CH 17 P 20

$$KE_i + PE_i = KE_f + PE_f \qquad V = k\frac{Q}{r}$$

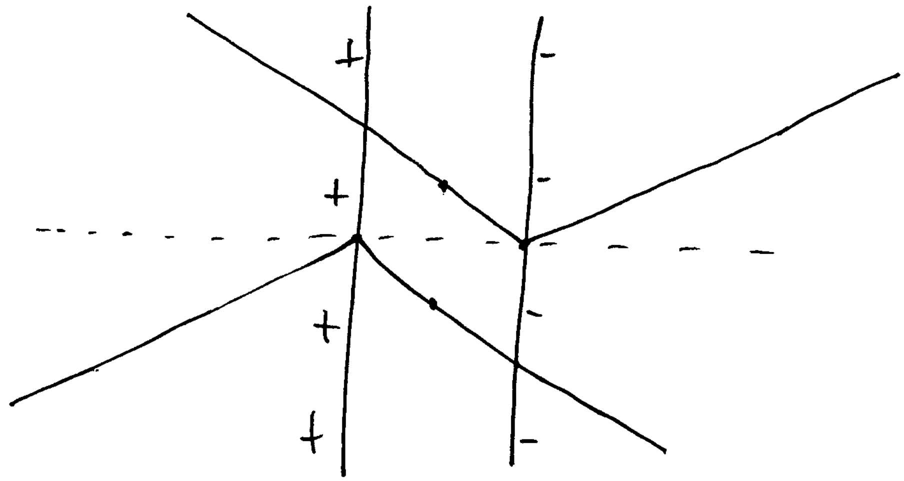
$$0 + k\frac{qQ}{r} = \frac{1}{2}mv_f^2 + 0 \qquad PE = qV$$

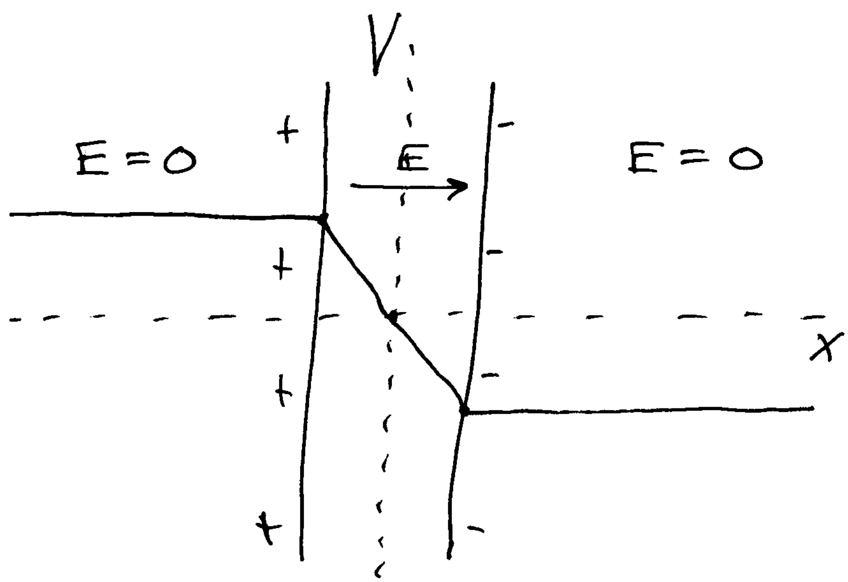
$$v_f^2 = \frac{2kqQ}{mr}$$

$$v_f = \sqrt{\frac{2kqQ}{mr}} = \sqrt{\frac{2\left(9\times10^9\,\frac{Nm^2}{C^2}\right)\left(-1.602\times10^{-19}\,C\right)\left(-0.125\times10^{-6}\,C\right)}{\left(9.11\times10^{-31}\,kg\right)\left(0.325\,m\right)}}$$

$$= 3.48\times10^7\ m/s$$

ELECTRIC POTENTIAL FOR A CAPACITOR





GENERAL PRINCIPLE:

$\vec{E}$ POINTS IN THE DIRECTION OF DECREASING V.

IN A REGION OF SPACE, $\vec{E} = 0$ IF AND ONLY IF V IS UNIFORM.

VOLTAGE = DIFFERENCE IN ELECTRIC POTENTIAL

FOR A CAPACITOR

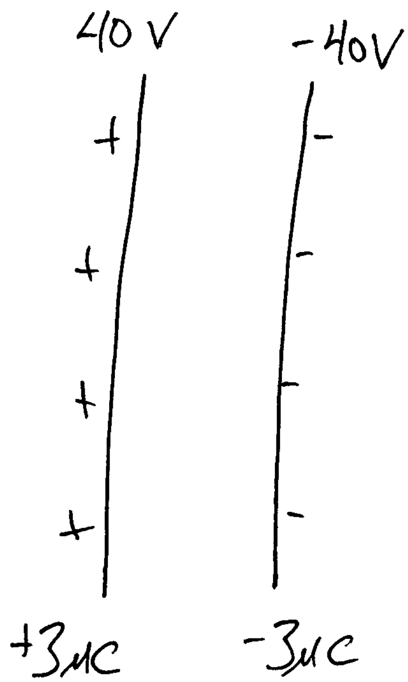
$$V = Ed$$

- V: DIFFERENCE IN ELECTRIC POTENTIAL BETWEEN THE PLATES
- E: ELECTRIC FIELD INSIDE CAPACITOR
- d: DISTANCE BETWEEN PLATES

IF YOU DOUBLE THE CHARGE ON YOUR CAPACITOR, THE VOLTAGE ACROSS THE CAPACITOR WILL ALSO DOUBLE.

$$Q = CV$$

- Q: CHARGE ON POSITIVE CAPACITOR PLATE
- C: CAPACITANCE
- V: VOLTAGE ACROSS CAPACITOR



$$Q = CV$$

$$(3 \times 10^{-6} C) = C\,(80\ V)$$

FOR A PARALLEL-PLATE CAPACITOR,

$$C = \epsilon_0 \frac{A}{d}$$

- A ← AREA OF POSITIVE PLATE
- C ← CAPACITANCE
- ϵ_0 ← CONSTANT
- d ← PLATE SEPARATION