A 12-V battery is connected between two parallel plates as in the figure. The separation between the plates is 0.3 cm, and the electric field is assumed to be uniform. (Note that this assumption is reasonable if the plate separation is small compared to the plate size and if we do not consider points near the edges of the plates). Find the electric field between the plates.
A proton is released from rest in a uniform electric field of $8 \times 10^4$ V/m directed along the positive x-axis (see fig). The proton undergoes a displacement of 0.5 m in the direction of $\mathbf{E}$.

a) Find the \textit{change} in the electric potential between the points A and B.

b) Find the \textit{change} in potential energy of the proton for this displacement.
Find the electric potential at a point P located on the axis of a uniformly charged ring of radius a and total charge Q. The plane of the ring is chosen perpendicular to the x-axis (see fig.)
A rod of length $l$ located along the x-axis has a uniform charge per unit length and a total charge $Q$. Find the electric potential at a point $P$ along the y-axis at a distance $d$ from the origin (see fig.)
Let us use the potential function for a point charge $q$ to derive the electric field at a distance $r$ from the charge.
An electric dipole consists of two equal and opposite charges separated by a distance 2a (see fig). Calculate the electric potential and the electric field at the point P on the x-axis and located a long distance x from the center of the dipole.