Ch23 (Homework)
Current Score : – / 28 **Due :** Monday, August 27 2018 02:11 PM CDT

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1. –/2 pointsSerPSE9 23.P.005.soln.

In a thundercloud there may be electric charges of +41.0 C near the top of the cloud and -41.0 C near the bottom of the cloud. These charges are separated by 1.90 km. What is the electric force on the top charge?

magnitude

[ ] Ndirection

- attractive
- repulsive

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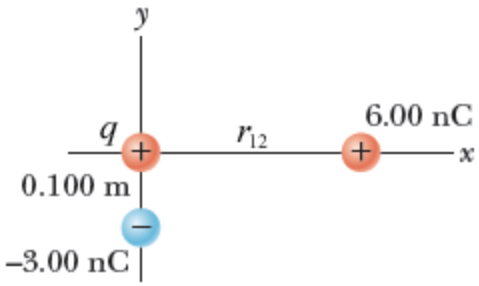
2. –/2 pointsSerPSE9 23.P.011.MI.FB.

Three point charges are arranged as shown in the figure below. Find the magnitude and direction of the electric force on the particle q = 5.30 nC at the origin. (Let r_{12} = 0.325 m.)

magnitude [ ] N

direction [ ] ° counterclockwise from the +x axis



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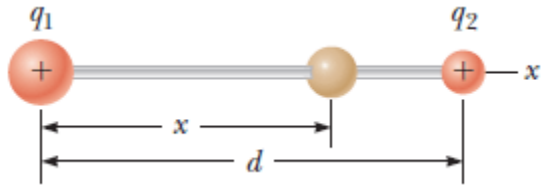
3. –/2 pointsSerPSE9 23.P.013.WI.

Two small beads having positive charges $q_1 = 4q$ 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?

$x =$ _____ 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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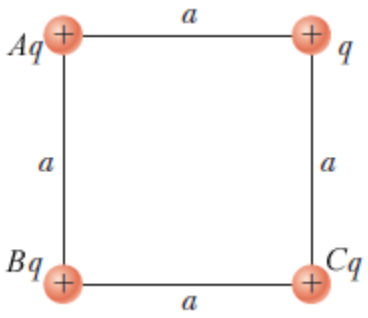
4. –/4 pointsSerPSE9 23.P.025.

Four charged particles are at the corners of a square of side a as shown in the figure below. (Let $A = 4$, $B = 4$, and $C = 8$.)



(a) Determine the electric field at the location of charge q. (Use the following as necessary: q, a, and k_e.)

magnitude

direction ° (counterclockwise from the +x-axis)

(b) Determine the total electric force exerted on q. (Use the following as necessary: q, a, and k_e.)

magnitude

direction ° (counterclockwise from the +x-axis)

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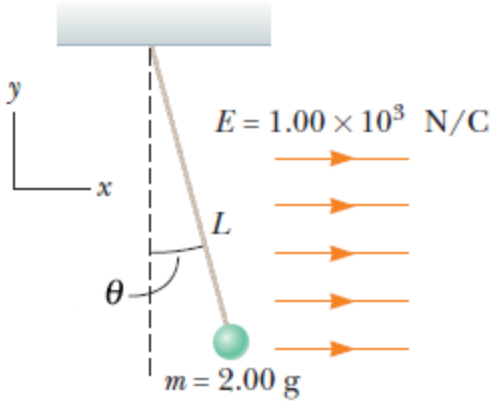
5. –/1 pointsSerPSE9 23.P.033.

A small, 2.00-g plastic ball is suspended by a 24.1-cm-long string in a uniform electric field as shown in the figure below. If the ball is in equilibrium when the string makes a 16.7° angle with the vertical, what is the net charge on the ball?

[ ] μC



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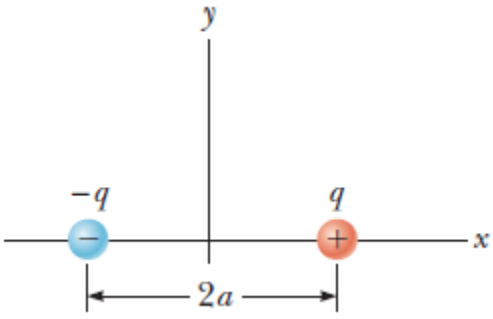
6. –/0 pointsSerPSE9 23.P.036.

Consider the electric dipole shown in the figure below. Show that the electric field at a *distant* point on the +x axis is $E_x \approx 4k_e qa/x^3$. (Submit a file with a maximum size of 1 MB.)

Browse... No file selected.

This answer has not been graded yet.



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7. –/2 pointsSerPSE9 23.P.045.MI.

A uniformly charged insulating rod of length 15.0 cm is bent into the shape of a semicircle as shown in the figure below. The rod has a total charge of −7.50 μC.

(a) Find the magnitude of the electric field at *O*, the center of the semicircle.

[ ] N/C

(b) Find the direction of the electric field at *O*, the center of the semicircle.

- to the left
- to the right
- upward
- downward
- into the page
- out of the page

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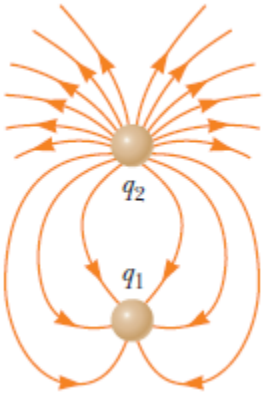
8. –/3 pointsSerPSE9 23.P.049.WI.

The figure below shows the electric field lines for two charged particles separated by a small distance.



(a) Determine the ratio q_1/q_2.

(b) What are the signs of q_1 and q_2?

q_1 ---Select---

q_2 ---Select---

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9. –/4 pointsSerPSE9 23.P.057.MI.

A proton moves at 3.80×10^5 m/s in the horizontal direction. It enters a uniform vertical electric field with a magnitude of 8.20×10^3 N/C. Ignore any gravitational effects.

(a) Find the time interval required for the proton to travel 4.50 cm horizontally.

[ ] ns

(b) Find its vertical displacement during the time interval in which it travels 4.50 cm horizontally. (Indicate direction with the sign of your answer.)

[ ] mm

(c) Find the horizontal and vertical components of its velocity after it has traveled 4.50 cm horizontally.

$\vec{\mathbf{v}} =$ ([ ] $\hat{\mathbf{i}}$ + [ ] $\hat{\mathbf{j}}$) km/s

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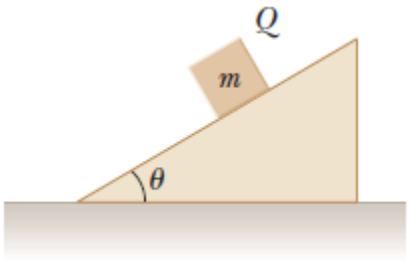
10. –/3 pointsSerPSE9 23.P.061.

A small block of mass m and charge Q is placed on an insulated, frictionless, inclined plane of angle θ as in the figure below. An electric field is applied parallel to the incline.



(a) Find an expression for the magnitude of the electric field that enables the block to remain at rest. (Use any variable or symbol stated above along with the following as necessary: g for the acceleration due gravity.)

E =

(b) If m = 5.06 g, Q = -7.56 μC, and θ = 24.9°, determine the magnitude and the direction of the electric field that enables the block to remain at rest on the incline.

magnitude N/C

direction ---Select---

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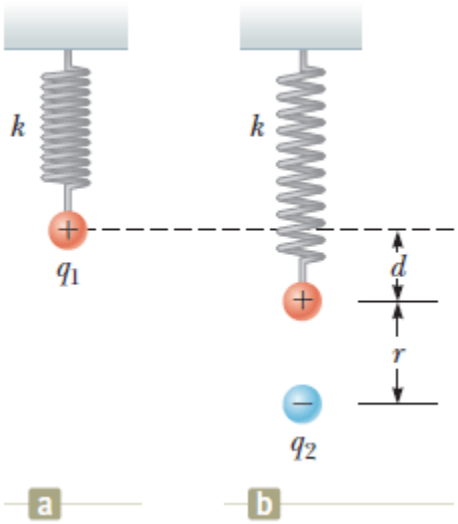
11. –/1 pointsSerPSE9 23.P.062.

A small sphere of charge $q_1 = 0.728\ \mu C$ hangs from the end of a spring as in Figure a. When another small sphere of charge $q_2 = -0.54\ \mu C$ is held beneath the first sphere as in Figure b, the spring stretches by $d = 3.60$ cm from its original length and reaches a new equilibrium position with a separation between the charges of $r = 4.80$ cm. What is the force constant of the spring?

[ ] N/m



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12. –/4 pointsSerPSE9 23.P.051.MI.

A proton accelerates from rest in a uniform electric field of 660 N/C. At one later moment, its speed is 1.40 Mm/s (nonrelativistic because v is much less than the speed of light).

(a) Find the acceleration of the proton.

[ ] m/s^2

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

[ ] s

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

[ ] m

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

[ ] J

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