

Wednesday Reading Assessment: Unit 1, Capacitance

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1 Memory Bank

- $C = A\epsilon_0/d$... Capacitance of a parallel-plate capacitor.
- $\epsilon_0 = 8.85 \times 10^{-12}$ F/m
- $C_{tot}^{-1} = C_1^{-1} + C_2^{-1}$... Total capacitance of two capacitors in series.
- $C_{tot} = C_1 + C_2$... Total capacitance of two capacitors in parallel.

2 Capacitors

1. Suppose you have a parallel plate capacitor with $A = 1 \text{ mm}^2$, and $d = 0.1 \text{ mm}$. What is the capacitance?
2. Now suppose two identical capacitors from the previous problem are added *in series*. What is the total capacitance?
3. Same question, but they are added *in parallel*. What is the total capacitance?
4. Which of the following should be the formula for the amount of capacitance per unit length of a coaxial cable? The inner and outer radii are R_1 and R_2 , respectively.
 - A: $C/l = (2\pi\epsilon_0 R_1)/\ln(R_2/R_1)$.
 - B: $C/l = (2\pi\epsilon_0)/\ln(R_2/R_1)$.
 - C: $C/l = (2\pi\epsilon_0 R_1 R_2)/\ln(R_2/R_1)$.
 - D: $C/l = (2\pi\epsilon_0)$.