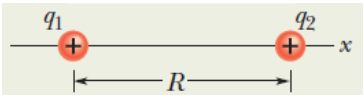
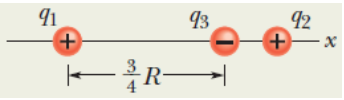
Chapter 18
Example Problems

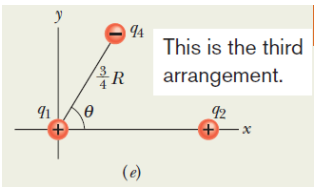
1. Two positively charge particles are fixed on the *x*-axis. The charge $q_1 = 1.60 \times 10^{-19}$ C and $q_2 = 3.20 \times 10^{-19}$ C are separated by a distance $R = 0.0200$ m. What is the magnitude of the electrostatic force $\boldsymbol{F}_{12}$ on particle 1 from particle 2?



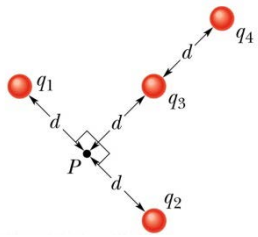
2. Charges $q_1 = 1.60 \times 10^{-19}$ C and $q_2 = 3.20 \times 10^{-19}$ C are separated by a distance $R = 0.0200$ m. A third charge $q_3 = -3.20 \times 10^{-19}$ C and is placed a distance ¾R from particle 1. What is the magnitude of the electrostatic force $\boldsymbol{F}_{1,net}$ on particle 1 from particle 2 and 3?



3. Charges $q_1 = 1.60 \times 10^{-19}$ C and $q_2 = 3.20 \times 10^{-19}$ C are separated by a distance $R = 0.0200$ m. A charge $q_4 = -3.20 \times 10^{-19}$ C and is placed a distance $\frac{3}{4}R$ from particle 1 and lies on a line that makes an angle of $\theta = 60^\circ$ with the x-axis. What is the magnitude of the net electrostatic force $\boldsymbol{F}_{1,net}$ on particle 1 from particle 2 and 4?



4. The four particles in the figure are fixed in place and have charges $q_1 = q_2 = +5e$, $q_3 = +3e$, and $q_4 = -12e$. Distance $d = 5.0$ μm. What is the magnitude of the net electric field at point P due to these particles?



5. An electric dipole consisting of charges of magnitude 1.50 nC separated by 6.20 μm is in an electric field of strength 1100 N/C. Determine the following:
    a. Magnitude of the electric dipole moment?
    b. Difference between the potential energies for dipole orientations parallel (0˚) and antiparallel (180˚) to **E**?