CENGAGE | WEBASSIGN

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(sign out)

Chapter 22 HW (Homework)

INSTRUCTOR
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Current Score

QUESTION	1	2	3	4	5	6	7	8	9	
POINTS	0.83/0.83 ✓	0.83/0.83 ✓	0.83/0.83 ✓	0.83/0.83 ✓	0.83/0.83 ✓	0.83/0.83 ✓	0.83/0.83 ✓	0.83/0.83 ✓	0.83/0.83 ✓	0.8

TOTAL SCORE

10/10	100.0%

Due Date

TUE, SEP 8, 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.

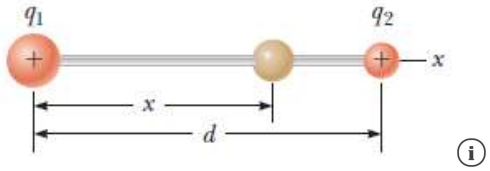
Assignment Scoring

Your last submission is used for your score.

1. **[0.83/0.83 Points]** DETAILS PREVIOUS ANSWERS **SERPSE10 22.3.P.007.**

MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

Two small beads having positive charges $q_1 = 16q$ and $q_2 = q$ are fixed at the opposite ends of a horizontal insulating rod of length $d = 1.50$ m. The bead with charge q_1 is at the origin. As shown in the figure below, a third small, charged bead is free to slide on the rod.



(a) At what position x is the third bead in equilibrium?

$x =$ 1.2 ✓ m

(b) Can the equilibrium be stable?

- (●) Yes, if the third bead has a positive charge. ✓
- ( ) Yes, if the third bead has a negative charge.
- ( ) No

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2. **[0.83/0.83 Points]** DETAILS PREVIOUS ANSWERS **SERPSE10 22.3.P.009.**

MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

In the Bohr theory of the hydrogen atom, an electron moves in a circular orbit about a proton, assume the radius of the orbit is 5.29×10^{-11} m.

(a) Find the magnitude of the electric force exerted on each particle.

8.22e-8 ✓ N

(b) If this force causes the centripetal acceleration of the electron, what is the speed of the electron?

2.19e6 ✓ m/s

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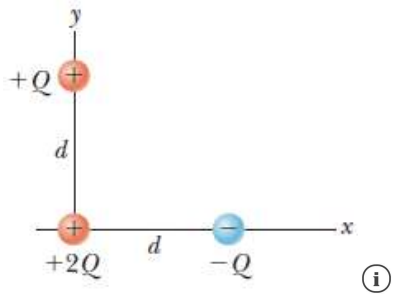
3. **[0.83/0.83 Points]** DETAILS PREVIOUS ANSWERS **SERPSE10 22.3.P.011.**

MY NOTES ASK YOUR TEACHER

A point charge $+2Q$ is at the origin and a point charge $-Q$ is located along the x axis at $x = d$ as in the figure below. Find a symbolic expression for the net force on a third point charge $+Q$ located along the y axis at $y = d$. (Use the following as necessary: k_e, the Coulomb constant, Q, and d.)

$\vec{\mathbf{F}}_{net}$ =

keQ2d2[12√2^i+(2−12√2)^j]



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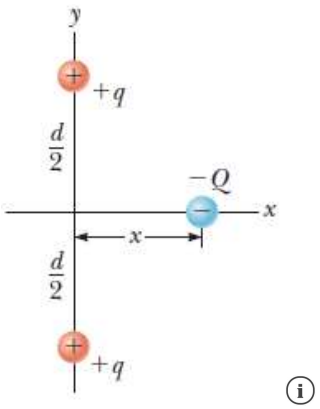
4. **[0.83/0.83 Points]** DETAILS PREVIOUS ANSWERS **SERPSE10 22.3.P.013.**

MY NOTES ASK YOUR TEACHER

Two identical particles, each having charge $+q$, are fixed in space and separated by a distance d. A third particle with charge $-Q$ is free to move and lies initially at rest on the perpendicular bisector of the two fixed charges a distance x from the midpoint between those charges (see figure below).



(a) Show that if x is small compared with d, the motion of $-Q$ is simple harmonic along the perpendicular bisector. (Submit a file with a maximum size of 1 MB.)

Choose File No file chosen

4_a.jpg

Score: 0.27 out of 0.27

Comment:

(b) Determine the period of that motion. (Use the following as necessary: q, Q, m for the mass of charge Q, d, and k_e.)

T =

n2√md3keQq

(c) How fast will the charge $-Q$ be moving when it is at the midpoint between the two fixed charges if initially it is released at a distance $a << d$ from the midpoint? (Use the following as necessary: a, q, Q, m for the mass of charge Q, d, and k_e.)

v =

4a√keQqmd3

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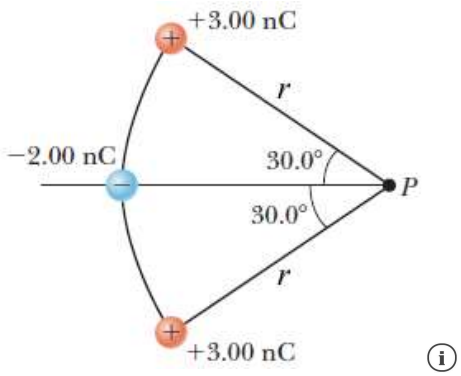
5. [0.83/0.83 Points] DETAILS PREVIOUS ANSWERS SERPSE10 22.4.P.019.

MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

Three point charges are located on a circular arc as shown in the figure below. (Take r = 3.92 cm. Let to the right be the $+x$ direction and up along the screen be the $+y$ direction.)



(a) What is the total electric field at P, the center of the arc?

$\vec{\mathbf{E}}$ = 1.87e4 ✓ $\hat{\mathbf{i}}$ N/C + 0 ✓ $\hat{\mathbf{j}}$ N/C

(b) Find the electric force that would be exerted on a -5.19–nC point charge placed at P.

$\vec{\mathbf{F}}$ = -9.72e-5 ✓ $\hat{\mathbf{i}}$ N + 0 ✓ $\hat{\mathbf{j}}$ N

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6. [0.83/0.83 Points] DETAILS PREVIOUS ANSWERS SERPSE10 22.6.P.024.MI.

MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

A proton accelerates from rest in a uniform electric field of 630 N/C. At one later moment, its speed is 1.30 Mm/s (nonrelativistic because v is much less than the speed of light).

(a) Find the acceleration of the proton.

6.04e10 ✓ m/s^2

(b) Over what time interval does the proton reach this speed?

2.16e-5 ✓ s

(c) How far does it move in this time interval?

14 ✓ m

(d) What is its kinetic energy at the end of this interval?

1.41e-15 ✓ J

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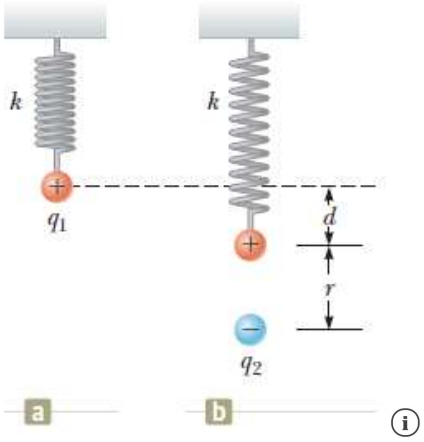
7. **[0.83/0.83 Points]** DETAILS PREVIOUS ANSWERS **SERPSE10 22.A.P.032.**

MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

A small sphere of charge q_1 = 0.864 μC hangs from the end of a spring as in Figure a. When another small sphere of charge q_2 = −0.618 μC is held beneath the first sphere as in Figure b, the spring stretches by d = 3.66 cm from its original length and reaches a new equilibrium position with a separation between the charges of r = 4.85 cm. What is the force constant of the spring?

55.8 ✔ N/m



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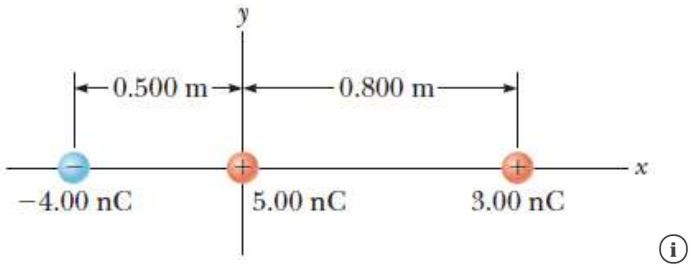
8. [0.83/0.83 Points] DETAILS PREVIOUS ANSWERS SERPSE10 22.A.P.035.

MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

Three point charges are aligned along the *x* axis as shown in the figure below.



Find the electric field at the following positions.

(a) (3.80, 0)

$\vec{\mathbf{E}}$ =

(4.17)^i

N/C

(b) (0, 3.80)

$\vec{\mathbf{E}}$ =

(−0.687)^i+(2.44)^j

N/C

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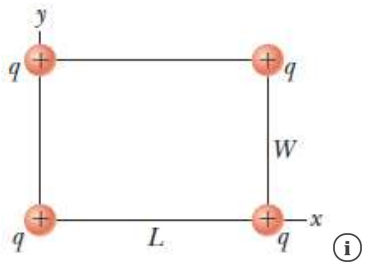
9. [0.83/0.83 Points] DETAILS PREVIOUS ANSWERS SERPSE10 22.A.P.038.

MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

Four identical charged particles (q = +10.7 μC) are located on the corners of a rectangle as shown in the figure below. The dimensions of the rectangle are L = 58.8 cm and W = 13.5 cm.



(a) Calculate the magnitude of the total electric force exerted on the charge at the lower left corner by the other three charges.

57.5 ✓ N

(b) Calculate the direction of the total electric force exerted on the charge at the lower left corner by the other three charges.

264.14 ✓ ° (counterclockwise from the +x-axis)

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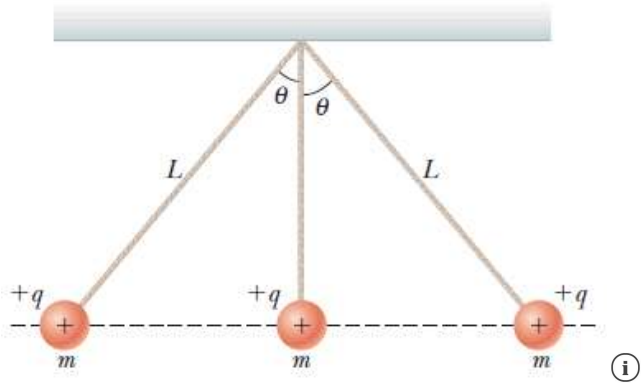
10. [0.83/0.83 Points] DETAILS PREVIOUS ANSWERS SERPSE10 22.A.P.041.

MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

Three identical point charges, each of mass m = 0.350 kg, hang from three strings, as shown in the figure below. If the lengths of the left and right strings are each L = 36.0 cm, and if the angle θ is 45°, determine the value of q.

4.45e-6 ✓ C



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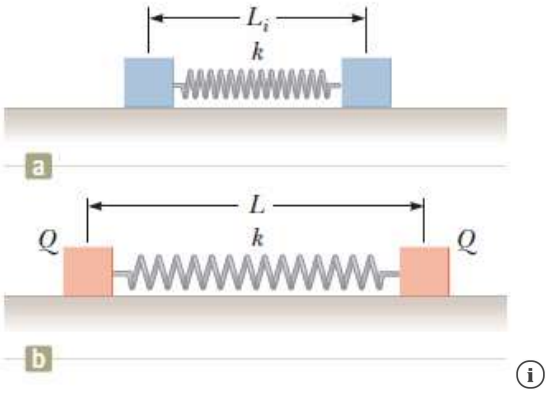
11. **[0.83/0.83 Points]** DETAILS PREVIOUS ANSWERS **SERPSE10 22.A.P.039.**

MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

Two identical blocks resting on a frictionless, horizontal surface are connected by a light spring having a spring constant k = 145 N/m and an unstretched length L_i = 0.490 m as shown in figure (a) below. A charge Q is slowly placed on each block, causing the spring to stretch to an equilibrium length L = 0.530 m as shown in figure (b) below. Determine the value of Q, modeling the blocks as charged particles.

1.35e-5 ✔ C



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12. **[0.87/0.87 Points]** DETAILS PREVIOUS ANSWERS **SERPSE10 22.6.P.025.MI.**

MY NOTES ASK YOUR TEACHER PRACTICE ANOTHER

A proton moves at 4.60 × 10^5 m/s in the horizontal direction. It enters a uniform vertical electric field with a magnitude of 8.60 × 10^3 N/C. Ignore any gravitational effects.

(a) Find the time interval required for the proton to travel 5.50 cm horizontally.

119.6 ✔ ns

(b) Find its vertical displacement during the time interval in which it travels 5.50 cm horizontally. (Indicate direction with the sign of your answer.)

5.89 ✔ mm

(c) Find the horizontal and vertical components of its velocity after it has traveled 5.50 cm horizontally.

$\vec{v}$ = (460 ✔ $\hat{i}$ + 98.6 ✔ $\hat{j}$) km/s

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