解答四



23.23. (a) Identify and Set Up**:**   The direction of  is always from high potential to low potential so point *b* is at higher potential.

(b) Apply Eq. (23.17) to relate  to *E*.

Execute:   



(c) 

Evaluate:   The electric force does negative work on a negative charge when the negative charge moves from high potential (point *b*) to low potential (point *a*).

23.74. Identify and Set Up:   The potential at the surface is given by Example 23.8 and the electric field at the surface is given by Example 22.5. The charge initially on sphere 1 spreads between the two spheres such as to bring them to the same potential.

Execute:   (a)  

(b) Two conditions must be met:

1) Let  and  be the final charges of each sphere. Then  (charge conservation)

2) Let  and  be the final potentials of each sphere. All points of a conductor are at the same potential, so 

 requires that  and then 



This gives  and 

(c)  and  which equals  as it should.

(d)  

Evaluate:   Part (a) says  The sphere with the larger radius needs more charge to produce the same potential at its surface. When   The sphere with the larger radius has the smaller electric field at its surface.