Probability: Exercise 15.2

Q.1 Two customers Shyam and Ekta are visiting a particular shop in the same week (Tuesday to Saturday). Each is equally likely to visit the shop on any day as on another day. What is the probability that both will visit the shop on (i) the same day? (ii) consecutive days? (iii) different days?

Sol. Since, elementary events associated to the event of visiting a particular shop in the same week (Tuesday to Saturday) by Shyam and Ekta:

(T, T), (T, W), (T, Th), (T, F), (T, S) (W, T), (W, W), (W, Th), (W, F), (W, S) (Th, T), (Th, W), (Th, Th), (Th, F), (Th, S) (F, T), (F, W), (F, Th), (F, F), (F, S) (S, T), (S, W), (S, Th), (S, F), (S, S)

So, total number of outcomes = $5 \times 5 = 25$

(i) Suppose, A is the event of visiting a particular shop on the same day by Shyam and Ekta. So, favourable outcomes to event A are (T, T), (W, W), (TH, TH), (F, F) and (S, S) So, favourable number of outcomes = 5

Thus, $P(A) = \frac{5}{25} = \frac{1}{5}$

(ii) Suppose, B is the event of visiting a particular shop by Shyam and Ekta on consecutive days. Then, favourable outcomes to event B are (T, W), (W, T), (W, TH), (TH, W) (TH, F) (F, TH) (S, F) (F, S). So, favourable number of outcomes = 8

Thus, $P(B) = \frac{8}{25}$

(iii) Suppose, C is the event of visiting a particular shop by Shyam and Ekta on different days. Then, favourable outcomes to event C are excluding (T, T), (W, W), (TH, TH), (F, F) and (S, S). So, these are 25 - 5 = 20 in number

So, favourable number of outcomes = 20

Thus, $P(C) = \frac{20}{25} = \frac{4}{5}$.

Q.2 A die is numbered in such a way that its faces show the numbers 1, 2, 2, 3, 3, 6. It is thrown two times and the total score in two throws is noted. Complete the following table which gives a few values of the total score on the two throws:

	2.72		ver			
÷	1	2	2	3	3	6
1	2	3	3	4	4	7
2	3	4	4	5	5	8
2					5	
3						
3			5			9
6	7	8	8	9	9	12

What is the probability that the total score is(i) even?(ii) 6?(iii) at least 6?

Sol. Complete table is as under:

	N	Number in first thro							
+	1	2	2	3	3	6			
1	2	3	3	4	4	7			
2	3	4	4	5	5	8			
2	3	4	4	5	5	8			
3	3	5	5	6	6	9			
3	3	5	5	6	6	9			
6	7	8	8	9	9	12			

So, total number of elementary events = $6 \times 6 = 36$ (i) Suppose, A is the event of getting total score even. So, favourable outcomes to event A are 2, 4, 4, 4, 4, 8, 4, 4, 8, 4, 6, 6, 4, 6, 6, 8, 8 and 12

So, favourable number of outcomes = 18 Thus, P(A) = $\frac{18}{36} = \frac{1}{2}$

(ii) Suppose, B is the event of getting total score 6. So, favourable outcomes to event B are 6, 6, 6 and 6. So, favourable number of outcomes = 4

Thus, P (B) =
$$\frac{4}{36} = \frac{1}{9}$$

(iii) Suppose, C is the event of the total score is at least 6. So, favourable outcomes to event C are 7, 8, 8, 6, 6, 9, 6, 6, 9, 7, 8, 8, 9, 9 and 12

So, favourable number of outcomes = 15

Thus, $P(A) = \frac{15}{36} = \frac{5}{12}$.

Q.3 A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball double that of a red ball, determine the number of blue balls in the bag.

Sol. Let x be the blue balls in the bag.

So, total number of balls in the bag = 5 + xNow, let P₁ = Probability of drawing a blue ball

 $=\frac{x}{x+5}$

 P_2 = Probability of drawing a red ball

 $=\frac{5}{5+x}$

Since, given $P_1 = 2P_2$

 $\Rightarrow \frac{x}{x+5} = 2 \times \frac{5}{5+x}$ $\Rightarrow x = 10$

Thus, there are 10 blue balls in the bag.

Q.4 A box contains 12 balls out of which x are black. If one ball is drawn at random from the box what is the probability that it will be a black ball ? If 6 more black balls are put in the box, the probability of drawing a black ball is now double of what it was before. Find x. *Sol.* Total 12 balls in the box. Out of these 12 balls, one ball can be taken in 12 ways.

So, total number of outcomes = 12

x black balls out of which one can be chosen in x ways.

So, favourable number of outcomes = x

Thus, $P_1 = P$ (getting a black ball) = $\frac{x}{12}$

According to question, 6 more black balls are put in the box. So, now total number of balls in the box = 12 + 6 = 18And number of black balls in the box = x + 6 So, $P_2 = P$ (getting a white ball) = $\frac{x+6}{18}$

Since, $P_2 = 2P_1$ $\Rightarrow \frac{x+6}{18} = 2 \times \frac{x}{12}$ $\Rightarrow x+6 = 3x$ $\Rightarrow 2x = 6$ $\Rightarrow x = 3$

Q.5 A jar contains 24 marbles, some are green and other are blue. If a marble is drawn at random from the jar, the probability that it is green is $\frac{2}{3}$. and the number of blue balls in the

jar.

Sol. Since, jar contains 24 marbles, some are green and others are blue. So, total number of outcomes = 24

Let x be green falls

So, favourable number of outcomes = x

So, P (G) =
$$\frac{x}{24}$$
 But, given P(G) = $\frac{2}{3}$
 $\Rightarrow \frac{x}{24} = \frac{2}{3}$
 $\Rightarrow x = \frac{2}{3} \times 24 = 16$

 \Rightarrow Thus, Number of green marbles = 16

 \Rightarrow And Number of blue marbles = 24 - 16 = 8