5. -/3 pointsSerCP10 16.WU.003.

A uniform electric field of magnitude 4.50 N/C is directed along the +*x*-axis. If a 2.55 μC charge moves from (1.00, 0) m to (2.38, 0) m in this field, determine the following. (Include the sign of the value in your answer.)

(a) the work done by the electric force
[ ] J

(b) the change in the electric potential energy of the particle
[ ] J

(c) the electric potential difference between the particle's initial and final points
[ ] V

Need Help? Read It

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6. -/2 pointsSerCP10 16.WU.005.

Two protons are located at (5.40, 0) m and (0, 3.40) m, respectively. Determine the following.

(a) the electric potential at the origin
[ ] V

(b) the electric potential energy of a third proton located at the origin
[ ] J

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7. -/2 pointsSerCP10 16.WU.006.

(a) A hydrogen atom can be ionized by a photon having an energy of 13.6 eV. Convert that quantity to joules.
[ ] J

(b) It requires 4.186 J of thermal energy to warm a gram of water by 1.00 K. Convert that energy to electron volts.
[ ] eV

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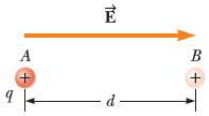
8. -/5 pointsSerCP10 16.P.006.

A point charge q = +41.0 μC moves from *A* to *B* separated by a distance d = 0.196 m in the presence of an external electric field $\vec{E}$ of magnitude 260 N/C directed toward the right as in the following figure.



(a) Find the electric force exerted on the charge.
magnitude [ ] N
direction ---Select---

(b) Find the work done by the electric force.
[ ] J

(c) Find the change in the electric potential energy of the charge.
[ ] J

(d) Find the potential difference between *A* and *B*.
$V_B - V_A$ = [ ] V

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9. -/2 pointsSerCP10 16.WU.012.

The plates of a parallel-plate capacitor are charged to a potential difference of 17.0 V. If the capacitance is 33.0 μF, calculate the following.

(a) the energy stored in the capacitor
[ ] J

(b) the magnitude of charge stored on each plate of the capacitor
[ ] C

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10. -/5 pointsSerCP10 16.WU.010.

Two capacitors are connected in parallel across a 24.0-V battery. If their capacitances are 21.0 μF and 28.0 μF, determine the following.

(a) the voltage across each capacitor
$V_{21.0\ \mu F}$ = [ ] V
$V_{28.0\ \mu F}$ = [ ] V

(b) the magnitude of charge stored on each plate of the 21.0 μF capacitor
[ ] C

(c) the magnitude of charge stored on each plate of the 28.0 μF capacitor
[ ] C

(d) the equivalent capacitance of the system
[ ] μF

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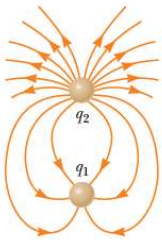
11. -/2 pointsSerCP10 15.P.030.

The figure below shows the electric field lines for two point charges 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 is positive.
- ☐ q_1 is negative.
- ☐ q_2 is positive.
- ☐ q_2 is negative.

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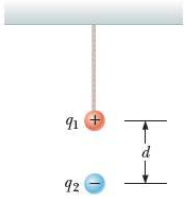
12. –/2 pointsSerCP10 15.P.004.

A small sphere of mass m = 7.10 g and charge q_1 = 30.8 nC is attached to the end of a string and hangs vertically as in the figure. A second charge of equal mass and charge q_2 = −58.0 nC is located below the first charge a distance d = 2.00 cm below the first charge as in the figure.



(a) Find the tension in the string.
[ ] N

(b) If the string can withstand a maximum tension of 0.180 N, what is the smallest value d can have before the string breaks?
[ ] cm

Need Help? Read It

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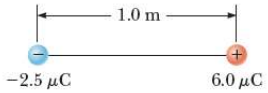
13. –/1 pointsSerCP10 15.P.027.

In the figure below, determine the point (other than infinity) at which the total electric field is zero.
[ ] m to the left of -2.5×10^{-6} C charge



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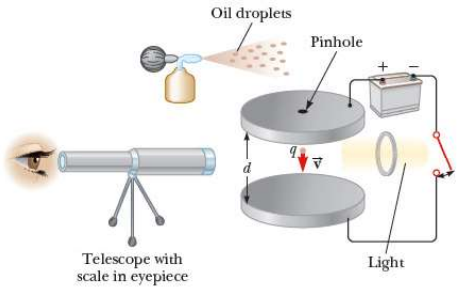
14. –/1 pointsSerCP10 15.P.038.

In the Millikan oil-drop experiment illustrated in the figure below, an atomizer (a sprayer with a fine nozzle) is used to introduce many tiny droplets of oil between two oppositely charged parallel metal plates. Some of the droplets pick up one or more excess electrons. The charge on the plates is adjusted so that the electric force on the excess electrons exactly balances the weight of the droplet. The idea is to look for a droplet that has the smallest electric force and assume it has only one excess electron. Suppose we are using an electric field of 7.50×10^4 N/C. The charge on one electron is 1.60×10^{-19} C. Calculate the radius of an oil drop of density 810 kg/m^3 for which its weight could be balanced by the electric force of this field on one electron.
[ ] μm



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15. –/2 pointsSerCP10 16.WU.007.

A capacitor with capacitance 5.25 μF is connected to a(n) 3.25-V battery.

(a) Find the charge on the capacitor in coulombs.
[ ] C

(b) What voltage battery would be required to store 5.00×10^{-5} C on the capacitor?
[ ] V

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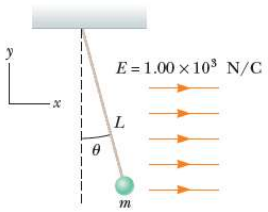
16. -/1 pointsSerCP10 15.P.052.MI.FB.

A small plastic ball of mass m = 1.50 g is suspended by a string of length L = 24.0 cm in a uniform electric field, as shown in the figure below. If the ball is in equilibrium when the string makes a θ = 17.0° angle with the vertical as indicated, what is the net charge on the ball?

[ ] μC



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Show My Work (Optional)