Suppose Box A contains 4 red and 5 blue chips and Box B contains 6 red and 3 blue chips. A chip is chosen at random from Box A and placed in Box B. Finally, a chip is chosen at random from among those now in Box B. What is the probability a blue chip was transferred from Box A to Box B given that the chip chosen from Box B is red?

A. \( \frac{1}{3} \)  
B. \( \frac{6}{13} \)  
C. \( \frac{1}{2} \)  
D. \( \frac{5}{9} \)  
E. \( \frac{15}{29} \)

Solution.
Let \( E \) be the event that the chip transferred from A to B was blue. Then \( E^c \) is the event that the chip transferred was red. Let \( F \) be the event that the chip chosen from B is red. Then

\[
Pr(E|F) = \frac{Pr(E \cap F)}{Pr(F)} = \frac{Pr(F|E) \cdot Pr(E)}{Pr(F) \cdot Pr(E) + Pr(F|E^c) \cdot Pr(E^c)} =
\]

\[
\frac{\frac{6}{10} \cdot \frac{5}{9}}{\frac{6}{10} \cdot \frac{5}{9} + \frac{7}{10} \cdot \frac{4}{9}} = \frac{1}{3} \cdot \frac{2}{9} = \frac{1}{15} \cdot \frac{14}{45} = \frac{1}{3} \cdot \frac{15}{29} = \frac{15}{29}.
\]

Answer E.

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