UNIT 2 EXERCISES

1) Consider two charged objects lying along the x-axis. A 2.0×10^{-9} C point charge is located at x = 3.0 cm and a -3.0×10^{-9} C point charge is located at x = 5.0 cm.

a) What is the magnitude of the force on the negatively charged object due to the positively charged object? What is its direction? Show your work and explain your reasoning.

b) Suppose the -3.0×10^{-9} C charge is moved to x = 5.0 cm and y = 6.0 cm. What is the magnitude of the force exerted by the negative point charge on the positive point charge? What is its direction? Show your work and explain your reasoning.

2) (from Arnold B. Arons, *Homework and Test Question for Introductory Physics Teaching*, John Wiley and Sons, Inc., NY, 1994.)

The charged particles A, B, and C, occupy fixed positions at the vertices of a right triangle, as shown. The charges on the particles are all equal in magnitude. Consider only the electrostatic forces between the particles.
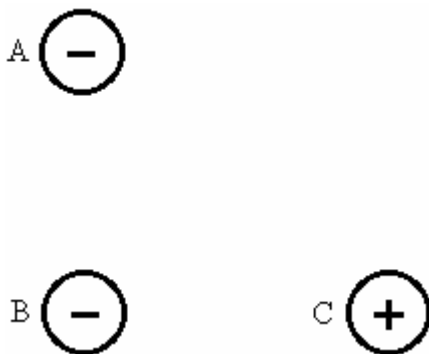

(a) Draw a force diagram for each particle showing all of the forces acting on it. Also draw the net force on each particle. For each force indicate the object exerting the force. Identify all Newton's Third Law pairs.

(b) If the magnitude of the charges is 2.6×10^{-6}C, and the distance between the charges A and B and B and C is 2×10^{-2}m, what is the magnitude of the net force on particle A? Show your work.

3) (from Arnold B. Arons, *Homework and Test Question for Introductory Physics Teaching*, John Wiley and Sons, Inc., NY, 1994.)

Two charged particles are located along the x-axis as shown, a charge of +2C at x = 0 and a charge of -1C is at x = 4cm. We define a region A as that for which x < 0, region B as that for which 0≤ x ≤ 4cm, and region C as that for which x > 4cm.

+2C   -1C

x = 0   x = 4cm
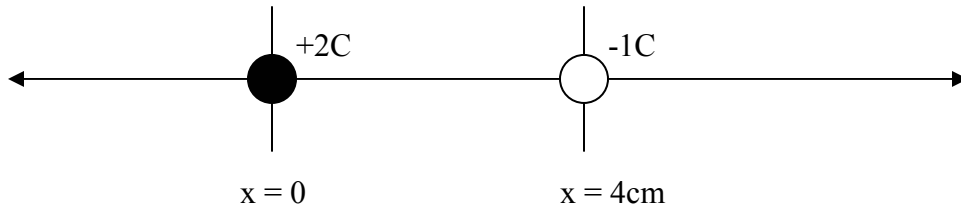
(a) Could the net force on a +1C charge be zero, anywhere in region A? In region B? In region C? Explain your reasoning.

(b) If you could place any amount of charge at $x = 0$ cm and $x = 4$ cm, could you arrange it so that there is no point on the x-axis, other than at $x = +\infty$ and $x = -\infty$, that the net force on a +1C would be zero? Describe them.