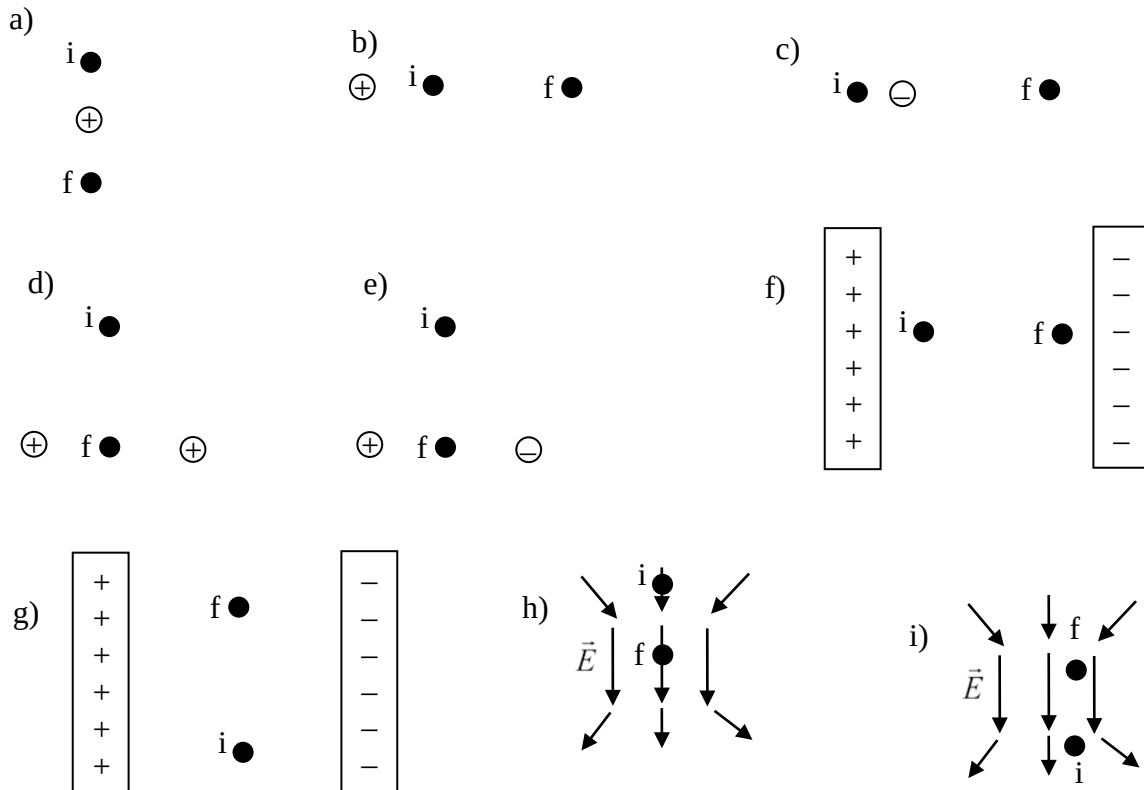


Electric potential examples

Example 1

For the different cases shown below, what is the sign of the change in the electric potential energy ΔU of a particle as the particle moves from an initial point (i) to a final point (f)? For each case, consider three types of particle: a proton, an electron, and a neutral hydrogen atom.



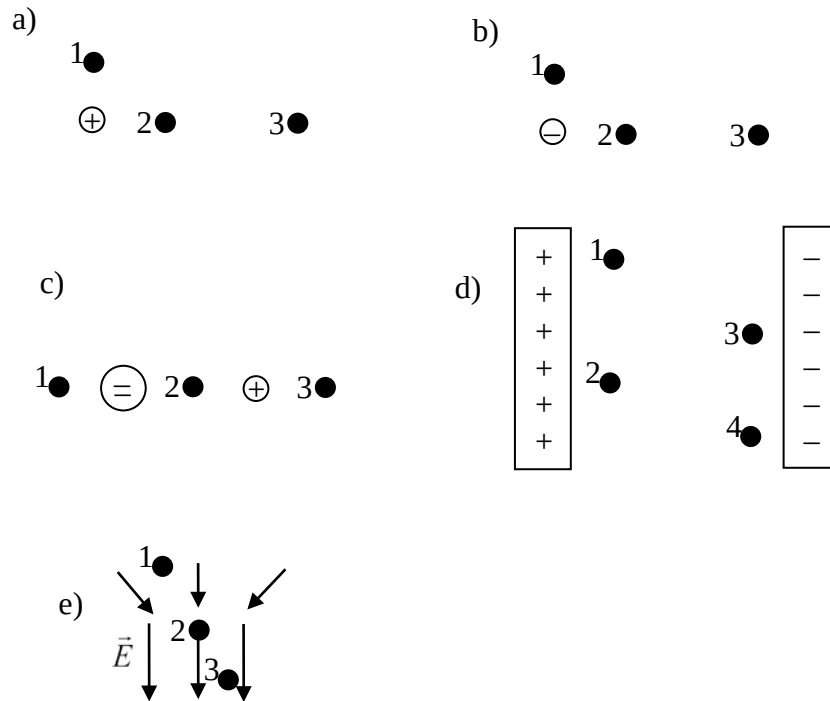
Example 2

A 2.0 mm diameter plastic bead is charged to -1.0 nC.

1. A proton is fired at the bead from far away with a speed of 1.0×10^6 m/s, and it collide head-on. What is the impact speed?
2. An electron is fired at the bead from far away. It "reflects", with a turning point 0.10 mm from the surface of the bead. What was the electron's initial speed?

Example 3

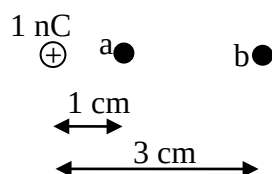
Rank in order the electric potentials at the numbered points.



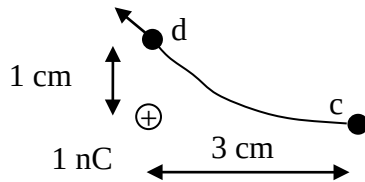
Example 4

For the situation shown in the figure, find

- The potential at points a and b.
- The potential difference between a and b.
- The potential energy of a proton at a and b.
- The speed at point b of a proton that was moving to the right at point a with a speed of 4.0×10^5 m/s.
- The speed at point a of a proton that was moving to the left at point b with a speed of 4.0×10^5 m/s.



Example 5



A proton moves along a trajectory that passes through points c and d . The proton's speed at point c is $4.0 \times 10^5 \text{ m/s}$. What is its speed at point d ?

Example 6

The graph shows the electric potential along the x -axis. Draw the potential energy diagram for a -20 nC charged particle that moves in this potential. Suppose this charged particle is shot in from the right (at $x > 12 \text{ cm}$) with a kinetic energy of $1 \mu\text{J}$.

- Where is the point of maximum speed?
- What is particle's kinetic energy at that point?
- Where is the turning point?
- What is the force on the particle at the turning point?

