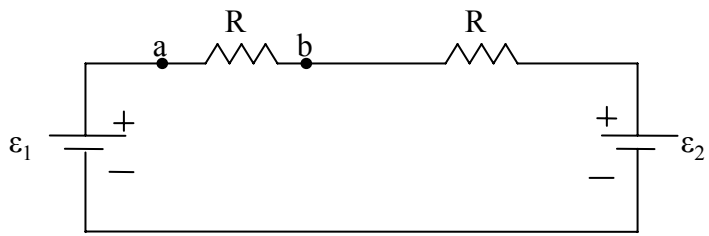
Questions

Chapter 27
Circuits

27-3 Calculating The Current In a Single-Loop Circuit
final-072

The figure shows two resistors, each of the resistance R, connected to two ideal batteries of emf ε1 and ε2 (ε1> ε2). The potential difference Va – Vb is equal to ε1/5. What is the ratio ε2/ε1?

A) 3/5
B) 2/5
C) 1/5
D) 4/5
E) 1



Answer A

27-3 Calculating The Current In a Single-Loop Circuit
final-062

Two resistors r and R are connected in series across 100 V line. If r = 30 kΩ and the voltage across it is found to be 60 V, find the resistance of R.

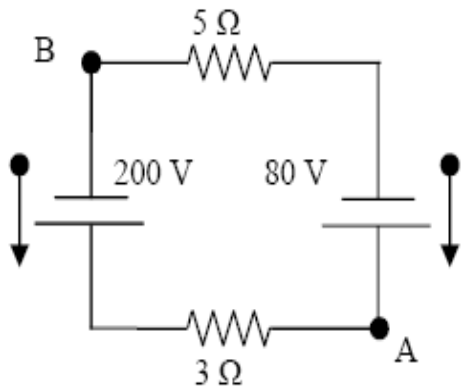
A) 30 kΩ
B) 20 kΩ
C) 10 kΩ
D) 15 kΩ
E) 5 kΩ

Answer B

27-3 Calculating The Current In a Single-Loop Circuit
final-061

Two ideal emf sources along with two resistors are connected as shown in the following figure. If the potential at A is 150 V, what would be the potential at point B?

A)6 V
B)-7 V
C)-5 V
D)8 V
E)10 V



Answer C

27-3 Calculating The Current In a Single-Loop Circuit
final-041

An electrical source with internal resistance r = 2.0 Ohm is used to operate a lamp of resistance R = 18 Ohm. What fraction of the total power is delivered to the lamp?

A)0.5.
B)1.8.
C)0.8.
D)0.2.
E)0.9.

Answer E

27-5 Resistances in Series and Parallel
final-062

A 6-V battery supplies a total of 48 W to three identical light bulbs connected in parallel. The resistance of each bulb is:

A) 3.23 Ω
B) 2.25 Ω
C) 4.02 Ω
D) 1.51 Ω
E) 0.13 Ω

Answer B

27-5 Resistances in Series and Parallel
final-062

Four resistors, each of 20-Ω, are connected in parallel and the combination is connected to a 20 V emf device. The current in any one of the resistors is:

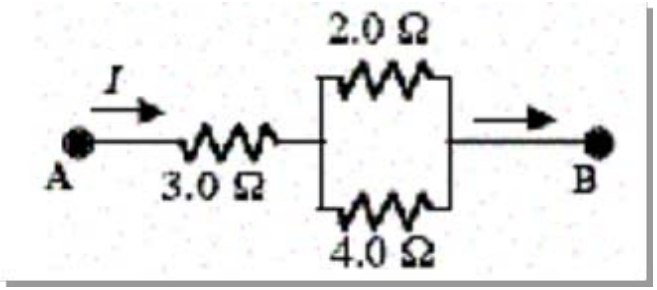
A)4.0 A
B)0.2 A
C)1.0 A
D)5.0 A
E)100 A

Answer C

27-5 Resistances in Series and Parallel
final-061

Three resistors are connected as shown in the following figure. The potential difference between points A and B is 30 V. How much current flows through the 4-Ohm resistor?

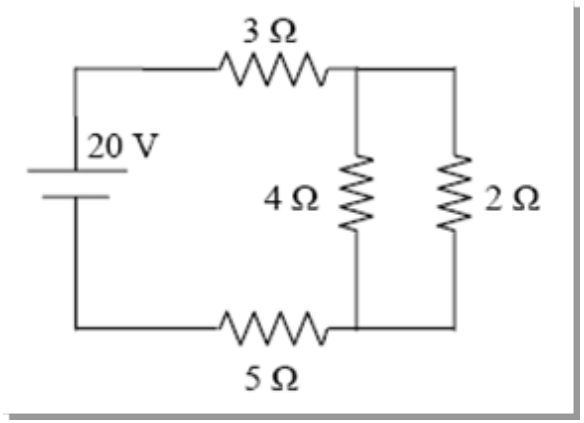
A)2.3 A
B)8.7 A
C)4.0 A
D)10 A
E)6.0 A



Answer A

27-5 Resistances in Series and Parallel
final-061

What is the total power dissipation in the circuit shown in the following figure.



A)43 W
B)50 W
C)55 W
D)61 W
E)48 W

Answer A

27-5 Resistances in Series and Parallel
final-042

Three resistors are connected as shown in figure 3. The potential difference between points A and B is 26 V. How much current flows through the 4-Ohm resistor?

A)4.0 A
B)6.0 A
C)10 A
D)2.0 A
E)8.7 A

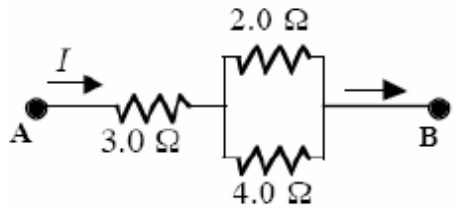


Figure 3

Answer D

27-5 Resistances in Series and Parallel
final-042

In the circuit shown in figure 4, I= 0.65 A and R= 15 Ohms. What is the value of the emf of the battery?

A)65 V
B)17 V
C)25 V
D)34 V
E)39 V

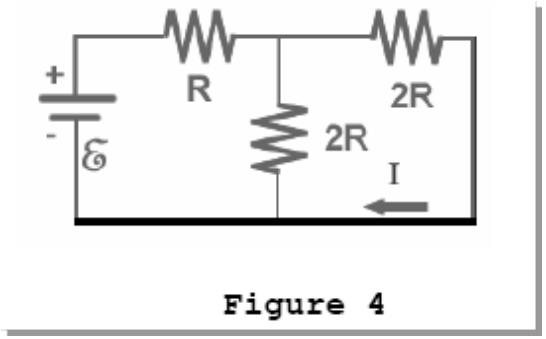


Figure 4

Answer E

27-5 Resistances in Series and Parallel
final-042

A number of 240-Ohms resistors are connected in parallel to a 120-V source. If the maximum current allowed in the circuit is 9 A, determine the largest number of resistors, which can be used in this circuit without exceeding the maximum current.

A)36.
B)9.
C)25.
D)34.
E)18.

Answer E

27-5 Resistances in Series and Parallel
final-042

In figure 6, three identical light bulbs are connected to a battery. Which one of the following statements is CORRECT?

A)The largest current passes through A.
B)The smallest current passes through A.
C)The largest current passes through B.
D)The largest current passes through C.
E)The current through all resistors is the same.

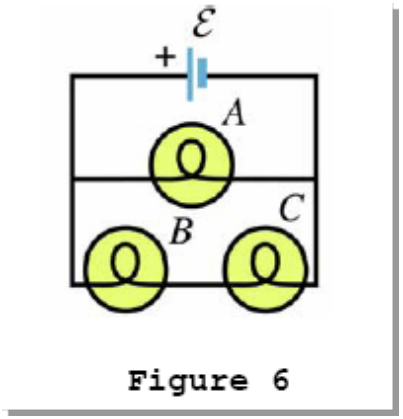


Figure 6

Answer A

27-5 Resistances in Series and Parallel
final-041

The current in single-loop circuit is 5.0 A. When an additional resistance of 2.0 Ohm is added in series, the current drops to 4.0 A. What was the resistance in the original circuit?

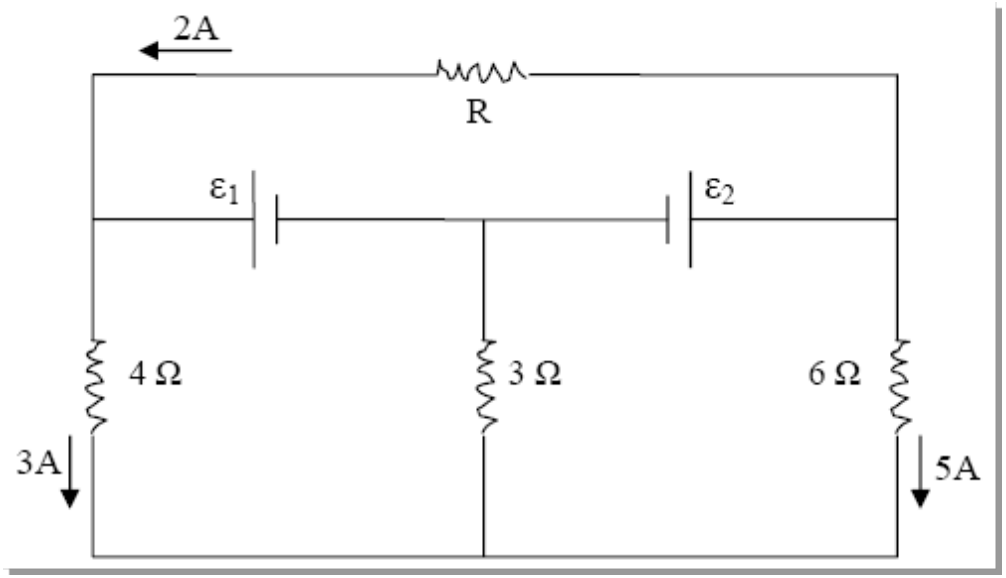
A)8.0 Ohm.
B)6.0 Ohm.
C)4.0 Ohm.
D)2.0 Ohm.
E)1.0 Ohm.

Answer A

27-6 Multiloop Circuits
final-062

In the following figure, find the current in 3 Ω resistor and the resistance R for the given currents.

A)2 A, 9 Ω
B)5 A, 8 Ω
C)8 A, 8 Ω
D)8 A, 9 Ω
E)1 A, 8 Ω



Answer D

27-6 Multiloop Circuits
final-042

In the circuit shown in figure 5, what is the current in the 8.00- Ohm resistor?

A)2.25 A to the left
B)2.25 A to the right
C)11.25 A to the left
D)11.25 A to the right
E)3.38 A to the left

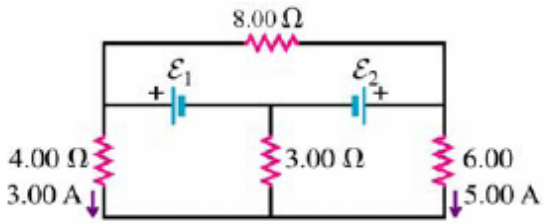


Figure 5

Answer A

27-6 Multiloop Circuits
final-041

Kirchoff's two laws for electric circuits can be derived by using certain conservation laws. On which conservation laws do Kirchoff's laws depend?

A)mass ; energy.
B)current ; charge.
C)charge ; energy .
D)charge ; mass.
E)current ; angular momentum.

Answer C

27-6 Multiloop Circuits
final-041

Three wires are joined together at a junction. A 0.40-A current flows toward the junction from one wire and a 0.3-A current flows away from the junction in the second wire. The current in the third wire is

A)0.30-A, toward the junction.
B)0.10-A, toward the junction.
C)0.70-A, away from the junction.
D)0.10-A, away from the junction .
E)0.70-A, toward the junction.

Answer D

27-7 RC Circuits
final-062

A 30.0 kΩ resistor and a capacitor are connected in series and a 15.0 V potential difference is suddenly applied across them. The potential difference across the capacitor rises to 5.00 V in 1.50 μs. Find the capacitance of capacitor.

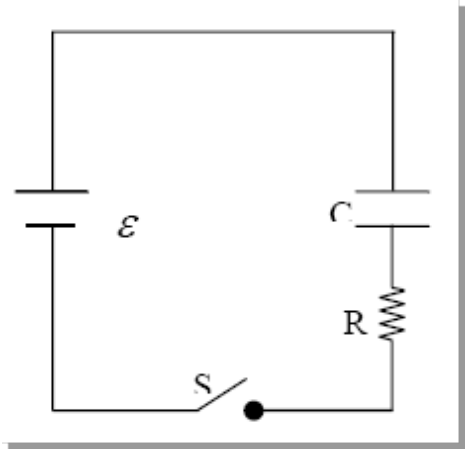
A)405 pF
B)123 pF
C)360 pF
D)150 pF
E)111 pF

Answer B

27-7 RC Circuits
final-061

Consider a series RC circuit as shown in the following figure, where R=1.0 x 10^6 Ω, C = 5.0 μF and ε = 30 V. If the switch is closed at t= 0, what is the current in resistance R at time 10 s after the switch is closed?

A)4.1 x10^{-6} A
B)5.0 x10^{-6} A
C)4.6 x10^{-6} A
D)6.0 x10^{-6} A
E)4.5 x10^{-6} A



Answer A

27-7 RC Circuits
final-042

A 5.0-micro-F capacitor is fully charged by connecting it to a 12-V battery. After disconnecting the battery, it was allowed for capacitor to discharge through a simple RC circuit, with a time constant of 4.0 s. What is the charge on the capacitor after one time constant has elapsed?

A)7.4×10^{-5} C
B)1.2×10^{-5} C
C)2.2×10^{-5} C
D)5.5×10^{-5} C
E)3.8×10^{-5} C

Answer C

27-7 RC Circuits
final-041

A capacitor of capacitance C is discharging through a resistor of resistance R. In terms of RC, when will the energy stored in the capacitor reduces to one fifth of its initial value?

A)0.80 RC.
B)0.35 RC.
C)0.70 RC.
D)1.20 RC.
E)0.55 RC.

Answer A