Case Study 1 : Probability (Classical Definition and Single Events)

Ravi is a shopkeeper who often plays small games with his customers to keep them engaged. One day, he designed a game involving a fair six-sided die and a standard deck of 52 playing cards. Whenever a customer purchases more than 500 rupees of goods, Ravi offers them a chance to play the game. In the first part, the customer has to roll a fair die and Ravi promises a discount coupon if the outcome is an even number. In the second part, the customer has to draw a card randomly from a well-shuffled deck. If the card happens to be a red face card, the customer receives a free gift. Ravi believes this game not only entertains but also increases the probability of customers returning to his shop. Based on this scenario, answer the following questions:

MCQ Questions

1. What is the probability that a customer rolling the die gets an even number?

   (a) $\dfrac{1}{2}$

   (b) $\dfrac{1}{3}$

   (c) $\dfrac{2}{3}$

   (d) $\dfrac{5}{6}$

   Answer: (a) $\dfrac{1}{2}$

   Solution: A die has 6 outcomes, out of which 3 are even (2,4,6). Probability $= \dfrac{3}{6} = \dfrac{1}{2}$.

2. What is the probability of drawing a red face card from a standard deck?

   (a) $\dfrac{3}{52}$

   (b) $\dfrac{6}{52}$

   (c) $\dfrac{12}{52}$

   (d) $\dfrac{9}{52}$

   Answer: (b) $\dfrac{6}{52}$

   Solution: Red face cards are Jack, Queen, King of Hearts and Diamonds. Total = 6 cards. Probability $= \dfrac{6}{52} = \dfrac{3}{26}$.

3. If a customer first rolls the die and then draws a card, what is the probability of getting an even number on the die and a red face card?

   (a) $\dfrac{1}{13}$

   (b) $\dfrac{3}{52}$

   (c) $\dfrac{3}{26}$

   (d) $\dfrac{3}{52}$

Answer: (a) $\dfrac{1}{13}$

Solution: Probability of even number $= \dfrac{1}{2}$, probability of red face card $= \dfrac{6}{52} = \dfrac{3}{26}$.
Combined probability $= \dfrac{1}{2} \times \dfrac{3}{26} = \dfrac{3}{52} = \dfrac{1}{13}$.

4. What is the probability that a card drawn is not a red face card?

   (a) $\dfrac{23}{26}$

   (b) $\dfrac{20}{26}$

   (c) $\dfrac{12}{26}$

   (d) $\dfrac{13}{26}$

Answer: (a) $\dfrac{23}{26}$

Solution: Total cards $= 52$, red face cards $= 6$. Not red face card $= 52 - 6 = 46$.
Probability $= \dfrac{46}{52} = \dfrac{23}{26}$.

5. If two customers play the die game independently, what is the probability that both get even numbers?

   (a) $\dfrac{1}{4}$

   (b) $\dfrac{1}{3}$

   (c) $\dfrac{1}{2}$

   (d) $\dfrac{1}{6}$

Answer: (a) $\dfrac{1}{4}$

Solution: Probability for one customer to get even $= \dfrac{1}{2}$. For two independent customers,
probability $= \dfrac{1}{2} \times \dfrac{1}{2} = \dfrac{1}{4}$.