

An example that illustrates the reciprocity theorem (互易定理).

We find the reading of the **ammeter** in the circuit of Fig. 1 using the mesh current method.

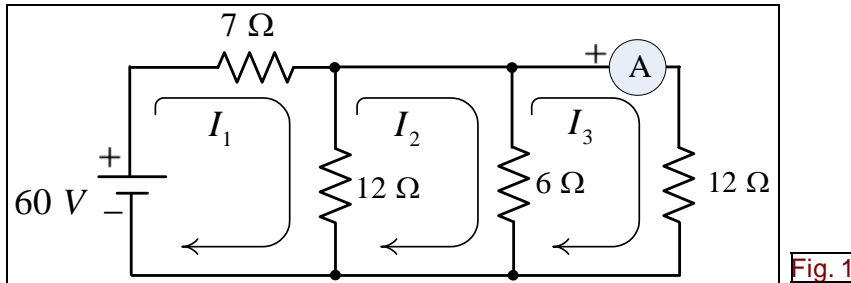


Fig. 1

$$\Delta_R := \begin{vmatrix} 7 + 12 & -12 & 0 \\ -12 & 12 + 6 & -6 \\ 0 & -6 & 6 + 12 \end{vmatrix} = 2880$$

$$\text{The reading of the ammeter is } I_3 := \frac{\begin{vmatrix} 19 & -12 & 60 \\ -12 & 18 & 0 \\ 0 & -6 & 0 \end{vmatrix}}{\Delta_R} = 1.5 \text{ A}$$

Now we exchange the positions of the voltage source and the ammeter as shown in Fig. 2.

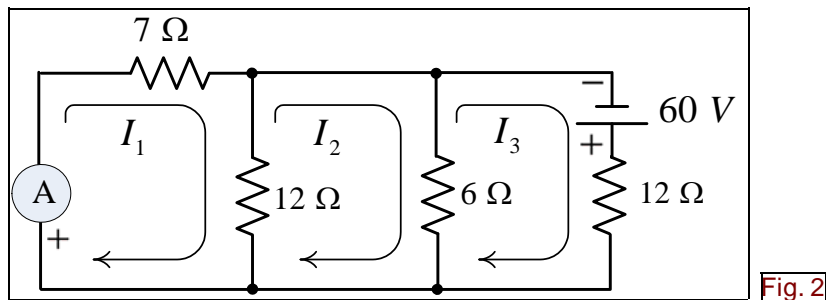


Fig. 2

$$\text{The reading of the ammeter } I_1 := \frac{\begin{vmatrix} 0 & -12 & 0 \\ 0 & 18 & -6 \\ 60 & -6 & 18 \end{vmatrix}}{\Delta_R} = 1.5 \text{ A}$$

which is the same as the case of Fig. 1.