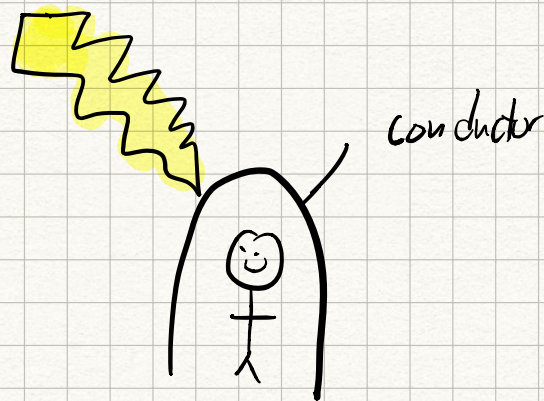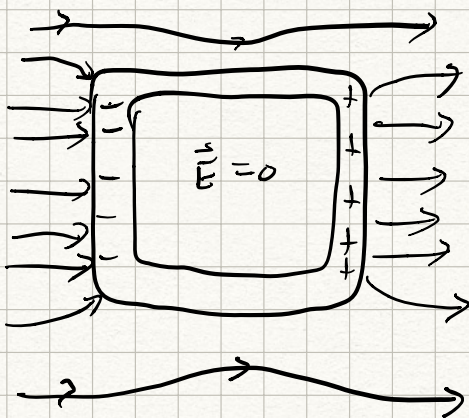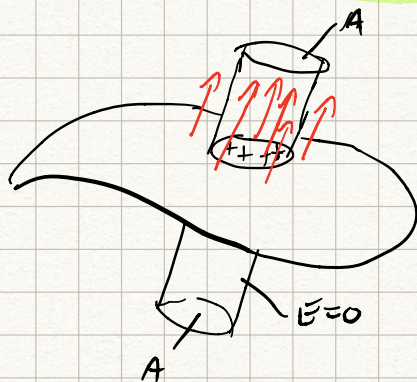# Faraday Cage

- the field inside a conductor is always zero.
  - a. induced charges create additional $\vec{E}$ that opposes.
  - b. to protect ourselves from electrical discharge, surround w/ conductor

$\vec{E} = 0$

conductor

- Safest place to be in during a thunder storm is your car.

Field on Surface of Conductor

A

$\vec{E} = 0$

A

$$\vec{E} (\pi r^2) = \frac{\sigma (\pi r^2)}{\varepsilon_0}$$

$$\vec{E} = \frac{\sigma}{\varepsilon_0} \quad \text{at the surface of any conductor.}$$

Why are lightning bolts vertical?

- Earth is good conductor, w/ negative charge @ surface.
- $\vec{E}$ points downward in atmosphere
- lightning occurs when positive charges in atmosphere are so great they cause charges to flow vertically

ex: electrical field on surface of conducting sphere.

From previously, $E = \frac{1}{4\pi \varepsilon_0} \left(\frac{q}{R^2} \right)$. Also, $\sigma = \frac{q}{4\pi R^2}$