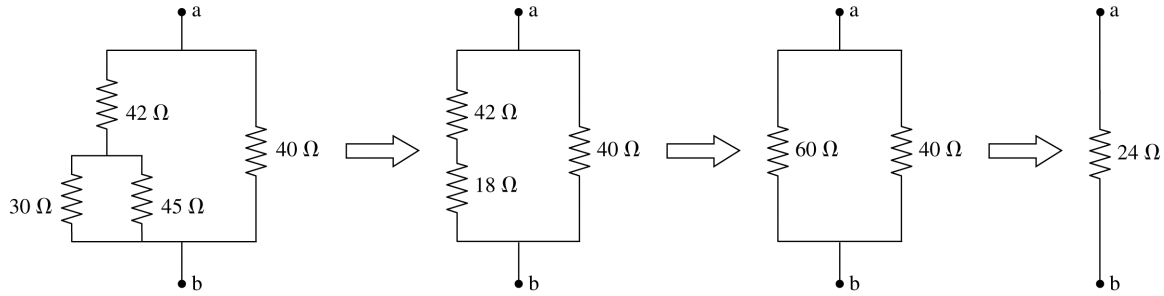
31.31. **Model:** The connecting wires are ideal with zero resistance.
Solve:



For the first step, the resistors 30 Ω and 45 Ω are in parallel. Their equivalent resistance is

$$\frac{1}{R_{\text{eq }1}} = \frac{1}{30\ \Omega} + \frac{1}{45\ \Omega} \Rightarrow R_{\text{eq }1} = 18\ \Omega$$

For the second step, resistors 42 Ω and $R_{\text{eq }1}$ = 18 Ω are in series. Therefore,

$$R_{\text{eq }2} = R_{\text{eq }1} + 42\ \Omega = 18\ \Omega + 42\ \Omega = 60\ \Omega$$

For the third step, the resistors 40 Ω and $R_{\text{eq }2}$ = 60 Ω are in parallel. So,

$$\frac{1}{R_{\text{eq }3}} = \frac{1}{60\ \Omega} + \frac{1}{40\ \Omega} \Rightarrow R_{\text{eq }3} = 24\ \Omega$$

The equivalent resistance of the circuit is 24 Ω.