DPP

DAILY PRACTICE PROBLEMS

CLASS : XIth
DATE :

Solutions

SUBJECT : MATHS
DPP NO. :2

Topic :-PROBABILITY

1 **(a)**

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

$\therefore 0.8 = 0.3 + P(B') - 0.3P(B')$

$\Rightarrow 0.5 = P(B')(0.7)$

$\Rightarrow P(B') = \frac{5}{7}$

$\therefore P(B) = 1 - \frac{5}{7} = \frac{2}{7}$

2 **(a)**

Required probability $= \frac{3}{6} = \frac{1}{2}$

3 **(c)**

There are two equilateral triangles in a regular hexagon

$\therefore$ Required probability $= \frac{2}{20} = \frac{1}{10}$

4 **(c)**

From the given condition it is clear that a particular person is always in a committee of 3 persons. It means we have to select 2 person out of 37 persons.

$\therefore$ Required probability $= \frac{^{37}C_2}{^{38}C_3}$

5 **(d)**

We know a leap year is fallen within 4 yr, so its probability $= \frac{25}{100} = \frac{1}{4}$.

In a century the probability of 53rd Sunday in a leap year $= \frac{1}{4} \times \frac{2}{7} = \frac{2}{28}$

Non-leap year in century = 75

Probability of selecting is non-leap year $= \frac{75}{100} = \frac{3}{4}$

53rd Sunday in non-leap year $= \frac{1}{7}$

Similarly, in a century probabilities of 53rd Sunday in a non-leap year

$= \frac{3}{4} \times \frac{1}{7} = \frac{3}{28}$

$\therefore$ Required probability $= \frac{2}{28} + \frac{3}{28} = \frac{5}{28}$

6 **(b)**

There are two conditions arise.

(i) When first is an ace of heart and second one is non-ace of heart, the probability $=\frac{1}{52}\times\frac{51}{51}=\frac{1}{52}$

(ii) When first is non-ace of heart and second one is an ace of heart, the probability $=\frac{51}{52}\times\frac{1}{51}=\frac{1}{52}$

$\therefore$ Required probability $=\frac{1}{52}+\frac{1}{52}=\frac{1}{26}$

7 **(c)**

We have,

Total number of binary operations on $A=n^{n^2}$

Total number of commutative binary operations on A

$=n^{\frac{n(n+1)}{2}}$

$\therefore$ Required probability $=\frac{n^{\frac{n(n+1)}{2}}}{n^{n^2}}=\frac{n^{n/2}}{n^{n^2/2}}$

8 **(a)**

Required probability $=\frac{^{12}C_1}{^{20}C_1}=\frac{3}{5}$

9 **(b)**

$P(A')=1-P(A)=0.8$, $P(A'\cap B)$ will maximum, if $B\subseteq A'$ in which case $A'\cap B=B$. So,

$P(A'\cap B)=P(B)=0.5$

10 **(a)**

The total number of ways in which 4 tickets can be drawn 5 times $=4^5=1024$

The number of ways of getting a sum of 23

$=$ Coeff. of x^{23} in $(x^{00}+x^{01}+x^{10}+x^{11})^5$

$=$ Coeff. of x^{23} in $[(1+x)(1+x^{10})]^5$

$=$ Coeff. of x^{23} in $(1+x)^5(1+x^{10})^5$

$=$ Coeff. of x^{23} in $\{(1+5\,x+10\,x^2+10\,x^3+5\,x^4+x^5)\,(1+5\,x^{10}+10\,x^{20}+10\,x^{30}+\dots)\}$

$=100$

Hence, required probability $=\frac{100}{1024}=\frac{25}{256}$

11 **(c)**

Required probability $=\ ^6C_4\left(\frac{1}{4}\right)^4\left(\frac{5}{6}\right)^2=\frac{125}{15552}$

12 **(c)**

In $3n$ conseecutive natural numbers, either

(i) n numbers are of from $3P$

(ii) n numbers are of from $3P+1$

$(iii)n$ numbers are of from $3P+2$

Here favourable number of cases= Either we can select three numbers from any of the set or we can select one from each set

$=\ ^nC_3+{}^nC_3+{}^nC_3+(\ ^nC_1\times\ ^nC_1\times\ ^nC_1)$

$=3\left(\frac{n(n-1)(n-2)}{6}\right)+n^3$

$$= \frac{n(n-1(n-2)}{2} + n^3$$

Total number of selections $= {}^{3n}C_3$

$\therefore$ Required probability

$$= \frac{\frac{n(n-1)(n-2)}{2} + n^3}{\frac{3n(3n-1)(3n-2)}{6}}$$

$$= \frac{3n^2 - 3n + 2}{(3n-1)(3n-2)}$$

13 **(d)**

A and B will agree in a certain statement if both speak truth or both tell a lie. We define following events

$E_1 = A$ and B both speak truth $\Rightarrow P(E_1) = xy$

$E_2 = A$ and B both tell a lie $\Rightarrow P(E_2) = (1-x)(1-y)$

$E = A$ and B agree in a certain statement

Clearly, $P(E \mid E_1) = 1$ and $P(E \mid E_2) = 1$

The required probability is $P(E_1|E)$

Using Bayes' theorem

$$P(E_1 \mid E) = \frac{P(E_1)P(E|E_1)}{P(E_1)P(E \mid E_1) + P(E_2)P(E|E_2)}$$

$$= \frac{xy.1}{xy.1 + (1-x)(1-y).1} = \frac{xy}{1-x-y+2xy}$$

14 **(c)**

$\because$ Total number of ways $= 5!$

and favourable number of ways $= 2 \cdot 4!$

Hence, required probability $= \frac{2 \cdot 4!}{5!} = \frac{2}{5}$

15 **(c)**

Three dice can be thrown in $6^3 = 216$ ways.

The same number can appear on three dice in the following ways : (1,1,1),(2,2,2),(3,3,3),(4,4,4),(5,5,5),(6,6,6)

$\therefore$ Favourable number of elementary events $= 6$

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

16 **(c)**

Probability that both are of red colours $= \frac{{}^8C_2}{{}^{15}C_2} = \frac{4}{15}$

And probability that both are of black colours

$$= \frac{{}^{7}C_2}{{}^{13}C_2} = \frac{3}{15}$$

$\therefore$ Probability that they are of same colour

$$= \frac{4}{15} + \frac{3}{15} = \frac{7}{15}$$

17 **(b)**

Consider the following events :

$A =$ Getting 2 black balls and 4 white in first 6 draws

$B =$ Getting a black ball in 7th draw

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

$\Rightarrow$Required probability $= \frac{{}^{3}C_2 \times {}^{10}C_4}{{}^{13}C_6} \times \frac{1}{7} = \frac{15}{286}$

18 **(a)**

$P(A) = 0.25, P(B) = 0.50, P(A \cap B) = 0.14$

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

$= 0.25 + 0.50 - 0.14 = 0.61$

$\therefore P(\overline{A} \cap \overline{B}) = P(\overline{A \cup B})=1 - P(A \cup B)$

$= 1 - 0.61 = 0.39$

19 **(a)**

Total number of cases $= 9999$

Favourable cases $= 10 \times 9 \times 8 \times 7 = 5040$

$\therefore$ Probability $= \frac{5040}{9999}$

20 **(d)**

Given, $x^2 + 4x + c = 0$

For real roots, $D = b^2 - 4ac \geq 0$

$= 16 - 4c \geq 0$

$\Rightarrow c = 1, 2, 3, 4$ will satisfy the above inequality

$\therefore$ Required probability $= \frac{4}{9}$

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