

Let A and B be independent events with $P(A) = 0.3$ and $P(B) = 0.4$. Find

(i) $P(A \cap B)$ (ii) $P(A \cup B)$

(iii) $P(A|B)$ (iv) $P(B|A)$

Solution:

Given, $P(A) = 0.3$ and $P(B) = 0.4$.

(i) If A and B are independent events, then

$$P(A \cap B) = P(A) \times P(B)$$

$$= 0.3 \times 0.4$$

$$= 0.12$$

(ii) Since, $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$$\Rightarrow P(A \cup B) = 0.3 + 0.4 - 0.12 = 0.58$$

(iii) Since, $P(A|B) = \frac{P(A \cap B)}{P(B)}$

$$\Rightarrow P(A|B) = \frac{0.12}{0.4} = 0.3$$

(iv) Since,
$$P(B|A) = \frac{P(A \cap B)}{P(A)}$$

$$\Rightarrow P(B|A) = \frac{0.12}{0.3} = 0.4$$