

25-4 Capacitors in Parallel and in Series

m2-041

In figure 6, a capacitor of capacitance $C = 9.0$ micro-F is charged to a potential difference $V_0 = 10.0$ volts. The charging battery is disconnected and the capacitor is connected to uncharged capacitor of unknown capacitance C_x . The potential difference across the combination is reduced to $V = 3$ volts. Find the value of C_x .

- (a) 3.0 micro-F.
- (b) 42 micro-F.
- (c) 11 micro-F.
- (d) 8.0 micro-F.
- (e) 21 micro-F.

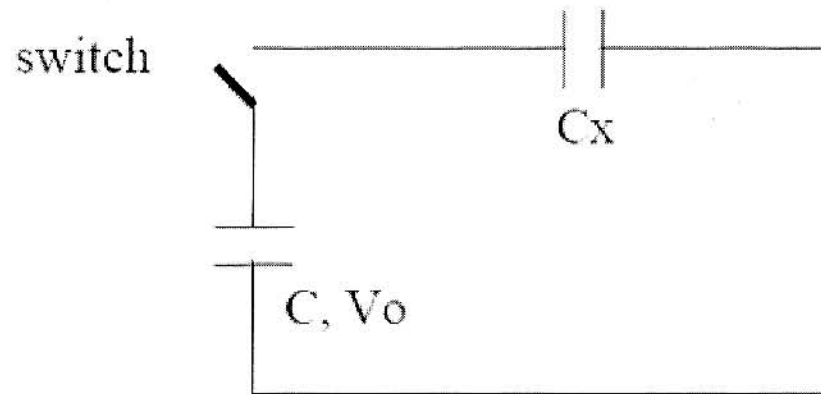


Figure (6)

$$Q_0 = C V_0 = 90 \mu C$$

$$V = \frac{Q_1}{C} = \frac{Q_2}{C_x} = 3$$

$$Q_1 + Q_2 = 90 \mu C$$

$$Q_1 = 90 - Q_2 \Rightarrow$$

$$\frac{90 - Q_2}{C} = \frac{Q_2}{C_x} = 3 \Rightarrow Q_2 = 90 - 27 = 63 \mu C$$

$$\frac{63 \mu C}{C_x} = 3 V \Rightarrow \boxed{C_x = 21 \mu F}$$

Answer E

