

Block A: Unit 1

Q1. [Problem 2.13]

Use KCL to determine the unknown currents in the following circuit (note that I_1 runs through R_1).

Given: $I_0 = -2\text{A}$, $I_1 = -4\text{A}$, $I_3 = 8\text{A}$ and $V_S = 12\text{V}$.

Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.

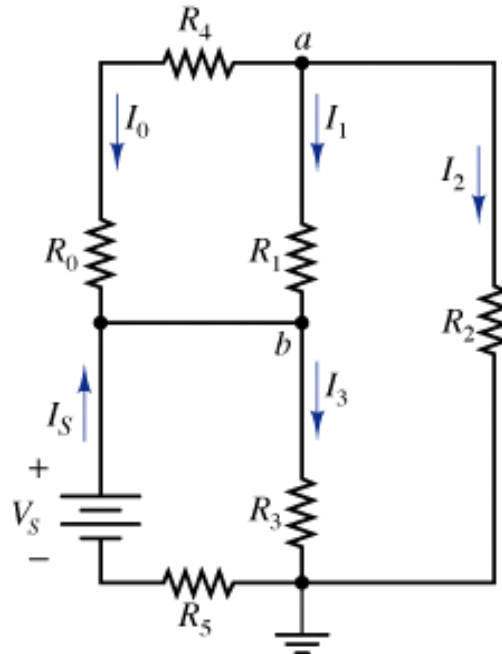


Figure P2.13

Q2. [Problem 2.24]

Determine which components in Figure P2.24 are supplying power and which are dissipating power. Also determine the amount of power dissipated and supplied overall. Is power conserved?

Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.

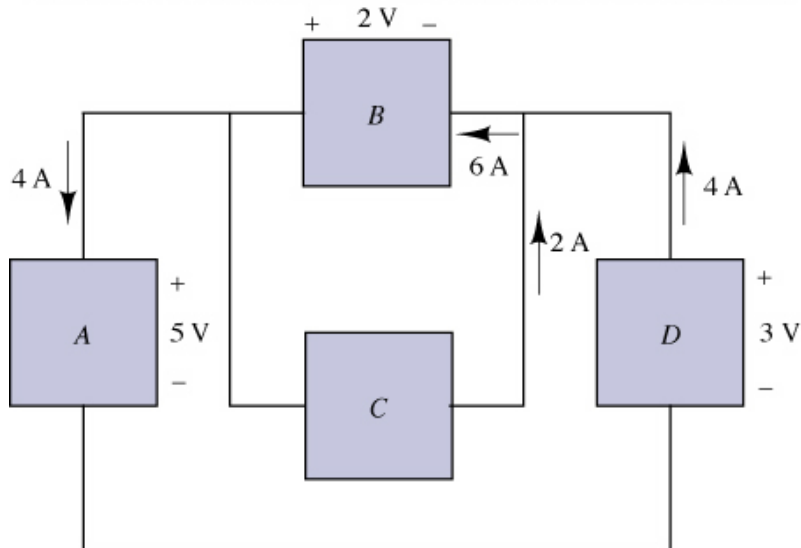
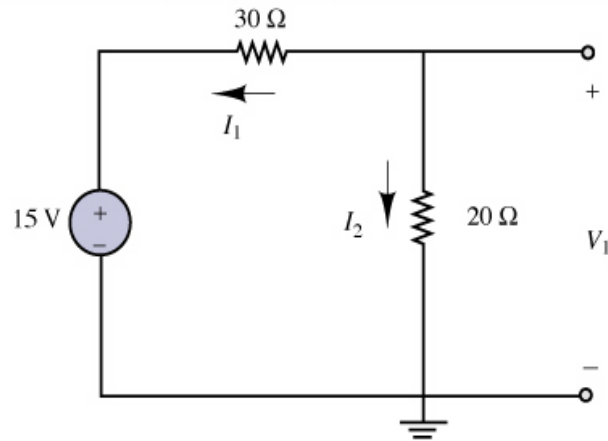


Figure P2.24

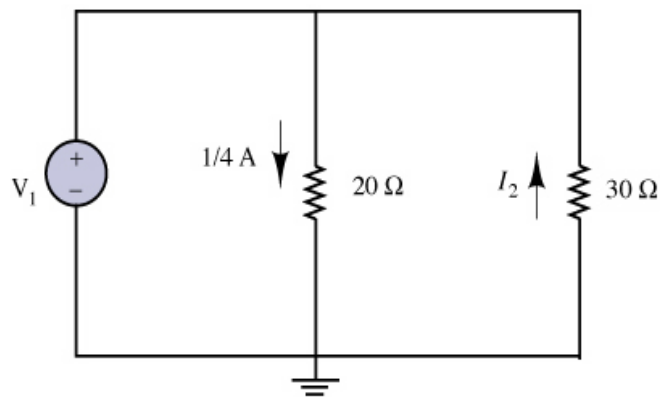
Q3. [Problem 2.18]

The directions of current and polarities of voltages have already been defined in the following circuit shown in Figure P2.18. Find the actual values of the indicate currents and voltages.

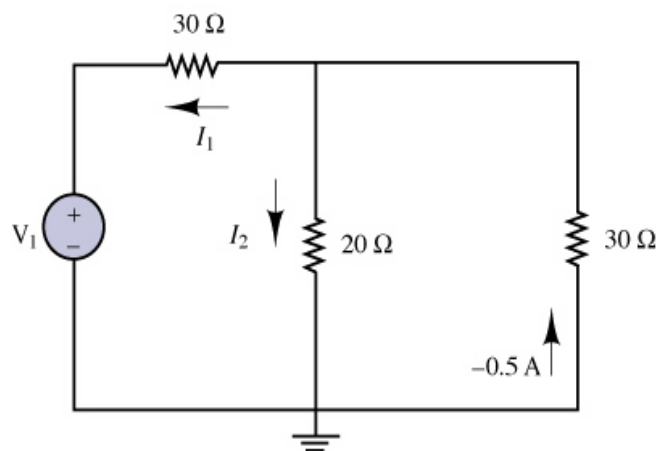
Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.



(a)



(b)



(c)

Figure P2.18

Q4. [Problem 2.46]

In the circuit shown in Figure P2.46, the power absorbed by the 15Ω resistor is 15W . Find R .

Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.

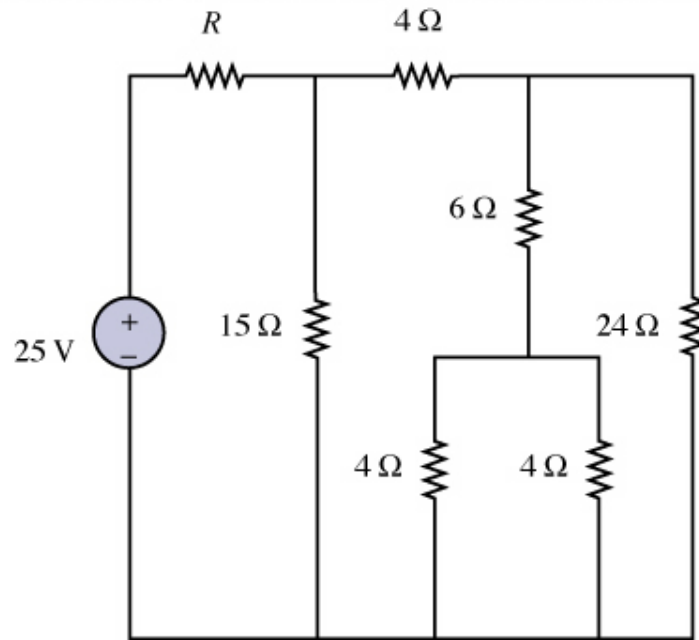


Figure P2.46

Q5. [Problem 2.21]

In the circuit of Figure P2.21, determine the power absorbed by the resistor R and the power delivered by the current source.

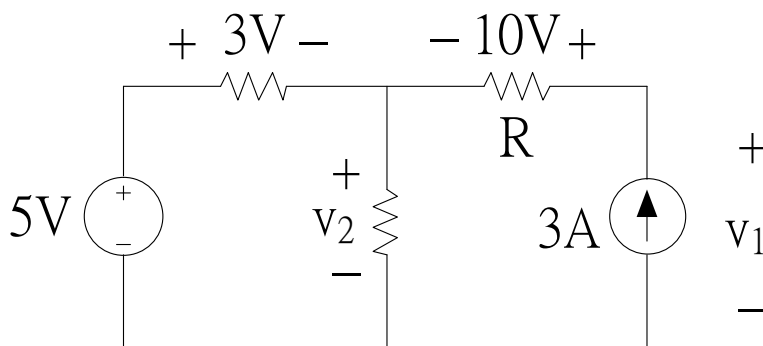


Figure P2.21

Q6. [Problem 2.63]

For the circuit shown in Figure P2.63,

- Find the equivalent resistance seen by the source.
- Find the current through the 90Ω resistor and the power absorbed by it.

$R_1 = 90\Omega$, $R_2 = 50\Omega$, $R_3 = 40\Omega$, $R_4 = 20\Omega$, $R_5 = 30\Omega$, $R_6 = 10\Omega$, $R_7 = 60\Omega$, $R_8 = 80\Omega$, $V_S = 110\text{V}$

Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.

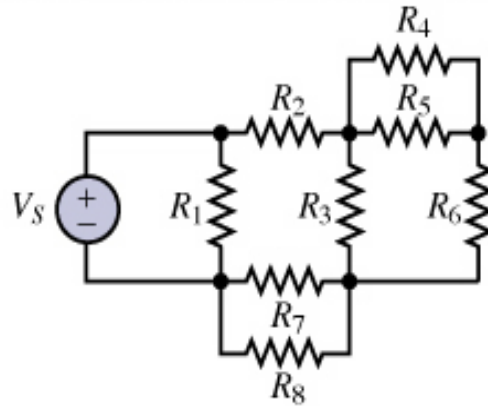


Figure P2.63

Q7. [Problem 2.47]

Find the equivalent resistance between terminals a and b in the circuit of Figure P2.47.

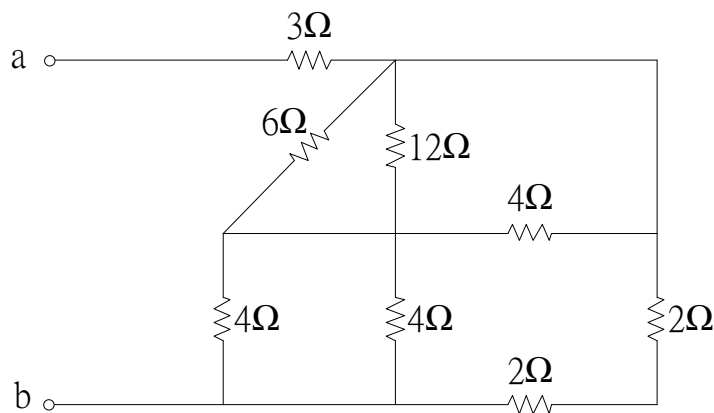


Figure P2.47

Q8. [Problem 2.64]

In the circuit of Figure P2.64, find the equivalent resistance looking in at terminals a and b if terminals c and d are open and again if terminals c and d are shorted together. Also find the equivalent resistance looking in terminals c and d if terminals a and b are open and if terminals a and b are shorted together.

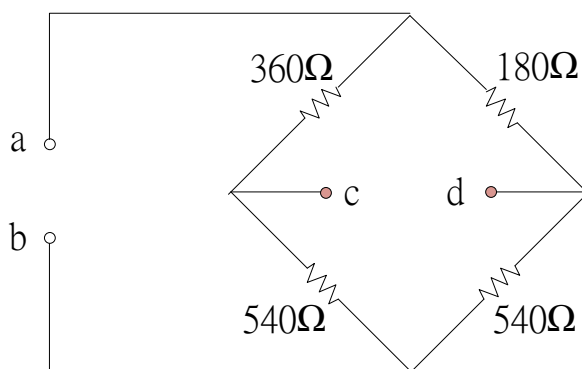


Figure P2.64

Q9. [Problem 2.49]

For the circuit shown in Figure P2.49, find the equivalent resistance, where $R_1 = 5\Omega$, $R_2 = 1\text{k}\Omega$, $R_3 = R_4 = 100\Omega$, $R_5 = 9.1\Omega$ and $R_6 = 1\text{k}\Omega$.

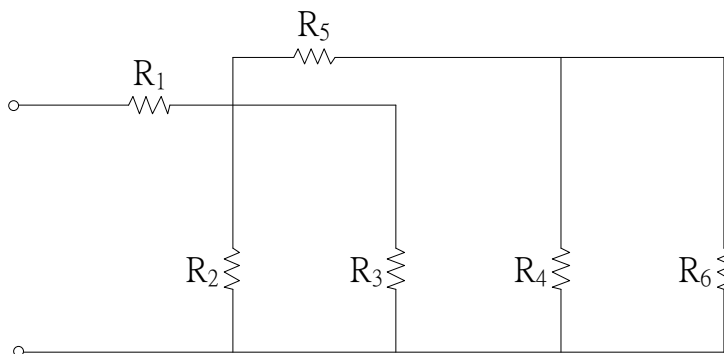


Figure P2.49

Q10. [Problem 2.60]

Find the equivalent resistance seen by the source in the circuit of Figure P2.60. Find the current i . Given $V_s = 12\text{V}$, $R_0 = 4\Omega$, $R_1 = 2\Omega$, $R_2 = 50\Omega$, $R_3 = 8\Omega$, $R_4 = 10\Omega$, $R_5 = 12\Omega$, $R_6 = 6\Omega$.

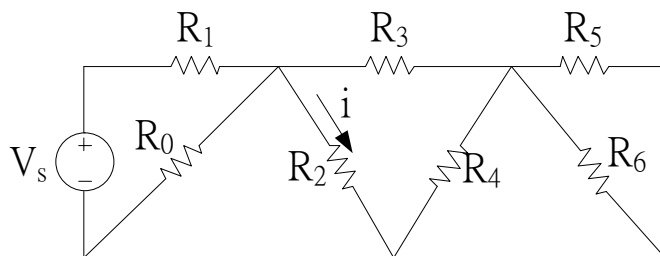


Figure P2.60

Q11. [Problem 2.73]

Consider the practical ammeter, described in Figure P2.73, consisting of an ideal ammeter in series with a $1\text{-k}\Omega$ resistor. The meter sees a full-scale deflection when the current through it is $30\mu\text{A}$. If we desire to construct a multi-range ammeter reading full-scale values of 10mA , 100mA , and 1A , depending on the setting of a rotary switch, determine appropriate values of R_1 , R_2 and R_3 .

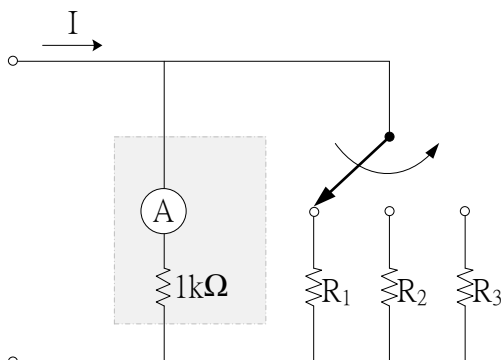


Figure P2.73

Q12. [Problem 2.78]

An ammeter is used as shown in Figure P2.78. The ammeter model consists of an ideal ammeter in series with a resistance. The ammeter model is placed in the branch as shown in the figure. Find the current through R_5 both with and without the ammeter in the circuit for the following values, assuming that $R_5 = 20\Omega$, $R_1 = 800\Omega$, $R_2 = 600\Omega$, $R_3 = 1.2\text{k}\Omega$, $R_4 = 150\Omega$, and $V_S = 24\text{V}$.

- $R_5 = 1\text{k}\Omega$
- $R_5 = 100\Omega$
- $R_5 = 10\Omega$
- $R_5 = 1\Omega$

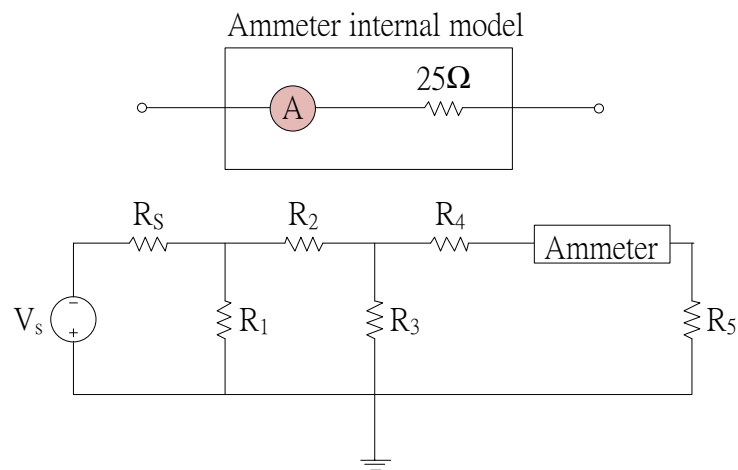


Figure P2.78

Numerical solutions**Q1. [Problem 2.13]**

$$I_2 = 6A, I_3 = 2A$$

Q2 [Problem 2.24]

$$A = 20W, B = -12W, C = 4W, D = -12W$$

Q3 [Problem 2.18]

$$a) I_1 = -0.3A; I_2 = 0.3A; V_1 = 6V$$

$$b) V_1 = 5V; I_2 = -5/30 = -1/6A$$

$$c) I_2 = 0.75A; I_1 = -1.25A; V_1 = 52.5V$$

Q4 [Problem 2.46]

$$R = 4\Omega$$

Q5 [Problem 2.21]

Resistor R: 30W

Current source: 36W

Q6 [Problem 2.63]

$$a) 47\Omega$$

$$b) 1.22A, 134.4W$$

Q7 [Problem 2.47]

$$5\Omega$$

Q8 [Problem 2.64]

$$400\Omega, 390\Omega, 360\Omega, 351\Omega$$

Q9 [Problem 2.49]

$$52.6\Omega$$

Q10. [Problem 2.60]

$$4.76\Omega, 140mA$$

Q11 [Problem 2.73]

$$R_1 = 3\Omega, R_2 = 0.3\Omega, R_3 = 0.03\Omega$$

Q12 [Problem 2.78]

With, without

$$(a) 9.90mA, 9.75mA$$

$$(b) 23.44mA, 22.59mA$$

$$(c) 27.15mA, 26.02mA$$

$$(d) 27.60mA, 26.42mA$$