

59. The voltage across capacitor 1 is

$$V_1 = \frac{q_1}{C_1} = \frac{30 \mu\text{C}}{10 \mu\text{F}} = 3.0 \text{ V} .$$

Since $V_1 = V_2$, the total charge on capacitor 2 is

$$q_2 = C_2 V_2 = (20 \mu\text{F}) (2 \text{ V}) = 60 \mu\text{C} ,$$

which means a total of $90 \mu\text{C}$ of charge is on the pair of capacitors C_1 and C_2 . This implies there is a total of $90 \mu\text{C}$ of charge also on the C_3 and C_4 pair. Since $C_3 = C_4$, the charge divides equally between them, so $q_3 = q_4 = 45 \mu\text{C}$. Thus, the voltage across capacitor 3 is

$$V_3 = \frac{q_3}{C_3} = \frac{45 \mu\text{C}}{20 \mu\text{F}} = 2.3 \text{ V} .$$

Therefore, $|V_A - V_B| = V_1 + V_3 = 5.3 \text{ V}$.