DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth
DATE :

Solutions

SUBJECT : MATHS
DPP NO. :3

Topic :-PROBABILITY

1 **(a)**

The required probability is given by

$P\{(A \cap \bar{B}) \cup (\bar{A} \cap B)\}$

$= P(A \cap \bar{B}) + P(\bar{A} \cap B)$ $\left[\begin{array}{c}\text{By add. Theorem for mutually} \\ \text{exclusive events}\end{array}\right]$

$= P(A)P(\bar{B}) + P(\bar{A})P(B)$ [$\because A, B$ are independent events]

$= P(A)(1 - P(B) + (1 - (A))P(B)$

$= P(A) + P(B) - 2\,P(A)P(B)$

$= P(A) + P(B) - 2\,P(A \cap B)$

2 **(c)**

Since, $P(A \cap B) = P(A)P(B)$

$\Rightarrow A$ and B are independent events

$\Rightarrow A^c$ and B^c will also independent events

Hence, $P(A \cup B)^c = P(A^c \cap B^c)$

$= P(A^c)P(B^c)$

3 **(a)**

Sum of Probabilities=1

$\Rightarrow\ p + 2p + 3p + 4p + 5p + 7p + 8p + 9p$

$+10p + 11p + 12p = 1$

$\Rightarrow\ 72p = 1\ \Rightarrow p = \frac{1}{72}$

4 **(b)**

Let the total number of students be 100, then in which 60 girls and 40 boys

As 25% of boys offer Mathematics $= \frac{25}{100} \times 40 = 10$ boys

and 10% of girls offer Mathematics $= \frac{10}{100} \times 60 = 6$ girls

$\therefore$ Total number of students, whose offers Mathematics is 16

$\therefore$ Required probability $= \frac{6}{16} = \frac{3}{8}$

5 **(a)**

Let $q = 1 - p$. Since, head appears first time in an even throw 2 or 4 or 6

$\therefore\ \frac{2}{5} = qp + q^3p + q^5p + \ldots$

$\therefore\ \frac{2}{5} = \frac{qp}{1 - q^2}$

$\Rightarrow\ \frac{2}{5} = \frac{(1 - p)p}{1 - (1 - p)^2}$

$\Rightarrow\ \frac{2}{5} = \frac{1 - p}{2 - p}$

$\Rightarrow\ 4 - 2P = 5 - 5P\ \Rightarrow\ p = \frac{1}{3}$

6 **(a)**

We have,

$P[(E_1 \cup E_2) \cap (\bar{E}_1) \cap (\bar{E}_2)]$
$= P[(E_1 \cup E_2) \cap (\bar{E}_1 \cap \bar{E}_2)]$
$= P[(E_1 \cup E_2) \cap (\overline{E_1 \cup E_2})] = P(\phi) = 0 \leq 1/4$

7 **(b)**

Given, $P(A \cap B) = \frac{1}{6}$

$\Rightarrow P(A)P(B) = \frac{1}{6}$ ...(i)

and $P(\bar{A} \cap \bar{B}) = \frac{1}{3}$

$\Rightarrow P(\bar{A})P(\bar{B}) = \frac{1}{3}$

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

$\Rightarrow 1 - \frac{1}{3} + P(A)P(B) = P(A) + P(B)$

$\Rightarrow \frac{2}{3} + \frac{1}{6} = P(A) + P(B)$ [from Eq.(i)]

$\Rightarrow P(A) + P(B) = \frac{5}{6}$ ...(ii)

On solving Eqs. (i) and (ii), we get

$P(A) = \frac{1}{2}, P(B) = \frac{1}{3}$

or $P(A) = \frac{1}{3}, P(B) = \frac{1}{2}$

9 **(a)**

We know, total probability distribution is 1.

$\therefore \frac{1}{10} + k + \frac{1}{5} + 2k + \frac{3}{10} + k = 1$

$\Rightarrow \frac{6}{10} + 4k = 1$

$\Rightarrow k = \frac{1}{10}$

10 **(d)**

We have, $p = 3/4$ and $n = 5$

$\therefore$ Required probability

$= {}^5C_3\left(\frac{3}{4}\right)^3\left(\frac{1}{4}\right)^2 + {}^5C_4\left(\frac{3}{4}\right)^4\left(\frac{1}{4}\right) + {}^5C_5\left(\frac{3}{4}\right)^5 = \frac{459}{512}$

11 **(c)**

One red card one queen can be drawn in the following mutually exclusive ways:
(I) By drawing one red card out of 24 red cards (excluding 2 red queens) and one red queen out of 2 red queens. Let this event be A
(II) By drawing one red card out of 26 red cards (including 2 red queens) and one queen out of 2 black queens. Let B
$\therefore$ Required probability $= P(A \cup B) = P(A) + P(B)$

$= \frac{{}^{24}C_1 \times {}^2C_1}{{}^{52}C_2} + \frac{{}^{26}C_1 \times {}^2C_1}{{}^{52}C_2} = \frac{50}{663}$

12 **(a)**

Given, $4P(A) = 6P(B) = 10P(A \cap B) = 1$

$\therefore P\left(\frac{B}{A}\right) = \frac{P(A \cap B)}{P(A)} = \frac{\frac{1}{10}}{\frac{1}{4}} = \frac{2}{5}$

13 **(c)**

Given, $np = 4, npq = 3V \Rightarrow p = \frac{1}{4}, q = \frac{3}{4}$

Mode is an integer x such that

$\Rightarrow\ 4+\frac{1}{4}>x>4-\frac{3}{4}$
$\Rightarrow\ 3.25<x<4.25$
$\therefore\ x=4$

14 **(c)**

$P\left(\frac{B}{A\cup B^C}\right)=\frac{P(B\cap(A\cup B^c))}{P(A\cup B^c)}$
$=\frac{P(A\cap B)}{P(A)+P(B^c)-P(A\cap B^c)}$
$=\frac{P(A)-P(A\cap B^c)}{P(A)+P(B^c)-P(A\cap B^c)}$
$=\frac{0.7-0.5}{0.8}=\frac{1}{4}$

15 **(b)**

The number of ways in which either player can choose a number from 1 to 25 is 25, so the total number of ways a choosing numbers is $25\times 25=625$. So, the probability that they will not win a prize in a single trial
$=1-\frac{1}{25}=\frac{24}{25}$

16 **(c)**

Let X be the number of defective bulbs in a sample of 5 bulbs.
Probability that a bulb is defective $=p=\frac{10}{100}=\frac{1}{10}$
Then, $P(X=r)=\ {}^5C_r\left(\frac{1}{10}\right)^r\left(\frac{9}{10}\right)^{5-r}$
$\therefore$ Required probability $=P(X=0)=\ {}^5C_0\left(\frac{1}{10}\right)^0\left(\frac{9}{10}\right)^5=\left(\frac{9}{10}\right)^5$

17 **(b)**

We know sum of probability distribution is 1
$\therefore\ k+2k+3k+2k+k=1$
$\Rightarrow\ k=\frac{1}{9}$
$\therefore$ Mean, $m=\sum_{i=1}^{5}P_ix_i$
$=k(1)+2k(2)+3k(3)+2k(4)+k(5)$
$=k(1+4+9+8+5)=\frac{1}{9}\times 27=3$
$\therefore\ (k,m)=\left(\frac{1}{9},3\right)$

18 **(d)**

$\therefore$ Required probability $=\frac{30+5}{60}=\frac{7}{12}$

19 **(b)**

Total number of ways$=\ {}^{11}C_5=462$
Number of ways in which 2 particular girls are included
${}^9C_3=84$
$\therefore$Required probability$=\frac{84}{462}=\frac{2}{11}$

20 **(b)**

Required probability$= 1 - P(\text{all letters in right envelope})$

$= 1 - \frac{1}{n!}$

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