DPP

DAILY PRACTICE PROBLEMS

CLASS : XIth
DATE :

Solutions

SUBJECT : MATHS
DPP NO. :3

Topic :-PROBABILITY

1 **(a)**

The required probability is given by

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

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

$= P(A)P(\overline{B}) + P(\overline{A})P(B)$ [$\because A, B$ 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^cwill 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,

$P[(E_1 \cup E_2) \cap (\bar{E}_1) \cap (\bar{E}_2)]$

$= P[(E_1 \cup E_2) \cap (\bar{E}_1 \cap \bar{E}_2)]$

$= P\left[(E_1 \cup E_2) \cap \left(\overline{E_1 \cup E_2}\right)\right] = P(\phi) = 0 \leq 1/4$

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

$$\therefore\ k + 2k + 3k + 2k + k = 1$$

$$\Rightarrow k = \frac{1}{9}$$

$$\therefore \text{Mean}, m = \sum_{i=1}^{5} P_i x_i$$

$$= k(1) + 2k(2) + 3k(3) + 2k(4) + k(5)$$

$$= k(1 + 4 + 9 + 8 + 5) = \frac{1}{9} \times 27 = 3$$

$$\therefore\ (k, m) = \left(\frac{1}{9}, 3\right)$$

18 **(d)**

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

19 **(b)**

Total number of ways = ${}^{11}C_5 = 462$

Number of ways in which 2 particular girls are included

${}^{9}C_3 = 84$

$\therefore$ Required probability $= \frac{84}{462} = \frac{2}{11}$

20 **(b)**

Required probability $= 1 - P$(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