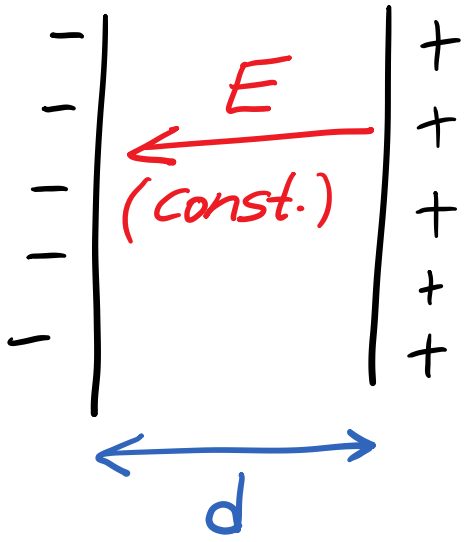
Lecture 7: Electric potential ctd

- Parallel plate capacitor
- Equipotential surfaces
- Relation field and potential

Parallel plate capacitor



$$F = qE$$

$$U_{el} = qEx$$

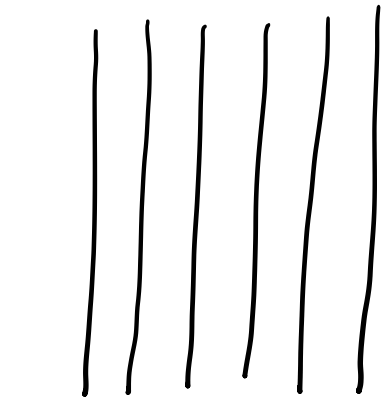
$$V = \frac{U}{q} = Ex$$

Compare

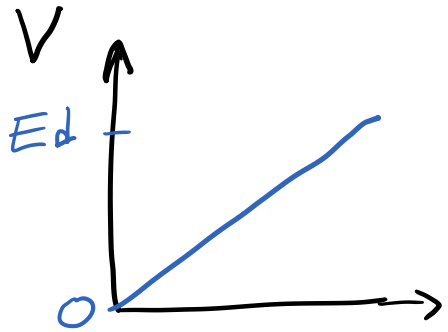
$F_g = mg$

$U_g = mgy$

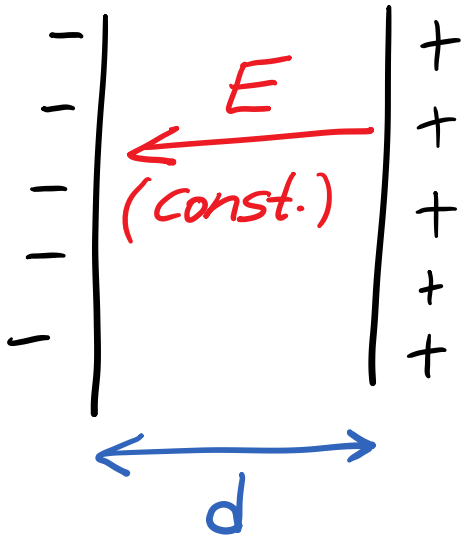
$$\Delta V = Ed$$

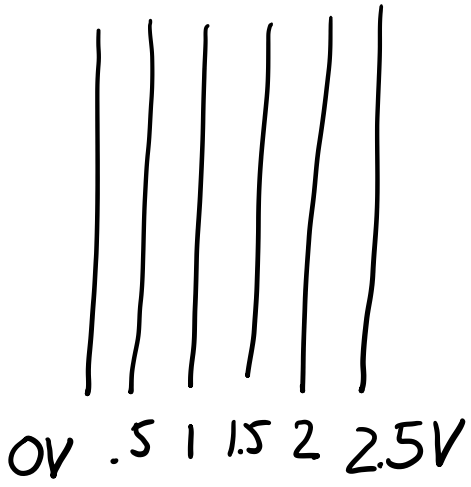


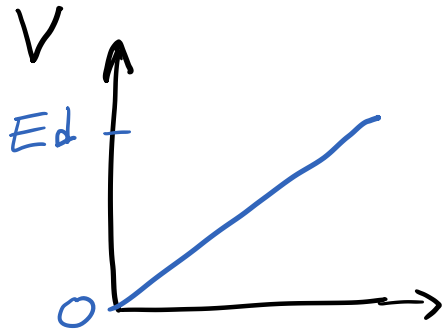
surfaces of V= const



Equipotential surfaces for capacitor







- Electric field is perpendicular to equipotential surfaces
- Electric field vector points towards lower potential
- If electric field is constant, distances between equipotential is constant

Example

The potential difference between two plates of a parallel plate capacitor equals 3,000 V. An electron is launched from the negative plate with a speed of 1.5×10^{7}m/s.
Derive a symbolic answer in terms of system parameters and calculate a numerical value for the speed with which the electron strikes the positive plate.

The potential difference between two plates of a parallel plate capacitor equals 3,000 V. An electron is launched from the negative plate with a speed of 1.5×107m/s.
What is the electron’s change in kinetic energy in electron volt?

Equipotential surfaces and field

- Electric field vector is perpendicular to equipotential surfaces
- Electric field vector points towards lower potential
- Electric field is stronger where equipotentials are closer together
- If electric field is constant, distances between equipotential is constant
- Conductor in electrostatic equilibrium
  Surface of a conductor is an equipotential surface.
  Electric field outside perpendicular to surface