Experiments

① Deterministic Experiments

$$a^2 + b^2 + 2ab \quad ① \quad (a+b)^2 \quad ② \quad (a+3)^2$$

$$\rightarrow ② \quad ④9$$

$$a \rightarrow 3$$

$$b \rightarrow 4$$

② Probabilitic Experiments

① Flipping a Coin

H or T

with Uncertainity

② Rolling a die

1   2   3   4   5   6

$\boxed{\text{Outcome}}$

Coin Toss

① Possible output $\{ H \}, \{ T \}$

$\downarrow$

0.5

Sample Space

→ Set of all possible Outcomes

Coin-Toss → {H, T}

Die → {1, 2, 3, 4, 5, 6}

Event

Any subset of Sample Space

Die : 2^3 Events possible

Total Events: 2^6

O(even-number) → {2, 4, 6}

→ Getting Even number is Event

1) $\{H, T\}$

Events

$\{H\}, \{T\}, \{H, T\}, \{\}$

Total Events : 2^n 1) 2^2 1) 4

Quiz 2

Roll of Dice
Coin Toss
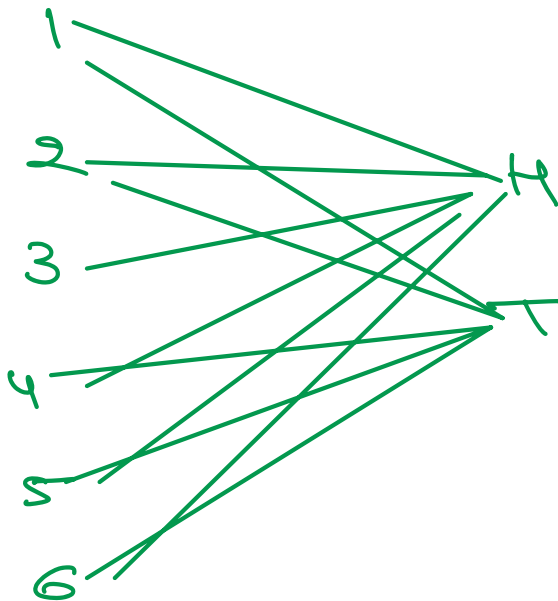
	Sample Space
H1	T1
(H2)	T2
H3	T3
(H4)	T4
H5	T5
(H6)	T6

$\frac{3}{12}$ 1) $\frac{1}{4}$

Set Operations

A_{event} ⊙ $\{1, 5, 6\}$ ← Sagar

B_{event} ⊙ $\{2, 4, 6\}$ ← Lakshmi

$A \cap B$ ⊙ $\{6\}$

Both S and L will win

$A \cup B$ ⊙ $\{1 \ 5 \ 6 \ 2 \ 4\}$

Either S or L can win

$S \rightarrow \{1 \; 2 \; 3 \; 4 \; 5 \; 6\}$

$A \rightarrow \{1, 5, 6\}$

$A^0 / A_c \rightarrow \{2, 3, 4\}$

(Complement of Event A)

$A_{event} \rightarrow \{1, 5, ; 6\} \rightarrow L$
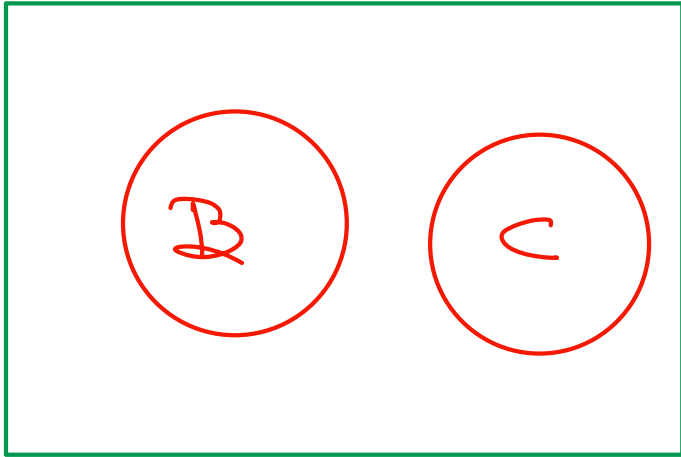
$B_{Event} \rightarrow \{2, 4, 6\} \leftarrow S$

$C_{event} \rightarrow \{1, 3, 5\}$

$\vee$

$A \cap C \rightarrow \{1, 5\}$

$B \cap C \rightarrow \{\}$

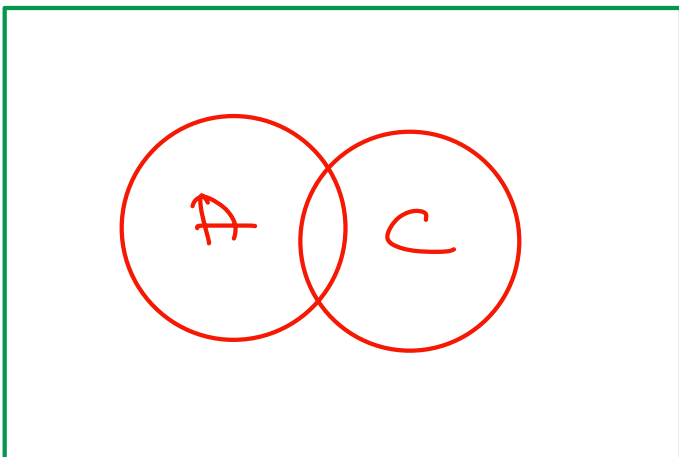① Disgoint Events / Mutually Exclusive Events

B and C are Mutually Exclusive

Disgoint Events

$$E_1 \cap E_2 = \{\}$$

② Non Mutually Exclusive

Joint Event

$$E_1 \cap E_2 \neq \{\}$$

Exhaustive Events

A ∪ C ⊃   {1, 3, 5, 6}

Not Same as
Sample Space

A ∪ B ∪ C ⊃ {1 2 3 4 5 6}
      ↓
Exhaustive Event ⊃ {Sample Sp}

① B ∪ C   Exhaustive ?

Yes

Summary

① Disjoint Events: Output Empty

② Joint Event: Output Non Empty

③ Exhaustive Event: Output full Sample
                        SPACE

Independent Events

Event A ⊘ Rolling a Die to get Even Number

$$\{2, 4, 6\} \quad \Rightarrow \quad \frac{3}{6}$$

Event B ⊘ Flip Coin for Head

$$\{H\} \quad \Rightarrow \quad \frac{1}{2}$$

Event A and B are independent Since outcome of A doesn't impact B

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

$$\frac{1}{2} \times \frac{1}{2} \Rightarrow \frac{1}{4}$$

Calculating Probs

$$P = \frac{\text{Out comes in favour of } E}{\text{Total Outcomes in } S}$$

$$P_H = \{H\} = \frac{1}{2} = 0.5$$

A = $\{2, 4, 6\}$

$$= \frac{3}{6}$$

B = $\{1, 2\}$

$$= \frac{2}{6}$$

C = $\{1, 4, 5, 6\}$

$$= \frac{4}{6}$$

* Addition Rule

$$P(A \cup B) = \frac{|A \cup B|}{|S|}$$
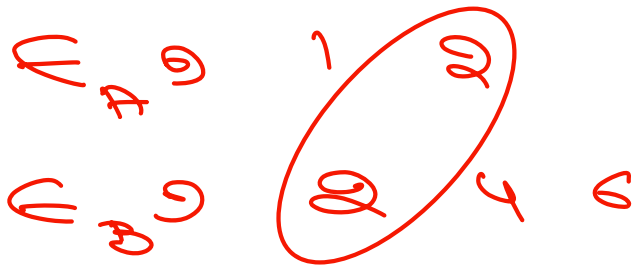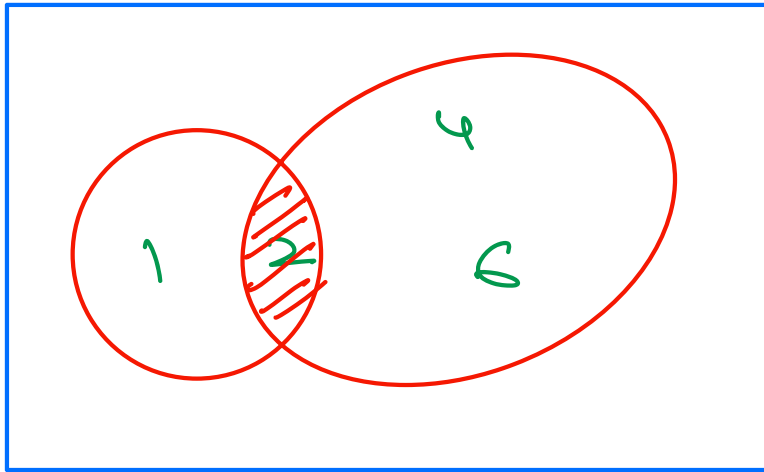
$$\left. \begin{array}{l} A = 2, 4, 6 \\ B = 1, 2 \end{array} \right\} A \cup B = 1\ 2\ 4\ 6$$

$$\frac{|A \cup B|}{|S|} = \frac{4}{6} = \frac{2}{3}$$

$1 = len$

$$P(A \cap B) = \frac{|A \cap B|}{|S|} = \frac{1}{6}$$
$$\{2\}$$

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

$(A) = 1 \quad 2$

$(B) = \boxed{2 \quad 4 \quad 6}$

Disjoint Event

$$P(A \cup B) = P(A) + P(B)$$

Since $A \cap B = \varnothing$

Quiz Total = 12 Balls

$P(G) = 4/12$

$P(B) = 2/12$

$P(Y) = 6/12$

Either A or B

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

$P(A \cup B) = \frac{2}{12} + \frac{6}{12} + \bigcirc$

$= \frac{8}{12}$

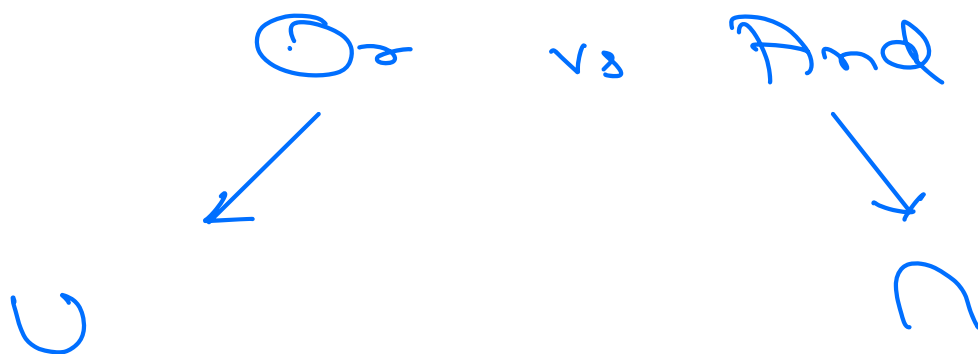Sachin $\longrightarrow$ Espressor $\checkmark$

Capuccino $\checkmark$

Swiggy $\checkmark$

Zomato $\checkmark$

A $\checkmark$

F $\checkmark$

Youtube Premium $\checkmark$

No premium $\times$

Or vs And

$\cup$ $\cap$

60% 20 50

$60 - 20 \Rightarrow 40$

P (Swiggy but Not Zomato)

$\Rightarrow$ P (Swiggy) $-$ P (S$\cap$Z)

$\Rightarrow$ $60 - 20$

$\Rightarrow$ 40