

Name: Key

Chapter 21 Equivalent Resistance Challenge

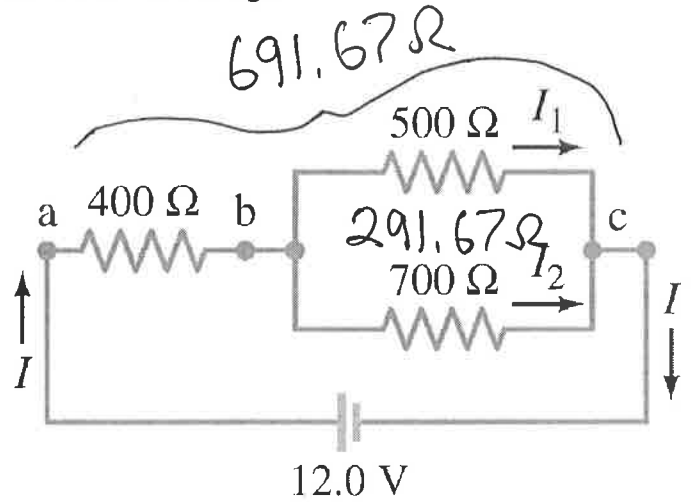
Problem 1

1. Find the equivalent resistance of this circuit.

$$R_{eq} = 400 + 291.67 \Omega$$

$$= \boxed{692 \Omega}$$

691.67 Ω



2. Find the current passing through the battery.

$$I_{TOT} = \frac{V}{R_{eq}} = \frac{12.0V}{691.67 \Omega} = \boxed{0.0173A}$$

0.01735 A

3. 400 Ω Resistor

A. Find V

$$V = I_{TOT} R = (0.01735A)(400 \Omega) = \boxed{6.94V}$$

6.940V

B. Find I

$$I = I_{TOT} = \boxed{0.0173A}$$

0.01735 A

C. Find P

$$P = I^2 R = (0.01735A)^2 (400 \Omega) = \boxed{0.120W}$$

0.1204 W

4. 500 Ω Resistor

A. Find V

$$V = I_{TOT} R_{eq} = (0.01735A)(291.67 \Omega) = \boxed{5.06V}$$

5.060V

B. Find I

$$I = \frac{V}{R} = \frac{5.060V}{500 \Omega} = \boxed{0.0101A}$$

0.01012 A

C. Find P

$$P = I^2 R = (0.01012A)^2 (500 \Omega) = \boxed{0.0512W}$$

0.05121 W

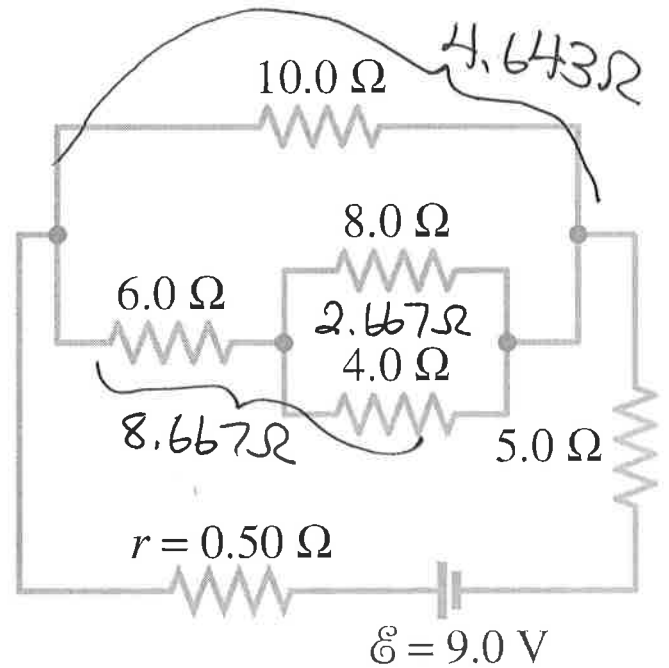
Problem 2

1. Find the equivalent resistance of this circuit.

$$R_{eq} = 0.50 + 4.643 + 5.0 \Omega$$

$$= \boxed{10.1 \Omega}$$

10.14 Ω



2. Find the current passing through the battery.

$$I = \frac{V}{R_{eq}} = \frac{9.0V}{10.14 \Omega} = \boxed{0.887A}$$

0.8873A

3. 10.0 Ω Resistor

A. Find V

$$V = I_{tot} R_{eq} = (0.8873A)(10.0 \Omega) = \boxed{4.12V}$$

4.120V

B. Find I

$$I = \frac{V}{R} = \frac{4.120V}{10.0 \Omega} = \boxed{0.412A}$$

0.4120A

C. Find P

$$P = I^2 R = (0.4120A)^2 (10.0 \Omega) = \boxed{1.70W}$$

1.697W

4. 4.0 Ω Resistor

A. Find V

$$I_{\text{Lower Branch}} = \frac{V}{R_{eq}} = \frac{4.120V}{8.667 \Omega} = 0.4754A$$

$$V_{4.0 \Omega} = I_{tot} R_{eq} = (0.4754A)(2.667 \Omega) = \boxed{1.27V}$$

1.268V

B. Find I

$$I = \frac{V}{R} = \frac{1.268V}{4.0 \Omega} = \boxed{0.317A}$$

0.3170A

C. Find P

$$P = I^2 R = (0.3170A)^2 (4.0 \Omega) = \boxed{0.402W}$$

0.4018W

Solutions:

Prob 1: 1. 692 Ω	2. 0.0173 A	3.A. 6.94 V	B. 0.0173 A	C. 0.120 W	4.A. 5.06 V	B. 0.0101 A	C. 0.0512 W
Prob 2: 1. 10.1 Ω	2. 0.887 A	3.A. 4.12 V	B. 0.412 A	C. 1.70 W	4.A. 1.27 V	B. 0.317 A	C. 0.402 W