अभय CLASS 10

PROBABILITY

Random Experiment : An experiment in which all the possible outcomes are known and the exact outcome cannot be predicted in advance is called a random experiment.

Example:

i. Tossing of a coin

ii. Rolling of a die dice

iii. Drawing a card from a pack of well shuffled cards.

किसी काम को करना !

#Sample Space (S) : The sample space of an experiment is the set of all possible outcomes.
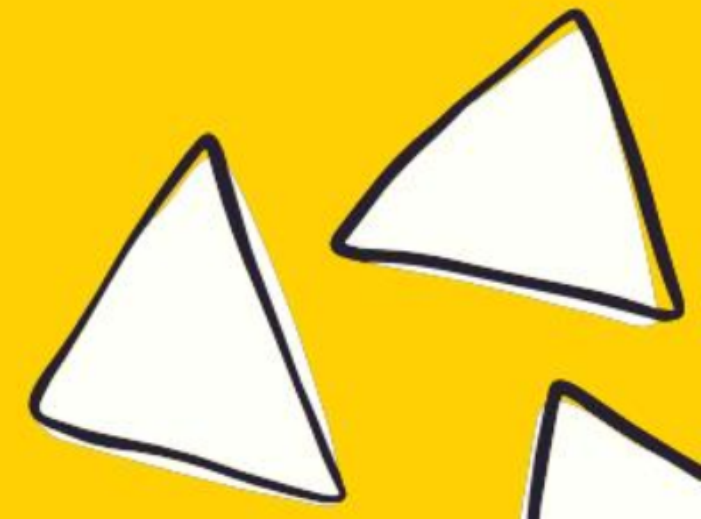
Example :

i. A coin is tossed $\{H, T\} \Rightarrow S=2$

ii. Two coins are tossed simultaneously $\{HH, TT, TH, HT\} \Rightarrow S=4$

iii. A die is rolled $\Rightarrow \{1, 2, 3, 4, 5, 6\} \Rightarrow S=6$

iv. Two dice are rolled simultaneously

$$S = \{ \quad (1,1), (2,1) \quad (3,1) \quad (4,1) \quad (5,1) \quad (6,1)$$

$$(1,2) \quad (2,2) \quad (3,2) \quad (4,2) \quad (5,2) \quad (6,2)$$

$$(1,3) \quad (2,3) \quad (3,3) \quad (4,3) \quad (5,3) \quad (6,3)$$

$$(1,4) \quad (2,4) \quad (3,4) \quad (4,4) \quad (5,4) \quad (6,4)$$

$$(1,5) \quad (2,5) \quad (3,5) \quad (4,5) \quad (5,5) \quad (6,5)$$

$$(1,6) \quad (2,6) \quad (3,6) \quad (4,6) \quad (5,6) \quad (6,6) \}$$

$$S = 36$$

possible outcomes

#Patto Ki Jaankaari:

$$\boxed{\text{Total} = \boxed{52} = S}$$

Total Black cards = 26
Red cards = 26
King = 4
Queen = 4
Ace = 4

Total face cards = ⑫

(suits)

13
(SPADE)
♠

1 → Ace
2
3
4
- - -
10
K
Q
J } face cards

13
(CLUB)
♣

2
- - -
10
K
Q
J

13
(HEART)
♥

1
2
3
- - -
10
K
Q
J

13
(DIAMOND)
♦

1
2
3
- - -
10
K
Q
J

#Event : The collection of specific outcomes from all possible outcomes is called an Event.

Example:

Two coins are tossed , write an event atleast one tail comes.

$$S = \{HH, TT, HT, TH\}$$

$$E = \{TT, HT, T, H\}$$

$$P(E) = \frac{3}{4}$$

सारे possible outcomes में से जो मेरे काम के हैं → Event कहते हैं।

#LP : A card is drawn at ~~random~~ *probability* from a well shuffled deck of 52 playing cards , write the following event that the card drawn is :

$S = 52$

i. A card of spade or an ace

$S = 52$

$E_1 = 13 + 3 \Rightarrow \underline{16} \longrightarrow P(E_1) = \dfrac{16}{52}$

$\underset{\underset{S}{\uparrow}}{} \quad \underset{\underset{A}{\uparrow}}{}$

ii. A black king

$S = 52$

$E_2 = 2 \longrightarrow P(E_2) = \dfrac{2}{52}$

iii. Neither a jack nor a king

$E_3 = 52 - \{\overset{J}{4} + \overset{k}{4}\} \Rightarrow \underline{44} \longrightarrow P(E_3) = \dfrac{44}{52}$

iv. Neither a king or a queen

$E_4 = 52 - \{4 + 4\} \rightarrow \underline{44} \Rightarrow P(E_4) = \dfrac{44}{52}$

#LP : Two dice are rolled, write the event of the following conditions :

i. Sum of the numbers of two dice are 5 $\rightarrow E_1 = 4 \longrightarrow P(E_1) = \dfrac{E_1}{S} = \dfrac{4}{36}$

ii. Difference of the numbers on the two dice are 2 $E_2 = 8 \longrightarrow P(E_2) = \dfrac{8}{36}$

iii. Same number on both dice $E_3 = 6 \longrightarrow P(E_3) = \dfrac{6}{36}$

iv. Different number on both dice $E_4 = 36 - 6 \Rightarrow \underline{30} \longrightarrow P(E_4) = \dfrac{30}{36}$

$S = \{$ (1,1), (2,1) (3,1) (4,1) (5,1) (6,1)

(1,2) (2,2) (3,2) (4,2) (5,2) (6,2)

(1,3) (2,3) (3,3) (4,3) (5,3) (6,3)

(1,4) (2,4) (3,4) (4,4) (5,4) (6,4)

(1,5) (2,5) (3,5) (4,5) (5,5) (6,5)

(1,6) (2,6) (3,6) (4,6) (5,6) (6,6) $\}$

$S = 36$ possible outcomes

Probability of occurance of an event E , denoted by P(E) is

$$P(E) = \frac{\text{favourable outcome}}{\text{total outcome}} = \frac{E}{S}$$

$$0 \le P(E) \le 1$$

$$P(E) + P(\bar{E}) = 1$$

note

#LP : A bag contains a red ball , a blue ball and a yellow ball , all the balls being of the same size . Kritika takes out a ball from the bag without looking into it . What is the probability that she takes out the

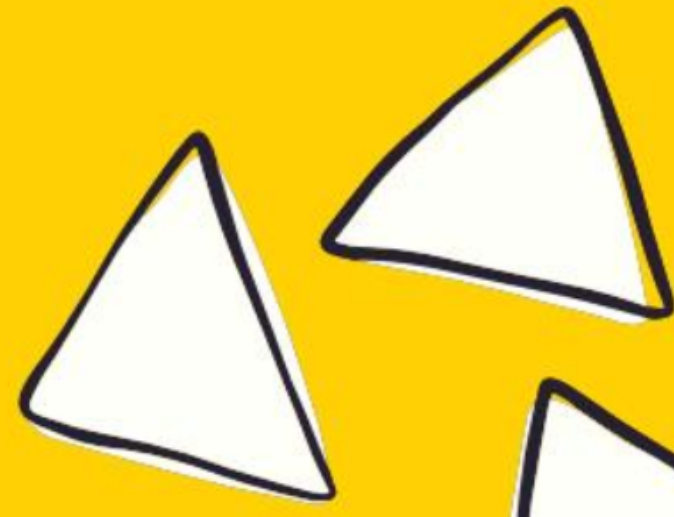i. yellow ball ?   ii. red ball ?   iii. blue ball ?

$\boxed{1R}$ $\boxed{1B}$ $\boxed{1Y}$

$$S = \{ B, R, Y \} = \boxed{3}$$

i) $E_1 = 1 \rightarrow P(E_1) = \dfrac{1}{3}$

ii) $E_2 = 1 \rightarrow P(E_2) = \dfrac{1}{3}$

iii) $E_3 = 1 \rightarrow P(E_3) = \dfrac{1}{3}$

#LP : A letter of English alphabet is chosen at random then find the probability that letter is a consonant.

$$S = 26$$

$$E = \text{consonants} = 26 - 5 \xrightarrow{\text{vowels}} 21$$

$$P(E) = \frac{21}{26}$$

#LP : A box contains 12 balls out of which x are black . If one ball is drawn at random from the box , what is the probability that it wil be a black ball ? If 6 more black balls are put in the box , the probability of drawing a black ball is now double of what is was before . Find 'x'.

(1)

$T = 12$

$B = x$

$$P(B) = \frac{x}{12}$$

$T = 12 + 6 = 18$

$B = x + 6$

$$P(B') = \frac{x+6}{18}$$

ATQ

$$P(B') = 2\, P(B)$$

$$\frac{x+6}{18} = \cancel{2}\left(\frac{x}{\cancel{12}}\right) \Rightarrow x+6 = 3x$$

$$6 = 2x$$

$$x = 3$$

Sure event : An event that is certain to happen is called sure event.

Example:

A dice is thrown , find the probability of getting a number less than 7.

$$P(\text{sure event}) = 1$$

$$S = \{1, 2, 3, 4, 5, 6\} \rightarrow \textcircled{6}$$

$$E = \text{no. less than } 7 \rightarrow \{1, 2, 3, 4, 5, 6\} \rightarrow \textcircled{6}$$

$$P(E) = \frac{6}{6} = \textcircled{1}$$

#Impossible Event : An event that cannot happen is impossible event

Example : A dice is thrown , find the probability of getting a number more than 6.

$$P(\text{impossible event}) = 0$$

$$S = \{1, 2, 3, 4, 5, 6\}$$

$$E = \text{no. more than } 6 = 0$$

$$P(E) = \frac{0}{6} = 0$$

impossible
event

sure
event

$$0 \leqslant P(E) \leqslant 1$$

#LP : A bag contains 5 red balls and some blue balls . If the probability of drawing a blue ball from the bag is thrice that of a red ball , find the number of blue balls in the bag.

$$R = 5$$

$$B = x \ (\text{Let})$$

$$\boxed{Total = 5 + x = 5}$$

$$P(B) = 3 \, P(R)$$

$$\frac{x}{5+x} = 3 \left(\frac{5}{5+x} \right)$$

$$\boxed{x = 15} \leftarrow \underline{blue \ balls}$$

$$[\; 10^{th} \; \text{Syllabus} \\ \text{COMPLETE!!} \qquad _{\bullet \bullet} \;]$$