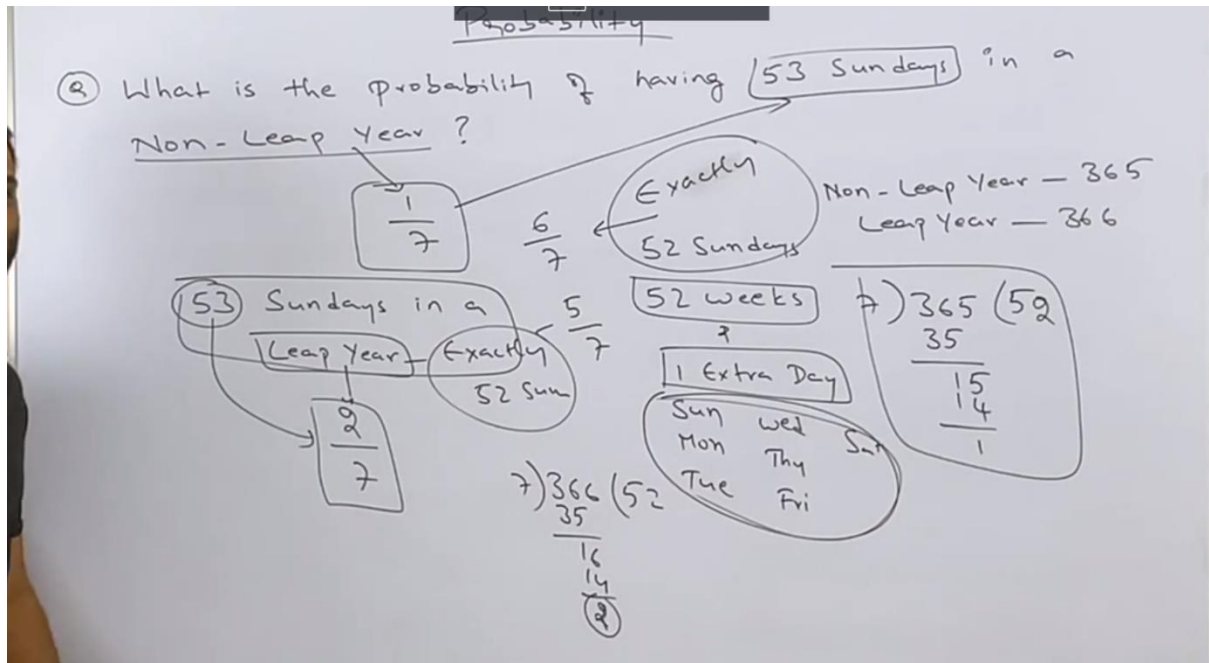


# PROBABILITY



Probability

53 Any day  $\rightarrow$  Non Leap Year —  $\frac{1}{7}$   
 53 Any day  $\rightarrow$  Leap Year —  $\frac{2}{7}$   
 Exactly 52 Anyday  $\rightarrow$  Non Leap Year  $\rightarrow \frac{6}{7}$   
 Exactly 52 Anyday  $\rightarrow$  Leap Year —  $\frac{5}{7}$

⑧ A number is selected at random from a set of 1 to 100, what is the probability of getting a Prime Number.

2 3 5 7 11 13 17 19 23 29  
31 37 41 43 47 53 59 61 67 71  
73 79 83 89 97

1 to 10 → 4 P  
1 to 20 → 8 P  
1 to 30 → 10 P  
1 to 100 → 25 P

$$\frac{{}^{25}C_1}{{}^{100}C_1} = \frac{25}{100} = \frac{1}{4}$$

From 8 Red Balls & 4 Green Balls, 3 balls are picked randomly. What is the probability that there is at least one Red Ball.

At least one Red  
↑  
Total - No Red Ball  
1 - No Red Ball

$$1 - \frac{{}^4C_3}{{}^{12}C_3} = 1 - \frac{4}{\frac{12 \times 11 \times 10}{3 \times 2 \times 1}} = 1 - \frac{4}{55}$$

$$= \frac{55-4}{55} = \frac{51}{55}$$

$2^1$	—	2
$2^2$	—	4
$2^3$	—	8
$2^4$	—	16
$2^5$	—	32
$2^6$	—	64
$2^7$	—	128
$2^8$	—	256
$2^9$	—	512
$2^{10}$	—	1024

CREATE U APTITUDE (in Telugu)

$$\frac{C!}{H!T!} \div 2^C$$

Probability  
Coins (2 sides)

Q 5 coins are tossed.  
Probability of 3 Heads & 2 Tails

DRAW  
one word

Sol:  $\frac{5!}{3!2!} \div 2^5 = \frac{5 \times 4 \times 3}{3 \times 2 \times 1} \div 32 = \frac{5}{16}$

$\frac{5!}{3!2!}$

7 coins Tossed  
Probability of 5H & 2T

$$\frac{7!}{5!2!} \div 2^7$$

$$= \frac{21}{128}$$

HHHHHTT  
 $\frac{7!}{5!2!}$

Coins

8 coins are Tossed

Atleast 6 Heads ?

6H & 2T or 7H and 1T or 8H

$$\frac{\frac{8!}{6!2!}}{2^8} + \frac{\frac{8!}{7!1!}}{2^8} + \frac{\frac{8!}{8!0!}}{2^8}$$
$$= \frac{28 + 8 + 1}{2^8} = \frac{37}{256}$$

Coins

5 Coins Tossed

Atmost 2 Heads

2H & 3T or 1H 4T or 5T

$$\frac{\frac{5!}{2!3!}}{2^5} + \frac{\frac{5!}{1!4!}}{2^5} + \frac{\frac{5!}{5!0!}}{2^5}$$
$$= \frac{10 + 5 + 1}{2^5} = \frac{16}{32} = \frac{1}{2}$$

Probability  
Dice (6 sides)

2 Dice  
2 odd  $\Rightarrow$  2 coins  
2 Heads  $= \frac{1}{2^2} = \frac{1}{4}$

7 Dice  
7 even  $\Rightarrow$  7 coins  
7 Tails  $\Rightarrow \frac{1}{2^7} = \frac{1}{128}$

2 Dice  $\rightarrow 6^2$

3 Dice  $\rightarrow 6^3$

Odd or Even

---

$6^2$

---

$36$

5 Dice  
3 even 2 odd  $\Rightarrow$  5 coins  
3 Heads 2 Tails  $= \frac{5!}{3!2!} = \frac{5 \times 4 \times 3 \times 2 \times 1}{3 \times 2 \times 1 \times 2 \times 1} = \frac{10}{32} = \frac{5}{16}$

Probability  
Dice (6 sides)

3 Dice  
 $\rightarrow$  Product  $\rightarrow$  odd

$\frac{1}{2^3} = \frac{1}{8}$

6 + 1 + 3 = 10  
6 + 3 + 6 = 15  
1 + 1 + 6 = 8  
3 + 1 + 6 = 10  
2 + 4 + 6 = 12  
3 + 1 + 5 = 9  
4 + 2 + 3 = 9

000  $\rightarrow$  0  
EEE  $\rightarrow$  E  
OEE  $\rightarrow$  E  
EOE  $\rightarrow$  E  
OEO  $\rightarrow$  E  
EEO  $\rightarrow$  E  
EOE  $\rightarrow$  E  
OEE  $\rightarrow$  E

Product Even

$$\frac{2^3}{2^3} = \frac{7}{8}$$

10 Dice

Product  $\rightarrow$  Even

$$\frac{2^{10} - 1}{2^{10}} = \frac{1023}{1024}$$

Product - odd

$$= \frac{1}{2^{10}} = \frac{1}{1024}$$

At most 5  $\frac{10}{36} = \frac{5}{18}$

Probability  
Dice (6 sides)

Sum  $\frac{10}{6/36} = \frac{1}{6}$

2 Dice

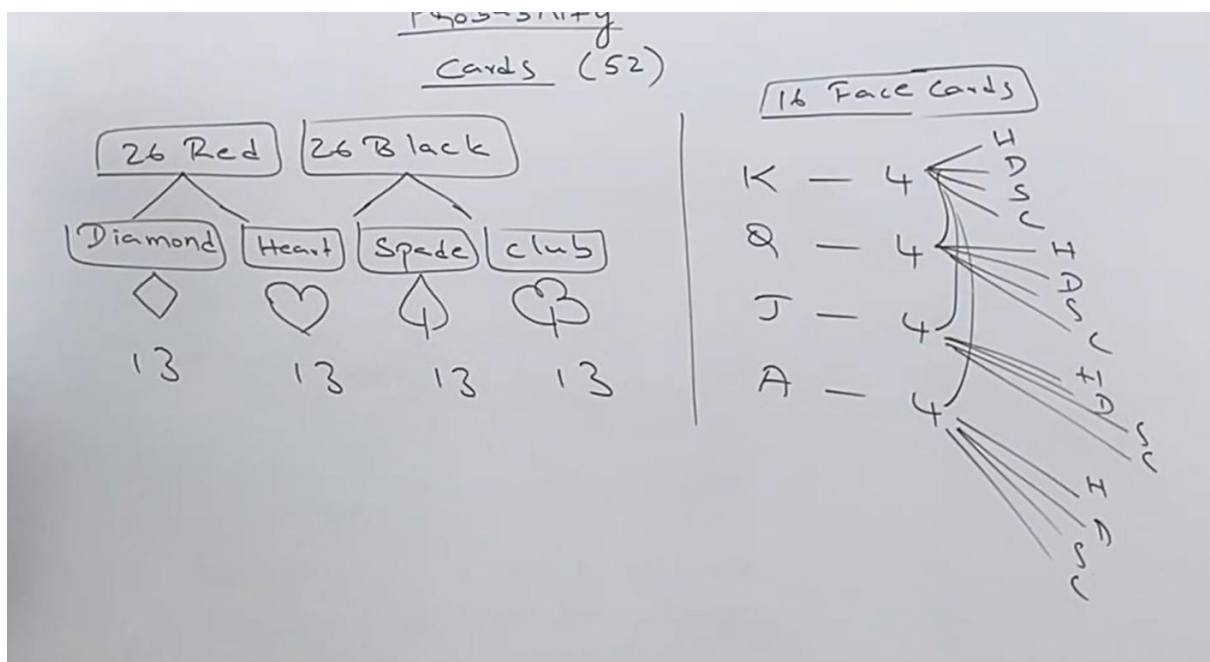
Sum	2	3	4	5	6	7	8	9	10	11	12
Prob	1	2	3	4	5	6	5	4	3	2	1

36

3 Dice

Sum	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Prob	1	3	6	10	15	21	25	27	27	25	21	15	10	6	3	1

216





Probability  
Cards (52)

one

A card is drawn from a pack of cards. What is the probability that the card is

- Black suit/colour  $\rightarrow \frac{26C_1}{52C_1} = \frac{26}{52} = \frac{1}{2}$
- A Spade card  $\rightarrow \frac{13C_1}{52C_1} = \frac{13}{52} = \frac{1}{4}$
- A red Face card  $\rightarrow \frac{8C_1}{52C_1} = \frac{8}{52} = \frac{2}{13}$
- A Face card of club  $\rightarrow \frac{4C_1}{52C_1} = \frac{4}{52} = \frac{1}{13}$
- Diamond or King  $\rightarrow \frac{(13 + 4) - 1}{52} = \frac{16}{52} = \frac{4}{13}$

13 D  
K D  
Q D  
A D  
J D  
2 D  
3 D  
4 D  
5 D  
6 D  
7 D  
8 D  
9 D  
10 D  
11 D  
12 D

16 Face Card  
C - 4  
S - 4  
D - 4  
H - 4  
K  
Q  
J  
10  
9  
8  
7  
6  
5  
4  
3  
2  
A

Probability  
Cards (52)

Two Cards are drawn at Random, what is the probability that

- Both are Aces  $\rightarrow \frac{4C_2}{52C_2} = \frac{4 \times 3}{52 \times 51} = \frac{1}{221}$
- No Face Card  $\rightarrow \frac{36C_2}{52C_2} = \frac{36 \times 35}{52 \times 51} = \frac{105}{221}$
- At least one King  $\rightarrow \frac{33}{221}$
- No Diamond  $\rightarrow \frac{39C_2}{52C_2} = \frac{39 \times 38}{52 \times 51} = \frac{19}{34}$
- One King & one Queen  $\rightarrow \frac{4 \times 4}{52 \times 51} = \frac{16}{2652} = \frac{4}{663}$

5 Sol:  $\frac{4C_1 \times 4C_1}{52C_2} = \frac{4 \times 4}{52 \times 51} = \frac{16}{2652} = \frac{4}{663}$

At least one = Total - None =  $1 - \frac{48C_2}{52C_2} = 1 - \frac{48 \times 47}{52 \times 51} = 1 - \frac{188}{221} = \frac{221 - 188}{221} = \frac{33}{221}$

### Probability

A bag contains 6 Red Balls, 4 Blue Balls, 2 Green Balls & 3 Yellow Balls.

- ① If 3 balls are picked at random, what is the Probability that 2 are blue & 1 is yellow?

Sol :  $\frac{{}^4C_2 {}^3C_1}{{}^{15}C_3} = \frac{\frac{4 \times 3}{2 \times 1} \times 3}{\frac{15 \times 14 \times 13}{3 \times 2 \times 1}} = \frac{18}{455}$

### Probability

A bag contains 6 Red Balls, 4 Blue Balls, 2 Green Balls & 3 Yellow Balls.

- ② If 4 balls are picked at random, what is the probability that at least one is blue.

Sol : Atleast one blue - Total - No Blue

$$\begin{aligned} &= 1 - \frac{{}^{11}C_4}{{}^{15}C_4} = 1 - \frac{\cancel{11} \times \cancel{10} \times \cancel{9} \times \cancel{8}}{\cancel{15} \times \cancel{14} \times 13 \times 12} \\ &= 1 - \frac{22}{91} = \frac{91-22}{91} = \frac{69}{91} \end{aligned}$$

### Probability

A bag contains 6 Red Balls, 4 Blue Balls, 2 Green Balls & 3 Yellow Balls.

(3) If 2 balls are picked at Random, what is the Probability that both are green or both are yellow?

Sol

$$\frac{{}^2C_2 + {}^3C_2}{{}^{15}C_2} = \frac{1 + 3}{\frac{15 \times 14}{2 \times 1}} = \frac{4}{105}$$

A bag contains 6 Red Balls, 4 Blue Balls, 2 Green Balls & 3 Yellow Balls.

If 4 balls are picked at Random, what is the Probability that one is green, two are blue & one is red.

Sol

$$\frac{{}^2C_1 {}^4C_2 {}^6C_1}{{}^{15}C_4} = \frac{2 \times \frac{4 \times 3}{2} \times 6}{\frac{15 \times 14 \times 13 \times 12}{4 \times 3 \times 2 \times 1}} = \frac{24}{455}$$