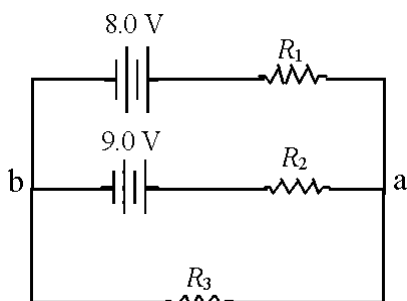


AP physics B - Websheet 18.1

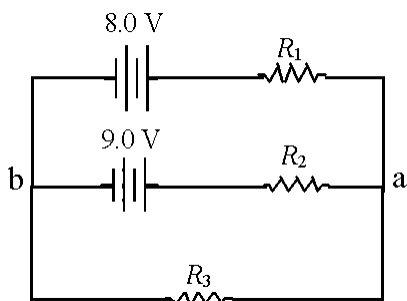
Multiple Choice

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

- _____ 1. If I_1 goes to the right through R_1 , I_2 goes to the right through R_2 , and I_3 goes to the right through R_3 , what is the resulting equation resulting from applying Kirchhoff's junction rule at point b?



- a. $I_1 + I_2 + I_3 = 0$
 b. $I_1 + I_2 - I_3 = 0$
 c. $I_1 - I_2 + I_3 = 0$
 d. $I_1 - I_2 - I_3 = 0$
 e. $I_1 - I_2 = 0$
- _____ 2. If I_1 goes to the right through R_1 , I_2 goes to the right through R_2 , and I_3 goes to the right through R_3 , what is the resulting equation resulting from applying Kirchhoff's loop rule for a clockwise loop around the perimeter of the circuit?

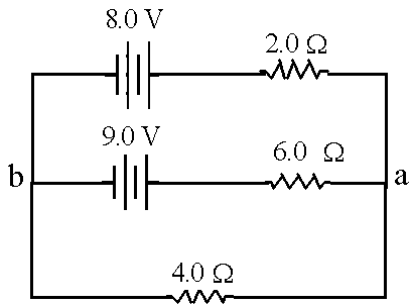


- a. $8.0 \text{ V} + I_1 R_1 + I_3 R_3 = 0$
 b. $8.0 \text{ V} + I_1 R_1 - I_3 R_3 = 0$
 c. $8.0 \text{ V} - I_1 R_1 + I_3 R_3 = 0$
 d. $-8.0 \text{ V} + I_1 R_1 + I_3 R_3 = 0$
 e. $17.0 \text{ V} - I_1 R_1 - I_2 R_2 + I_3 R_3 = 0$

Name: _____

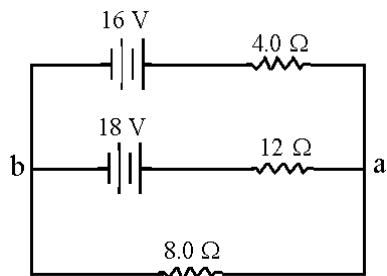
ID: A

_____ 3. What is the current through the 2- Ω resistor?



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

_____ 4. What is the current through the 8- Ω resistor?

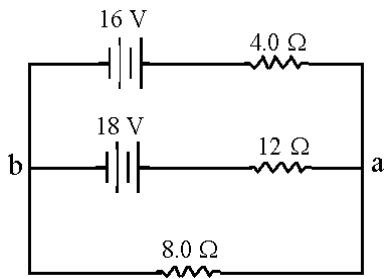


- a. 1.0 A
- b. 0.50 A
- c. 1.5 A
- d. 2.0 A
- e. 2.5 A

Name: _____

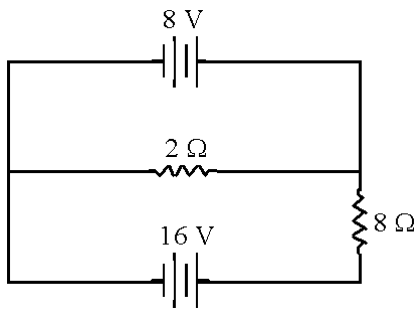
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____ 5. What is the potential difference between points a and b?



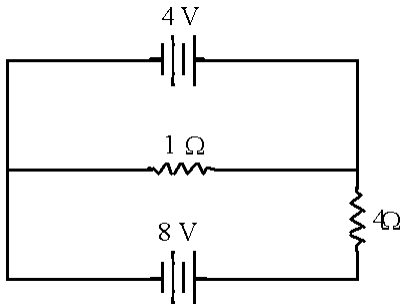
- a. 6 V
- b. 8 V
- c. 12 V
- d. 24 V
- e. 27 V

____ 6. What is the current flowing through the 2-Ω resistor?

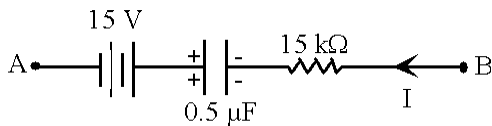


- a. 2 A
- b. 3 A
- c. 4 A
- d. 6 A
- e. 7 A

_____ 7. What is the current flowing through the 4- Ω resistor?

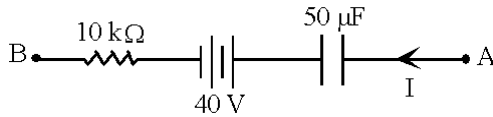


- a. 1 A
 b. 2 A
 c. 3 A
 d. 6 A
 e. 9 A
- _____ 8. In a circuit, a current of 2.0 A is drawn from a battery. The current then divides and passes through two resistors in parallel. One of the resistors has a value of 64 Ω and the current through it is 0.40 A. What is the value of the other resistor?
- a. 8.0 Ω
 b. 16 Ω
 c. 24 Ω
 d. 32 Ω
 e. 40 Ω
- _____ 9. In the circuit segment shown if $I = 7$ mA and $Q = 50$ μ C, what is the potential difference, $V_A - V_B$?

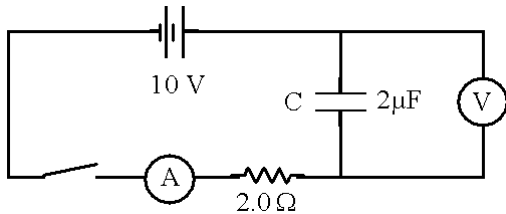


- a. -40 V
 b. +40 V
 c. +20 V
 d. -20 V
 e. -15 V

- _____ 10. If $I = 2.0 \text{ mA}$ and the potential difference, $V_A - V_B = +30 \text{ V}$ in the circuit segment shown, determine the charge and polarity of the capacitor.

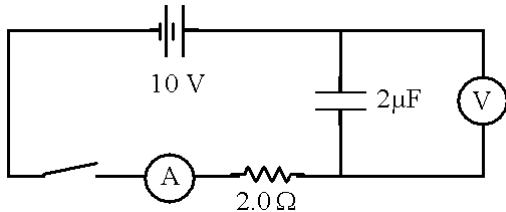


- 1.5 mC, left plate is positive
 - 1.5 mC, right plate is positive
 - 0.50 mC, left plate is positive
 - 0.50 mC, right plate is positive
 - 1.0 mC, left plate is positive
- _____ 11. If one doubles the emfs in a circuit and doubles the resistances in the circuit at the same time, what happens to the currents through the resistors? Assume there are only emfs and resistors in the circuit.
- They stay the same.
 - They double.
 - They quadruple.
 - They halve.
 - They increase by a factor of 8.
- _____ 12. A 10-V-emf battery is connected in series with the following: a $2\text{-}\mu\text{F}$ capacitor, a $2\text{-}\Omega$ resistor, an ammeter, and a switch, initially open; a voltmeter is connected in parallel across the capacitor. At the instant the switch is closed, what are the current and capacitor voltage readings, respectively?

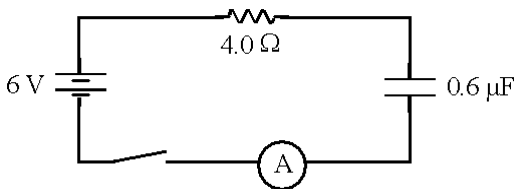


- zero A, 10 V
- zero A, zero V
- 5 A, zero V
- 5 A, 10 V
- 20 A, 10 V

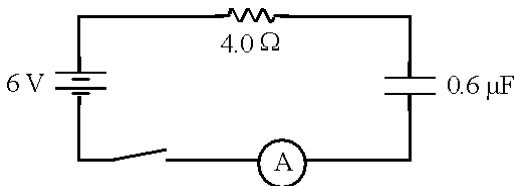
- _____ 13. A 10-V-emf battery is connected in series with the following: a $2\text{-}\mu\text{F}$ capacitor, a $2\text{-}\Omega$ resistor, an ammeter, and a switch, initially open; a voltmeter is connected in parallel across the capacitor. After the switch has been closed for a relatively long period (several seconds, say), what are the current and capacitor voltage readings, respectively?



- a. zero A, 10 V
 b. zero A, zero V
 c. 5 A, zero V
 d. 5 A, 10 V
 e. 20 A, 10 V
- _____ 14. A circuit contains a 6.0-V battery, a $4.0\text{-}\Omega$ resistor, a $0.60\text{-}\mu\text{F}$ capacitor, an ammeter, and a switch all in series. What will be the current reading immediately after the switch is closed?

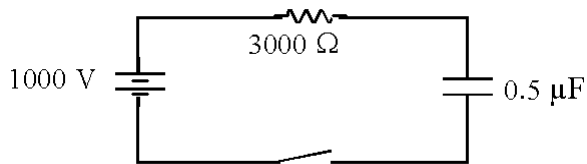


- a. zero
 b. 0.75 A
 c. 1.5 A
 d. 10 A
 e. 24 A
- _____ 15. A circuit contains a 6.0-V battery, a $4.0\text{-}\Omega$ resistor, a $0.60\text{-}\mu\text{F}$ capacitor, an ammeter, and a switch in series. What will be the charge on the capacitor 10 min after the switch is closed?

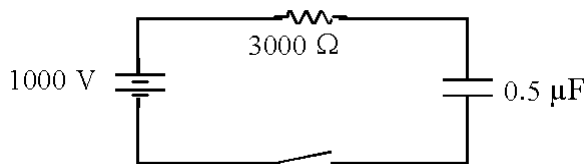


- a. zero
 b. $0.10\ \mu\text{C}$
 c. $3.6\ \mu\text{C}$
 d. $2.4\ \mu\text{C}$
 e. $1.2\ \mu\text{C}$

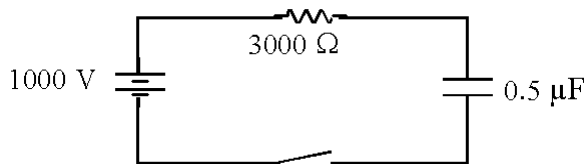
- _____ 16. A 1 000-V battery, a 3 000- Ω resistor and a 0.50- μ F capacitor are connected in series with a switch. The capacitor is initially uncharged. What is the value of the current the moment after the switch is closed?



- a. 0.39 A
 b. 0.33 A
 c. 0.84 A
 d. 2 000 A
 e. 1.0 A
- _____ 17. A 1 000-V battery, a 3 000- Ω resistor and a 0.50- μ F capacitor are connected in series with a switch. The time constant for such a circuit, designated by the Greek letter, τ , is defined as the time required to charge the capacitor to 63% of its capacity after the switch is closed. What is the value of τ for this circuit?



- a. 6.0×10^9 s
 b. 1.7×10^{-10} s
 c. 1.7×10^{-7} s
 d. 1.5×10^{-3} s
 e. 1.5×10^{-1} s
- _____ 18. A 1 000-V battery, a 3 000- Ω resistor and a 0.50- μ F capacitor are connected in series with a switch. The time constant for such a circuit, designated by the Greek letter, τ , is defined as the time that the capacitor takes to charge to 63% of its capacity after the switch is closed. What is the current in the circuit at a time interval of τ seconds after the switch has been closed?



- a. 0.14 A
 b. 0.21 A
 c. 0.12 A
 d. 0.32 A
 e. 0.18 A

Name: _____

ID: A

- _____ 19. The following three appliances are connected to a 120-V house circuit: i) toaster, 1 200 W, ii) coffee pot, 750 W, and iii) microwave, 800 W. If all were operated at the same time, what total current would they draw?
- a. 3.0 A
 - b. 5.0 A
 - c. 10 A
 - d. 23 A
 - e. 31 A
- _____ 20. What is the maximum number of 60-W light bulbs you can connect in parallel in a 120-V home circuit without tripping the 30-A circuit breaker?
- a. 11
 - b. 35
 - c. 59
 - d. 3 600
 - e. 6 800

AP physics B - Websheet 18.1
Answer Section

MULTIPLE CHOICE

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