PROBABILITY

NUMERICAL BASED ON CARDS

Playing Cards :

(i) Total : 52 (26 red, 26 black)

(ii) Four suits : Heart, Diamond, Spade, Club - 13 cards each

(iii) Court Cards : 12 (4 Kings, 4 queens, 4 jacks)

(iv) Honour Cards:16 (4 aces, 4 kings, 4 queens, 4 jacks)

Ex.1 All the three face cards of spades are removed from a well-shuffled pack of 52 cards. A card is then drawn at random from the remaining pack. Find the probability of getting **[CBSE - 2007]**

(i) black face card (ii) a queen (iii) a black card.

Sol. After removing three face cards of spades (king, queen, jack) from a deck of 52 playing cards, there are 49 cards left in the pack. Out of these 49 cards one card can be chosen in 49 ways.

$\therefore$ Total number of elementary events $= 49$

(i) There are 6 black face cards out of which 3 face cards of spades are already removed. So, out of remaining 3 black face cards one black face card ban be chosen in 3 ways.

$\therefore$ Favorable number of elementary events $= 3$

Hence, P (Getting a black face card) $= \frac{3}{49}$

(ii) There are 3 queens in the remaining 49 cards. So, out of these three queens, on queen can be chosen in 3 ways

$\therefore$ Favorable number of elementary events $= 3$

Hence P (Getting a queen) $= \frac{3}{49}$

(iii) There are 23 black cards in the remaining 49 cards, So, out to these 23 black card, one black card can be chosen in 23 ways

$\therefore$ Favorable number of elementary events $= 23$

Hence, P (Getting a black card) $= \frac{23}{49}$

Ex.2 A card is drawn at random from a well-shuffled pack of 52 cards. Find the probability that the card drawn is neither a red card nor a queen.

Sol. There are 26 red cards (including 2 red queens) and 2 more queens are there. Thus, we have to set aside 28 cards.

And, we have to draw 1 card out of the remaining $(52 - 28) = 24$ cards.

$\therefore$ Required probability $= \frac{24}{52} = \frac{6}{13}$.

Ex.3 One card is drawn from a well-shiffled deck of 52 cards. Find the probability of drawing:

(i) an ace

(ii) 2' of spades

(iii) '10' of black suit

Sol. (i) There are 4 aces in deck.

$\therefore$ Number of such favourable outcomes $= 4$

$\because$ Total number of cards in deck $= 52$.

$\therefore$ Total number of possible outcomes $= 52$.

$\therefore$ P(an ace) $= \frac{4}{52} = \frac{1}{13}$.

(ii) Number of '2' of spades $= 1$

Number of favourable outcomes $= 1$

Total number of possible outcomes $= 52$

$\therefore$ P('2' of spades) $= \frac{1}{52}$

(iii) There are 2 '10' of black suits (i.e. spade and club)

$\therefore$ Number of favourable outcomes $= 2$

Total number of possible outcomes $= 52$

$\therefore$ P('10' of a black suit) $= \frac{2}{52} = \frac{1}{26}$

Ex.4 17 Cards numbered 1, 2, 3 ... 17 are put in a box and mixed thoroughly. One person draws a card from the box. Find the probability that the number on the card is

(i) Odd

(ii) A prime

(iii) Divisible by 3

(iv) Divisible by 3 and 2 both.

Sol. Out of 17 cards, in the box, one card can be drawn in 17 ways.

$\therefore$ Total number of elementary events $= 17$.

(i) There 9 odd numbered cards, namely, 1, 3, 5, 7, 9, 11, 13, 15, 17. Out of these 9 cards one card can be drawn in 9 ways.

$\therefore$ Favourable number of elementary events $= 9$.

Hence, required probability $= \frac{9}{17}$.

(ii) There are 7 prime numbered cards, namely, 2, 3, 5, 7, 11, 13, 17. Out of these 7 cards one card can be chosen in 7 ways.

$\therefore$ Favourable number of elementary events $= 7$.

Hence, P (Getting a prime number) $= \frac{7}{17}$.

(iii) Let A denote the event of getting a card bearing a number divisible by 3. Clearly, event A occurs if we get a card bearing one of the numbers 3, 6, 9, 12, 15.

$\therefore$ Favourable number of elementary events $= 5$.

Hence, P (Getting a card bearing a number divisible by 3) $= \frac{5}{17}$.

(iv) If a number is divisible by both 3 and 2, then it is a multiple of 6. In cards bearing number 1, 2, 3 ..., 17 there are only 2 cards which bear a number divisible by 3 and 2 both i.e. by 6. These cards bear numbers 6 and 12

$\therefore$ Favourable number of elementary events $= 2$

Hence, P (Getting a card bearing a number divisible by 3 and 2) $= \frac{2}{17}$.

Ex.5 A card is drawn at random from a well-shuffled pack of 52 cards. Find the probability that the card drawn is neither a red card nor a queen.

Sol. Number of red cards including 2 red queens $= 26$

Number of black queens $= 2$

Therefore, number of red cards including 2 red queens and 2 black queens $= 26 + 2 = 28$

Number of cards neither a red card nor a queen $= 52 - 28 = 24$

$$P = \frac{\text{Number of favourable outcomes}}{\text{Total number of possible outcomes}}$$

P (neither a red nor a queen card) $= \frac{24}{52} = \frac{6}{13}$