Numeric Response Questions
Probability

Q.1 An unbiased coin is tossed n times. If the probability that head occurs 6 times is equal to the probability that head cocurs 8 times, then find the value of n.

Q.2 A problem in mathematics is given to three students A, B and C and their respective probability of solving the problem is $1/2, 1/3$ and $1/4$ then find the probability that the problem is solved.

Q.3 A and B are two events where $P(A) = 0.25$ and $P(B) = 0.5$. The probability of both happening together is 0.14. Then find the probability of both A and B not happening.

Q.4 A coin is tossed n times, The probability of getting head at least once is greater than 0.8, then find the least value of n.

Q.5 The probability that a man will live 10 more years, is $1/4$ and the probability that his wife will live 10 more years, is $1/3$. If the probability that none of them will be alive after 10 years, is $\frac{k}{10}$ then find k.

Q.6 If the probability of the occurrence of a multiple of 3 on one die, a multiple of 2 on the other die if both are thrown together is $\frac{11}{k}$, then find k.

Q.7 Seven white balls and three black balls are randomly placed in a row. If the probability that no two black balls are placed adjacently equals $\frac{k}{\lambda}$ then find $k + \lambda$.

Q.8 In tossing 10 coins the probability of getting exactly 5 heads is $\frac{63}{k}$ then find k.

Q.9 Three cards are drawn from a pack of 52 cards. If the probability that they are of the same colour is $\frac{k}{\lambda}$ then find $\lambda - k$.

Q.10 Two coins are tossed together. Then find the probability of getting two heads.

Q.11 The probability that a bulb produced by a factory will fuse after 150 days if used is 0.05. If the probability that out of 5 such bulbs none will fuse after 150 days of use is $\left(\frac{19}{k}\right)^5$ then find k.

Q.12 In a throw of a dice the probability of getting one in even number of throws is $\frac{\lambda}{11}$ then find λ.

Q.13 A card is drawn from a pack of 52 cards. A gambler bets that it is a spade or an ace. If the odds against his winning this bet is $\lambda: 4$ then find λ.

Q.14 A pack of cards contains 4 aces, 4 kings, 4 queens and 4 jacks. Two cards are drawn at random from this pack without replacement. If the probability that at least one of them will be an ace, is $\frac{\lambda}{k}$ then find $\lambda + \mathrm{k}$

Q.15 Two persons A and B take turns in throwing a pair of dice. The first person to through 9 from both dice will be awarded the prize. If A throws first and the probability that B wins the game is $\frac{k}{17}$ then find k.

ANSWER KEY

1. 14.00	**2.** 0.75	**3.** 0.39	**4.** 3.00	**5.** 5.00	**6.** 36.00	**7.** 22.00
8. 256.00	**9.** 13.00	**10.** 0.25	**11.** 20.00	**12.** 5.00	**13.** 9.00	**14.** 29.00
15. 8.00						

Hints & Solutions

1. $\frac{{}^{n}C_6}{2^n} = \frac{{}^{n}C_8}{2^n}$

$\Rightarrow n = 6 + 8$

$n = 14$

2. $P(A \cup B \cup C) = 1 - P(\overline{A} \cap \overline{B} \cap \overline{C})$

$= 1 - \frac{1}{2} \times \frac{2}{3} \times \frac{3}{4}$

$= \frac{3}{4}$

3. $P(\overline{AB}) = P(\overline{A \cup B}) = 1 - P(A \cup B)$

$= 1 - \{P(A) + P(B) - P(A \cap B)\}$

$= 1 - \{0.25 + 0.50 - 0.14\} = 0.39$

4. P(At least 1 head) > 0.8

1 – P(No Head) > 0.8

$1 - \left(\frac{1}{2}\right)^n > 0.8$

$\frac{2}{10} > \left(\frac{1}{2}\right)^n$

$2^{n+1} > 10$

n = 1, 2, 3, 4, ...

✖ ✖ ✓ ✓

$\Rightarrow n_{min} = 3$

5. Let A be the name of man and B be the name of his wife.

P(A will live 10 more years) = $\frac{1}{4}$

P(A will not alive after 10 years) = $\frac{3}{4}$

P(B will live 10 more years) = $\frac{1}{3}$

P(B will not alive after 10 years) = $\frac{2}{3}$

So, P(None of them will be alive after 10 years) =?

i.e. P(A will nor be alive after 10 years and B will not be alive after 10 years) = $\frac{3}{4} \times \frac{2}{3} = \frac{1}{2}$

6. $P\left[\begin{matrix}1\\2k\end{matrix}\begin{matrix}2\\3k\end{matrix} \cup \begin{matrix}1\\3k\end{matrix}\begin{matrix}2\\2k\end{matrix}\right]$

$= \frac{(3 \times 2)}{36} + \left(\frac{2 \times 3}{36}\right) - \frac{1 \times 1}{36}$

$= \frac{11}{36}.$

7. $P = \frac{\lfloor 7 \times {}^{8}C_3 \times \lfloor 3}{\lfloor 10} = \frac{7 \times 6}{10 \times 9} = \frac{7}{15}$

8. $P = \frac{{}^{10}C_5}{2^{10}} = \frac{9 \times 4 \times 7}{1024} = \frac{63}{256}$

9. Ex. events = ${}^{52}C_3$

Fav. events = ${}^{26}C_3 + {}^{26}C_3$

Total black colour = 26

Total red colour = 26

Req. probability = $\frac{{}^{26}C_3 + {}^{26}C_3}{{}^{52}C_3} = \frac{4}{17}$

10. Sample space (S) = {HH, HT, TT, TH}

Ex. events = 2 × 2 = 4

Req. probability = $\frac{\text{Fav. Events}}{\text{Ex. Events}} = \frac{1}{4}$

11. $P(\text{Bulb fuse}) = \frac{1}{20}$

$P(\overline{\text{Bulb fuse}}) = \frac{19}{20}$

$n = 5$

$P(\text{none is fuse}) = \left(\frac{19}{20}\right)^5$

12. $P = \left(\frac{5}{6}\times\frac{1}{6}\right)+\left(\frac{5}{6}\right)^3\left(\frac{1}{6}\right)+....\infty$ G.P.

$P = \frac{\frac{5}{36}}{1-\frac{25}{36}} = \frac{5}{11}$

13. $P(\text{Win}) = P(\text{spade} \cup \text{Ace}) = \frac{13+4-1}{52} = \frac{16}{52}$

$\therefore$ Odd in against $= 36 : 16 = 9 : 4$

14. Required probability $= 1 - \frac{^{12}C_2}{^{16}C_2} = \frac{9}{20}$

15. $P(B_w) = \frac{8}{9}\times\frac{1}{9}+\left(\frac{8}{9}\right)^3\frac{1}{9}+\left(\frac{8}{9}\right)^5\frac{1}{9}+....$

$= \frac{\frac{8}{9}\times\frac{1}{9}}{1-\left(\frac{8}{9}\right)^2} = \frac{8}{17}$