## **Electric Field: Examples**

• Electric field determines the electric force acting on a charge q:

$$\vec{F}_{elect} = q\vec{E}$$

• Electric field of a point charge **Q** or a sphere with the same charge (**outside**), at distance **R**:

$$E = \frac{kQ}{R^2}$$

• Electric field inside the hollow charged sphere is ZERO!

E = 0

•Electric field of a plate with total charge Q, and area A:

## **Electrostatic Potential**

• Reminder: **Electric Field** = electric force acting on a probe charge q, divided by q:

$$\vec{E} = rac{\vec{F}_{elect}}{q}$$

• Similarly, **Electrostatic Potential** = electrostatic potential energy divided by charge. It is also known as Voltage, since SI unit of potential is Volt (V):

$$V = \frac{U_{elect}}{q}$$

• **Example.** Consider constant electric field E(x)=E,(as inside a capacitor). Potential energy change = - Work:



## Homework

A capacitor is made of two parallel metallic plates separated by distance **h=1mm**. Area of each plate is A=1cm<sup>2</sup>. The capacitor is attached to a 3 Volt battery as shown below. Find the charge Q at each of the plates.

Reminder: electric field inside a capacitor is  $4\pi kQ/A$ .

