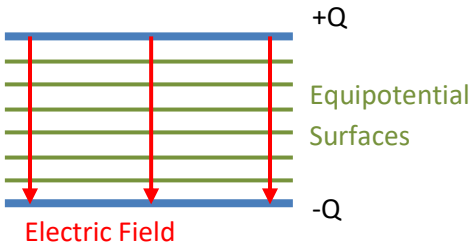
CONCEPT: PARALLEL PLATE CAPACITORS

- Capacitance for ANY Capacitor is → C = Q / V
- Capacitance for PARALLEL PLATE Capacitor is: → C = _____
  - A is area, d is distance between plates, $\epsilon_0 = 8.85 \times 10^{-12} \left[\frac{F}{m}\right]$

- Electric Field BETWEEN plates is _____.
- Electric Field OUTSIDE plates is _____.

- The magnitude of the UNIFORM Electric Field within a capacitor: $\mathbf{E} =$ _____ $\rightarrow \mathbf{E} = \frac{\mathbf{Q}}{\epsilon_0 \mathbf{A}}$

- Equipotential surfaces between plates:



EXAMPLE: A parallel plate capacitor has an area of 5 cm^2, a plate separation of 10 mm, and a voltage across the plates of 100 V. a) What is the charge of the capacitor? b) What is the magnitude of the electric field between the plates?

PRACTICE: CAPACITANCE OF PARALLEL CIRCULAR PLATES

Two circular plates of radius 2cm are brought together so their separation is 5mm. What is the capacitance of these plates?

EXAMPLE: POINT CHARGE IN CAPACITOR

Two 1 cm by 1 cm plates, separated by 10 mm, form a capacitor. If each plate is charged to 30 nC,

(a) What is the potential difference between the plates?
(b) What is the electric field between the plates?
(c) How much energy does it take to move a – 5 nC charge from the positive plate to the negative plate?

PRACTICE: CHARGING A CAPACITOR

A 3 F capacitor is given a potential difference across its plates of 10 V. What is the charge built up on its plates? If the source of the potential difference across the plates is removed, but the plates maintain their charge, what is the new potential difference across the capacitor if the distance between the plates is doubled?