

← AP Physics 2, section B4,

Current and Resistance #1 (Homework)

 INSTRUCTOR

Ian Page

Singapore American School

Current Score

QUESTION

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

POINTS

2/2

2/2

3/3

2/2

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1/1

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✓

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TOTAL SCORE

25/25

100.0%

Due Date

WED, DEC 18, 2024

11:59 PM GMT+8

+

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.

1. [2/2 Points]

DETAILS

MY NOTES

SERCPAP12 17.STEP.1.1A.

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

The charging station for an electric vehicle delivers 60.0 C of charge to the vehicle in 2.60 s. The magnitude of the charge on an electron is 1.60×10^{-19} C.

- (a) Find the average current delivered to the vehicle (in A).
- 23.08

✓

A
- (b) Find the number of electrons that pass through the charging station during that time.
- 3.75e20

✓

electrons

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2. [2/2 Points]

DETAILS

MY NOTES

SERCPAP12 17.STEP.1.2B.

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

A cordless drill draws a current of 30.0 A from its battery pack.

- (a) Find the time Δt (in s) required for the battery pack to deliver 3.00 C of charge.
- 0.1

✓

s
- (b) Find the energy (in J) delivered by the battery pack in that time, if the potential difference across it is 14.4 V.
- 43.2

✓

J

Need Help?

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3. [3/3 Points] DETAILS MY NOTES SERCPAP12 17.STEP.3.1A.

PREVIOUS ANSWERS

ASK YOUR TEACHER

(a) Name a device that measures current.

- ☒ ammeter
- ☐ ohmmeter
- ☐ tachometer
- ☐ voltmeter
- ☐ wattmeter



(b) Name a device that measures voltage differences.

- ☐ ammeter
- ☐ ohmmeter
- ☐ tachometer
- ☒ voltmeter
- ☐ wattmeter



(c) Name a device that measures current, voltage differences, and resistance.

- ☐ ammeter
- ☐ tachometer
- ☐ voltmeter
- ☐ ohmmeter
- ☒ multimeter



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4. [2/2 Points] DETAILS MY NOTES SERCPAP12 17.STEP.3.2A.

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

Determine whether assertions given in the following statement are true or false.

To measure current, an ammeter must be in series with a circuit and have a very low resistance.

(a) An ammeter must be in series with a circuit.

- ☒ True
- ☐ False



(b) An ammeter must have a very low resistance.

- ☒ True
- ☐ False



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5. [2/2 Points] DETAILS MY NOTES SERCPAP12 17.STEP.3.3A.

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

Determine whether assertions given in the following statement are true or false.

To measure a voltage difference between points A and B in a circuit, a voltmeter must be in parallel with a circuit branch containing the two points, and have a very small resistance.

(a) A voltmeter must be in parallel with a circuit branch containing the two points.

- ☒ True
- ☐ False



(b) A voltmeter must have a very small resistance.

- ☐ True
- ☒ False



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6. [1/1 Points] DETAILS MY NOTES SERCPAP12 17.STEP.4.1A.

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

When the current through a resistor is 2.00 mA, the potential difference across it is 1.10 V. Calculate the resistor's resistance (in Ω).

 ✓ Ω

Need Help?

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7. [1/1 Points] DETAILS MY NOTES SERCPAP12 17.STEP.4.2A.

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

A 20-gauge copper wire has a length of 125 m long and a radius of 0.000406 m. Calculate its resistance (in Ω). The resistivity of copper is $1.70 \times 10^{-8} \Omega \cdot \text{m}$.

 ✓ Ω

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8. [1/1 Points] DETAILS MY NOTES SERCPAP12 17.STEP.4.2C.

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

A gold wire has a length of 27.5 m and a resistance of 0.200 Ω . Calculate its cross-sectional area (in m^2). The resistivity of gold is $\rho = 2.44 \times 10^{-8} \Omega \cdot \text{m}$.

 ✓ m^2

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9. [1/1 Points] DETAILS MY NOTES SERCPAP12 17.STEP.4.3A.

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

A wire of length L_0 and cross-sectional area A_0 is melted down and recast with twice its original length. Find its new resistance, R_n , in terms of its original resistance, R_0 .

 ✓ R_0

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10. [1/1 Points] DETAILS MY NOTES SERCPAP12 17.STEP.4.4A.

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

A wire of length 9.00 m and cross-sectional area $8.00 \times 10^{-6} \text{ m}^2$ is attached across a voltage difference of 24.0 V. If an ammeter in circuit reads 7.00 A, find the resistivity of the wire (in $\Omega \cdot \text{m}$).

 ✓ $\Omega \cdot \text{m}$

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11. [2/2 Points] DETAILS MY NOTES SERCPAP12 17.STEP.6.1A.

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

A direct current circuit provides a current of 20.0 A at an operating voltage of 92.0 V.

(a) Calculate the total power (in W) delivered by this circuit.

 ✓ W

(b) How many 20.0 W light bulbs could the circuit light up? Include fractional numbers of bulbs in your answer.

 ✓

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12. [1/1 Points] DETAILS MY NOTES SERCPAP12 17.STEP.6.1C.

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

A voltmeter shows a potential difference of 1.50 V across a 113 Ω resistor. Calculate the power delivered to the resistor (in W).

 ✓ W

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13. [2/2 Points] DETAILS MY NOTES SERCPAP12 17.STEP.6.2A.

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

A battery-powered water heater maintains a potential difference of 13.6 V across a heating element with a resistance of 1.90 Ω .

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

 ✓ W

(b) How long (in s) would it take to heat 12.0 kg of water from 22.0°C to 50.0°C with this heater? Water has a specific heat of 4,186 J/(kg · °C). Neglect any energy losses to the environment.

 ✓ s

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14. [1/1 Points]

DETAILS

MY NOTES

SERCPAP12 17.A.P.051.

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

If a battery is rated at $57.7 \text{ A} \cdot \text{h}$, how much total charge can it deliver before it goes "dead"?

 ✓ C

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15. [3/3 Points]

DETAILS

MY NOTES

SERCPAP12 17.A.P.061.

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

A 120 V motor has mechanical power output of 2.40 hp . It is 84.0% efficient in converting power that it takes in by electrical transmission into mechanical power.

(a) Find the current (in A) in the motor.

 ✓ A

(b) Find the energy (in MJ) delivered to the motor by electrical transmission in 2.10 h of operation.

 ✓ MJ

(c) If the electric company charges $\$0.230/\text{kWh}$, what does it cost to run the motor for 2.10 h ?

 ✓

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