74. (a) If S_1 is closed, and S_2 and S_3 are open, then $i_a = \varepsilon/2R_1 = 120\text{ V}/40.0\ \Omega = 3.00\text{ A}$.

(b) If S_3 is open while S_1 and S_2 remain closed, then

$$R_{eq} = R_1 + R_1\,(R_1 + R_2)\,/(2R_1 + R_2) = 20.0\ \Omega + (20.0\ \Omega) \times (30.0\ \Omega)/(50.0\ \Omega) = 32.0\ \Omega,$$

so $i_a = \varepsilon/R_{eq} = 120\text{ V}/32.0\ \Omega = 3.75\text{ A}$.

(c) If all three switches S_1, S_2 and S_3 are closed, then $R_{eq} = R_1 + R_1 R'/(R_1 + R')$ where

$$R' = R_2 + R_1\,(R_1 + R_2)/(2R_1 + R_2) = 22.0\ \Omega,$$

i.e.,

$$R_{eq} = 20.0\ \Omega + (20.0\ \Omega)\,(22.0\ \Omega)/(20.0\ \Omega + 22.0\ \Omega) = 30.5\ \Omega,$$

so $i_a = \varepsilon/R_{eq} = 120\text{ V}/30.5\ \Omega = 3.94\text{ A}$.