15.2 ILLUSTRATIONS

Ex.1 A box contains 5 red balls, 4 green balls and 7 white balls. A ball is drawn at random from the box. Find the probability that the ball drawn is

(i) white (ii) neither red nor white

Sol. Total number of balls in the bag = 5 + 4 + 7 = 16

$\therefore$ Total number of elementary events =16

(i) There are 7 white balls in the bag.

$\therefore$ Favorable number of elementary events = 7

$$\text{Hence, P (Getting a white ball)} = \frac{\text{Total No. favourable elementary events}}{\text{Total No. of elementary events}} = \frac{7}{16}$$

(ii) There are 4 balls that are neither red nor white

$\therefore$ Favorable number of elementary events = 4

$$\text{Hence, P (Getting neither red not white ball)} = \frac{4}{16} = \frac{1}{4}$$

Ex.2 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

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

(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

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

(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

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

Ex.3 A die is thrown, Find the probability of

(i) prime number (ii) multiple of 2 or 3 (iii) a number greater than 3

Sol. In a single throw of die any one of six numbers 1,2,3,4,5,6 can be obtained. Therefore, the tome number of elementary events associated with the random experiment of throwing a die is 6.

(i) Let A denote the event “Getting a prime no”. Clearly, event A occurs if any one of 2,3,5 comes as out come.

$\therefore$ Favorable number of elementary events = 3

Hence, P (Getting a prime no.) = $\frac{3}{6}=\frac{1}{2}$

(ii) An multiple of 2 or 3 is obtained if we obtain one of the numbers 2,3,4,6 as out comes

$\therefore$ Favorable number of elementary events = 4

Hence, P (Getting multiple of 2 or 3) = $\frac{4}{6}=\frac{2}{3}$

(iii) The event "Getting a number greater than 3" will occur, if we obtain one of number 4,5,6 as an out come.

$\therefore$ Favorable number of out comes = 3

Hence, required probability = $\frac{3}{6}=\frac{1}{2}$

Ex.4 Two unbiased coins are tossed simultaneously. Find the probability of getting
(i) two heads (ii) at least one head (iii) at most one head.

Sol. If two unbiased coins are tossed simultaneously, we obtain any one of the following as an out come :
HH, HT, TH, TT

$\therefore$ Total number of elementary events = 4

(i) Two heads are obtained if elementary event HH occurs.

$\therefore$ Favorable number of events = 1

Hence, P (Two heads) = $\frac{1}{4}$

(ii) At least one head is obtained if any one of the following elementary events happen :
HH, HT, TH

$\therefore$ favorable number of events = 3

Hence P (At least one head) = $\frac{3}{4}$

(iii) If one of the elementary events HT, TH, TT occurs, than at most one head is obtained

$\therefore$ favorable number of events = 3

Hence, P (At most one head) = $\frac{3}{4}$

Ex.5 A box contains 20 balls bearing numbers, 1,2,3,4……20. A ball is drawn at random from the box. What is the probability that the number of the ball is
(i) an odd number (ii) divisible by 2 or 3 (iii) prime number

Sol. Here, total numbers are 20.

$\therefore$ Total number of elementary events = 20

(i) The number selected will be odd number, if it is elected from 1,3,5,7,9,11,13,15,17,19

$\therefore$ Favorable number of elementary events = 10

Hence, P (An odd number) = $\frac{10}{20}=\frac{1}{2}$

(ii) Number divisible by 2 or 3 are 2,3,4,6,8,9,10,12,14,15,16,18,20

$\therefore$ Favorable number of elementary events = 13

P (Number divisible by 2 or 3) = $\frac{13}{20}$

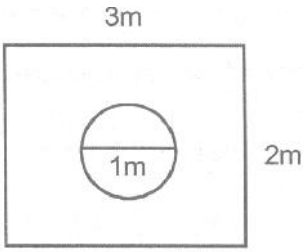
(iii) There are 8 prime number from 1 to 20 i.e., 2,3,5,7,11,13,17,19

$\therefore$ Favorable number of elementary events = 8

P (prime number) = $\frac{8}{20} = \frac{2}{5}$

Ex.6 A die is drop at random on the rectangular region as shown in figure. What is the probability that it will land inside the circle with diameter 1m ?

Sol. Area of rectangular region = 3m × 2m = $6m^2$



Area of circle = πr^2

$= \pi \times \left(\frac{1}{2}\right)^2$

$= \frac{\pi}{4} m^2$

$\therefore$ Probability that die will land inside the circle

$= \frac{\pi / 4}{6}$

$= \frac{\pi}{24}$