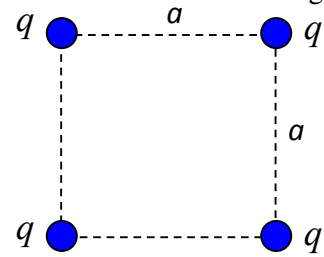


**Lesson #11: Work & Energy in  
Electrostatics**

Name: \_\_\_\_\_

Study Section 2.4 and Example 2.8, and then answer the following questions:

1. Four identical point charges, which are initially infinitely far apart, are brought together and located at the corners of a square of side  $a$  as shown. How much work is done in assembling this charge distribution?



2. In Section 2.4.3, work through all of the mathematical steps (some of which your author skips over) required to go from Eq. 2.43 to Eq. 2.44. Hint: you will need to invoke the divergence theorem to get this to work out.
3. In Section 2.4.3, Griffiths argues that we may ignore the surface integral piece of Eq. 2.44. Explain why this is justified.
4. Equations 2.43 and 2.45 may both be used to determine the electrostatic energy of a charge distribution. For each of these, explain what the integration is over. Be as specific as you can.
5. In Solution 2 of Example 2.8, your author uses Eq. 2.45 to find the electrostatic energy contained in a spherical shell of charge. Why does he integrate only from  $R$  to  $\infty$ , when Eq. 2.45 should be integrated over “all space”?