CHAPTER- Probability

Q1. The probability of selecting a red ball at random from a jar that contains only red, blue and orange balls is $\frac{1}{4}$. The probability of selecting a blue ball at random from the same jar is $\frac{1}{3}$. If the jar contains 10 orange balls, find the total number of balls in the jar

Q2. A card is drawn at random from a well shuffled pack of 52 playing cards. Find the probability that the drawn card is

1) neither a king nor a queen.
2) neither a jack nor an ace
3) a red king.
4) a queen or a jack.
5) face card

Q3. What is the probability that a randomly selected month with 31 days will contain 5 Sundays?

Q4. A bag contains 15 white and some black balls. If the probability of drawing a black ball from the bag is thrice that of drawing a white ball, find the number of black balls in the bag.

Q5. The probability of selecting a blue marble at random from a jar that contains only blue, black and green marbles is 1/5. The probability of selecting a black marble at random from the same jar is 1/4. If the jar contains 11 green marbles, find the total number of marbles in the jar.

Q6.

Three different coins are tossed together. Find the probability of getting
(i) exactly two heads,
(ii) at least two heads (iii) at least two tails.

Q7. **There are 100 cards in a bag on which numbers from 1 to 100 are written. A card is taken out from the bag at random. Find the probability that the number on the selected card (i) is divisible by 9 and is a perfect square (ii) is a prime number greater than 80.**

Q8. A bag contains 25 cards numbered from 1 to 25. A card is drawn at random from the bag. Find the probability that the number on the drawn card is:
(i) divisible by 3 or 5
(ii) a perfect square number.

Q9. A card is drawn at random from a well-shuffled deck of playing cards. Find the probability that the card drawn is
(i) A card of spade or an ace
(ii) A black king
(iii) Neither a jack nor a king
(iv) Either a king or a queen

Q10

Q3. A number is chosen at random from the numbers -3,-2,-1,0,1,2,3. What will be the probability that square of this number is less than or equal to 1

Solution

Q1.

$P(\text{Red}) = \frac{1}{4}$, $P(\text{blue}) = \frac{1}{3}$

As we know, Total Probability = 1

$\Rightarrow P(\text{orange}) = 1 - \frac{1}{4} - \frac{1}{3} = \frac{5}{12}$

$\Rightarrow P(\text{orange}) = \frac{\text{Total no. of orange balls}}{\text{Total no. of balls}}$

$\Rightarrow \frac{5}{12} = \frac{10}{\text{Total no. of balls}}$

$\Rightarrow \text{Total no. of balls} = \frac{10 \times 12}{5} = 24$

Q2.

(i) P (neither a king nor a queen)

= 1 – P (king or queen)

$= 1 - \left(\frac{8}{52}\right)$

$= 1 - \frac{2}{13} = \frac{11}{13}$

(ii) Total number of cards = 52

Numbers of jacks = 4

Numbers of aces = 4

Card is neither a jack nor an ace

= 52 – 4 – 4 = 44

∴ Required probability = $\frac{44}{52} = \frac{11}{13}$

Cards in a pack = 52

Number of kings = 4

Number of red kings = 2

(iii) P(a red king) $= \frac{2}{52} = \frac{1}{26}$

(iv) P(a queen or a jack)

$= P(\text{a queen}) + P(\text{a jack})$

$= \frac{4}{52} + \frac{4}{52} = \frac{8}{52} = \frac{2}{13}$

(v) Possible outcomes of face cards = 12

$\therefore P(\text{a face card}) = \frac{12}{52} = \frac{3}{13}$

Q3.

A month with 31 days has 4 complete weeks (28 days) and 3 extra days. The extra days can be any combination of three consecutive days.

To have 5 Sundays, at least one of those extra days must be a Sunday. The possible combinations for three extra days can include Sunday in several ways:

- If the extra days are Sunday-Monday-Tuesday,
- If they are Saturday-Sunday-Monday,
- If they are Friday-Saturday-Sunday,
- If they are Thursday-Friday-Saturday,
- If they are Wednesday-Thursday-Friday.

Thus, there are 3 favorable outcomes out of 7 total possible combinations for including at least one Sunday in those three extra days.

$$P(5 \text{ Sundays}) = \frac{3}{7}$$

Q4.

Number of white balls = 15

Let x be the number of black balls.

Total number of balls in the bag = 15 + x

Also, the probability of drawing a black ball from the bag is thrice that of drawing a white ball.

$\Rightarrow x/(15 + x) = 3[15/(15 + x)]$

$\Rightarrow x = 3 \times 15 = 45$

Hence, the number of black balls in the bag = 45.

Q5.

Given that,

P(selecting a blue marble) = 1/5

P(selecting a black marble) = 1/4

We know that the sum of all probabilities of events associated with a random experiment is equal to 1.

So, P(selecting a blue marble) + P(selecting a black marble) + P(selecting a green marble) = 1

(1/5) + (1/4) + P(selecting a green marble) = 1

P(selecting a green marble) = 1 – (1/4) – (1/5)

= (20 – 5 – 4)/20

= 11/20

P(selecting a green marble) = Number of green marbles/Total number of marbles

11/20 = 11/Total number of marbles {since the number of green marbles in the jar = 11}

Therefore, the total number of marbles = 20

Q6.

Set of possible outcomes

= {HHH, HHT, HTH, THH, HTT, THT, TTH, TTT}.

(i) Let E_1 be the event of getting exactly two heads.

$\therefore$ Favourable outcomes = {HHT, HTH, THH}

No. of favourable outcomes = 3

$$\therefore \quad P(E_1) = \frac{3}{8}$$

(ii) Let E_2 be the event of getting atleast two heads.

$\therefore$ Favourable outcomes = {HHT, HTH, THH, HHH}

No. of favourable outcomes = 4

$$\therefore \quad P(E_2) = \frac{4}{8} = \frac{1}{2}$$

(iii) Let E_3 be the event of getting atleast two tails.

$\therefore$ Favourable outcomes

= {HTT, THT, TTH, TTT}

No. of favourable outcomes = 4

$$\therefore \quad P(E_3) = \frac{4}{8} = \frac{1}{2}$$

Q7.

Number of possible outcomes = 100

(i) Let E_1 be the event of getting a number divisible by 9 and is a perfect square.

$\therefore$ Favourable outcomes = {9, 36, 81}

Number of favourable outcomes = 3

$$\therefore \quad P(E_1) = \frac{3}{100}$$

(ii) Let E_2 be the event of getting a prime number greater than 80.

$\therefore$ Favourable outcomes = {83, 89, 97}

Number of favourable outcomes = 3

$$\therefore \quad P(E_2) = \frac{3}{100}$$

Q8.

Total number of possible outcomes = 25

(i) Let E_1 be the event of getting a number divisible by 3 or 5.

Favourable outcomes = {3, 6, 9, 12, 15, 18, 21, 24, 5, 10, 20, 25}

$\therefore$ Number of favourable outcomes = 12

$\therefore$ P(getting a no. divisible by 3 or 5)

$$P(E_1) = \frac{12}{25}$$

(ii) Let E_2 be the event of getting a perfect square number.

Favourable outcomes = {1, 4, 9, 16, 25}

$\therefore$ Number of favourable outcomes = 5

$\therefore$ P(getting a perfect square number)

$$P(E_2) = \frac{5}{25} = \frac{1}{5}$$

Q9.

Let S be the sample space of drawing a card from a well-shuffled deck

Then, $S = 52$

(i) There are 13 spade cards and 4 acs in a deck. As a ace of spade is included in 13 spade cards

So, there are 13 spade cards and 3 ace's

A card of spade or an ace can be drawn in

$13 + 4 - 1 = 16$ (ways)

Probability of drawing a card of spade or an ace

$$P = \frac{16}{52} = \frac{4}{13}$$

(ii) There are 2 black king cards in a deck.

Probability of drawing a black king

$$P = \frac{2}{52}$$

$$P = \frac{1}{26}$$

either king or a queen.

$$P = \frac{8}{52}$$

$$P = \frac{2}{13}$$

Q10.

Solution:

No. of all possible outcomes = 7

The numbers whose square is ≤ 1 = -1, 0, 1

No. of favourable outcomes = 3

$\therefore$ Required probability $= \frac{3}{7}$