A Capacitor with capacitance $C$ is connected to a battery with a voltage $V$. It has a plate charge $Q$ and a total energy $U$. Fill the gap with material which has dielectric constant $\kappa$. The corresponding new quantities are $Q'$ and $U'$.

Determine the ratio of charges $\frac{Q'}{Q}$.

A) $\frac{Q'}{Q} = \kappa$
B) $\frac{Q'}{Q} = 1$
C) $\frac{Q'}{Q} = \frac{1}{\kappa}$
\[ V' = \frac{Q'}{C'} = V = \frac{Q}{C}, \quad \text{or} \]

\[ \frac{Q'}{Q} = \frac{C'}{C} = \kappa. \]

Answer A.

26.05-03‘A‘Fixed‘V‘Case 2004-3-24