Phys102 Lecture 12

Kirchhoff's Rules

Key Points

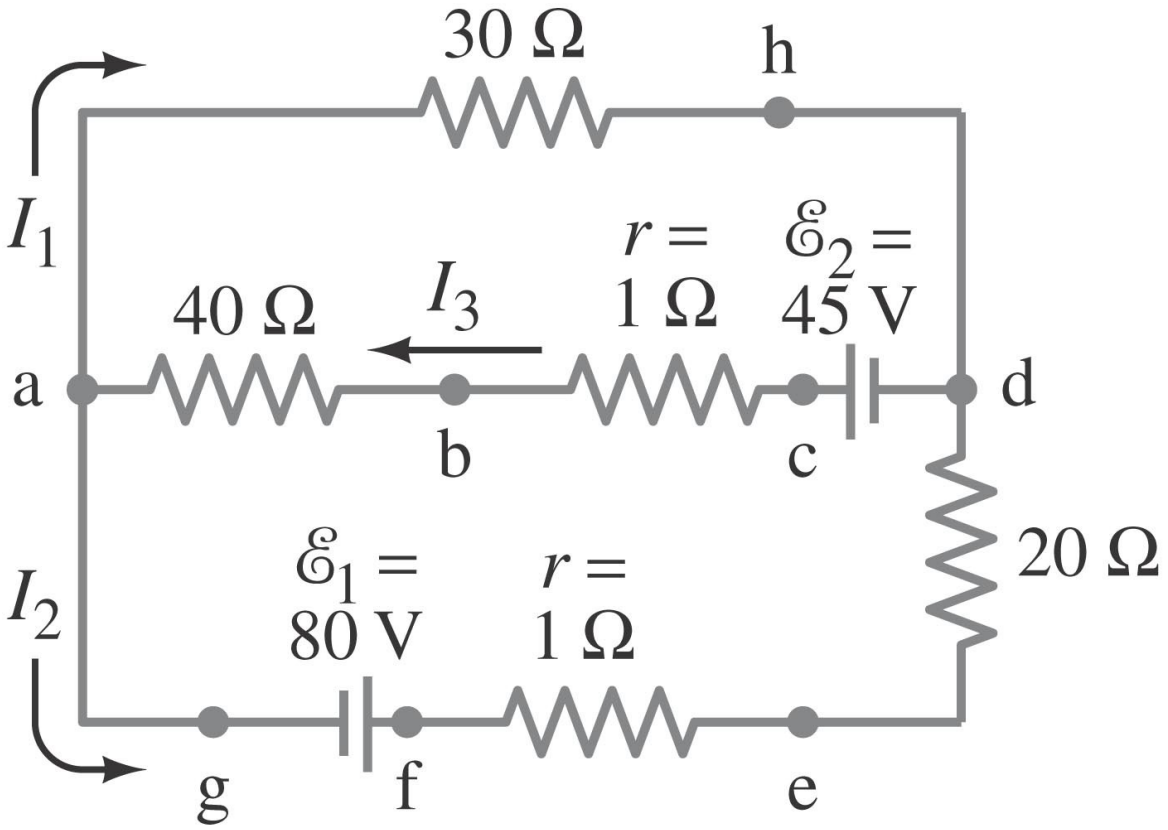
- Kirchhoff's Junction Rule
- Kirchhoff's Loop Rule
- Solving Linear Algebraic Equations

References

19-3.

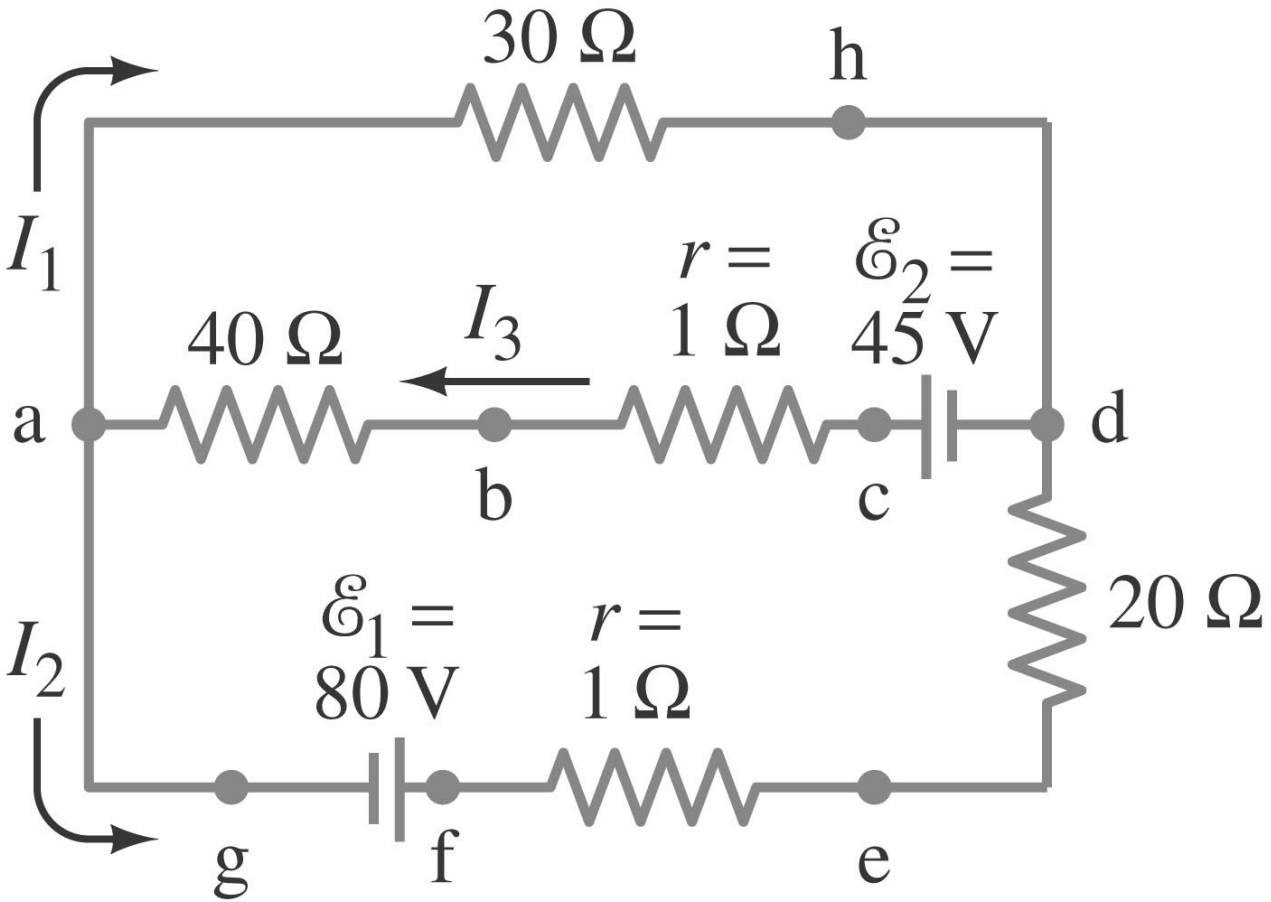
Kirchhoff's Rules

Some circuits cannot be broken down into series and parallel connections. For these circuits we use Kirchhoff's rules.



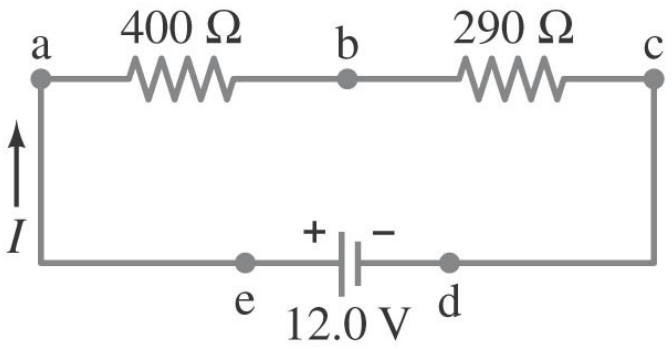
19-3 Kirchhoff's Rules

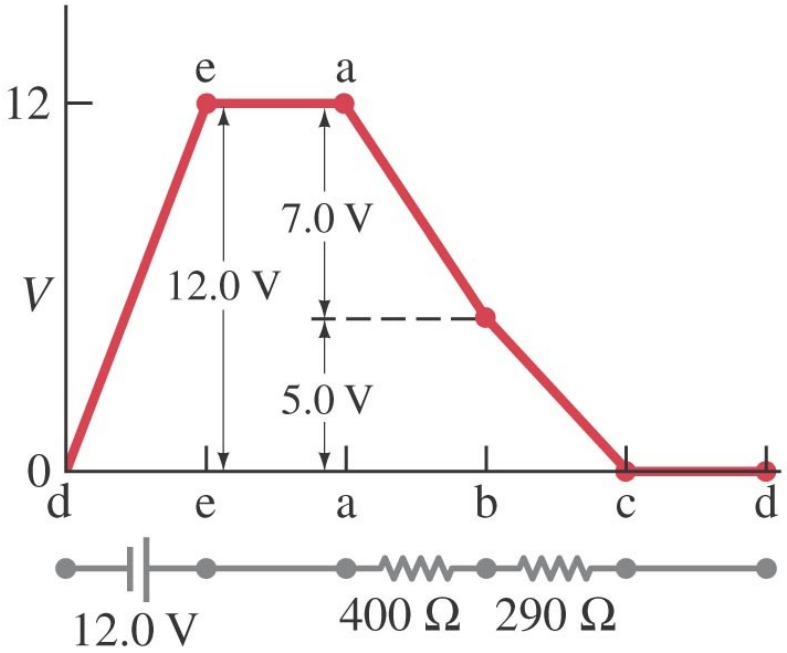
Junction rule: The sum of currents entering a junction equals the sum of the currents leaving it.



19-3 Kirchhoff's Rules

Loop rule: The sum of the changes in potential around a closed loop is zero.





19-3 Kirchhoff's Rules

Problem Solving: Kirchhoff's Rules

1. **Label each current, including its direction.**
2. **Identify unknowns.**
3. **Apply junction and loop rules; you will need as many independent equations as there are unknowns.**
4. **Solve the equations, being careful with signs. If the solution for a current is negative, that current is in the opposite direction from the one you have chosen.**

Example: Using Kirchhoff's rules.

Calculate the currents I_1, I_2, and I_3 in the three branches of the circuit in the figure.