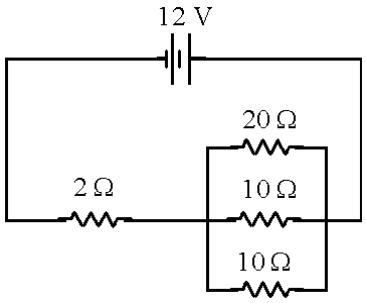
Circuits Practice Websheet 18.1

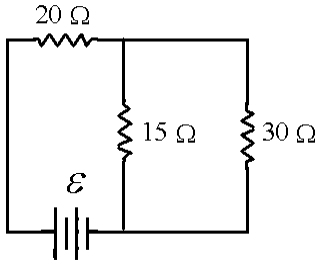
Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. 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

____ 2. If ε = 24 V, at what rate is thermal energy generated in the 20-Ω resistor?



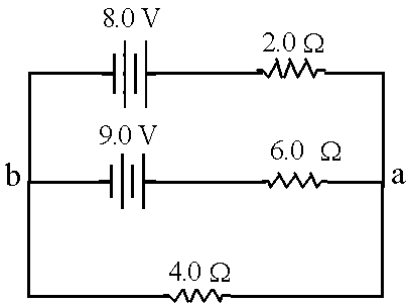
a. 13 W
b. 3.2 W
c. 23 W
d. 39 W
e. 0.51 W

____ 3. If $R_1 < R_2 < R_3$, and if these resistors are connected in parallel in a circuit, which one has the highest current?
a. R_1
b. R_2
c. R_3
d. All have the same current.
e. The answer depends on the internal resistance of the battery.

____ 4. Resistors of values 8.0 Ω, 12.0 Ω, and 24.0 Ω are connected in parallel across a fresh battery. Which resistor dissipates the greatest power?

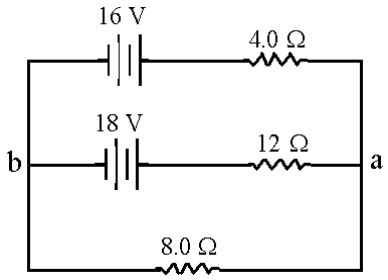
a. the 8.0-Ω resistor
b. the 12.0-Ω resistor
c. the 24.0-Ω resistor
d. All dissipate the same power when in series.
e. The answer depends on the internal resistance of the battery.

____ 5. What is the current through the 2-Ω resistor?



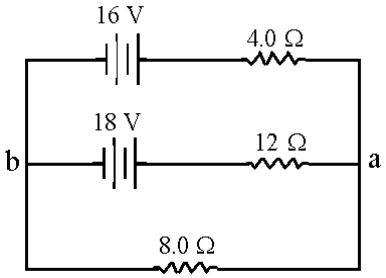
a. 1.0 A
b. 0.50 A
c. 1.5 A
d. 2.0 A
e. 2.5 A

____ 6. What is the current through the 8-Ω resistor?



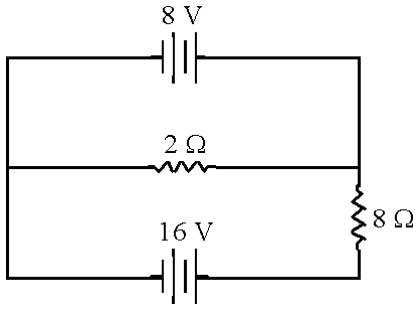
a. 1.0 A
b. 0.50 A
c. 1.5 A
d. 2.0 A
e. 2.5 A

____ 7. What is the potential difference between points a and b?



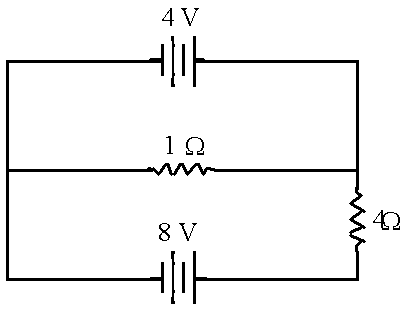
a. 6 V
b. 8 V
c. 12 V
d. 24 V
e. 27 V

____ 8. What is the current flowing through the 2-Ω resistor?



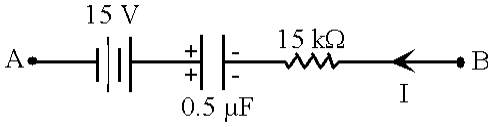
a. 2 A
b. 3 A
c. 4 A
d. 6 A
e. 7 A

____ 9. What is the current flowing through the 4-Ω resistor?



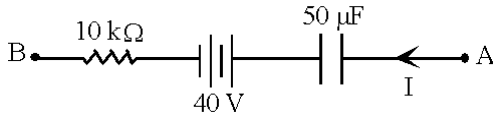
a. 1 A
b. 2 A
c. 3 A
d. 6 A
e. 9 A

____ 10. In the circuit segment shown if I = 7 mA and Q = 50 μC, what is the potential difference, $V_A - V_B$?



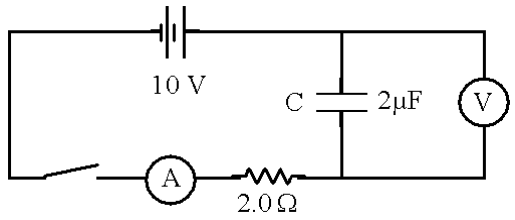
a. –40 V
b. +40 V
c. +20 V
d. –20 V
e. –15 V

____ 11. If I = 2.0 mA and the potential difference, VA - VB = +30 V in the circuit segment shown, determine the charge and polarity of the capacitor.



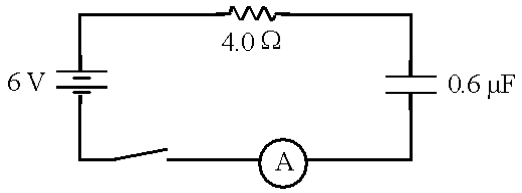
a. 1.5 mC, left plate is positive
b. 1.5 mC, right plate is positive
c. 0.50 mC, left plate is positive
d. 0.50 mC, right plate is positive
e. 1.0 mC, left plate is positive

____ 12. A 10-V-emf battery is connected in series with the following: a 2-μF capacitor, a 2-Ω 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?



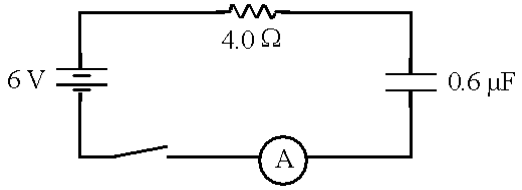
a. zero A, 10 V
b. zero A, zero V
c. 5 A, zero V
d. 5 A, 10 V
e. 20 A, 10 V

____ 13. A circuit contains a 6.0-V battery, a 4.0-Ω resistor, a 0.60-μF capacitor, an ammeter, and a switch all in series. What will be the current reading immediately after the switch is closed?



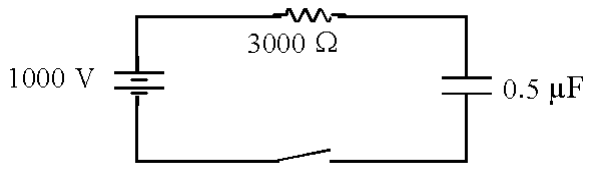
a. zero
b. 0.75 A
c. 1.5 A
d. 10 A
e. 24 A

____ 14. A circuit contains a 6.0-V battery, a 4.0-Ω resistor, a 0.60-μF capacitor, an ammeter, and a switch in series. What will be the charge on the capacitor 10 min after the switch is closed?



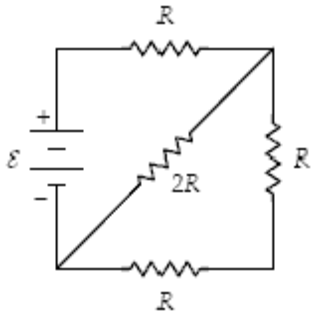
a. zero
b. 0.10 μC
c. 3.6 μC
d. 2.4 μC
e. 1.2 μC

____ 15. A 1 000-V battery, a 3 000-Ω resistor and a 0.50-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?



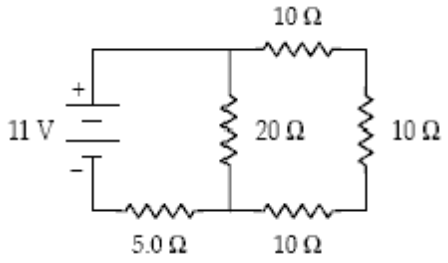
a. 0.39 A
b. 0.33 A
c. 0.84 A
d. 2 000 A
e. 1.0 A

____ 16. At what rate is thermal energy being generated in the 2R-resistor when ε = 12 V and R = 3.0 Ω?



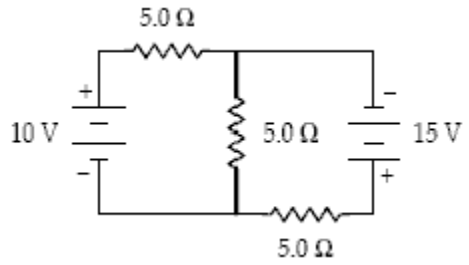
a. 12 W
b. 24 W
c. 6.0 W
d. 3.0 W
e. 1.5 W

____ 17. What is the magnitude of the potential difference across the 20-Ω resistor?



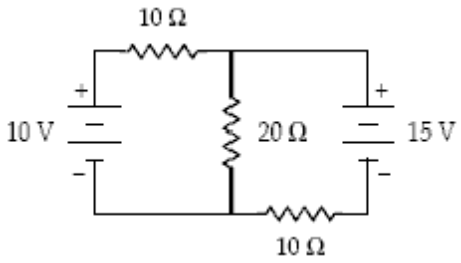
a. 3.2 V
b. 7.8 V
c. 11 V
d. 5.0 V
e. 8.6 V

____ 18. Determine the current in the 10-V emf.



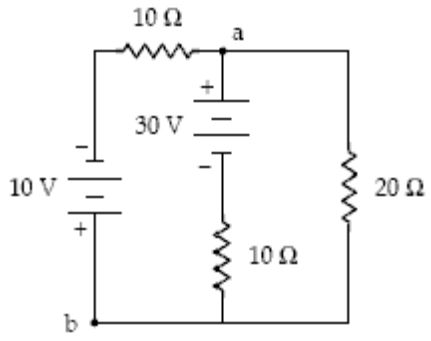
a. 2.3 A
b. 2.7 A
c. 1.3 A
d. 0.30 A
e. 2.5 A

____ 19. What is the magnitude of the current in the 20-Ω resistor?



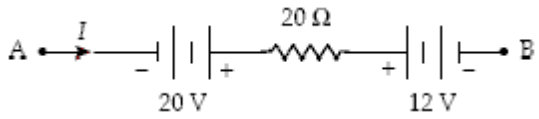
a. 0.75 A
b. 0.00 A
c. 0.25 A
d. 0.50 A
e. 1.00 A

____ 20. What is the potential difference $V_b - V_a$ shown in the circuit below.



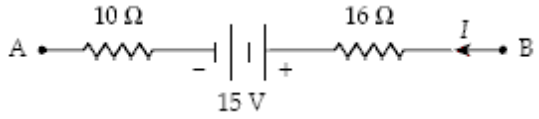
a. −8.0 V
b. +8.0 V
c. −18 V
d. +18 V
e. −12 V

____ 21. What is the potential difference $V_B - V_A$ when the I = 1.5 A in the circuit segment below?



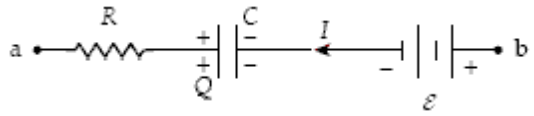
a. +22 V
b. −22 V
c. −38 V
d. +38 V
e. +2.0 V

____ 22. What is the potential difference $V_B - V_A$ when I = 0.50 A in the circuit segment shown below?



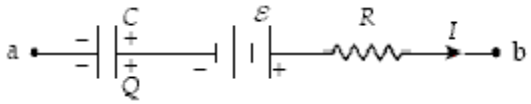
a. +28 V
b. +2.0 V
c. −28 V
d. −2.0 V
e. +18 V

____ 23. If R = 2.0 kΩ, C = 4.0 mF, ε = 8.0 V, Q = 20 mC, and I = 3.0 mA, what is the potential difference $V_b - V_a$?



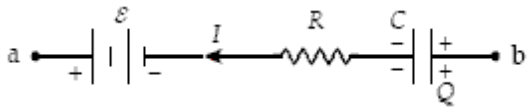
a. +7.0 V
b. +19 V
c. +9.0 V
d. –3.0 V
e. –14 V

____ 24. If R = 3.0 kΩ, C = 5.0 mF, ε = 6.0 V, Q = 15 mC, and I = 4.0 mA, what is the potential difference $V_b - V_a$?



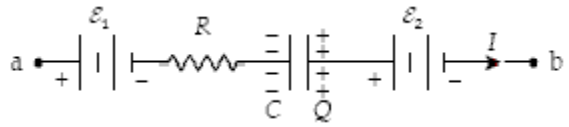
a. –3.0 V
b. +9.0 V
c. –15 V
d. +21 V
e. –6.0 V

____ 25. If R = 4.0 kΩ, C = 3.0 mF, ε = 15 V, Q = 12 mC, and I = 2.0 mA, what is the potential difference $V_b - V_a$?



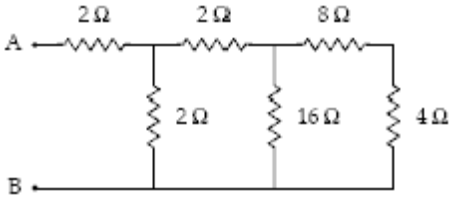
a. +3.0 V
b. –19 V
c. –3.0 V
d. +27 V
e. +21 V

____ 26. If R = 3.0 kΩ, C = 6.0 nF, ε_1 = 10.0 V, Q = 18 nC, ε_2 = 6.0 V, and I = 5.0 mA, what is the potential difference $V_b - V_a$?



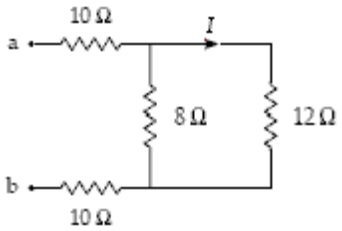
a. −13 V
b. +28 V
c. +13 V
d. −28 V
e. +2.0 V

____ 27. If the current in the 4.0-Ω resistor is 1.4 A, what is the magnitude of the potential difference, $V_A - V_B$?



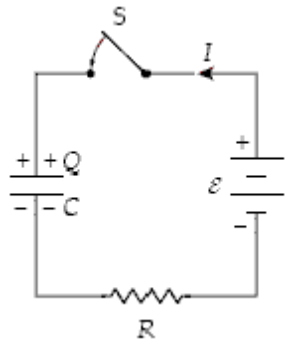
a. 69 V
b. 55 V
c. 62 V
d. 48 V
e. 31 V

____ 28. If I = 0.40 A in the circuit segment shown below, what is the potential difference $V_a - V_b$?



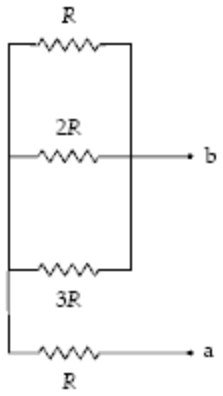
a. 31 V
b. 28 V
c. 25 V
d. 34 V
e. 10 V

____ 29. At $t = 0$ the switch S is closed with the capacitor uncharged. If $C = 30\ \mu F$, $\varepsilon = 50$ V, and $R = 10$ kΩ, what is the potential difference across the capacitor when $I = 2.0$ mA?



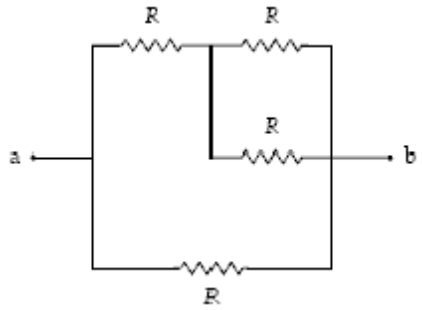
a. 20 V
b. 15 V
c. 25 V
d. 30 V
e. 45 V

____ 30. What is the equivalent resistance between points a and b when $R = 13$ Ω?



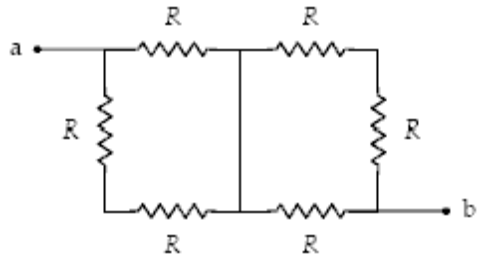
a. 29 Ω
b. 23 Ω
c. 26 Ω
d. 20 Ω
e. 4.6 Ω

____ 31. What is the equivalent resistance between points a and b when $R = 30\ \Omega$?



a. 27 Ω
b. 21 Ω
c. 24 Ω
d. 18 Ω
e. 7.5 Ω

____ 32. What is the equivalent resistance between points a and b when $R = 12\ \Omega$?



a. 20 Ω
b. 16 Ω
c. 24 Ω
d. 28 Ω
e. 6.0 Ω

Circuits Practice Websheet 18.1
Answer Section

MULTIPLE CHOICE

1. ANS: D PTS: 1 DIF: 2
   TOP: 18.1 Sources of emf | 18.2 Resistors in Series | 18.3 Resistors in Parallel
2. ANS: A PTS: 1 DIF: 3
   TOP: 18.1 Sources of emf | 18.2 Resistors in Series | 18.3 Resistors in Parallel
3. ANS: A PTS: 1 DIF: 1
   TOP: 18.1 Sources of emf | 18.2 Resistors in Series | 18.3 Resistors in Parallel
4. ANS: A PTS: 1 DIF: 2
   TOP: 18.1 Sources of emf | 18.2 Resistors in Series | 18.3 Resistors in Parallel
5. ANS: A PTS: 1 DIF: 3
   TOP: 18.4 Kirchhoff's Rules and Complex DC Circuits
6. ANS: C PTS: 1 DIF: 3
   TOP: 18.4 Kirchhoff's Rules and Complex DC Circuits
7. ANS: C PTS: 1 DIF: 3
   TOP: 18.4 Kirchhoff's Rules and Complex DC Circuits
8. ANS: C PTS: 1 DIF: 2
   TOP: 18.4 Kirchhoff's Rules and Complex DC Circuits
9. ANS: A PTS: 1 DIF: 2
   TOP: 18.4 Kirchhoff's Rules and Complex DC Circuits
10. ANS: D PTS: 1 DIF: 3
    TOP: 18.4 Kirchhoff's Rules and Complex DC Circuits
11. ANS: A PTS: 1 DIF: 3
    TOP: 18.4 Kirchhoff's Rules and Complex DC Circuits
12. ANS: C PTS: 1 DIF: 2 TOP: 18.5 RC Circuits
13. ANS: C PTS: 1 DIF: 2 TOP: 18.5 RC Circuits
14. ANS: C PTS: 1 DIF: 2 TOP: 18.5 RC Circuits
15. ANS: B PTS: 1 DIF: 2 TOP: 18.5 RC Circuits
16. ANS: C PTS: 2 DIF: Average
17. ANS: B PTS: 2 DIF: Average
18. ANS: A PTS: 3 DIF: Challenging
19. ANS: D PTS: 3 DIF: Challenging
20. ANS: A PTS: 3 DIF: Challenging
21. ANS: B PTS: 2 DIF: Average
22. ANS: A PTS: 2 DIF: Average
23. ANS: C PTS: 2 DIF: Average
24. ANS: A PTS: 2 DIF: Average
25. ANS: C PTS: 2 DIF: Average
26. ANS: D PTS: 2 DIF: Average
27. ANS: D PTS: 3 DIF: Challenging
28. ANS: C PTS: 2 DIF: Average
29. ANS: D PTS: 2 DIF: Average
30. ANS: D PTS: 2 DIF: Average

31. ANS: D PTS: 2 DIF: Average
32. ANS: B PTS: 2 DIF: Average