

Chapter -> 12

Probability

Chances

Probability

$$0 \leq P(A) \leq 1$$

$$P(A) = \frac{\text{Specific ways} \rightarrow \text{Favourable outcomes}}{\text{Normal ways} \rightarrow \text{Total outcomes}}$$

eg 1

1, 2, 3, 4, 5, ... 10

- (a) P(even) =
- (b) P(multiple of 5)
- (c) P(multiple of 3)
- (d) P(Perfect square)

$$(a) P(A) = \frac{5}{10}$$

$$(b) P(A) = \frac{2}{10}$$

$$= \frac{1}{2}$$

$$= \frac{1}{5}$$

$$(c) P(A) = \frac{3}{10}$$

$$(d) P(A) = \frac{3}{10}$$

$P(A) = \frac{\text{Special Condition}}{\text{Normal Condition}}$

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* Problems of Coins \rightarrow

Problems of 1 coin

1) A coin is tossed what is probabilities of getting

- (a) a head
- (b) a tail

Ans \rightarrow

H T

$$(a) P(\text{a head}) = \frac{1}{2}$$

$$(b) P(\text{a tail}) = \frac{1}{2}$$

Problems of 2 coin \rightarrow

2) Two coins are tossed ^{एक साथ} simultaneously what is probabilities of getting

(a) A head

(b) at least 1 head (1 और उसे जगहा)

(c) at most 1 head (1 और उसे नम)

(d) no head

Ans \rightarrow HH, TT, TH, HT

$$(a) P[\text{a head}] = \frac{2}{4} = \frac{1}{2} \quad [HT, TH]$$

$$(b) P[\text{at least 1 head}] = \frac{3}{4} \quad [HH, TH, HT]$$

$$(c) P[\text{at most 1 head}] = \frac{3}{4} \quad [TT, TH, HT]$$

$$(d) P[\text{no head}] = \frac{1}{4} \quad [TT]$$

किससे की जागी या की

जागी से जागी या उससे नम

जागी

no. of ways = 2^n $2^1 = 2$ $2^2 = 4$ $2^3 = 8$

Problems of 3 coins

③ 3 coins are tossed. what is probabilities of getting

(a) at least 1 head (1 or more)

(b) at least 2 Tail (2 or more)

(c) at most 2 heads (2 or less)

(d) head & tail are alternate

Ans →

- H H H
- H H T
- H T H
- H T T
- T H H
- T H T
- T T H
- T T T

(a) P (at least 1 head) = $\frac{7}{8}$

(b) P (at least 2 Tail) = $\frac{4}{8} = \frac{1}{2}$

(c) P (at most 2 heads) = $\frac{7}{8}$

(d) P (head & tail ^{are} alternate) = $\frac{2}{8} = \frac{1}{4}$

$$\text{no. of ways} = 6^n = 6^1 = 6$$
$$6^2 = 36$$

* Problems of dice \Rightarrow

Problems of one dice \Rightarrow

(i) A dice is thrown. What is probability of getting no. which is

(a) multiple of 5

(b) multiple of 3

(c) perfect square

Ans \rightarrow 1, 2, 3, 4, 5, 6

$$(a) P(\text{multiple of 5}) = \frac{1}{6} \quad [5]$$

$$(b) P(\text{multiple of 3}) = \frac{2}{6} = \frac{1}{3} \quad [3, 6]$$

$$(c) P(\text{perfect square}) = \frac{2}{6} = \frac{1}{3} \quad [1, 4]$$

Problems of two dice \Rightarrow

~~(0,0)~~

(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)

$$(4) = 3 \text{ diff}$$

$$(1) = 0 \text{ no difference.}$$

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① 2 dice are thrown simultaneously
what is probabilities of getting

(a) same no.

(b) no difference of points

(c) difference of 2

(d) difference of 3

(e) first no. greater than second

(f) sum of 7

(g) sum of 11

(h) sum of at least 8.

$$(a) P(\text{same no.}) = \frac{6}{36} = \frac{1}{6}$$

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

$$(b) P(\text{no diff}^n \text{ of points}) = \frac{6}{36} = \frac{1}{6}$$

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

$$(c) P(\text{difference of 2}) = \frac{8}{36} = \frac{2}{9}$$

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

$$(d) P(\text{difference of 3}) = \frac{6}{36} = \frac{1}{6}$$

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

$$(e) P(\text{1st no. greater than 2nd}) = \frac{15}{36} = \frac{5}{12}$$

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

$$(f) P(\text{sum of 7}) = \frac{6}{36} = \frac{1}{6}$$

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

$$(g) P(\text{Sum of 11}) = \frac{2}{36} = \frac{1}{18}$$

(5,6)

(6,5)

$$(h) P(\text{sum of at least 8}) = \frac{15}{36}$$

8 5

9 4

10 3

11 2

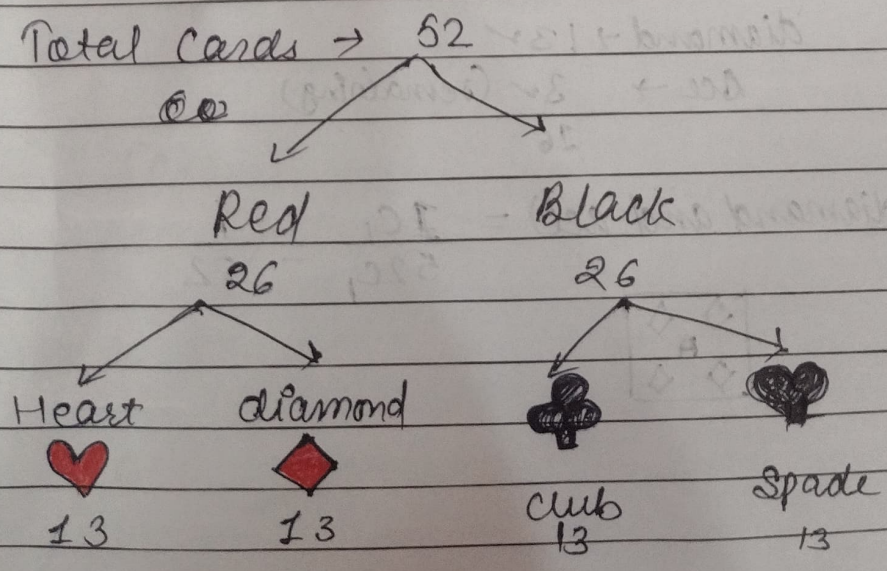
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Short trick

Sum of	no. of time
2	1
3	2
4	3
5	4
6	5
7	6
8	5
9	4
10	3
11	2
12	1

* Problems of Cards →



- A → Ace → 4
- K → King → 4
- Q → Queen → 4
- J → Jack → 4

e.g.1 A card is selected from pack of 52 shuffled cards. What is probability that it shows . . .

(a) red colour

(b) Heart

(c) king

(d) diamond or ace (दुहेरी चमक के/के/के)

(e) diamond and ace (दोनों चाहिए)

इस part में diamond के 13 cards हैं और ace के 4 cards हैं।

$$(a) P(\text{red colour}) = \frac{26C_1}{52C_1} = \frac{26}{52} = \frac{1}{2}$$

$$(b) P(\text{Heart}) = \frac{13C_1}{52C_1} = \frac{13}{52} = \frac{1}{4}$$

$$(c) P(\text{king}) = \frac{4C_1}{52C_1} = \frac{4}{52} = \frac{1}{13}$$

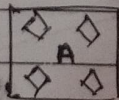
$$(d) P(\text{diamond or ace}) = \frac{16C_1}{52C_1} = \frac{16}{52} = \frac{4}{13}$$

diamond \rightarrow 13 ✓

ace \rightarrow 4 ✓ (remaining)

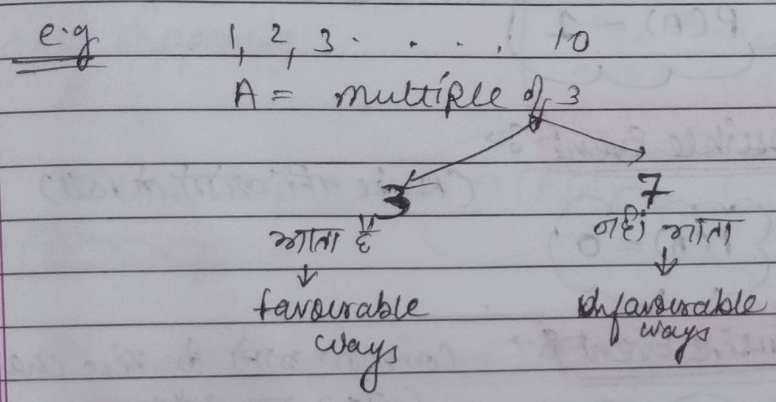
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$$(e) P(\text{diamond and ace}) = \frac{1C_1}{52C_1} = \frac{1}{52}$$



Odds in favour of event = $\frac{\text{favourable ways}}{\text{unfavourable ways}}$

Odds against event = $\frac{\text{unfavourable ways}}{\text{favourable ways}}$



what are Odds in favour of event of A = $\frac{F}{U} = \frac{3}{7}$

Odds against A = $\frac{U}{F} = \frac{7}{3}$

$P(A) = \frac{\text{specific}}{\text{Normal}} = \frac{3}{10} = \frac{\text{Favourable}}{\text{favourable + unfavourable}}$

① Odds in favour of B = $\frac{6}{5} = \frac{F}{U}$

$P(B) = \frac{F}{F+U} = \frac{6}{6+5} = \frac{6}{11}$

② Odds against of B = $\frac{5}{6} = \frac{U}{F}$

$P(B) = \frac{F}{F+U} = \frac{6}{6+5} = \frac{6}{11}$

Head & Tail = are = Exclusive & Exhaustive & Equally likely

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Types of Events

- ① Sure event \Rightarrow the event is called sure event when the chance of event is 100%.
(होना सतम होगा)

$$P(A) = 1$$

- ② Impossible Event \Rightarrow (Kaise nahi hoga me fail)

$$P(A) = 0$$

- ③ Exclusive Event \Rightarrow Common होने के Zero chance.
(सब असंग-2 हैं)

$$P(A \cap B) = 0$$

cards में red या Black -
एक निकालने से
coin में Head या Tail - दोनों नहीं
आते

- ④ Exhaustive Event \Rightarrow
एक जाना

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

कूदने होगा या नहीं या तो

Coin toss \rightarrow head आसकता
or Tail आसकता
कूदने होगा है पकका

- ⑤ Equally likely Event \Rightarrow

$$P(A) = P(B)$$

Head आने की $P(H) = 1/2$
Tail आने की $P(T) = 1/2$

⑥ Dependent Event \Rightarrow

जो कौन की Probability (Chances) दूसरा से affect करेगी हो।
your result is dependent on your bond.
पैसे देने पर भी
मौजूदा Passing के chance
मौजूदा bond के dependent है।

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

Probability of A after happening B.

~~$P(B/A) = \frac{P(A \cap B)}{P(A)}$~~

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

⑦ Independent Event \Rightarrow

you are intelligent

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

Expected Value \Rightarrow

4 coin को toss करने में है
निचे आने वाले है

- Expect Head 0
- (on an average) 1
- (average \rightarrow mean) 2
- 3
- 4

Expected value
[average value]
[mean]

$$E(X) = \sum X \cdot P$$

$$E(X^2) = \sum X^2 \cdot P$$

$$\text{variance} = E(X^2) - [E(X)]^2$$