

Week 8 Challenge Homework

Resistive Circuits

Submission Details | Submit a digital copy (PDF, jpg, etc.) to Canvas. Include solutions to the metacognitive exercise and each question. Please use the interface to associate each page of your submission with the assignment. It makes grading much easier. Please clearly indicate which question is being solved. If data is needed to complete a problem, be sure to cite the source you've acquired your data from. Typed work will not receive credit. See the course website for further details.

Group Submissions | You may submit a group collaboration to Canvas. Add each group member to the submission. Each group member should contribute to the work. Clearly indicate which part of the submission is written by each member (color or labels are preferable).

Sensemaking | You will be asked to apply sensemaking in some problems. More information about sensemaking can be found on the BoxSand [Sensemaking](#) page, which is linked on the Canvas homepage.

Metacognitive Exercise

Each week will feature a metacognitive exercise, followed by one or two challenge problems to solve. The metacognitive exercise will usually ask you to reflect on your solution to the previous week's challenge problems.

Review your solution to the Week 7 Challenge Homework. If you do not have a copy of it anymore, you can find it on Canvas or Gradescope, under the Week 7 Challenge Homework assignment. Also, review the solution which has been posted to the BoxSand solutions archive ([click here for a link](#)). Solutions are posted a few days after the assignment is due.

- (a) Spend a couple or few sentences reflecting on the sensemaking you have learned and/or used in PH20x. Answer at least one of these prompts: What are your feelings about sensemaking? Have you used it in this course without prompting? Maybe on an exam, you discovered that an answer you found couldn't be correct due to some sensemaking? Do you enjoy sensemaking? Does it feel superfluous? Have you noticed yourself doing it in another course or context outside physics?

Question 1

The current in the $8\ \Omega$ resistor in the drawing is $0.5\ \text{A}$.

- (a) Find the current in the $20\ \Omega$, $12\ \Omega$, and both $9\ \Omega$ resistors.
- (b) Find the voltage drop between the points and indicate which point is at higher potential for the following sets of points:

G and **F**

A and **B**

A and **E**

E and **C**

- (c) Use the known value sensemaking technique by answering the following prompts.

(i) What do you expect the electric potential difference to be over a complete circuit loop that starts and ends at the same location?

(ii) Show that the electric potential differences between **A**→**E**, **E**→**B**, and **B**→**A** add to give you your expected result in part (i).

- (d) A brand new standard household 9V battery has about the same potential energy as a $2200\ \text{lb}$ car raised $6\ \text{ft}$ above the ground (assuming $y = 0\text{m}$ at the ground). How long will the circuit operate if its voltage source is replaced with a 9V battery?

