

Chapter 7 Review Questions

Solutions can be found in Chapter 12.

Section I: Multiple Choice

1. A wire made of brass and a wire made of silver have the same length, but the diameter of the brass wire is 4 times the diameter of the silver wire. The resistivity of brass is 5 times greater than the resistivity of silver. If R_B denotes the resistance of the brass wire and R_S denotes the resistance of the silver wire, which of the following is true?

- (A) $R_B = \frac{5}{16} R_S$
(B) $R_B = \frac{4}{5} R_S$
(C) $R_B = \frac{5}{4} R_S$
(D) $R_B = \frac{5}{2} R_S$

2. For an ohmic conductor, doubling the voltage without changing the resistance will cause the current to

- (A) decrease by a factor of 4
(B) decrease by a factor of 2
(C) increase by a factor of 2
(D) increase by a factor of 4

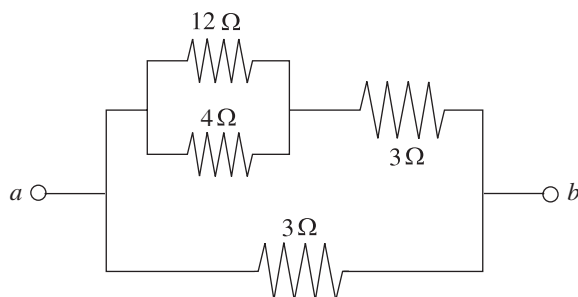
3. If a 60-watt light bulb operates at a voltage of 120 V, what is the resistance of the bulb?

- (A) 2 Ω
(B) 30 Ω
(C) 240 Ω
(D) 720 Ω

4. A battery whose emf is 40 V has an internal resistance of 5 Ω . If this battery is connected to a 15 Ω resistor R, what will the voltage drop across R be?

- (A) 10 V
(B) 30 V
(C) 40 V
(D) 50 V

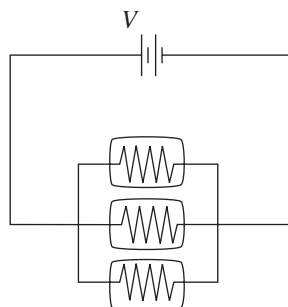
5.



Determine the equivalent resistance between points *a* and *b*.

- (A) 0.25 Ω
(B) 0.333 Ω
(C) 1.5 Ω
(D) 2 Ω

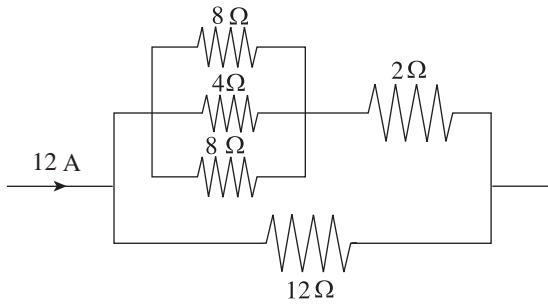
6.



Three identical light bulbs are connected to a source of emf, as shown in the diagram above. What will happen if the middle bulb burns out?

- (A) The light intensity of the other two bulbs will decrease (but they won't go out).
(B) The light intensity of the other two bulbs will increase.
(C) The light intensity of the other two bulbs will remain the same.
(D) More current will be drawn from the source of emf.

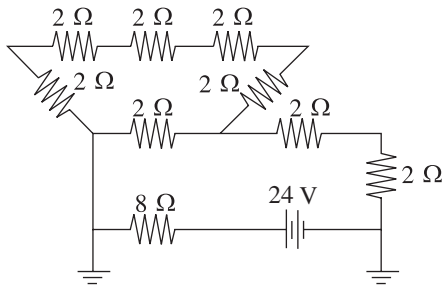
7.



What is the voltage drop across the $12\ \Omega$ resistor in the portion of the circuit shown above?

- (A) 24 V
- (B) 36 V
- (C) 48 V
- (D) 72 V

8.



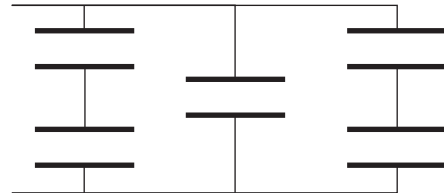
What is the current through the $8\ \Omega$ resistor in the circuit shown above?

- (A) 0.5 A
- (B) 1.0 A
- (C) 1.5 A
- (D) 3.0 A

9. How much energy is dissipated as heat in 20 s by a $100\ \Omega$ resistor that carries a current of 0.5 A?

- (A) 50 J
- (B) 100 J
- (C) 250 J
- (D) 500 J

10.

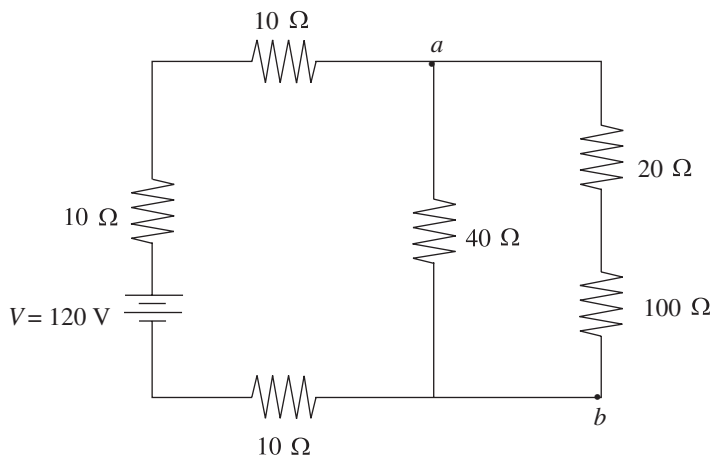


If each of the capacitors in the array shown above is C , what is the capacitance of the entire combination?

- (A) $C/2$
- (B) $2C/3$
- (C) $5C/6$
- (D) $2C$

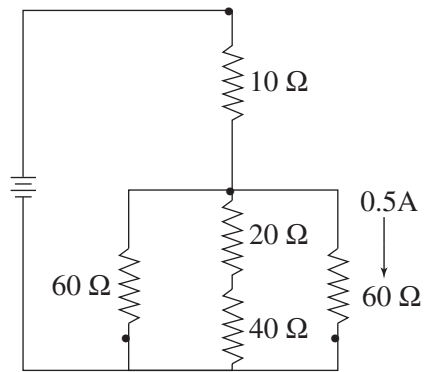
Section II: Free Response

1. Consider the following circuit:



- (a) At what rate does the battery deliver energy to the circuit?
- (b) Find the current through the 40 Ω resistor.
- (c)
 - (i) Determine the potential difference between points *a* and *b*.
 - (ii) At which of these two points is the potential higher?
- (d) Find the energy dissipated by the 100 Ω resistor in 10 s.
- (e) Given that the 100 Ω resistor is a solid cylinder that's 4 cm long, composed of a material whose resistivity is 0.45 Ω·m, determine its radius.

2. Consider the following circuit:



- (a) What is the current through each resistor?
- (b) What is the potential difference across each resistor?
- (c) What is the equivalent resistance of the circuit?