Terminal Voltage of a Battery

Friday, 29 January, 2021 21:25

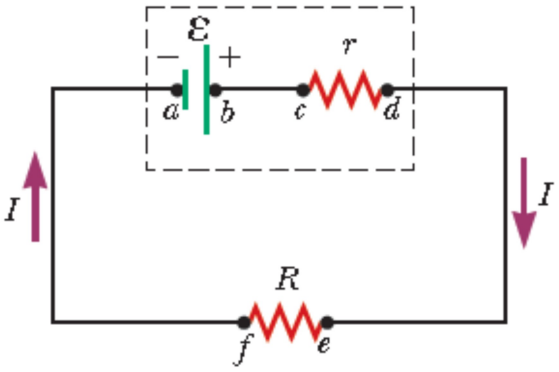
A battery has an emf of $12.0\,V$ and an internal resistance of $0.0500\,\Omega$. Its terminals are connected to a load resistance of $3.00\,\Omega$.

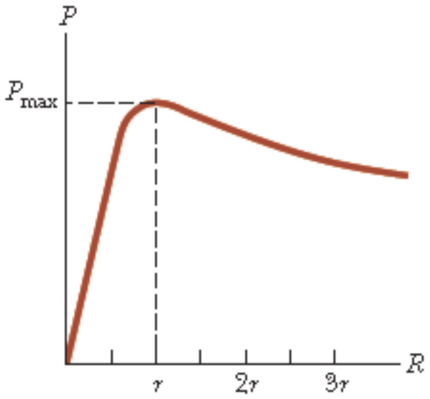
- (A) Find the current in the circuit and the terminal voltage of the battery.
- (B) Calculate the power delivered to the load resistor, the power delivered to the internal resistance of the battery, and the power delivered by the battery.

Matching the Load

Tuesday, 2 February, 2021 21:18

Find the load resistance R for which the maximum power is delivered to the load resistance shown in the figure.



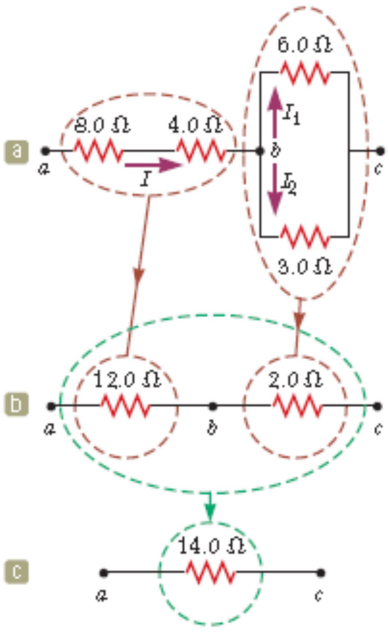


Find the Equivalent Resistance

Tuesday, 2 February, 2021 21:25

Four resistors are connected as shown.

- Find the equivalent resistance between points a and c.
- What is the current in each resistor if a potential difference of $42\ V$ is maintained between a and c?

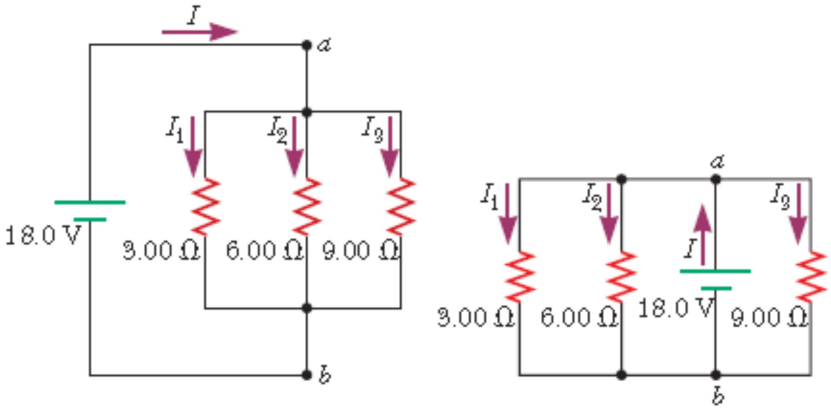


Three Resistors in Parallel

Tuesday, 2 February, 2021 21:33

Three resistors are connected in parallel as shown. A potential difference of $18.0\,V$ is maintained between points a and b.

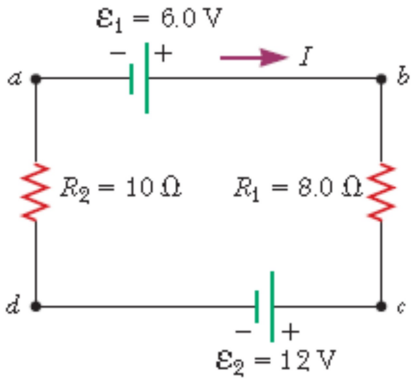
- Calculate the equivalent resistance of the circuit.
- Find the current in each resistor.
- Calculate the power delivered to each resistor and the total power delivered to the combination of resistors.



A Single-Loop Circuit

Tuesday, 2 February, 2021 21:37

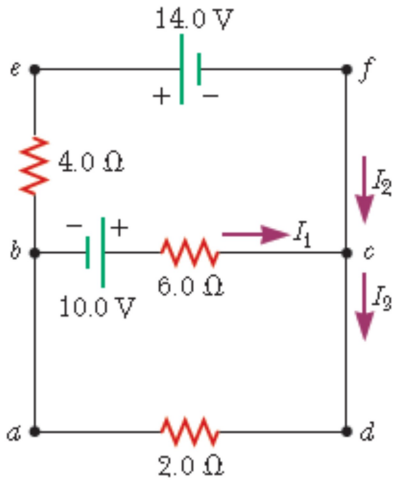
A single-loop circuit contains two resistors and two batteries as shown. (Neglect the internal resistances of the batteries.) Find the current in the circuit.



A Multiloop Circuit

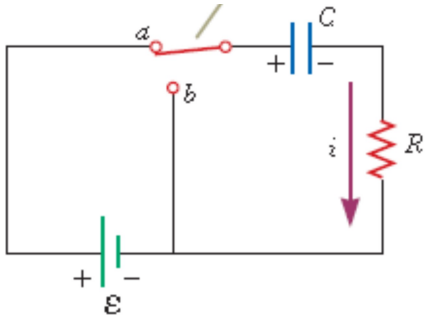
Tuesday, 2 February, 2021 21:43

Find the currents I_1, I_2, and I_3 in the circuit shown.



Charging a Capacitor in an RC Circuit

Tuesday, 2 February, 2021 21:45



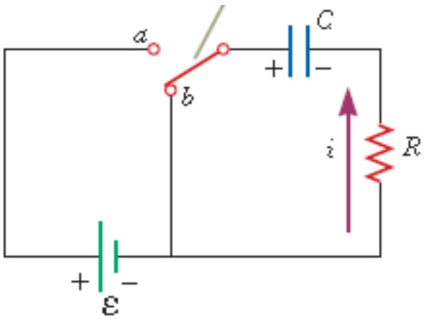
An uncharged capacitor and a resistor are connected in series to a battery as shown, where $\varepsilon = 12.0\,V$, $C = 5.00\,\mu F$, and $R = 8.00 \times 10^5\,V$. The switch is thrown to position a. Find:

- the time constant of the circuit,
- the maximum charge on the capacitor,
- the maximum current in the circuit, and
- the charge and current as functions of time.

Discharging a Capacitor in an RC Circuit

Tuesday, 2 February, 2021 21:50

Consider a capacitor of capacitance C that is being discharged through a resistor of resistance R as shown.



- After how many time constants is the charge on the capacitor one-fourth its initial value?
- The energy stored in the capacitor decreases with time as the capacitor discharges. After how many time constants is this stored energy one-fourth its initial value?

Energy Delivered to a Resistor

Thursday, 4 February, 2021 15:49

A $5.00 - \mu F$ capacitor is charged to a potential difference of $800\,V$ and then discharged through a resistor. How much energy is delivered to the resistor in the time interval required to fully discharge the capacitor?