D1

In an experiment in space, one proton is held fixed and another proton is released from rest a distance of 4.00 mm away.

What is the initial acceleration of the proton after it is released?

Express the answer with three significant figures.

D2

Three point charges are arranged along the x-axis. Charge q_1 = +3.00 μC is at the origin, and charge q_2 = -5.00 μC is at x = 0.200 m. Charge q_3 = +8.00 μC.
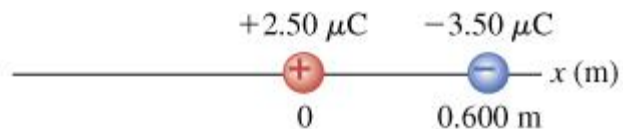
Where is q_3 located if the net force on q_1 is 7.00 N in the −x direction?

Express the answer with three significant figures.

Problem 21.64

Two charges, one of 2.50 μC and the other of -3.50 μC, are placed on the *x*-axis, one at the origin and the other at x = 0.600 m, as shown in the figure.

Find the position on the *x*-axis where the net force on a small charge +q would be zero.

$+2.50\ \mu C$ $-3.50\ \mu C$

$x\ (m)$

0 $0.600\ m$

Problem 21.68

Two identical spheres with mass m are hung from silk threads of length L, as shown in the figure. Each sphere has the same charge, so $q_1=q_2=q$. The radius of each sphere is very small compared to the distance between the spheres, so they may be treated as point charges.

Suppose that the angle θ is small, and find the equilibrium separation d between the spheres (*Hint:* If θ is small, then $\tan\theta \cong \sin\theta$.)

Express your answer in terms of the variables q, L, m and appropriate constants.

L L

θ θ

mass m mass m

charge q_1 charge q_2