Name_____

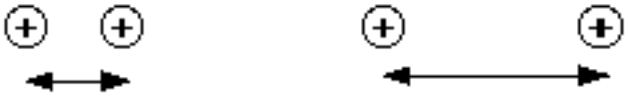
Date_____ **Pd**____

E&M Unit II - Worksheet 3
Electric Potential Energy and Electric Potential

For each problem below, identify which situation (final or initial) where the system has more electrical potential energy. Explain your reasoning.

1. Initial Final Explanation

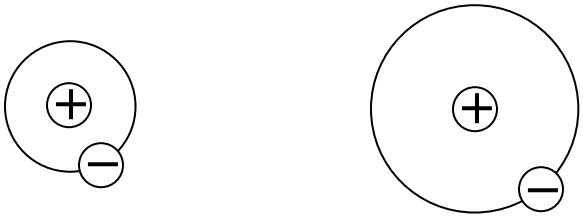
2. Initial Final Explanation



3. Initial Final Explanation

4. A hydrogen atom has a negatively charged electron that occupies the space around the positively charged proton at its nucleus. The figure below shows this. The electron makes a circular orbit around the proton.

Initial Final Explanation

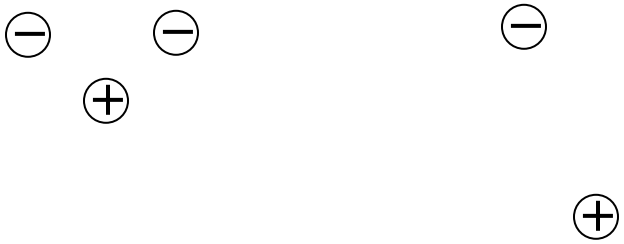


5. Given the three charges below, compare the energy of the initial and final states.

Initial Final Explanation

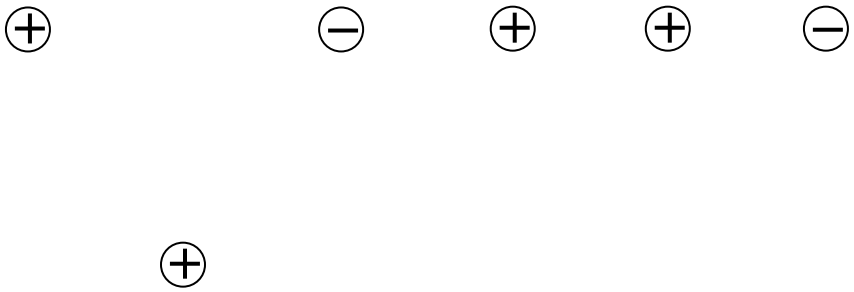
6. Given the three charges below, compare the energy of the initial and final states.

Initial Final Explanation

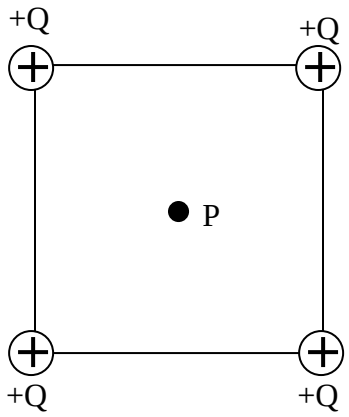


7. Given the three charges below, compare the energy of the initial and final states.

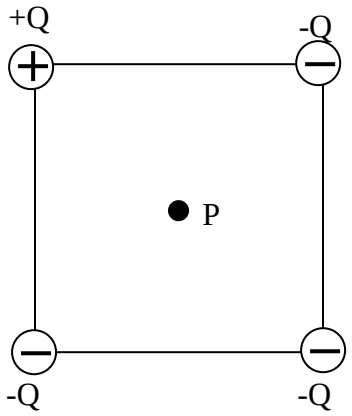
Initial Final Explanation



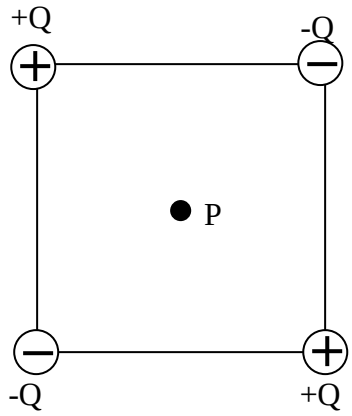
8. Point P is located at the center of the square below. Draw a vector with its tail on point P indicating the direction of the electric field at the point. If the value of the electric field at P due to one point charge is **E**, what is the value due to the 4 point charges? If the value of the electric potential at P due to one positive point charge is **V**, what is the value due to the 4 point charges?

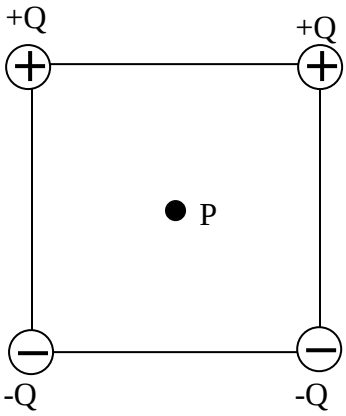


9. Point P is located at the center of the square below. Draw a vector with its tail on point P indicating the direction of the electric field at the point. If the value of the electric field at P due to one point charge is **E**, what is the value due to the 4 point charges? If the value of the electric potential at P due to one positive point charge is **V**, what is the value due to the 4 point charges?

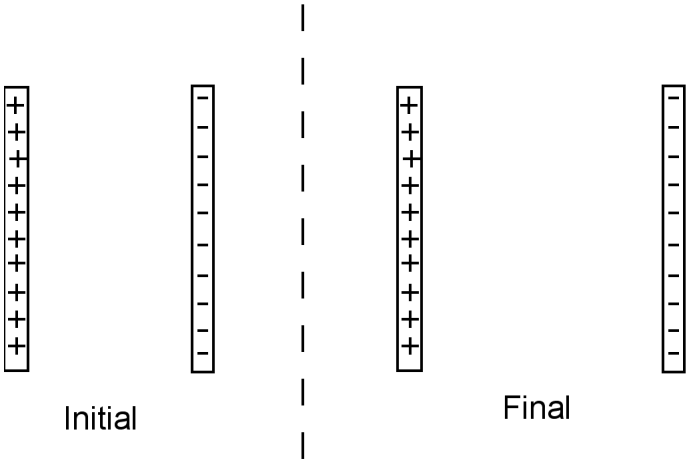


10. Same instructions for both systems below. Draw a vector with its tail on point P indicating the direction of the electric field at the point. If the value of the electric field at P due to one point charge is **E**, what is the value due to the 4 point charges? If the value of the electric potential at P due to one positive point charge is **V**, what is the value due to the 4 point charges?



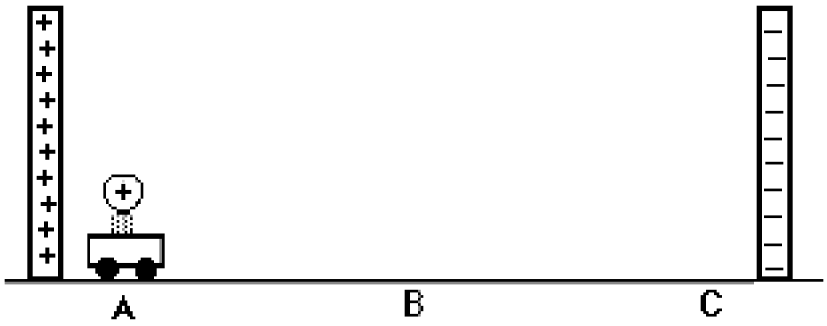


11. The two plates below have opposite charges. Compare the electric potential energy of initial and final states. Explain.



12. Compare the potential difference between the plates and the field strength of the initial and final states.

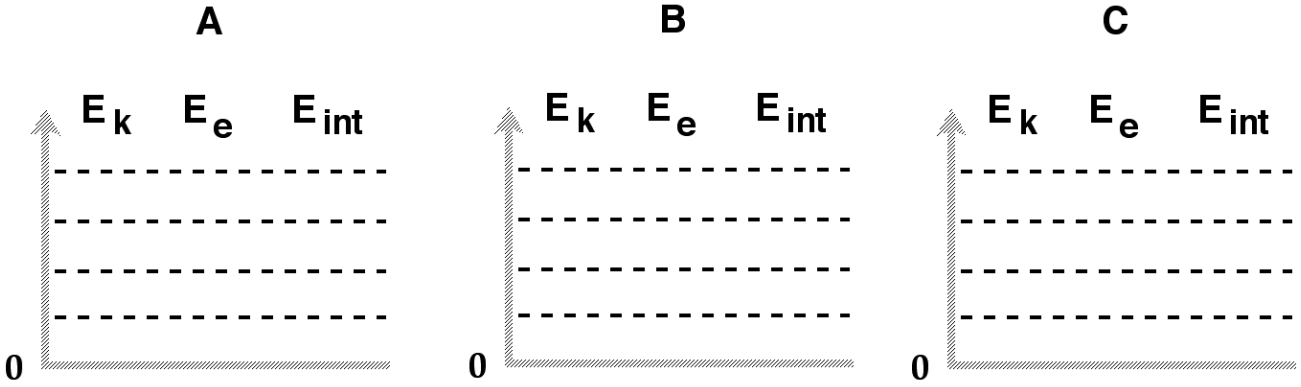
13. A cart on a track has a large, positive charge on the top and is located between two sheets of charge. Initially at rest at point A, the cart moves from A to C.



a. Draw qualitative force diagrams for the cart when it is at each position A, B and C.

A B C

b. Draw qualitative energy bar charts for the system when the cart is at each position A, B and C. (Be sure to first identify the objects that make up your system.)



14. How would your force and energy diagrams change (if at all) if the sheet to the right were also positively charged?