DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth
DATE :

Solutions

SUBJECT : MATHS
DPP NO. :9

Topic :-PROBABILITY

1 **(c)**

Given, $P(\overline{A} \cup \overline{B}) = P(\overline{A \cap B}) = \frac{7}{10}$

Since,$P(A \cap B)$ +$P(\overline{A \cap B})$=1

$\Rightarrow P(A \cap B) = 1 - \frac{7}{10} = \frac{3}{10}$

Also, $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$\Rightarrow \frac{4}{5} = P(A) + \frac{2}{5} - \frac{3}{10}$

$\Rightarrow P(A) = \frac{4}{5} - \frac{2}{5} + \frac{3}{10}$

$= \frac{2}{3} + \frac{3}{10} = \frac{7}{10}$

2 **(c)**

Probability of getting an ace

$P(E_1) = \frac{4}{52} = \frac{1}{13}, P\left(\frac{E_2}{E_1}\right) = \frac{15}{51} = \frac{5}{17}$

$P(E_1 \cap E_2) = P(E_1) \cdot P\left(\frac{E_2}{E_1}\right)$

$= \frac{1}{13} \cdot \frac{5}{17} = \frac{5}{221}$

3 **(b)**

4 five-rupee, 3 two-rupee and 2 one-rupee coins can be stacked together in a column in $\frac{9!}{4!3!2!}$ ways
The number of ways in which coins of the same denomination the consecutive is same as the number of ways of arranging 3 distinct items i.e. 3! Ways

Hence, required probability $= \frac{3!}{\frac{9!}{4!\,3!\,2!}} = \frac{1}{210}$

4 **(b)**

The total number of ways of selecting two squares is 64×63
For each of the four corner squares, the favourable number of way is 2
For each of the 24 non-corner squares on either side of chess board, the favourable number of cases is 3
For each of the 36 remaining squares, the favourable, number of ways is 4
Thus, the total number of favourable ways
$= 4 \times 2 + 24 \times 3 + 36 \times 4 = 224$
Hence, required probability $= \frac{224}{64 \times 63} = \frac{1}{18}$

5 **(b)**

We define the following events:

A_1:He knows the answer;

A_2:He does not know the answer;

E:He gets the correct answer

Then, $P(A_1) = \frac{9}{10}, P(A_2) = 1 = \frac{9}{10} = \frac{1}{10},$

$P(E \mid A_1) = 1, P(E \mid A_2) = \frac{1}{4}$

$\therefore$ Required probability $= P(A_2|E)$

$$= \frac{P(A_2)P(E/A_2)}{P(A_1)P(E \mid A_1) + P(A_2)P(E|A_2)} = \frac{\frac{1}{10} \cdot \frac{1}{4}}{\frac{9}{10} .1 + \frac{1}{10} \cdot \frac{1}{4}} = \frac{1}{37}$$

6 **(d)**

$P(A \cap B') = P(A) - P(A \cap B)$

7 **(d)**

Let $A =$ Event of getting i on first dice

and $B =$ Event of getting more than i on second dice

$\therefore$ Required probability $= \sum_{i=1}^{5} P(A_i \cap B_1)$

$$= \frac{1}{6}[P(B_1) + P(B_2) + P(B_3) + P(B_4) + P(B_5)]$$

$$= \frac{1}{6}\left[\frac{5}{6} + \frac{4}{6} + \frac{3}{6} + \frac{2}{6} + \frac{1}{6}\right]$$

$$= \frac{15}{36} = \frac{5}{12}$$

8 **(a)**

The event that the fifth toss results in a head is independent of the event that the first four tosses result in tails.

$\therefore$ Probability of the required event $=\frac{1}{2}$

9 **(a)**

Let A_1 denote the event that a coin having heads on both sides is chosen, and A_2 denote the event that a fair coin is chosen. Let E denote the event that head occurs. Then

$P(A_1)=\frac{n}{2n+1}, P(A_2)=\frac{n+1}{2n+1}, P(E/A_1)=1, P(E/A_2)=\frac{1}{2}$

Now, $P(E)=P(A_1\cap E)+P(A_2\cap E)$

$\Rightarrow P(E)=P(A_1)P(E/A_1)+P(A_2)P(E/A_2)$

$\Rightarrow \frac{31}{42}=\frac{n}{2n+1}\times 1+\frac{n+1}{2n+1}\times\frac{1}{2}$

$\Rightarrow \frac{31}{42}=\frac{3n+1}{2(2n+1)}$

$\Rightarrow 124n+62=126n+42$

$\Rightarrow 2n=20 \Rightarrow n=10$

10 **(d)**

In binomial distribution, mean $=np=10$, variance $=npq=5$

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

Let x be the mode, then

$np+p<x>np-q$

$\therefore\ 10+\frac{1}{2}>x>10-\frac{1}{2}$

$\Rightarrow \frac{21}{2}>x>\frac{19}{2} \Rightarrow 9.5<x<10.5$

$\therefore\ x=10$

11 **(b)**

Mean $=np=4$, variance $=nqp=3$

On solving, we get $q=\frac{3}{4}, n=16, p=\frac{1}{4}$

Now, $P(X\geq 1)=1-P(X=0)=1-{}^nC_0p^0q^{n-0}$

$=1-\left(\frac{3}{4}\right)^{16}$

12 **(c)**

Probability of defective transistor $=\frac{5}{15}=\frac{1}{3}$ and probability of non-defective transistor $=1-\frac{1}{3}=\frac{2}{3}$

Probability that the inspectors finds non-defective transistors

$= \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} = \frac{8}{27}$

Hence, probability that atleast one of the inspectors finds a defective transistor

$= 1 - \frac{8}{27} = \frac{19}{27}$

13 **(b)**

The probability of suffering of a disease is 10%

$p = \frac{10}{100} = \frac{1}{10}$ and $q = \frac{9}{10}$

Total number of patients, $n = 6$

$\therefore$ Required probability

$= {}^6C_3 \left(\frac{1}{10}\right)^3 \left(\frac{9}{10}\right)^3$

$= \frac{6.5.4}{3.2.1} \times \frac{1}{1000} \times \frac{9 \times 9 \times 9}{1000}$

$= \frac{2}{10^5} \times 729 = 1458 \times 10^{-5}$

14 **(c)**

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$\therefore 0.6 = P(A) + P(B) - 0.2$

$\Rightarrow P(A) + P(B) = 0.8$

$\Rightarrow P(\bar{A}) + P(\bar{B}) = 12$ $[\because P(A) = 1 - P(\bar{A})]$

15 **(c)**

$n(S) = 36$

Let $E =$ Event of getting sum 7

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

$\therefore\ n(E) = 6$

$E =$ Event of getting sum 11

$= \{(6,5), (5,6)\}$

$\therefore\ n(F) = 2$

Also $n(E \cap F) = 0$

$\therefore\ n(E \cup F) = n(E) + n(F) - n(E \cap F)$

$= 6 + 2 = 8$

$\therefore$ Required probability $= \frac{8}{36} = \frac{2}{9}$

16 **(a)**

Since the graph of $y = 16\,x^2 + 8(a+5)x - 7\,a - 5$ is strictly above x-axis. Therefore,
$y > 0$ for all x
$\Rightarrow 16\,x^2 + 8(a+5)x - 7\,a - 5 > 0$ for all x
$\Rightarrow 64(a+5)^2 + 64(7\,a+5) < 0$ [$\because$ Disc < 0]
$\Rightarrow a^2 + 17\,a + 30 < 0$
$\Rightarrow -15 < a < -2$

$\therefore$ Required probability $= \frac{\int_{-15}^{-2} dx}{\int_{-20}^{0} dx} = \frac{13}{20}$

17 **(c)**

Duplicate $=5$, original $= 10$
Taking 3 times.
The probability that none of the items is duplicate *ie*, all the three are original
$= \frac{{}^{10}C_3}{{}^{15}C_3} = \frac{24}{91}$

18 **(b)**

The probability that only two tests are needed = (probability that the first tested machine is faulty) $\times$ (probability that the second tested machine is faulty given the first machine tested is faulty) $= \frac{2}{4} \times \frac{1}{3} = \frac{1}{6}$.

19 **(c)**

Five tickets out of 50 can be drawn in ${}^{50}C_5$ ways. Since $x_1 < x_2 < x_3 < x_4 < x_5$ and $x_3 = 30$.
Therefore, $x_1, x_2 < 30$ i.e. x_1 and x_2 should come from tickets numbered 1 to 29 and this may happen in ${}^{29}C_2$ ways. Remaining two i.e. $x_4, x_5 < 30$, should come from 20 tickets numbered 31 to 50 in ${}^{29}C_2$ ways.
So, favourable number of elementary events $= {}^{29}C_2 \times {}^{20}C_2$
Hence, required probability $= \frac{{}^{29}C_2 \times {}^{20}C_2}{{}^{50}C_5}$

20 **(a)**

Probability of no tail in four throws $= \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{16}$
Probability of atleast one tail $= 1 - \frac{1}{16} = \frac{15}{16}$

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