DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth
DATE :

Solutions

SUBJECT : MATHS
DPP NO. :7

Topic :-PROBABILITY

1 **(b)**

Total number of ways placing 3 letters in three envelopes

$= 3! = 3 \times 2 \times 1 = 6$

Out of these ways only one way is correct

$\therefore$ The required probability $= \frac{1}{6}$

2 **(c)**

Given probability of speaking truth are

$P(A) = \frac{4}{5}$ and $P(B) = \frac{3}{4}$

And their corresponds probabilities of not speaking truth are

$P(\overline{A}) = \frac{1}{5}$ and $P(\overline{B}) = \frac{1}{4}$

The probability that they contradict each other

$= P(A) \times P(\overline{B}) + P(\overline{A}) \times P(B)$

$= \frac{4}{5} \times \frac{1}{4} + \frac{1}{5} \times \frac{3}{4}$

$= \frac{1}{5} + \frac{3}{20}$

$= \frac{7}{20}$

3 **(d)**

Consider the following events:

$A =$ Numbers on two tickets are not more than 10

$B =$ Lowest number on two tickets is 5

$\therefore$ Required probability $= P(B/A)$

$\Rightarrow$ Required Probability $= \frac{P(A \cap B)}{P(A)} = \frac{{}^5C_1 \times {}^1C_1 / {}^{100}C_2}{{}^{10}C_2 / {}^{100}C_2} = \frac{1}{9}$

4 **(b)**

Let A_i denote an event of getting number $i(i = 1,2,...,6)$ on each die. Then, A_i, i = 1,2,...,6 are mutually exclusive events

$\therefore$ Required probability $= P(A_1) + P(A_2) + ... + P(A_6)$ ...(i)

Now,

$P(A_i) =$ Probability of getting number i on each die

$\Rightarrow P(A_i) = \frac{1}{6} \times \frac{1}{6} \times \frac{1}{6} = \frac{1}{216}$

So, required probability $= \frac{6}{216} = \frac{1}{36}$ [From (i)]

<u>ALITER</u> We have,

Total number of elementary events $= 6 \times 6 \times 6 = 216$

Same number can be obtained on each die in one of the following ways:

(1,1,1),(2,2,2),(3,3,3),(4,4,4),(5,5,5),(6,6,6)

Favourable number of elementary events $= 6$

Hence, required probability $= \frac{6}{216} = \frac{1}{36}$

5 **(b)**

$$P\left(\frac{B_2}{R}\right) = \frac{P(B_2)P\left(\frac{R}{B_2}\right)}{P(B_1)P\left(\frac{R}{B_1}\right) + P(B_2)P\left(\frac{R}{B_2}\right) + P(B_3)P\left(\frac{R}{B_3}\right)}$$

$$= \frac{\frac{1}{3} \times \frac{2}{5}}{\frac{1}{2} \times \frac{1}{3} + \frac{1}{3} \times \frac{2}{5} + \frac{1}{6} \times \frac{3}{7}}$$

$$= \frac{\frac{2}{15}}{\frac{1}{6} + \frac{2}{15} + \frac{1}{14}} = \frac{14}{39}$$

6 **(d)**

Total number of elementary events associated to the random experiment is $36 \times 36 = 36^2$

Throws of the two persons are equal means the sum of the numbers are same. The sum of the numbers can be 2,3,...,12.

$\therefore$ Favourable number of elementary events

$= 2(1 \times 1 + 2 \times 2 + \dots + 3 \times 3 + 5 \times 5) + 6 \times 6 = 146$

Hence, required probability $= -1\frac{146}{36^2} = \frac{572}{648}$

7 **(c)**

At least one spade and one ace can be drawn in two mutually exclusive ways:

(i) Drawing one spade and one ace from 3 aces other than ace of spade

(ii) Drawing ace of spade and one other spade.

$\therefore$ Required probability

$$= \frac{{}^{13}C_1 \times {}^{3}C_1 + {}^{12}C_1 \times {}^{1}C_1}{{}^{52}C_2} = \frac{51}{{}^{52}C_2} = \frac{1}{26}$$

8 **(d)**

P (selecting a black ball) $= \frac{{}^{5}C_1}{{}^{12}C_1}$

P (selecting a red ball) $= \frac{{}^{3}C_1}{{}^{12}C_1}$

P (black ball or red ball) $= \frac{^5C_1 + \ ^3C_1}{^{12}C_1} = \frac{2}{3}$

9 **(b)**

Given total number of bolts=600

Numbers of large bolts=20% of 600

$= \frac{20}{100} \times 600 = 120$

Number of small bolts=10% of 600

$= \frac{10}{100} \times 600 = 60$

$\therefore$ Number of suitable bolts

$= 600 - 120 - 60 = 420$

$\therefore$ Probability of selecting suitable bolt

$= \frac{420}{600} = \frac{7}{10}$

10 **(d)**

Let A denote the event that the student is selected in I.I.T. entrance test and B denotes the event that he is selected in Roorkee entrance test. Then,

$P(A) = 0.2, P(B) = 0.5$ and $P(A \cap B) = 0.3$

$\therefore$ Required probability $= P(\bar{A} \cap \bar{B})$

$\Rightarrow$ Required probability $= 1 - P(A \cup B)$

$\Rightarrow$ Required probability $= 1 - \{P(A) + P(B) - P(A \cap B)\}$

$\Rightarrow$ Required probability $= 1 - (0.2 + 0.5 - 0.3) = 0.6$

11 **(c)**

The probability that A get r heads in the three tosses of a coin is

$P(X = r) = \ ^3C_r \left(\frac{1}{2}\right)^3$. The probability that A and B both get r heads in three tosses of a coin is

$^3C_r \left(\frac{1}{2}\right)^3 . \ ^3C_r \left(\frac{1}{2}\right)^3$

$= (^3C_r)^2 \left(\frac{1}{2}\right)^6$

$\therefore$ Required probability $= \sum_{r=0}^{3} (^3C_r)^2 \left(\frac{1}{2}\right)^6$

$= \left(\frac{1}{2}\right)^6 (1 + 9 + 9 + 1) = \frac{20}{64} = \frac{5}{16}$

12 **(b)**

We have, $P(S) = P\{5, 6\} = \frac{2}{6} = \frac{1}{3}$

Let us denote the occurrence of a number greater than 4 in a single throw of the die and F denote its failure.

$\Rightarrow P(F) = \frac{2}{3}$

P (an even number of tosses is needed)

$= P(FS \text{ or } FFFS \text{ or } FFFFFS \text{ or} \ldots)$

$= P(F)P(S) + P(F)^3P(S) + P(F)^5P(S) + \ldots$

$$= \frac{P(F)P(S)}{1 - P(F)^2} = \frac{\frac{2}{9}}{1 - \frac{4}{9}} = \frac{2}{5}$$

13 **(c)**

Let $E =$ event when each American man is seated adjacent to his wife

and $A =$ event when Indian man is seated adjacent to his wife.

Now, $n(A \cap E) = (4!) \times (2!)^5$

Even when each American man is seated adjacent to his wife.

Again, $n(E) = (5!) \times (2!)^4$

$$\therefore P\left(\frac{A}{E}\right) = \frac{n(A \cap E)}{n(E)}$$

$$= \frac{(4!) \times (2!)^3}{(5!) \times (2!)^4} = \frac{2}{5}$$

14 **(a)**

Required probability $= \frac{{}^5C_2 + {}^4C_2}{{}^9C_2} = \frac{4}{9}$

15 **(b)**

Let A_1 be the event that the black card is lost, A_2 be the event that red card is lost and let E be the event that first 13 cards examined are red. Then,

Required probability $= P(A_1/E)$

We have,

$P(A_1) = P(A_2) = 1/2$, as black and red cards were initially equal in number

Also, $P(E/A_1) = \frac{{}^{26}C_{13}}{{}^{51}C_{13}}$ and $P(E/A_2) = \frac{{}^{25}C_{13}}{{}^{51}C_{13}}$

$\therefore$ Required probability $= P(A_1/E)$

$$= \frac{P(E/A_1)P(A_1)}{P(E/A_1)P(A_1) + P(E/A_2)P(A_2)} = \frac{\frac{1}{2} \times \frac{{}^{26}C_{13}}{{}^{51}C_{13}}}{\frac{1}{2} \times \frac{{}^{26}C_{13}}{{}^{51}C_{13}} + \frac{1}{2} \times \frac{{}^{25}C_{13}}{{}^{51}C_{13}}} = \frac{2}{3}$$

16 **(b)**

The probability of getting at least one head in n tosses of a coin $= 1 - \left(\frac{1}{2}\right)^n$

$$\therefore 1 - \left(\frac{1}{2}\right)^n \geq 0.9 \Rightarrow \left(\frac{1}{2}\right)^n \leq 0.1 \Rightarrow 2^n \geq 10 \Rightarrow n \geq 4$$

Hence, the least value of n is 4

17 **(b)**

Favourable ways $=3!\left(1-\frac{1}{1!}+\frac{1}{2!}-\frac{1}{3!}\right)=2$

Total ways $=3!$

$\therefore$ Probability $=\frac{2}{3!}=\frac{1}{3}$

18 **(a)**

$\because f(x)=x^3+ax^2+bx+c$

$\therefore f'(x)=3x^2+2ax+b$

$y=f(x)$ is increasing.

$\Rightarrow f'(x)\geq 0, \forall x$

And for $f'(x)=0$ should not form an interval.

$\Rightarrow 4a^2-4\times 3\times b\leq 0$

$\Rightarrow a^2-3b\leq 0$

This is true for exactly 16 ordered pairs (a,b), $1\leq a,b\leq 6$ namely (1, 1), (1, 2), (1, 3), (1, 4); (1, 5), (1, 6), (2, 2),(2, 3), (2, 4), (2, 5), (2, 6); (3, 3),(3, 4),(3, 5),(3, 6) and (4, 6).

Thus, required probability $=\frac{16}{36}=\frac{4}{9}$

19 **(b)**

$P(0<x<3)=P(x=1)+P(x=2)$

$$=\frac{{}^3C_1\times{}^7C_3}{{}^{10}C_4}+\frac{{}^3C_2\times{}^7C_2}{{}^{10}C_4}=\frac{3\times 35}{210}+\frac{3\times 21}{210}=\frac{4}{5}$$

20 **(c)**

Given, $np=4, npq=2$

$$\Rightarrow p=q=\frac{1}{2}$$

$$\therefore n=4\times 2=8$$

$$\therefore P(X>6)={}^8C_7\left(\frac{1}{2}\right)^7\left(\frac{1}{2}\right)+{}^8C_8\left(\frac{1}{2}\right)^8$$

$$=\frac{8}{256}+\frac{1}{256}=\frac{9}{256}$$

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	B	C	D	B	B	D	C	D	B	D
Q.	11	12	13	14	15	16	17	18	19	20
A.	C	B	C	A	B	B	B	A	B	C