If A and B be two events such that $P(A)=\frac{3}{8}$, $P(B)=\frac{5}{8}$ and $P(A\cup B)=\frac{3}{4}$, then $P(A/B)\cdot P(A'/B)$ is equal to

(a) $\frac{2}{5}$ (b) $\frac{3}{8}$ (c) $\frac{3}{20}$ (d) $\frac{6}{25}$

Here, $P(A)=\frac{3}{8}, P(B)=\frac{5}{8}$ and $P(A\cup B)=\frac{3}{4}$

$\because$ $P(A\cup B)=P(A)+P(B)-P(A\cap B)$

$\Rightarrow$ $P(A\cap B)=\frac{3}{8}+\frac{5}{8}-\frac{3}{4}=\frac{3+5-6}{8}=\frac{2}{8}=\frac{1}{4}$

$\because$ $P(A/B)=\frac{P(A\cap B)}{P(B)}=\frac{1/4}{5/8}=\frac{8}{20}=\frac{2}{5}$

and $P(A'/B)=\frac{P(A'\cap B)}{P(B)}=\frac{P(B)-P(A\cap B)}{P(B)}$

$$=\frac{\frac{5}{8}-\frac{1}{4}}{\frac{5}{8}}=\frac{\frac{5-2}{8}}{\frac{5}{8}}=\frac{3}{5}$$

$\therefore$ $P(A/B)\cdot P(A'/B)=\frac{2}{5}\cdot\frac{3}{5}=\frac{6}{25}$