CENGAGE | WEBASSIGN

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(sign out)

← PHYS-2B, section 34945, Spring 2020

Kirchoff's Rules (Homework)

INSTRUCTOR
John Walkup
California State University Fresno

Current Score

QUESTION	1	2	3	4	5	6	7	8	9	10	11	12
POINTS	1/1 ✓	2/2 ✓	2/2 ✓	1/1 ✓	3/3 ✓	2/2 ✓	6/6 ✓	0/2 ✗	4/4 ✓	1/2 ✓✗	2/2 ✓	1/1 ✓

TOTAL SCORE

25/28	89.3%

Due Date Past Due

WED, FEB 26, 2020
11:59 PM PST

Request Extension

Assignment Submission & Scoring

Assignment Submission

For this assignment, you submit answers by question parts. The number of submissions remaining for each question part only changes if you submit or change the answer.

Assignment Scoring

Your last submission is used for your score.

The due date for this assignment has passed.

Your work can be viewed below, but no changes can be made.

Important! Before you view the answer key, decide whether or not you plan to request an extension. Your Instructor may not grant you an extension if you have viewed the answer key. Automatic extensions are not granted if you have viewed the answer key.

Request Extension View Key

1. 1/1 points | Previous Answers | SERCP11 17.4.OP.010.

My Notes | Ask Your Teacher

The potential difference across a resistor in a particular electric circuit is 360 V. The current through the resistor is 20.0 A. What is its resistance (in Ω)?

18 ✓ Ω

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2. 2/2 points | Previous Answers | SERCP11 17.4.OP.014.

My Notes | Ask Your Teacher

An aluminum wire with a circular cross-section has a mass of 1.25 g and a resistance of 0.770 Ω. At 20°C, the resistivity of aluminum is 2.82×10^{-8} Ω · m and its density is 2,700 kg/m^3.

How long (in m) is the wire?

3.56 ✓ m

What is the diameter (in mm) of the wire?

.4069 ✓ mm

Need Help? Read It

3. 2/2 points | Previous Answers | **SERCP11 17.4.P.011.**

My Notes | Ask Your Teacher

A voltmeter connected across the terminals of a tungsten-filament light bulb measures 118 V when an ammeter in line with the bulb registers a current of 0.508 A.

HINT

(a) Find the resistance of the light bulb. (Enter your answer in ohms.)

232.3 ✓ Ω

(b) Find the resistivity of tungsten (in Ω · m) at the bulb's operating temperature if the filament has an uncoiled length of 0.613 m and a radius of 2.48×10^{-5} m.

7.322e-7 ✓ *Resistivity* is a material property not depending on the device's size and shape. *Resistance* is a property of a particular device, depending on the material (through its resistivity), its length, and cross-sectional area. Both resistivity and resistance vary with temperature. Ω · m

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4. 1/1 points | Previous Answers | **SERCP11 17.5.P.024.**

My Notes | Ask Your Teacher

If a certain silver wire has a resistance of 9.00 Ω at 30.0°C, what resistance will it have at 49.0°C?

9.65 ✓ Ω

Need Help? Read It

5. 3/3 points | Previous Answers | SERCP11 17.6.OP.036.

My Notes | Ask Your Teacher

In a particular area of the country, electrical energy costs $0.12 per kilowatt-hour. (Round your answers, in dollars, to at least two decimal places.)

(a) How much does it cost to operate an old-style incandescent 60.0-W light bulb continuously for 24 hours?

$.173 ✓

(b) A modern LED light bulb that emits as much visible light as a 60.0-W incandescent only draws 8.50 W of power. How much does it cost to operate this bulb for 24 hours?

$.025 ✓

(c) A particular electric oven requires a potential difference of 220 V and draws 20.0 A of current when operating. How much does it cost to operate the oven for 5.30 hours?

$2.796 ✓

Need Help? Read It

6. 2/2 points | Previous Answers | SERCP11 17.6.P.038.

My Notes | Ask Your Teacher

A portable coffee heater supplies a potential difference of 12.0 V across a Nichrome heating element with a resistance of 2.17 Ω.

HINT

(a) Calculate the power (in W) consumed by the heater.

66.359 ✓ The three equivalent expressions for electrical power are linked by Ohm's law: $P = I\Delta V = I^2R = \frac{(\Delta V)^2}{R}$. W

(b) How many minutes would it take to heat 1.13 kg of coffee from 20.6°C to 51.2°C with this heater? Coffee has a specific heat of 4184 $\frac{\text{J}}{(\text{kg} \cdot \text{°C})}$. Neglect any energy losses to the environment.

36.3 ✓ min

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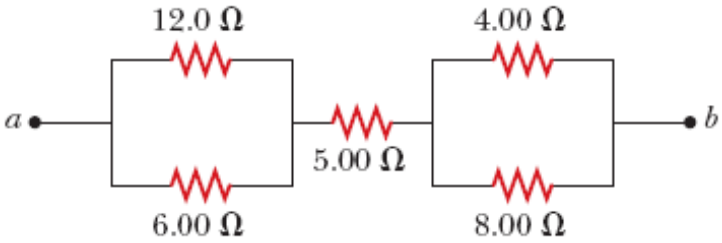
7. 6/6 points Previous Answers **SERCP11 18.3.OP.008.**

My Notes Ask Your Teacher

The figure below shows a network of connected resistors between points *a* and *b*. The resistance of each is given in the figure.



(a) What is the equivalent resistance (in Ω) of the entire network between points *a* and *b*?

1.167e1 ✓ Ω

(b) A battery with a potential difference of 60.4 V is connected to the network, with one terminal connected to point *a* and the other connected to point *b*. What is the current (in A) in each resistor?

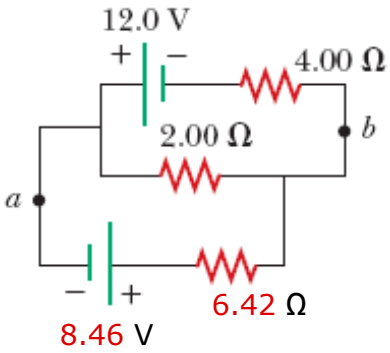
12.0 Ω	1.725 ✓	A
6.00 Ω	3.45 ✓	A
5.00 Ω	5.177 ✓	A
4.00 Ω	3.45 ✓	A
8.00 Ω	1.725 ✓	A

Need Help? Read It

8. 0/2 points | Previous Answers | **SERCP11 18.4.OP.020.**

My Notes | Ask Your Teacher

The figure below shows with two batteries and three resistors. The potential difference across the batteries and the resistance of each resistor is given in the figure.



(a) What is the current (in A) in the 2.00 Ω resistor? (Enter the magnitude.)

.9 ✗

Use Kirchhoff's junction and loop rules to find equations to solve for the unknown currents in the branches of the circuit. You will need one junction equation and two loop equations to get three equations and three unknowns. Be careful of sign rules in your equations. A

(b) What is the potential difference (in V) between points *a* and *b*, that is, $\Delta V = V_b - V_a$?

-1.9 ✗

Remember that $V_a - V_b$ refers to the potential at the final point (point *b*) minus the potential at the initial point (point *a*). Can you choose a path in the circuit from *a* to *b* that uses the current found in part (a)? Be careful of sign rules when finding potential differences along this path. V

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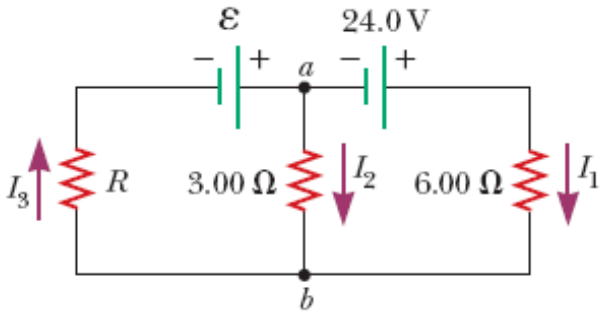
9. 4/4 points | Previous Answers | **SERCP11 18.4.OP.022.**

My Notes | Ask Your Teacher

A lab assistant is attempting to determine the currents through each branch of the circuit in the figure below. The assistant has assumed the currents are in the directions shown in the figure. The assistant has found that the current I_1 is 3.32 A and the values of $\mathcal{E}$ and R are unknown.



What is the magnitude of the current I_2 (in A)?

1.36 ✓ A

Does the direction of the current I_2 match the direction shown in the figure?

- ○ Yes, I_2 points in the direction shown.
- ◉ No, I_2 points opposite to the direction shown.
- ○ The magnitude of I_2 is zero, so there is no direction.

✓

What is the magnitude of the current I_3 (in A)?

1.96 ✓ A

Does the direction of the current I_3 match the direction shown in the figure?

- ◉ Yes, I_3 points in the direction shown.
- ○ No, I_3 points opposite to the direction shown.
- ○ The magnitude of I_3 is zero, so there is no direction.

✓

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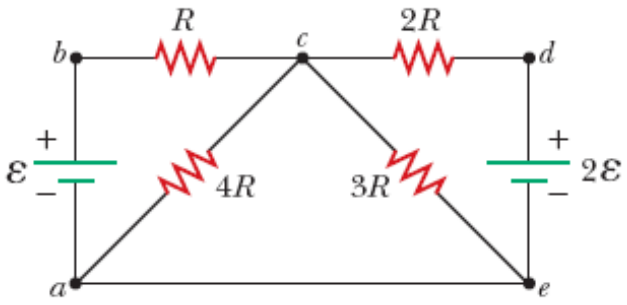
10. 1/2 points | Previous Answers | SERCP11 18.4.P.021.

My Notes | Ask Your Teacher

Taking R = 1.60 kΩ and $\mathscr{E}$ = 190 V in the figure shown below, determine the magnitude and direction of the current in the horizontal wire between a and e.

magnitude 2.38 ✗
Your response is off by a multiple of ten. mA

direction from a to e ✓



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11. 2/2 points | Previous Answers | SERCP11 18.CQ.001.

My Notes | Ask Your Teacher

Choose the words that make each statement correct.

HINT

(a) When two or more resistors are connected in series, the equivalent resistance is always [greater than] ✓ any individual resistance.

(b) When two or more resistors are connected in parallel, the equivalent resistance is always [less than] ✓ The most common mistake in calculating the equivalent resistance for resistors in parallel is to forget to invert the answer after summing the reciprocals. Don't forget to flip it! any individual resistance.

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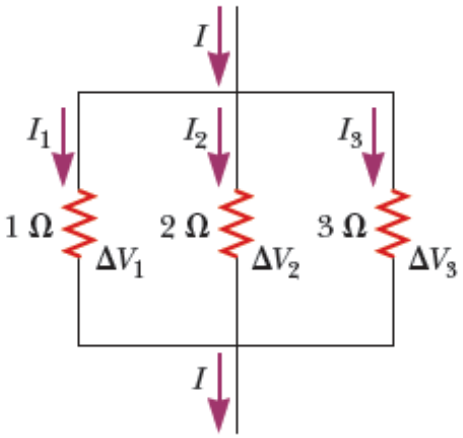
12. 1/1 points Previous Answers **SERCP11 18.CQ.005.**

My Notes Ask Your Teacher

Electric current I enters a node with three resistors connected in parallel (see the figure below).



HINT

Which one of the following is correct?

- $I_2 > I_1$ and $I_2 > I_3$
- $I_1 = I$ and $I_2 = I_3 = 0$
- $\Delta V_1 < \Delta V_2 < \Delta V_3$
- $I_1 > I_2 > I_3 > 0$ ✓

You may have heard the statement, "Current takes the path of least resistance." For a parallel combination of resistors, an accurate version of that statement would be, "Electric current takes all available paths, and the most current follows the path of least resistance."

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