Independent Event

A & B → Independend event

if occurence of one event doesn't affect the other.

$P(E \cap F) = P(E) \times P(F)$

$$P(E \cap F) = P(E) + P(F) - P(E \cup F)$$

Cards → 52

→ 1 Card ⇒ $\frac{1}{52}$

2 Cards →

$$\boxed{\frac{1}{52} \times \frac{1}{51}}$$

$$\left(\frac{1}{52} \times \frac{1}{52}\right)$$

$P(A) \rightarrow$ prob. of event A

$\cap \rightarrow$ and

$\cup \rightarrow$ OR

$P(A') = P(\bar{A}) =$ prob. of event not A.

$$\boxed{P(A') = 1 - P(A)}$$

$P(A' \cap B') = P(A \cup B)' = 1 - P(A \cup B)$

$P(A' \cup B') = P(A \cap B)' = 1 - P(A \cap B)$

$P(A \cap B') = P(A) - P(A \cap B)$

$P(A' \cap B) = P(B) - P(A \cap B)$

Q. 2 Two cards are drawn at random and without replace. from $\boxed{52}$ playing cards. Find prob. that both are black?

Soln:- Total = 52

Drawn = 2

$\because$ Black cards = 26

let E = when 1^{st} cards is drawn $\Rightarrow P(E) = \frac{26}{52} = \frac{1}{2}$

F = When II^{nd} cards is drawn $\Rightarrow P(F) = \frac{25}{51}$

so the final prob $= \frac{1}{2} \times \frac{25}{51}$ Ans $= \frac{25}{102}$ Ans

Q. A fair Coin & a Die are tossed. let A be event 'Head appers on coin' & B is event '3 on the Die'

Check whether A & B are independent event or not?

Soln:- Sample space = { H1, H2, H3, H4, H5, H6
T1, T2, T3, T4, T5, T6 }

A ⇒ 'Head appers' → { H1, H2, H3, H4, H5, H6 }

$P(A) = 6/12 = 1/2$

B → '3 on Die' → { H3, T3 } → $P(B) = 2/12 = 1/6$

∴ $A \cap B = \{H3\}$ → $P(A \cap B) = 1/12$

Now $P(A) \times P(B) = P(A \cap B)$ → events indenpdent

$1/2 \times 1/6 = 1/12$ → Yes

Q. Given that the events $\boxed{A \;\&\; B}$ are such that

$P(A) = 1/2$, $P(A \cup B) = 3/5$ & $P(B) = p$ → find p if

(1) mutually exclusive ii) Independent.

when events are mutually exclusive = $\boxed{E \cap F = \phi}$

$\therefore P(E \cap F) = 0$

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

$3/5 = 1/2 + p \qquad 0$

$\Rightarrow p = 1/10$

ii) when events are independ.

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

$P(A \cap B) = 1/2 \times p = p/2$

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

$\frac{3}{5} = \frac{1}{2} + p - \frac{p}{2}$

$\frac{3}{5} - \frac{1}{2} = \frac{p}{2} \Rightarrow \frac{p}{2} = \frac{1}{10} \Rightarrow p = 2/10 = 1/5$

Q. Given two indenendent events $\underline{A \,\&\, B}$ such that

$P(A) = 0.3, \quad P(B) = 0.6$

① $P(A \text{ and } B) = P(A \cap B) = 0.3 \times 0.6 = 0.18$

② $P(A \text{ and not } B) = P(A \cap B') = P(A) - P(A \cap B)$

$= 0.3 - 0.18 = 0.12$

③ $P(A \underline{\text{ or }} B) = P(A \cup B) = 0.3 + 0.6 - 0.18$

$= 0.72$

④ $P(\text{neither } A \text{ nor } B) = P(A' \cap B')$

$= P(A \cup B)' = 1 - P(A \cup B)$

$= 1 - 0.72 = 0.28$

Ans: A Die tossed thrice. Find the prob. of getting an $\boxed{\text{odd number}}$ at least once.

Sol^n:- When Die is thrown 1 time = 6 (sample space)

odd no. $\Rightarrow \{1, 3, 5\}$

→ so getting an odd no. when Die is thrown 1 time $= 3/6 = 1/2$

then the prob. of not getting an odd no. (even no.) $= 1/2$

Now probability of getting $\boxed{\text{even no.}}$ all three times $= \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{8}$

So prob. of getting odd no. at least one = 1 − {pro. of getting even no. all three time}

$= 1 - \frac{1}{8} = 7/8$ Ans

$\Rightarrow S = \{HHH, HHT, HTH, THH, HTT, THT, TTH, TTT\}$

TTTT

$1/16$

at least one head $= \{HHH, HHT, HTH, THH, HTT, THT, TTH\}$

Coin $\rightarrow$ 4 toss $= 7/8$

16

$\rightarrow$ at least one head $= 1 - \frac{1}{16} = \frac{15}{16}$