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Chapter 27 Homework: Direct-Current Circuits (Homework)

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Current Score

QUESTION	1	2	3	4	5	6	7	8	9	10
POINTS	2/2 ✓	2/2 ✓	5/5 ✓	5/5 ✓	3/3 ✓	5/5 ✓	5/5 ✓	2/2 ✓	3/3 ✓	2/2 ✓

TOTAL SCORE

34/34	100.0%

Due Date Past Due

SUN, OCT 25, 2020
11:59 PM GMT+4

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

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1. **[2/2 Points]** DETAILS | PREVIOUS ANSWERS **SERPSE10 27.1.OP.003.**

MY NOTES | ASK YOUR TEACHER | PRACTICE ANOTHER

An automobile battery has an emf of 12.6 V and an internal resistance of 0.0890 Ω. The headlights together have an equivalent resistance of 7.90 Ω (assumed constant).

(a) What is the potential difference across the headlight bulbs when they are the only load on the battery? (Enter your answer to at least two decimal places.)

12.46 ✓ V

(b) What is the potential difference across the headlight bulbs when the starter motor is operated, with 35.0 A of current in the motor? (Enter your answer to at least two decimal places.)

9.379 ✓ V

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2. **[2/2 Points]** DETAILS PREVIOUS ANSWERS **SERPSE10 27.1.P.001.**

MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

Two 1.50-V batteries—with their positive terminals in the same direction—are inserted in series into the barrel of a flashlight. One battery has an internal resistance of 0.380 Ω, the other an internal resistance of 0.180 Ω. When the switch is closed, a current of 600 mA occurs in the lamp.

(a) What is the bulb's resistance?

4.44 ✓ Ω

(b) What fraction of the chemical energy transformed appears as internal energy in the batteries?

11.2 ✓ %

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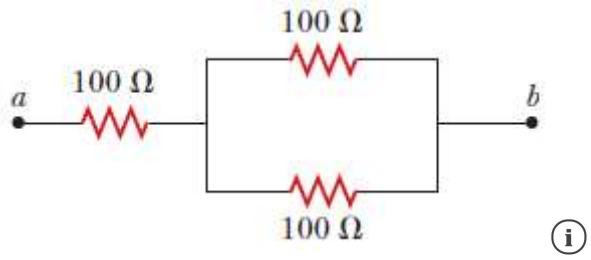
3. **[5/5 Points]** DETAILS PREVIOUS ANSWERS **SERPSE10 27.2.OP.004.**

MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

Three 100 Ω resistors are connected as shown in the figure. The maximum power that can safely be delivered to any one resistor is 24.5 W.



(a) What is the maximum potential difference that can be applied to the terminals *a* and *b*?

74.25 ✓ V

(b) For the voltage determined in part (a), what is the power delivered to each resistor?

resistor on the left 24.5 ✓ W

resistor at the top of the loop 6.125 ✓ W

resistor at the bottom of the loop 6.125 ✓ W

(c) What is the total power delivered to the combination of resistors?

36.75 ✓ W

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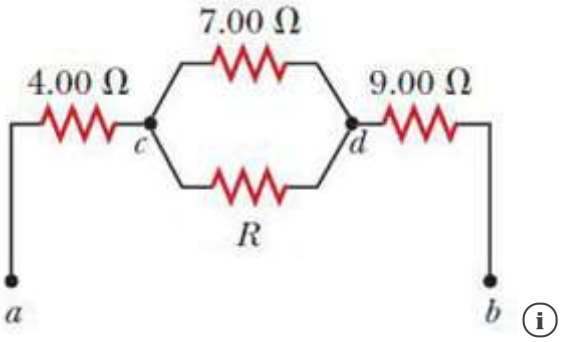
4. [5/5 Points] DETAILS PREVIOUS ANSWERS SERPSE10 27.2.OP.007.MI.

MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

Consider the following figure.



(a) Find the equivalent resistance between points *a* and *b* in the figure. (R = 11.0 Ω)

17.28 ✓ Ω

(b) Calculate the current in each resistor if a potential difference of 28.0 V is applied between points *a* and *b*.

I (4.00 Ω) = 1.62 ✓ A

I (7.00 Ω) = 0.99 ✓ A

I (11.0 Ω) = 0.63 ✓ A

I (9.00 Ω) = 1.62 ✓ A

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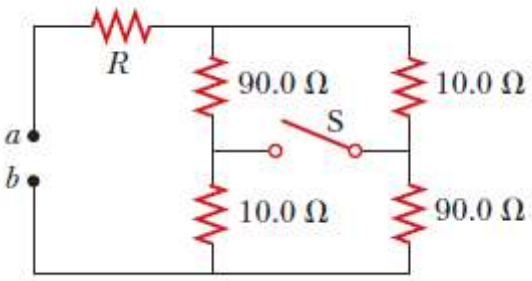
5. **[3/3 Points]** DETAILS PREVIOUS ANSWERS **SERPSE10 27.2.OP.008.**

MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

Consider the circuit shown in the figure.



(a) Let the equivalent resistance of the circuit when the switch is open be $R_{eq,\ open}$, and the equivalent resistance when the switch is closed be $R_{eq,\ closed}$. Find the difference (in Ω) between the two equivalent resistances, $R_{eq,\ open} - R_{eq,\ closed}$.

$R_{eq,\ open} - R_{eq,\ closed}$ = 32 ✓ Ω

(b) When the switch S is closed, the equivalent resistance drops to 54.0% of the original value. Determine the value of R (in Ω).

19.57 ✓ Ω

(c) **What If?** What would the voltage (in V) between points *a* and *b* have to be for 200 W to be delivered to the circuit when the switch is closed? Assume that *R* has the value found in part (b).

86.7 ✓ V

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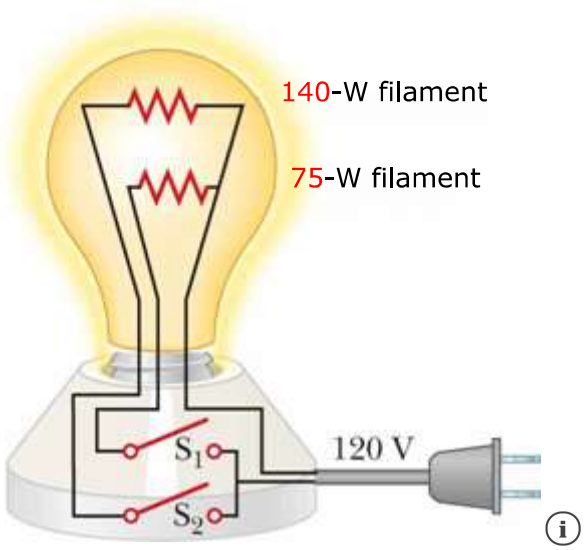
6. [5/5 Points] DETAILS PREVIOUS ANSWERS SERPSE10 27.2.P.003.CTX.

MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

The figure shows the interior of a three-way incandescent lightbulb, which provides three levels of light intensity.



The socket of the lamp is equipped with a four-position switch for selecting different light intensities, with the positions described as follows: (1) off (switches S_1 and S_2 both open), (2) switch S_1 closed, (3) switch S_2 closed, and (4) switches S_1 and S_2 both closed. The lightbulb contains two filaments. When the lamp is connected to a 120 V source, one filament receives 140 W of power and the other receives 75 W. What is the total power input (in W) to the light bulb at the following configurations?

(a) only switch S_1 is closed

75 ✓ You are correct; only the 75-W filament is operating. W

(b) only switch S_2 is closed

140 ✓ You are correct; only the 140-W filament is operating. W

(c) both switches are closed

215 ✓ You are correct; both filaments are operating. W

(d) **What If?** Suppose the 75 W filament breaks and no longer is able to carry a current. How many switch positions will result in light leaving the bulb?

2 ✓

What will be the power input to the bulb in those positions (in W)?

140 ✓ W

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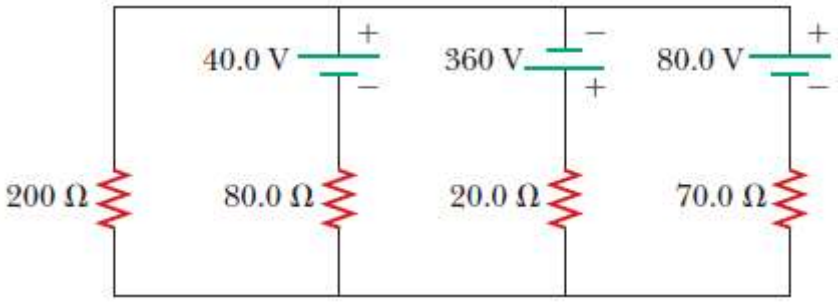
7. **[5/5 Points]** DETAILS PREVIOUS ANSWERS **SERPSE10 27.3.OP.016.**

MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

In the circuit in the figure below, determine the following.



(a) the current in each resistor (Indicate the direction of the current flow through each resistor through the sign of your answer. Take upward current flow as positive.)

Resistor (Ω)	Current (A)
200	1 ✓
80.0	3 ✓
20.0	-8 ✓
70.0	4 ✓

(b) the potential difference across the 70 Ω resistor

280 ✓ V

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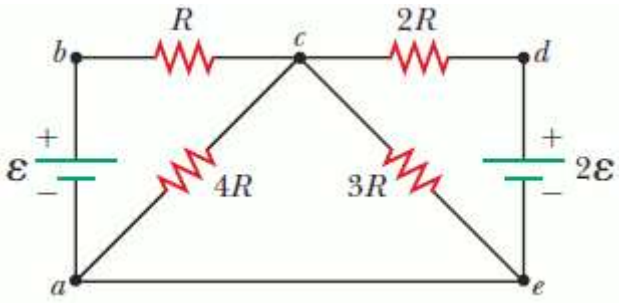
8. [2/2 Points] DETAILS PREVIOUS ANSWERS SERPSE10 27.3.P.019.

MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

Taking R = 2.60 kΩ and $\mathcal{E}$ = 420 V in the figure below,



determine the direction and magnitude of the current in the horizontal wire between a and e.

- from e to a
- from a to e
- not enough information to decide

32.31 mA

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9. **[3/3 Points]** DETAILS PREVIOUS ANSWERS **SERPSE10 27.4.OP.022.**

MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

A 2.00-nF capacitor with an initial charge of 5.34 μC is discharged through a 1.25-kΩ resistor.

(a) Calculate the current in the resistor 9.00 μs after the resistor is connected across the terminals of the capacitor. (Let the positive direction of the current be define such that $\frac{dQ}{dt} > 0$.)

-58.4 ✓ mA

(b) What charge remains on the capacitor after 8.00 μs?

0.22 ✓ μC

(c) What is the (magnitude of the) maximum current in the resistor?

2.14 ✓ A

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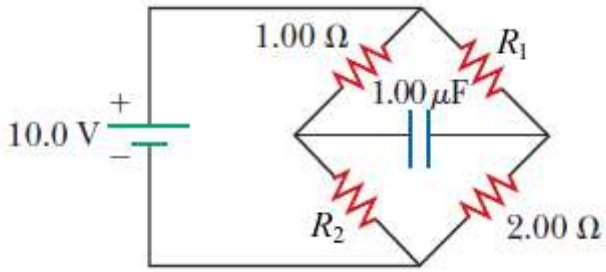
10. [2/2 Points] DETAILS PREVIOUS ANSWERS SERPSE10 27.4.OP.023.MI.

MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

The circuit in the figure below has been connected for a long time. Let R_1 = 9.00 Ω and R_2 = 5.00 Ω.



(a) What is the potential difference across the capacitor?

6.5 ✓ V

(b) If the battery is disconnected from the circuit, over what time interval does the capacitor discharge to one-fourth its initial voltage?

5.71 ✓ μs

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