
P 3.2-3  Consider the circuit shown in Figure P 3.2-3.
(a) Suppose that $R_1 = 8 \, \Omega$ and $R_2 = 4 \, \Omega$. Find the current $i$ and the voltage $v$.
(b) Suppose, instead, that $i = 2.25 \, \text{A}$ and $v = 42 \, \text{V}$. Determine the resistances $R_1$ and $R_2$.
(c) Suppose, instead, that the voltage source supplies 24 W of power and that the current source supplies 9 W of power. Determine the current $i$, the voltage $v$, and the resistances $R_1$ and $R_2$.

![Figure P 3.2-3](image)

P 3.2-12  Determine the voltage and current of each of the circuit elements in the circuit shown in Figure P 3.2-12.

![Figure P 3.2-12](image)
P 3.2-15  Determine the value of the voltage that is measured by the meter in Figure P 3.2-15.

![Figure P 3.2-15](image)

P 3.2-17  Determine the current $i$ in Figure P 3.3-17.

![Figure P 3.3-17](image)

P 3.3-7  Determine the value of voltage $v$ in the circuit shown in Figure P 3.3-7.

![Figure P 3.3-7](image)
**P 3.3-11** For the circuit of Figure P 3.3-11, find the voltage $v_3$ and the current $i$ and show that the power delivered to the three resistors is equal to that supplied by the source.

![Figure P 3.3-11](image1)

**P 3.4-8** Determine the value of the voltage $v$ in Figure P 3.4-8.

![Figure P 3.4-8](image2)

**P 3.4-10** Determine the values of the resistances $R_1$ and $R_2$ for the circuit shown in Figure P 3.4-10.

![Figure P 3.4-10](image3)

**P 3.5-2** Determine the power supplied by each source in the circuit shown in Figure P 3.5-2.

![Figure P 3.5-2](image4)
P 3.6-2  The circuit shown in Figure P 3.6-2a has been divided into three parts. In Figure P 3.6-2b, the rightmost part has been replaced with an equivalent circuit. The rest of the circuit has not been changed. The circuit is simplified further in Figure 3.6-2c. Now the middle and rightmost parts have been replaced by a single equivalent resistance. The leftmost part of the circuit is still unchanged.

(a) Determine the value of the resistance $R_1$ in Figure P 3.6-2b that makes the circuit in Figure P 3.6-2b equivalent to the circuit in Figure P 3.6-2a.

(b) Determine the value of the resistance $R_2$ in Figure P 3.6-2c that makes the circuit in Figure P 3.6-2c equivalent to the circuit in Figure P 3.6-2b.

(c) Find the current $i_1$ and the voltage $v_1$ shown in Figure P 3.6-2c. Because of the equivalence, the current $i_1$ and the voltage $v_1$ shown in Figure P 3.6-2b are equal to the current $i_1$ and the voltage $v_1$ shown in Figure P 3.6-2c.

**Hint:** $24 = 6(i_1-2) + i_1R_2$

(d) Find the current $i_2$ and the voltage $v_2$ shown in Figure P 3.6-2b. Because of the equivalence, the current $i_2$ and the voltage $v_2$ shown in Figure P 3.6-2a are equal to the current $i_2$ and the voltage $v_2$ shown in Figure P 3.6-2b.

**Hint:** Use current division to calculate $i_2$ from $i_1$.

(e) Determine the power absorbed by the 3-Ω resistance shown at the right of Figure P 3.6-2a.
**P 3.6-3** Find $i$ using appropriate circuit reductions and the current divider principle for the circuit of Figure P 3.6-3.

![Figure P 3.6-3](image)

**P 3.6-21** Determine the value of the resistance $R$ in the circuit shown in Figure P 3.6-22, given that $R_{eq} = 9 \Omega$.

![Figure P 3.6-22](image)

**P 3.6-28** Determine the value of the resistance $R$ that causes the voltage measured by the voltmeter in the circuit shown in Figure P 3.6-28 to be 6 V.

![Figure P 3.6-28](image)
DP 3-5 The input to the circuit shown in Figure DP 3.5 is the voltage source voltage, $v_s$. The output is the voltage $v_o$. The output is related to the input by

$$v_o = \frac{R_2}{R_1 + R_2} v_s = g v_s$$

The output of the voltage divider is proportional to the input. The constant of proportionality, $g$, is called the gain of the voltage divider and is given by

$$g = \frac{R_2}{R_1 + R_2}$$

The power supplied by the voltage source is

$$p = v_s i_s = v_s \left( \frac{v_s}{R_1 + R_2} \right) = \frac{v_s^2}{R_1 + R_2} = \frac{v_s^2}{R_{in}}$$

where

$$R_{in} = R_1 + R_2$$

is called the input resistance of the voltage divider.

(a) Design a voltage divider to have a gain, $g = 0.65$.

(b) Design a voltage divider to have a gain, $g = 0.65$, and an input resistance, $R_{in} = 2500 \, \Omega$. 
**P 4.2-2** Determine the node voltages for the circuit of Figure P 4.2-2.

**Figure P 4.2-2**

**P 4.2-6** Simplify the circuit shown in Figure P 4.2-6 by replacing series and parallel resistors with equivalent resistors; then analyze the simplified circuit by writing and solving node equations.

(a) Determine the power supplied by each current source.

(b) Determine the power received by the 12-Ω resistor.

**Figure P 4.2-6**