2.8 In the circuit shown in Fig. P2.8, determine v_x, v_y, i_a, and i_b.

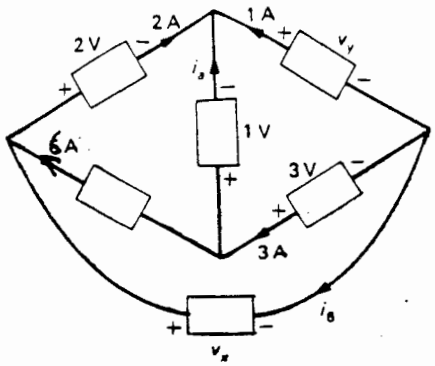


FIGURE P2.8

2.10 In the circuit shown in Fig. P2.10, determine v_x, v_y, and i_z.

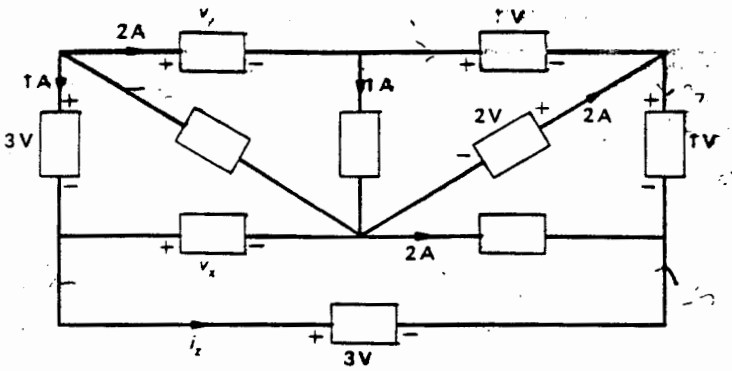


FIGURE P2.10

2.11 Automobile storage batteries are rated in terms of their terminal voltage (12-V) and their ampere-hour (Ah) capacities. For a typical 12-V battery having a 115-Ah capacity, determine the length of time this battery will light a 6-W bulb. (Assume that the battery voltage is constant at 12 V, even though this is not true for real batteries.) Determine the total energy stored in the battery before it is connected to the bulb.

2.12 In the circuit shown in Fig. P2.12, apply KVL, KCL, and Ohm's law to determine the currents and voltages associated with all the elements. Compute the power absorbed by the resistors and the power delivered by the ideal sources. Does conservation of energy result?

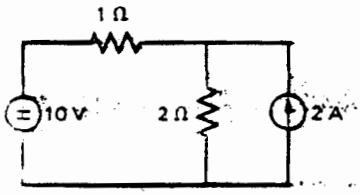
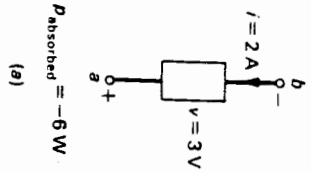
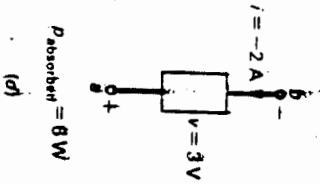
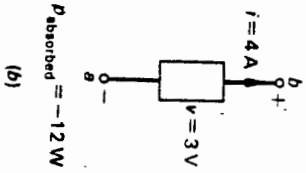
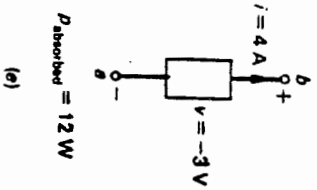


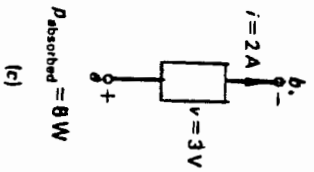
FIGURE P2.12



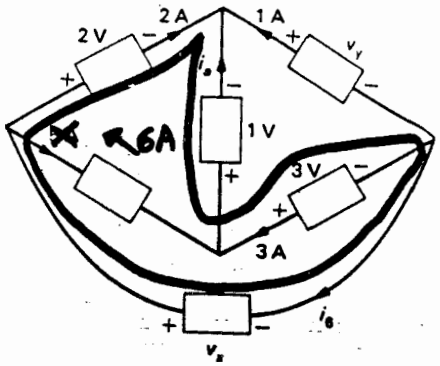








① TEXT #2.8



USING KVL AROUND LOOP SHOWN GIVES

$V_x - 2 + 1 - 3 = 0 \rightarrow \boxed{V_x = 4V}$.

KVL AROUND RIGHT HALF GIVES

$3 - 1 - V_y = 0 \rightarrow \boxed{V_y = 2V}$.

KCL AT TOP NODE GIVES $2 + 1 + i_a = 0 \rightarrow \boxed{i_a = -3A}$

KCL AT RIGHT NODE GIVES $3 + 1 + i_b = 0 \rightarrow \boxed{i_b = -4A}$

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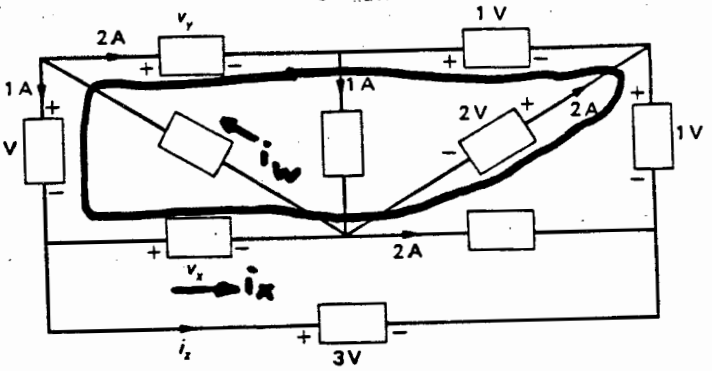
② TEXT #2.10



KVL AROUND LOOP SHOWN GIVES

$V_x + 3 - V_y - 1 - 2 = 0 \rightarrow \boxed{V_x = V_y}$

KVL AROUND BORDER GIVES

$3 + 3 - V_y - 1 - 1 = 0 \rightarrow \boxed{V_y = 4V}$

KCL AT UPPER LEFT $\rightarrow i_w = 3A$.

KCL AT CENTER $\rightarrow i_x + 1 = 2 + 2 + i_w \rightarrow i_x = 6A$. $1 = i_x + i_z \rightarrow \boxed{i_z = -5A}$

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③ TEXT #2.11

$P = iV$. $6w = i(12v) \rightarrow i = 1/2$ AMP. 115 A-HR $/ (1/2$ AMP$) = \boxed{230$ HOURS$}$

$\sim 9\frac{1}{2}$ DAYS

ENERGY $= Pt = iVt = (it)V = (115$ A-HR$)(3600$ SEC/HR$)(12v) = \boxed{4.968 \times 10^6}$ J

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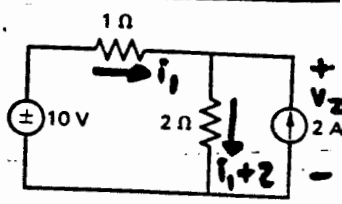
④ TEXT #2.12



LET i_1 = CURRENT LEFT-TO-RIGHT THROUGH 1Ω.

KVL: $10 - i_1(1\Omega) - (i_1+2)(2\Omega) = 0 \rightarrow \boxed{i_1 = 2A}$.

V_2 = VOLTAGE ACROSS CURRENT SOURCE $= (i_1+2)(2\Omega) = \boxed{8V}$.

CONSERV. OF ENERGY:

10V	$(10v)(-2A) = -20$ w	1Ω	$(2A)^2(1\Omega) = 4$ w
2A	$(-2A)(8v) = -16$ w	2Ω	$(8v)^2/2\Omega = 32$ w
	-36 w DISSIPATED		36 w DISSIPAT

REF: D.E. JOHNSON, J.R. JOHNSON, J.L. HILBURN, P.D. SCOTT — ELECTRIC CIRCUIT ANALYSIS 3RD ED. — PRENTICE HALL 1997