Fall 2021

Homework 1

1. Three point charges are arranged along the *x*-axis. Charge *q*1 = +3.00 uC is at the origin, and charge *q*2 = -5.00 uC is at *x* = 0.200 m. Charge *q*3 = -8.00 uC. Where is *q*3 located if the net force on *q*1 is 7.00 N in the –*x*-direction?
2. A particle has charge -5.00 nC. (a) Find the magnitude and direction of the electric field due to this particle at a point 0.250 m directly above it. (b) At what distance from this particle does its electric field have a magnitude of 12.0 N/C?
3. A point charge is at the origin. With this point charge as the source point, what is the unit vector in the direction of the field point (a) at *x* = 0, *y* = -1.35 m; (b) at *x* = 12.0 cm, *y* = 12.0 cm; (c) at *x* = -1.10 m, *y* = 2.60 m? Express your results in terms of the unit vectors and .
4. The two charges *q*1 and *q*2 shown in **Fig. E21.38** have equal magnitudes. What is the direction of the net electric field due to these two charges at points *A* (midway between the charges), *B*, and *C* if (a) both charges are negative, (b) both charges are positive, (c) *q*1 is positive and *q*2 is negative.
5. Two point charges are separated by 25.0 cm (**Fig. E21.43**). Find the net electric field these charges produce at point *A*. (b) What would be the magnitude and direction of the electric force this combination of charges would produce on a proton at *A*?
6. A straight, nonconducting plastic wire 8.50 cm long carries a charge density of +175 nC/m distributed uniformly along its length. It is lying on a horizontal tabletop. (a) Find the magnitude and direction of the electric field this wire produces at a point 6.00 cm directly above its midpoint. (b) If the wire is now bent into a circle lying flat on the table, find the magnitude and direction of the electric field it produces at a point 6.00 cm directly above its center.