IN CLASS PROBLEMS

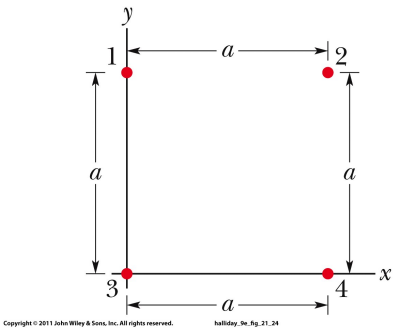
Problems:

- 21-3
- 21-10
- 21-38
- 22-9
- 22-16

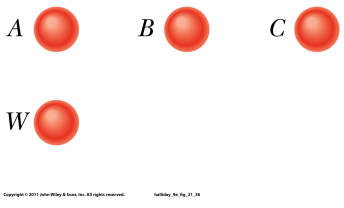
Note: It is important that students understand the material presented on the blackboard by the TAs as well as the problems specified here.

21-3. What must be the distance between point charge $q_1 = 26.0\ \mu$C and point charge $q_2 = -47.0\ \mu$C for the electrostatic force between them to have a magnitude of 5.70 N?

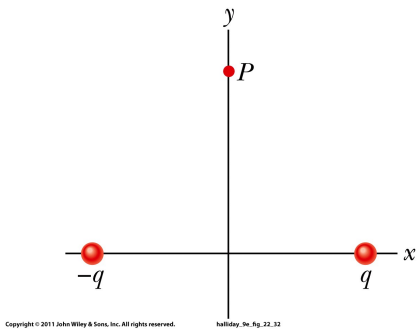
21-10. In the figure below, four particles form a square. The charges are $q_1 = q_4 = Q$ and $q_2 = q_3 = q$. (a) What is Q/q if the net electrostatic force on particles 1 and 4 is zero? (b) Is there any value of q that makes the net electrostatic force on each of the four particles zero? Explain.



21-38. Figure 21-36 shows four identical conducting spheres that are actually well separated from one another. Sphere W (with and initial charge of zero) is touched to sphere A and then they are separated. Next, sphere W is touched to sphere B (with an initial charge of $-32e$) and then they are separated. Finally, sphere W is touched to sphere C (with an initial charge of $+48e$), and then they are separated. The final charge on sphere W is $+18e$. What was the initial charge on sphere A?



22-9. The figure below shows two charged particles on the $x-$axis: $-q = -3.20 \times 10^{-19}$ C at $x = -3.00$ m and $q = 3.20 \times 10^{-19}$ C at $x = +3.00$ m. What are the (a) magnitude and (b) direction (relative to the positive direction of the x-axis) of the net electric field produced at point P at $y = 4.00$ m?



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22-16. The figure below shows a plastic ring of radius $R = 50.0$ cm. Two small charged beads are on the ring: Bead 1 of charge $+2.00$ μC is fixed in place at the left side; Bead 2 of charge $+6.00$ μC can be moved along the ring. The two beads produce a net electric field of magnitude E at the center of the ring. At what (a) positive and (b) negative value of angle θ should Bead 2 be positioned such that $E = 2.00 \times 10^5$ N/C?