Chapter 1, Solution 17
If $p_1 = -205 \text{ W}$, $p_2 = 60 \text{ W}$, $p_4 = 45 \text{ W}$, $p_3 = 30 \text{ W}$, calculate the power $p_3$ received or delivered by element 3.

\[ \sum p = 0 \rightarrow -205 + 60 + 45 + 30 + p_3 = 0 \]

$p_3 = 205 - 135 = 70 \text{ W}$. Thus element 3 receives \textbf{70 W}.

Chapter 1, Solution 19
Find $I$ in the network below

\[ I = 8 - 2 = 6 \text{ A} \]

Or using power conservation,
\[ 9 \times 8 = 2 \times 9 + 3I + 6I = 18 + 9I \]
\[ 8 = 2 + I \text{ or } I = 6 \text{ A} \]

Using the passive sign convention on page 11 as a guide (also see below), the power absorbed by each element is
- 8A source: $P = VI = (-9)(8) = -72\text{W}$ (power is supplied, not absorbed)
- Element 1: $P = (9)(2) = 18\text{W}$
- Element 2: $P = (3)(I) = (3)(6) = 18\text{W}$
- Element 3: $P = (6)(I) = (6)(6) = 36\text{W}$

We see that power supplied = power absorbed: $72 = 18 + 18 + 36$
Chapter 1, Solution 20

Find $V_0$ in the circuit below, and the power absorbed by each element

Since $\sum p = 0$: $-30 \times 6 + 6 \times 12 + 3V_0 + 28 + 28 \times 2 - 3 \times 10 = 0$

$72 + 84 + 3V_0 = 210$ or $3V_0 = 54$

$V_0 = 18 \text{ V}$

For the power “absorbed” by each element, note the passive sign convention on page 11 of the text. This is a simple statement, but critical to understand. Note, from this statement on page 11, you can see that “power absorbed” has a positive sign, and “power supplied” has a negative side.

Power absorbed:
- 30V source: $P = VI = (-30)(6) = -180 \text{ W}$, supplied (not absorbed)
- Element 1: $P = (12)(6) = 72 \text{ W}$
- Element 2: $P = (V_0)(3) = (18)(3) = 54 \text{ W}$
- Element 3: $P = (28)(1) = 28 \text{ W}$
- Element 4: $P = (28)(2) = 56 \text{ W}$
- Element 5: $P = (-5I_o)(3) = (-5)(2)(3) = -30 \text{ W}$, supplied, or released.

Note that the power absorbed $72 + 54 + 28 + 56 = \text{power supplied } 180 + 30 = 210 \text{ W}$

Chapter 1, Solution 26

A flashlight battery has a rating of 0.8 Ah and a lifetime of 10 hours.

(a) This battery can deliver $0.8 \text{ Ah} / 10 \text{ h} = 0.08 \text{ A} = 80 \text{ mA}$

(b) $P = VI = (6)(0.08) = 0.48 \text{ W}$

(c) Energy stored, in the units of Wh, is $(0.48 \text{ W})(10 \text{ h}) = 4.8 \text{ Wh}$. Note that in the standard unit of energy, the Joule, $(4.8 \text{ Wh})(3600 \text{ s/h}) = 17.28 \text{ kJ}$
Chapter 1, Solution 28

A 60-W incandescent lamp is connected to a 120-V source, and is left burning continuously in an otherwise dark staircase. Determine:
(a) the current through the lamp,
(b) the cost of operating the light for one non-leap year if electricity costs 9.5 cents per kWh.

(a) \[ i = \frac{P}{V} = \frac{60}{120} = 0.5 \text{ A} \]

(b) \[ W = pt = 60 \times 365 \times 24 \text{ Wh} = 525.6 \text{ kWh} \]
Cost = $0.095 \times 525.6 = $49.93

Chapter 2, Solution 12

For loop 1, \[ -40 - 50 + 20 + v_1 = 0 \text{ or } v_1 = 40 + 50 - 20 = 70 \text{ V} \]

For loop 2, \[ -20 + 30 - v_2 = 0 \text{ or } v_2 = 30 - 20 = 10 \text{ V} \]

For loop 3, \[ -v_1 + v_2 + v_3 = 0 \text{ or } v_3 = 70 - 10 = 60 \text{ V} \]
Chapter 2, Solution 13

At node 2,
\[ 3 + 7 + I_2 = 0 \quad \rightarrow \quad I_2 = -10\,A \]

At node 1,
\[ I_1 + I_2 = 2 \quad \rightarrow \quad I_1 = 2 - I_2 = 2\,A \]

At node 4,
\[ 2 = I_4 + 4 \quad \rightarrow \quad I_4 = 2 - 4 = -2\,A \]

At node 3,
\[ 7 - I_4 = I_3 \quad \rightarrow \quad I_3 = 7 - 2 = 5\,A \]

Hence,
\[ I_1 = 12\,A, \quad I_2 = -10\,A, \quad I_3 = 5\,A, \quad I_4 = -2\,A \]

Chapter 2, Solution 16

Determine \[ V_o \] in the circuit in Fig. 2.80.

Apply KVL,
\[ -10 + (16+14)I + 25 = 0 \quad \text{or} \quad 30I = 10 - 25 = -15 \quad \text{or} \quad I = -15/30 = -0.5\,mA \]

Also,
\[ -10 + 16I + V_o = 0 \quad \text{or} \quad V_o = 10 - 16(-0.5) = 10 + 8 = 18\,V \]