Exercise No.13.1

Q. 1 Arshad rolls a dice, with sides labelled $\mathrm{L,M,N,O,P,U}$. What is the probability that the dice lands on consonant?

Solution:
When dice is rolled the sample space will be; $S = \{L,M,N,O,P,U\}, n(S) = 6$
Let ' A ' be the event of getting consonant, $\mathrm{A} = \{\mathrm{L,M,N,P}\}, \mathrm{n(A)} = 4$
We know that

$$p(A) = \frac{n(A)}{n(S)} = \frac{4}{6}$$
$$= \frac{2}{3}$$

Thus, the probability of getting consonant is $\frac{2}{3}$.

Q. 2 Shazia throws a pair of fair dice. What will be the probability of getting:
(i) Sum of dots is at least 4.
(ii) Product of both dots is between 5 to 10
(iii) The difference between both the dots is equal to 4.
(iv) Number at least 5 on the first dice and the number at least 4 on the second dice.

Solution:
When a pair of fair dice is rolled, the sample space will be:

1st / 2nd	1	2	3	4	5	6
1	(1,1)	(1,2)	(1,3)	(1,4)	(1,5)	(1,6)
2	(2,1)	(2,2)	(2,3)	(2,4)	(2,5)	(2,6)
3	(3,1)	(3,2)	(3,3)	(3,4)	(3,5)	(3,6)
4	(4,1)	(4,2)	(4,3)	(4,4)	(4,5)	(4,6)
5	(5,1)	(5,2)	(5,3)	(5,4)	(5,5)	(5,6)
6	(6,1)	(6,2)	(6,3)	(6,4)	(6,5)	(6,6)

(i) Sum of dots is at least 4.

Solution:
Probability of sum of dots is at least 4 .
Let A be even of getting sum of dots is at least 4 :
Since, there are only 3 outcomes where sum of dots is less than 4, so, there are 33 outcomes where sum of dots is either 4 or more than 4 so, $n(A) = 33$.

$$\mathrm{P(\ A)} = \frac{\mathrm{n(\ A)}}{\mathrm{n(\ S)}} = \frac{33}{36} = \frac{11}{12}$$

Thus, probability of getting sum of dots at least 4 is $\frac{11}{12}$.

(ii) Product of both dots is between 5 to 10.

Solution:
Probability of getting product of dots is between 5 and 10.
Let B be an event of getting product of dots from 5 to 10.

$$B = \{(1,5),(1,6),(2,3),(2,4),(2,5),(3,2),$$
$$(3,3),(4,2),(5.1),(5,2),(6,1)\}$$
$$P(B) = \frac{n(B)}{n(S)} = \frac{11}{36}$$

Thus, the probability of getting product of dots between 5 and 10 is $\frac{11}{36}$.

(iii) The difference between both the dots is equal to 4.
Solution:
Let D be event getting difference of dots equal to 4.

$$\mathrm{D} = \{1,5),(2,6),(5,1),(6,2)\},\mathrm{n(D)} = 4$$

Probability of getting difference of dots equal to 4 is:

$$P(D) = \frac{n(D)}{n(S)} = \frac{4}{36} = \frac{1}{9}$$

(iv) Number at least 5 on the first dice and the number at least 4 on the second dice.
Solution:
Let E be an event getting at least 5 on the first dice and at least 4 on the second dice.

$$E = \{(5,4),(5,5),(5,6),(6,4),(6,5),(6,6)\}$$
$$n(E) = 6$$

Probability of event E is:

$$\mathrm{p(E)} = \frac{\mathrm{n(E)}}{\mathrm{n(\ S)}} = \frac{6}{36} = \frac{1}{6}$$

Q. 3 One alphabet is selected at random from the word "MATHEMATICS". Find he probability of getting:
(i) vowel
(ii) Consonant
(iii) an E.
(iv) an A
(v) not M
(vi) not T

Word: Mathematics
Sample space: $S = \{M,A,TH,E,M,A,$ T, I, C, S$\}$

$\mathrm{n(S)} = 11$
(i) Vowel

Solution:
Let "A" be an event getting a vowel. $\mathrm{A} = \{\mathrm{A,E,I,A}\}, \mathrm{n(A)} = 4$
Probability of getting a vowel is:

$$\mathrm{P(A)}\frac{\mathrm{n(A)}}{\mathrm{n(S)}} = \frac{4}{11}$$

(ii) Consonant

Solution:
Let " B " be an event getting a consonant $\mathrm{B} = \{\mathrm{M,T,H,M,T,C,S}\}, \mathrm{n(B)} = 7$
Probability of getting a consonant is:

$$P(B) = \frac{n(B)}{n(S)} = \frac{7}{11}$$

(iii) an $\mathbb{E}$

Solution:
Let " C " be can event of getting an E ,

$$C = \{E\}, n(E) = 1$$

Probability of getting an E :

$$P(E) = \frac{n(E)}{n(S)} = \frac{1}{11}$$

(iv) an A

Solution
Let " D " be an event of getting an A .

$$D = \{A, A\}, n(D) = 2$$

Probability of getting an A:

$$P(D) = \frac{n(D)}{n(S)} = \frac{2}{11}$$

(v) notM

Let " M " be an event of getting M .

$$M = \{M, M\}, n(M) = 2$$

Probability of getting M:

$$P(M) = \frac{n(M)}{n(S)} = \frac{2}{11}$$

Probability of getting not M :

$$P(M') = 1 - P(M)$$
$$= 1 - \frac{2}{11}$$
$$= \frac{11 - 2}{11} = \frac{9}{11}$$

(vi) not T

Solution:
Let E be an event getting T.

$$E = \{T, T\}, n(E) = 2$$

Probability of getting T:

$$P(E) = \frac{n(E)}{n(S)} = \frac{2}{11}$$

Probability of getting not T:

$$\mathrm{P}\left(\mathrm{E}'\right) = 1 - \mathrm{p(E)} = 1 - \frac{2}{11} = \frac{11-2}{11} = \frac{9}{11}$$

Q. 4 Aslam rolled a dice. What is the probability of getting the numbers 3 or 4 ? Also find the probability of getting the numbers 3 or 4.

Solution:

When a dice is rolled, he sample space is:

$$S = \{1,2,3,4,5,6\}$$

Let A be an event of getting 3 or 4 .

$$\mathrm{n(\ A) = \{3,4\}, n(\ A) = 2}$$

Probability of getting 3 or 4:

$$\mathrm{P(\ getting\ 3\ or\ 4) = \frac{n(A)}{n(S)} = \frac{2}{6} = \frac{1}{3}}$$

Probability of getting (not 3 or 4):

$$P\left(A'\right) = 1 - P(A) = 1 - \frac{1}{3}$$

$$= \frac{3-1}{3} = \frac{2}{3}$$

Q. 5 Abdul Hadi labelled cards from 1 to 30 and put them in a box. He selects a card at random. What is the probability that selected card containing:

(i) the number 25
(ii) number between 17 to 22
(iii) number at lest 20
(iv) number not 27and 29
(v) number not between 12 to 15

Solution

$$\text{Sample space } = S = \{1,2,3,4,\ldots,30\},$$
$$n(S) = 30$$

(i) The number 25

Solution:
Let "A" be an event of getting card containing 25, $\mathrm{A} = \{25\}, \mathrm{n(A)} = 1$
Probability of getting a card containing 5:

$$\mathrm{P(\ A)} = \frac{\mathrm{n(\ A)}}{\mathrm{n(\ S)}} = \frac{1}{30}$$

(ii) Number between 17 to 22

Solution:
Let "B" is an event of selecting a card from 17 to 22.

$$B = \{17,18,19,20,21,22\}, n(B) = 6$$

Probability of selecting number from 17 to 22 is:

$$P(B) = \frac{n(B)}{n(S)} = \frac{6}{30} = \frac{1}{5}$$

(iii) Number at least 20

Solution:
Let "C" be an event of selecting a card containing number at least 20 .

$$C = \{20,21,22,\ldots 30\}, n(C) = 11$$

Probability of selecting a card containing a number at least 20 .

$$P(C) = \frac{n(C)}{n(S)} = \frac{11}{30}$$

(iv) Number not 27 and 29

Solution:
Let "D" be an event of selecting a card containing 27 and 29 ..

$$\mathrm{D} = \{27,29\}, \mathrm{n(D)} = 2$$

Probability of selecting a card containing 27 and 29.

$$P(D) = \frac{2}{30} = \frac{1}{15}$$

Probability of selecting a card containing a number not 27 and 29.

$$\begin{aligned} P\left(D'\right) &= 1 - P(D) \\ &= 1 - \frac{1}{15} \\ &= \frac{15-1}{15} = \frac{14}{15} \end{aligned}$$

(v) Numbers not between 12 to 15 .

Solution:
Let ' E ' be an event of selecting a card containing number ' 12 ' to ' 15 '.

$$E = \{12,13,14,15\}, n(E) = 4$$

Now, let E' be an event of selecting a card containing number not between 12 to 15 .

$$n\left(E'\right) = n(S) - n(E) = 30 - 4 = 26$$

$$P(E) = \frac{n(S)}{n\left(\left(E'\right)\right.} = \frac{26}{30} = \frac{13}{15}$$

So, probability that the selected cards contains a number not between 12 to 15 is $\frac{13}{15}$.

Q. 6 The probability that Ayesha will pass the examination is 0.85 . What will be the probability that Ayesha will not pass the examination?
Solution:
Let "A" be an event of Ayesha will pass examination. The probability of Ayesha will not pass examination $\mathrm{p}(\mathrm{A}) = 1 - \mathrm{P}(\mathrm{A})$

$$\mathrm{P}\left(\left(\mathrm{A}'\right) = 1 - 0.85\right.$$
$$\mathrm{P}\left(\left(\mathrm{A}'\right) = 0.15\right.$$

Q. 7 Taabish tossed a fair coin and rolled a fair dice once. Find the probability of the following events:
(i) tail on con and at least 4 on dice.

(ii) head on coin and the number 2,3 on dice.
(iii) head and tail on coin and the number 6 on dice.
(iv) not tail on coin and the number 5 on dice.
(v) not head on coin and the number 5 and 2 on dice.
Solution:
When a fair coin is tossed along with rolling a fair dice one, the possible outcomes are:

$$S = \{(H,1),(H,2),(H,3),(H,4),(H,5),(H,6)$$
$$(T,1),(T,2),(T,3),(T,4),(T,5),(T,6)\}$$
$$n(S) = 12$$

(i) Tail on coin and at least 4 on dice.

Solution:
Let A be an event of occurring tail on coin and at least 4 an dice;

$$A = \{T,4),(T,5),(T,6)\},n(A) = 3$$

Probability of event A:

$$P(A) = \frac{n(A)}{n(S)} = \frac{3}{12} = \frac{1}{4}$$

(ii) Head on coin and the number 2,3 on dice.
Let " B " is an event of selecting a Head coin and number 2,3 on dice:

$$B = \{H,2),(H,3)\},n(B) = 2$$

Probability of event B.

$$P(B) = \frac{n(C)}{n(S)} = \frac{2}{12} = \frac{1}{6}$$

(iii) Head and tail on coin and the number of 6 on dice.
Solution:
Let "C" be an event of occurring head and tail on coin and number 6 on dice

$$C = \{(H,6),(T,6)\},n(C) = 2$$

Probability of event C :

$$P(C)\frac{n(C)}{n(S)}=\frac{2}{12}=\frac{1}{6}$$

(iv) Not tail on coin and the number 5 on dice.

Solution:

Let "D" be an event of occurring a tail on coin and number 5 on dice.

$$D=\{(T,5)\},n(D)=1$$

Probability event D :

$$P(D)=\frac{n(D)}{n(S)}=\frac{1}{12}$$

The probability of not tail on coin and number 5 on dice is:

$$\begin{aligned}P(D')&=1-P(D)\\&=1-\frac{1}{12}\\&=\frac{12-1}{12}=\frac{11}{12}\end{aligned}$$

(v) Not head on coin and the number 5 and 2 on dice.

The probability of not tail on coin and number 5 on dice is:

$$\begin{aligned}P(D')&=1-P(D)\\&=1-\frac{1}{12}\\&=\frac{12-1}{12}=\frac{11}{12}\end{aligned}$$

(v) Not head on coin and the number 5 and 2 on dice.

Solution:

Let "E" be an event of occurring head on coin and number 5 and 2 on dice.

$$E=\{(H,2),(H,5)\},n(E)=2$$

Probability event E :

$$P(E)=\frac{n(E)}{n(S)}=\frac{2}{12}=\frac{1}{6}$$

The probability of not occurring head on coin and number 5 and 2 on dice.

$$\begin{aligned} P\left(E'\right) &= 1 - P(E) \\ &= 1 - \frac{1}{6} \\ &= \frac{6-1}{6} = \frac{5}{6} \end{aligned}$$

Q. 8 A card is selected at random from a well shuffled pack of 52 plying cards. What will be the probability of selecting.

(i) a queen
(ii) neither a queen nor a jack

Solution:
Since total cards are 52 , so $\mathrm{n(S)} = 52$
(i) A queen

Solution:
Let A be an event of getting a queen. $\mathrm{n(A)} = 4$, there are four cards of queen.
Probability of getting a queen:

$$\mathrm{p(\ A) = \frac{n(\ A)}{n(\ S)} = \frac{4}{52} = \frac{1}{13}}$$

(ii) Neither a queen nor a jack

Let " B " be an event of getting a queen or jack, Since, there are 4 cards of queen and 4 cards of Jack, so,

$$n(B) = 8$$

Probability of event B .

$$\mathrm{P(\ B) = \frac{n(\ B)}{n(\ S)} = \frac{8}{52} = \frac{2}{13}}$$

The probability of getting neither queen nor jack.

$$P(B') = 1 - \frac{2}{13}$$
$$= \frac{13-2}{13} = \frac{11}{13}$$

Q. 9 A card is chosen at random from a

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

Q. 9 A card is chosen at random from a pack of 52 playing cards. Find the probability of getting.
(i) a Jack (ii) no diamond

Solution:
Since total cards are 52,

$$\text{so, } n(S) = 52$$

(i) a jack

Let A be an event of getting a jack.
$n(A) = 4$, (There are four cards of jack) probability of event A:

$$p(A) = \frac{n(A)}{n(S)} = \frac{4}{52} = \frac{1}{13}$$

(ii) no diamond

Let " B " is an event of getting diamond.
Since there are 13 cards of diamond so,

$$n(B) = 13$$

Probability of event B.

$$P(B) = \frac{n(B)}{n(S)} = \frac{13}{52} = \frac{1}{4}$$

Probability of getting no diamond.

$$
\begin{aligned}
P\left(B'\right) &= 1 - p(B) \\
&= 1 - \frac{1}{4} \\
&= \frac{4-1}{4} = \frac{3}{4}
\end{aligned}
$$