

ELECTRICITY & CIRCUITS

Chapter 18-19 In-Class Example Problems

ELECTRIC CURRENT:

1. In a certain wire, there are 1.25×10^{13} electrons that flow past a certain point over the course of 10 minutes. What is the electric current in the wire?

OHM'S LAW & ELECTRIC POWER:

2. A 25Ω resistor is connected to a 6V battery in an electric circuit.
 - a. What is the current in the circuit?
 - b. What is the power developed by the resistor?
 - c. How much energy is dissipated by the resistor in 5 minutes?
3. What is the cost of leaving a 100W light bulb burning bright for 3 straight days, assuming that electric energy costs 9 cents per kilowatt-hour?

RESISTIVITY:

4. If a potential difference of 9V is maintained across a 3m section of 2mm-radius copper wire, what current will flow through the wire?
5. Find the resistance of a 20m-long, 3mm-radius copper wire at 52°C.

BATTERY EMF:

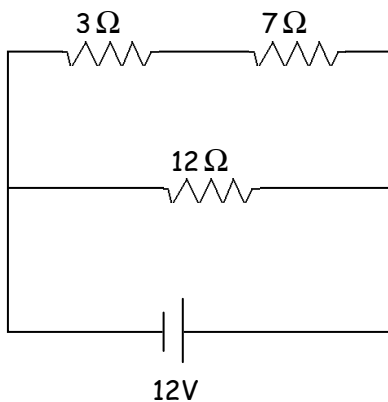
6. Calculate the terminal voltage for a battery with an emf of 9V and internal resistance of 0.5Ω , when the battery is connected to a 100Ω resistor.

COMBINATIONS OF RESISTORS:

7. Three resistors, 4Ω , 7Ω , and 10Ω , are connected together in series, and then connected to a 9V battery. Find the equivalent resistance of the group, and find the voltage across and current through the 7Ω resistor.

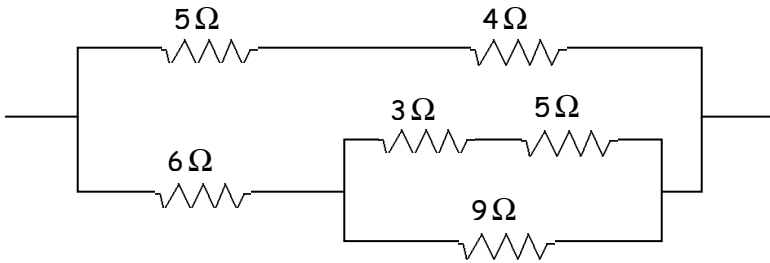
8. Three resistors, $4\ \Omega$, $7\ \Omega$, and $10\ \Omega$, are connected together in parallel, and then connected to a 9V battery. Find the equivalent resistance of the group, and find the voltage across and current through the $7\ \Omega$ resistor.

9. Find the equivalent resistance of the circuit, and find the current in and voltage across each resistor.



10. If each resistor in the previous arrangement really represents a light bulb, rank the bulbs in terms of their brightness.

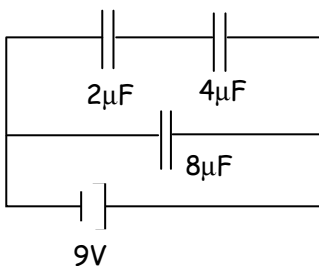
11. Find the equivalent resistance of the complex combination of resistors in the diagram, and then find the current through the 3Ω resistor.



COMBINATIONS OF CAPACITORS:

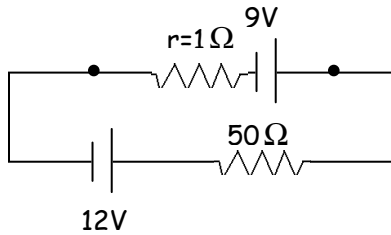
12. Three capacitors, $4\mu\text{F}$, $7\mu\text{F}$, and $10\mu\text{F}$, are connected together in series, and then connected to a 12V battery. Find the equivalent capacitance of the group, and find the charge stored by the $10\mu\text{F}$ capacitor.

13. Find the equivalent capacitance of the combination of capacitors shown in the figure, find the charge on and potential difference across the $4\mu\text{F}$ capacitor and find the amount of energy stored in the entire circuit.

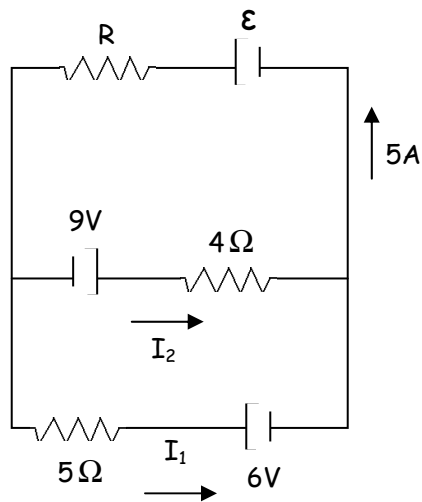


KIRCHHOFF'S RULES:

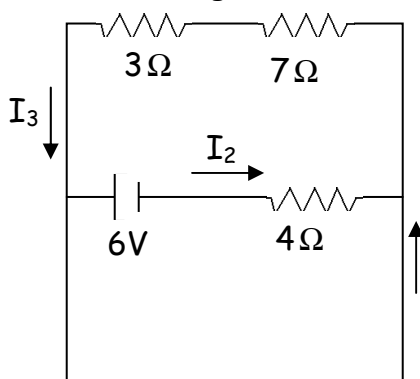
9. Find the terminal voltage of the 9V battery shown in the diagram.



10. Find the current in the 5Ω resistor in the complex circuit shown in the figure.



11. Find the voltage drop across the 3Ω resistor in the complex circuit shown in the figure.



I_1

