Problem 1.18

Find the power absorbed by each of the elements in Fig. 1.29.
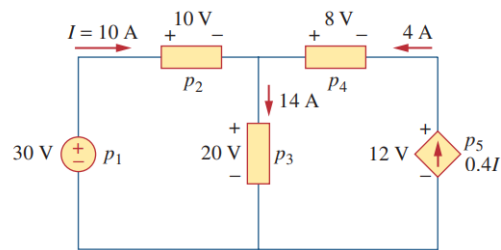

Figure 1.29
For Prob. 1.18.

Solution

If the current is flowing out of an element through the plus-side, the power is emitted; otherwise, the power is absorbed. The numerical value of the power for an element is obtained by multiplying the voltage and current through it.

$$p_1 = (30 \text{ V})(-10 \text{ A}) = -300 \text{ W (emitted)}$$

$$p_2 = (10 \text{ V})(10 \text{ A}) = 100 \text{ W (absorbed)}$$

$$p_3 = (20 \text{ V})(14 \text{ A}) = 280 \text{ W (absorbed)}$$

$$p_4 = (8 \text{ V})(-4 \text{ A}) = -32 \text{ W (emitted)}$$

$$p_5 = (12 \text{ V})(-4 \text{ A}) = -48 \text{ W (emitted)}$$

Observe that the sum of power in this circuit is zero, consistent with the law of conservation of energy.

$$\sum p = p_1 + p_2 + p_3 + p_4 + p_5 = (-300 + 100 + 280 - 32 - 48) \text{ W} = 0$$