3 μF capacitor, what is the time constant?

a. 4.0 ms b. 6.0 ms c. 10 ms d. 16 ms

AP Physics C: Unit II/III Practice
Answer Section

MULTIPLE CHOICE

1. B
2. A
3. B
4. B
5. D
6. D
7. C
8. D
9. A
10. D
11. A
12. C
13. A
14. B
15. A
16. D
17. A
18. C
19. C
20. D
21. B
22. B