← AP Physics 2, section B4,

Electric Potential and Capacitance #1 (Homework)

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Current Score

QUESTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
POINTS	0/1	0/1	–/1	–/1	0/1	–/1	–/1	–/1	–/2	–/1	–/1	–/1	–/1	–/1	–/1

TOTAL SCORE

0/16	0.0%

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.

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1. **[0/1 Points]** DETAILS MY NOTES **SERCPAP12 16.STEP.1.1A.**

PREVIOUS ANSWERS ASK YOUR TEACHER PRACTICE ANOTHER

A constant electric field of 3,000 N/C pointed in the positive x-direction accelerates a boron nucleus through a displacement Δx of 3.50 m. Calculate the change in the boron nucleus' electric potential energy (in J). The charge of a boron nucleus is 8.01×10^{-19} C.

-0.00000000 ✖

Write the equation for the change in potential due to a particle traveling in an electric field and substitute values. J

Need Help? Read It

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2. **[0/1 Points]** DETAILS MY NOTES **SERCPAP12 16.STEP.1.1C.**

PREVIOUS ANSWERS ASK YOUR TEACHER PRACTICE ANOTHER

A constant electric field of 4,000 N/C pointed in the positive x-direction accelerates an electron through a displacement Δx of -2.50 m. Calculate the change in the electron's electric potential energy (in J). The charge of an electron is -1.60×10^{-19} C.

0.00000000 ✖

Write the equation for the change in potential due to a particle traveling in an electric field and substitute values. J

Need Help? Read It

3. **[–/1 Points]** DETAILS MY NOTES **SERCPAP12 16.STEP.1.1E.**

ASK YOUR TEACHER

As a lithium nucleus moves through a displacement Δx of 2.50 m, its electric potential energy decreases by 4.80×10^{-16} J. Find the x-component of the electric field (in N/C). The charge of a lithium nucleus is 4.81×10^{-19} C.

[ ] N/C

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4. **[–/1 Points]** DETAILS MY NOTES **SERCPAP12 16.STEP.1.2B.**

ASK YOUR TEACHER

A carbon nucleus is moving in the positive x-direction at 1.25×10^{6} m/s when it enters a region of space where there is an electric field of magnitude 1,000 N/C directed in the positive x-direction. Find the carbon nucleus' speed (in m/s) after it has moved through a displacement of 3.60 m in the presence of this electric field. The charge and mass of a carbon nucleus are 9.61×10^{-19} C and 1.99×10^{-26} kg, respectively.

[ ] m/s

Need Help? Read It

5. **[0/1 Points]** DETAILS MY NOTES **SERCPAP12 16.STEP.1.3A.**

PREVIOUS ANSWERS ASK YOUR TEACHER PRACTICE ANOTHER

A constant electric field of 2,000 N/C accelerates a proton through a displacement of 3.00 m. Calculate the change in the proton's electric potential (in J/C).

-0.00000000 ✖

Write the equation for the change in potential due to a particle traveling in an electric field and substitute values. J/C

Need Help? Read It

6. **[–/1 Points]** DETAILS MY NOTES **SERCPAP12 16.STEP.1.4A.**

ASK YOUR TEACHER

An electron is moving in the positive x-direction at 3.00×10^{5} m/s when it enters a region of space where an electric field changes its electric potential by 250 V. Calculate the electron's final speed (in m/s). The charge and mass of an electron are -1.60×10^{-19} C and 9.11×10^{-31} kg, respectively.

[ ] m/s

Need Help? Read It

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7. **[–/1 Points]** DETAILS MY NOTES **SERCPAP12 16.STEP.1.4B.**

ASK YOUR TEACHER

An electron is moving in the positive x-direction at 6.00×10^{5} m/s when it enters a region of space where an electric field slows the electron to 150 m/s. Calculate the change in the electron's electric potential (in V). The charge and mass of an electron are -1.60×10^{-19} C and 9.11×10^{-31} kg, respectively.

[ ] V

Need Help? Read It

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8. **[–/1 Points]** DETAILS MY NOTES **SERCPAP12 16.STEP.2.1A.**

ASK YOUR TEACHER

A lithium nucleus, q_A, at rest is at $\left(x_A, y_A\right)$ = (5.00×10^{-15} m, 2.00×10^{-15} m). Another lithium nucleus, q_B, is on the x-axis at $\left(x_B, y_B\right)$ = (7.00×10^{-15} m, 0 m). Calculate the electric potential (in J/C) at the point P, $\left(x_P, y_P\right)$ = (0 m, 2.00×10^{-15} m) on the y-axis. The charge of a lithium nucleus is 4.81×10^{-19} C.

[ ] J/C

Need Help? Read It

9. **[–/2 Points]** DETAILS MY NOTES **SERCPAP12 16.STEP.2.2A.**

ASK YOUR TEACHER

Charge q_A is located at (x_A, y_A) = (1.00×10^{-3} m, 3.00×10^{-3} m) and charge q_B is at (x_B, y_B) = (2.00×10^{-3} m, -2.00×10^{-3} m).

(a) Find the electric potential (in J/C) at point P, (x_P, y_P) = (3.00×10^{-3} m, 0 m) on the x-axis if q_A = 3.00 nC and q_B = 1.00 nC.

[ ] J/C

(b) Determine the work required (in J) to bring a third charge q_C = −2.00 nC from arbitrarily far away (at "infinity") to the point P.

[ ] J

Need Help? Read It

10. **[–/1 Points]** DETAILS MY NOTES **SERCPAP12 16.STEP.2.3B.**

ASK YOUR TEACHER

Two protons are on the x-axis, one held stationary at the origin and the other at a position approaching positive infinity. If the distant proton is given a velocity of magnitude 6.50×10^5 m/s toward the stationary proton, find the distance of closest approach between them (in m). The charge and mass of a proton are 1.60×10^{-19} C and 1.67×10^{-27} kg, respectively.

[ ] m

Need Help? Read It

11. **[–/1 Points]** DETAILS MY NOTES **SERCPAP12 16.STEP.2.5A.**

ASK YOUR TEACHER

A helium nucleus has a kinetic energy of 9.00×10^{-19} J when it is at a great distance from a bare lead nucleus with a charge of $82e$, where e is the fundamental electric charge. If it is traveling directly at the nucleus, at what distance (in m) does it slow to zero before the nucleus repels it? Neglect the motion of the much more massive lead nucleus. The charge of a helium nucleus is 3.20×10^{-19} C, and the fundamental electric charge e is 1.60×10^{-19} C.

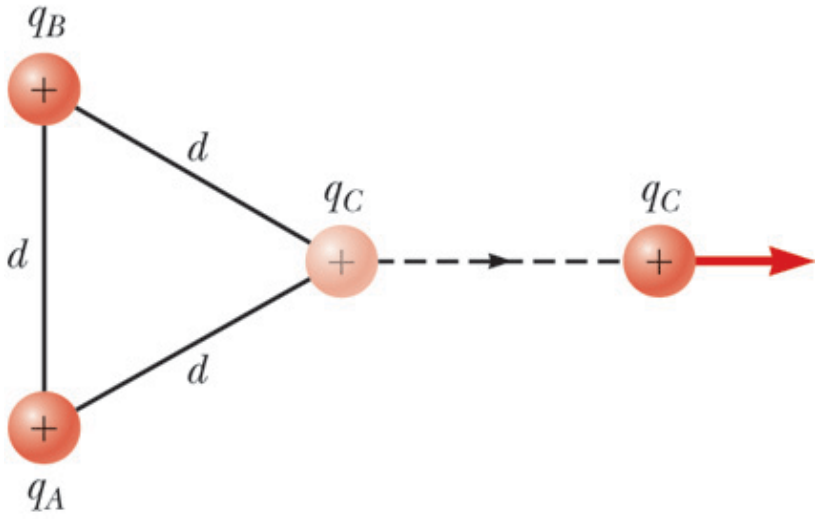
[ ] m

Need Help? Read It

12. **[–/1 Points]** DETAILS MY NOTES **SERCPAP12 16.STEP.2.6B.**

ASK YOUR TEACHER

Three carbon nuclei are arranged on the corners of an equilateral triangle, each a distance $d = 3.00 \times 10^{-15}$ m from the others, as in the figure.



The carbon nucleus on the right is released. Find its speed (in m/s) at infinity. The charge and mass of a carbon nucleus are 9.61×10^{-19} C and 1.99×10^{-26} kg, respectively.

[ ] m/s

Need Help? Read It

13. **[–/1 Points]** DETAILS MY NOTES **SERCPAP12 16.STEP.3.1A.**

ASK YOUR TEACHER

A lithium nucleus, which has charge 4.81×10^{-19} C, is moved from point *A*, where the electric potential is −4,600 J/C, to point *B*, where the electric potential is −6,000 J/C. Calculate the work done by the electric field on the lithium nucleus in electron volts.

[ ] eV

Need Help? Read It

14. **[–/1 Points]** DETAILS MY NOTES **SERCPAP12 16.STEP.3.1B.**

ASK YOUR TEACHER

An electric field does 1,500 eV of work on a boron nucleus of charge 8.02×10^{-19} C. Find the associated change in electric potential (in V).

[ ] V

Need Help? Read It

15. **[–/1 Points]** DETAILS MY NOTES **SERCPAP12 16.STEP.3.1C.**

ASK YOUR TEACHER

An electric field does 4,500 eV of work on a carbon nucleus of charge 9.61×10^{-19} C as it moves from point *A* to point *B*. Find the electric potential (in V) at point *A* if the electric potential at point *B* is −6,000 V.

[ ] V

Need Help? Read It