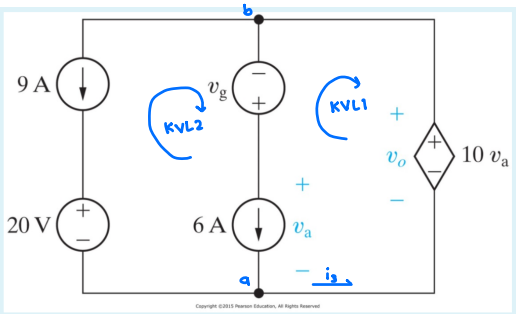
① 

P2.10_10ed

Given that v_g = 5 Volts.

Find the total power developed in the circuit. $P_{delivered}$ = ?? W

"+" = absorbed and "-" = delivered

Answer: -210

1. $V_b = 5\,V$

$V_b = 10 V_a$

$V_a = 0.5\,V$

KVL : $-V_a + V_g + V_b = 0$

$V_g = V_a - V_b = 0.5V - 5V = -4.5V$

KVL : $-20V + V_{9A} - V_g + V_a = 0$

$V_{9A} = 20V + V_g - V_a$

$= 20V - 4.5V - 0.5V = 15V$

KCL Node a : $-9A - 6A + i_3 = 0$

$i_3 = 15A$

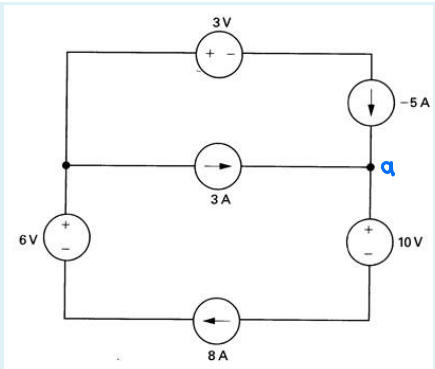
P_{del} : $P_{10V_a} = -(10V_a)\,i_3$

$= -(5V)(15A) = -75\,W$

$P_{9A} = -V_{9A}(9A)$

$-(15V)(9A) = -135\,W$

$-210\,W$

② 

P2.07_6ed

Is the circuit's interconnection valid?

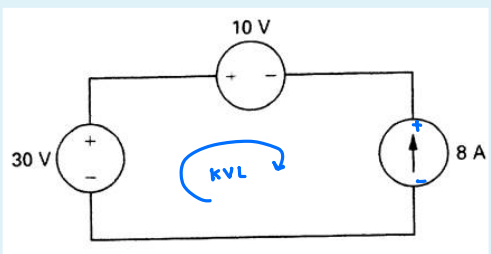
Valid: No

Node a : $-(-5A) - 3A + 8A = 0$

$5A - 3A + 8A = 0$

$10A \neq 0$

The circuit's interconnection invalid.

③ 

P2.05b_6ed

What is the power delivered in this circuit?

$P_{delivered}$ = -240 W

What is the power absorbed in this circuit?

$P_{absorbed}$ = 240 W

KVL : $-30V + 10V + V_1 = 0$

$V_1 = 20V$

P_{del} : $P_{10V} = -(8A)(10V) = -80W$

$P_{30V} = -(8A)(20V) = -160W$

$-240\,W$

P_{abs} : $P_{30V}\,(8A)(30V) = 240\,W$

$-30 + 10 - V_1 = 0$

$V_1 = -20\,V$

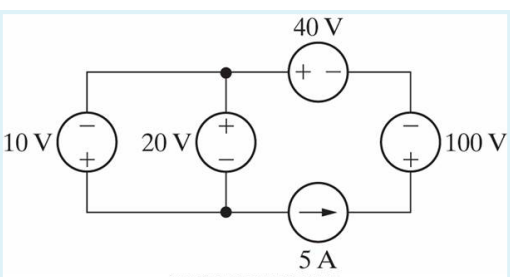
$V = iR$

$-V_1 + V_2 + V_3 = 0$

$-9.8 + i_1 R_1 + V_3 = 0$

$-9.8 + (1A)(4.2) + V_3 = 0$

$V_3 = 5.6$

④ 

P2.02_9ed

Is the circuit's interconnection valid? yes or no?

Answer: no

KVL : $10V + 20V = 0$

$30V \neq 0$

the circuit interconnection is invalid

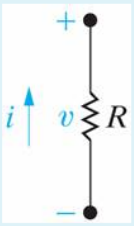
⑤ C4

A resistor is a passive circuit element. Resistors can only (absorb/deliver) power.

Fill in the blank with your answer.

Answer: absorb

6



CQ2.02

Given: v = 51 Volts i = -5 Amps

Find the unknown resistance R. R = ?? Ω Ohms

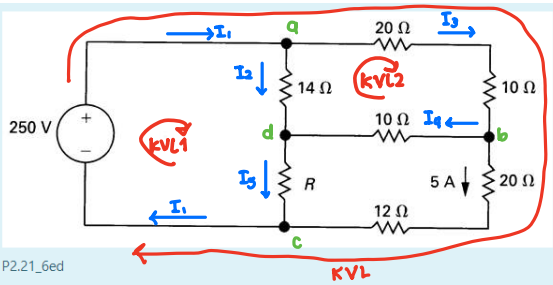
Answer: 10.2 ✔

$v = 51\ V \quad i = -5A$

$v = -iR$

$R = -V/i = -51/(-5) = 10.2\ \Omega$

7



P2.21_6ed

a) Find the value of the unknown resistor R

R = 60 ✔ Ω (Ohm)

b) Find the power absorbed/delivered by the 250V source.

P_{250V} = -2000 ✔ W "-" = Delivering "+" = Absorbing

KVL: $-250V + 20I_3 + 10I_3 + 20(5) + 12(5) = 0$

$I_3 = 3\ A$

Node b: $-I_3 + I_4 + 5A = 0$

$I_4 = 3A - 5A = -2A$

Node a: $-I_1 + I_2 + I_3 = 0 \longrightarrow I_2 = I_1 - I_3$

Node c: $-5A - I_5 + I_1 = 0 \longrightarrow I_5 = -5A + I_1$

$I_2 = 8A - 3A = 5A$

$I_5 = -5A + 8A = 3A$

KVL2: $-14I_2 + 20I_3 + 10I_3 + 10I_4 = 0$ ($30I_3$)

$-14(I_1 - I_3) + 30(3) + 10(-2) = 0$

$-14I_1 + 14(3) + 90 - 20 = 0$

$I_1 = 8\ A$

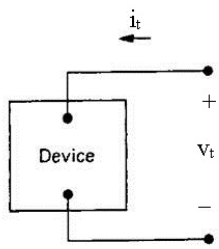
KVL1: $-250V + 14I_2 + RI_5 = 0$

$-250V + 14(5) + R(3) = 0$

$R = 60\ \Omega$

$P_{250V} = -(250)(8) = -2000\ W$

8



(a)

v_t (V)	i_t (A)
50	0
65	3
80	6
95	9
110	12
125	15

(b)

P2.18_6ed

The voltage and current were measured at the terminals of the device as shown in the table (b).

What is the value of the current source and resistor known to make up the device?

Current Source = 10 ✔ A

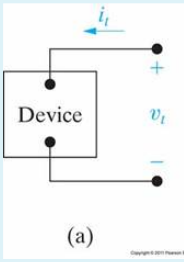
Resistor = 5 ✔ Ω (Ohm)

$V = iR$

$R = V/i = \frac{65-50}{3-0} = 5\ \Omega$

$I = V/R = 50/5 = 10A$

9



v_t (V)	i_t (A)
100	0
120	4
140	8
160	12
180	16

(a) (b)

P2.14_9ed

The voltage and current were measured at the terminals of the device as shown in the table (b).

What is the value of the current source and resistor known to make up the device?

Current Source i = 20 ✔ A

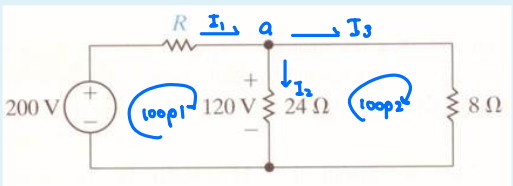
Resistor R = 5 ✔ Ω (Ohm)

$V = iR$

$R = V/i = \frac{120-100}{4-0} = 5\,\Omega$

$I = V/R = 100/5 = 20\,A$

10



AP2.06_9ed

Use Ohm's Law and Kirchhoff's laws to find the value of R in this circuit. R = ?? Ω (Ohm)

Answer: 4 ✔

$V = iR$

$I_2 = 120V/24\,\Omega = 5\,A$

KVL2 : $-120V + 8I_3 = 0$

$I_3 = 15\,A$

Node a : $I_1 = I_2 + I_3$

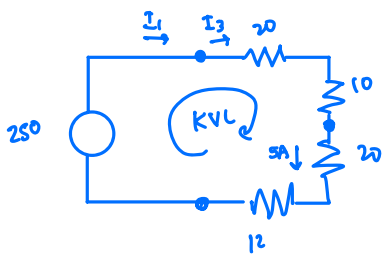
$= 5A + 15\,A$

$= 20A$

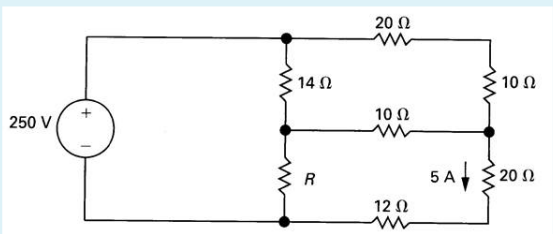
KVL1 : $-200V + RI_1 + 120V = 0$

$20R = 80$

$R = 4\,\Omega$



KVL: $-250V + 20I_3 + 10I_3 + 20(5) + 12(5) = 0$



P2.21_6ed

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