CLASS : XIth
DATE :

Solutions

SUBJECT : MATHS
DPP NO. :6

Topic :-PROBABILITY

1 **(c)**

Given, $f(x) = \frac{x}{2}$ $[0 \le x \le 2]$

$\therefore P(X > 1.5) = \int_{1.5}^{2} \frac{x}{2} dx = \left[\frac{x^2}{4}\right]_{1.5}^{2}$

$= 0.4375$

and $P(X > 1) = \int_1^2 \frac{x}{2} dx = \left[\frac{x^2}{4}\right]_1^2 = 0.75$

$\therefore P\left(\frac{X > 1.5}{X > 1}\right) = \frac{P(X > 1.5)}{P(X > 1)}$

$= \frac{0.4375}{0.75} = \frac{7}{12}$

2 **(a)**

Required probability $= 1 - \left(1 - \frac{2}{3}\right)\left(1 - \frac{3}{4}\right) = \frac{11}{12}$

3 **(a)**

Given, $P(A \cup B) = 0.6, P(A \cap B) = 0.2$

Probability of exactly one of the event occurs is

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

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

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

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

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

$= 0.6 - 0.2 = 0.4$

4 **(c)**

Probability of each case $=\frac{9}{15}=\frac{3}{5}$

Required probability (with replacement) $=\left(\frac{3}{5}\right)^7$

5 **(b)**

The total number of ways $=6^3=216$

If the second number is $i(i>1)$, then the total number of favourable ways

$$=\sum_{i=1}^{5}(i-1)(6-i)=20$$

$\therefore$ Required probability $=\frac{20}{216}=\frac{5}{54}$

6 **(b)**

$$\frac{P(X=K)}{P(X=k-1)}=\frac{{}^nC_k p^k q^{n-k}}{{}^nC_{k-1}p^{k-1}q^{n-k+1}}$$

$$=\left(\frac{n-k+1}{k}\right).\frac{p}{q}$$

8 **(d)**

We have, $P(E_i)=\frac{1}{2}$ for $i=1,2,3$

For $i\neq j$, we have,

$P(E_i\cap E_j)=\frac{1}{4}=P(E_i)P(E_j)$

$\Rightarrow E_i$ and E_j are independent events for $i\neq j$

Also, $P(E_1\cap E_2\cap E_3)=\frac{1}{4}\neq P(E_1)\,P(E_2)\,P(E_3)$

$\Rightarrow E_1,E_2,E_3$ are not independent

Hence option (d) is not correct

9 **(a)**

$$P(A)=1-P(\bar{A})=1-\frac{2}{3}=\frac{1}{3}$$

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

$$\Rightarrow\frac{3}{4}=\frac{1}{3}+P(B)-\frac{1}{4}\Rightarrow P(B)=\frac{2}{3}$$

Now, $P(\bar{A}\cap B)=(B)-P(A\cap B)=\frac{2}{3}-\frac{1}{4}=\frac{5}{12}$

11 **(a)**

Let x,y and z be the parts and $x\leq y\leq z$. Then, $(x,y,z)\in$ (1, 1, 8), (1, 2, 7), (1, 3, 6), (1, 4, 5), (2, 2, 6), (2, 3, 5), (3, 3, 4)(2, 4, 4)}.Only the cases when (x,y,z) formed a triangle are {(3, 3, 4), (2, 4, 4)},

Required probability $=\frac{2}{8}=\frac{1}{4}$.

12 **(b)**

Let E_1 denote the event of travelling by train and E_2 denote the event travelling by plane.

$P(E_1)=\frac{2}{3}, P(E_2)=\frac{1}{5}$
$P(E_1\cup E_2)=P(E_1)+P(E_2)$
$=\frac{2}{3}+\frac{1}{5}=\frac{13}{15}$

13 **(a)**

Three digit numbers multiple of 11 are 110, 121,...,990 (81 numbers). Now number also divisible by 9 are divisible by 99. So, numbers are 198, 297,...,990(9 numbers).

So, required probability $=\frac{9}{81}=\frac{1}{9}$.

14 **(b)**

If any number the last digit can be 0,1,2,3,4,5,6,7,8,9. We want that the last digit in the product is an odd digit other than 5 i.e. it is any one of the digits 1,3,7,9. This means that the product is not divisible by 2 or 5. The probability that a number is divisible by 2 or 5 is $\frac{6}{10}$, and in the case the last digit can be one of 0,2,4,5,6 or 8. The probability that the number is not divisible by 2 or 5, is $1-\frac{6}{10}$ $=\frac{2}{5}$

In order that the product is not divisible by 2 or 5, none of the constituent numbers should be divisible by 2 or 5 and its probability is $\left(\frac{2}{5}\right)^4=\frac{16}{125}$

15 **(c)**

Let $E=$ Event of getting sum of 7 in two dice
$=\{(1,6),(2,5),(3,4),(4,3),(5,2),(6,1)\}$
Now, $P(E)=\frac{6}{36}=\frac{1}{6}$ (say)
$\Rightarrow p=\frac{1}{6}$
$\therefore\ q=1-p=\frac{5}{6}$
Required probability $=\ {}^4C_2\left(\frac{1}{6}\right)^2\left(\frac{5}{6}\right)^2$
$=6\times\frac{5^2}{6^4}=\frac{25}{216}$

16 **(d)**

The probability that Mr. A selected the loosing horse
$=\frac{4}{5}\times\frac{3}{4}=\frac{3}{5}$
The probability that Mr. A selected the winning horse
$=1-\frac{3}{5}=\frac{2}{5}$

17 **(b)**

Given, $S=\{1,2,3\ldots,50\}$
$A=\left\{n\in S{:}n+\frac{50}{n}>27\right\}$
$=\{n\in S{:}n^2-27n+50>0\}$
$=\{n\in S{:}n<2 \text{ or } n>25\}$
$=\{1, 26, 27,\ldots, 50\}$

$\Rightarrow n(A) = 26$

$B = \{n \in S : n \text{ is a prime}\}$

$= \{2,3,5,7,11,13,17,19,23,29,31,37,41,43,47\}$

$\Rightarrow n(B) = 15$

$\therefore\ C = \{n \in S : n \text{ is a square}\}$

$= \{1,4,9,16,25,36,49\}$

$\Rightarrow n(C) = 7$

$\therefore\ P(A) = \frac{n(A)}{n(S)} = \frac{26}{50}, P(B) = \frac{15}{50}, P(C) = \frac{7}{50}$

$\Rightarrow P(A) > P(B) > P(C)$

18 **(c)**

$\therefore$ Required probability

$= P(WBWB) + (BWBW)$

$$= \frac{{}^5C_1 \times {}^3C_1 \times {}^4C_1 \times {}^2C_1}{{}^8C_1 \times {}^7C_1 \times {}^6C_1 \times {}^5C_1} + \frac{{}^3C_1 \times {}^5C_1 \times {}^2C_1 \times {}^4C_1}{{}^8C_1 \times {}^7C_1 \times {}^6C_1 \times {}^5C_1}$$

$$= 2\left(\frac{5 \times 3 \times 4 \times 2}{8 \times 7 \times 6 \times 5}\right) = \frac{1}{7}$$

19 **(c)**

The total number of favourable cases, $n(E) = 18$

The total number of cases, $n(S) = {}^{20}C_3$

$$= \frac{20 \times 19 \times 18}{3 \times 2 \times 1} = 1140$$

$\therefore$ Required probability $= \frac{18}{1140} = \frac{3}{190}$

20 **(b)**

The sum of two numbers is odd only when one is odd and other is even.

$\therefore$ Required probability $= \frac{{}^{20}C_1 . {}^{20}C_1}{{}^{40}C_2}$

$$= \frac{20 \times 20}{\frac{40 \times 39}{2 \times 1}} = \frac{20 \times 20}{20 \times 39}$$

$$= \frac{20}{39}$$

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