Important Questions for Class 11 Maths Chapter 14 - Probability

Question 1:

If P(A) is $3/5$. Find P (not A)

Solution:

Given that: P(A) = $3/5$

To find P(not A) = 1 – P(A)

P (not A) = 1- $3/5$

= (5-3)/5

= $2/5$

Therefore, P(not A) = $2/5$.

Question 2:

Find the probability that when a hand of 7 cards are drawn from the well-shuffled deck of 52 cards, it contains

(i) all kings and (ii) 3 kings

Solution:

(i) To find the probability that all the cards are kings:

If 7 cards are chosen from the pack of 52 cards

Then the total number of combinations possible is: $^{52}C_7$

= 52!/[7! (52-7)!]

= 52!/ (7! 45!)

Assume that A be the event that all the kings are selected

We know that there are only 4 kings in the pack of 52 cards

Thus, if 7 cards are chosen, 4 kings are chosen out of 4, and 3 should be chosen from the 48 remaining cards.

Therefore, the total number of combinations is:

$n(A) = {}^4C_4 \times {}^{48}C_3$

= [4!/4!0!] x [48!/3!(48-3)!]

= 1 x [48!/3! 45!]

= 48!/3! 45!

Therefore, P(A) = n(A)/n(S)

= [48!/3! 45!] ÷[52!/ (7! 45!]

= [48! x 7!] ÷ [3!x 52!]

= 1/7735

Therefore, the probability of getting all the 7 cards are kings is 1/7735

(ii) To find the probability that 3 cards are kings:

Assume that B be the event that 3 kings are selected.

Thus, if 7 cards are chosen, 3 kings are chosen out of 4, and 4 cards should be chosen from the 48 remaining cards.

Therefore, the total number of combinations is:

$n(B) = {}^4C_3 \times {}^{48}C_4$

= [4!/3!(4-3)!] x [48!/4!(48-4)!]

= 4 x [48!/4! 44!]

= 48!/3! 45!

Therefore, P(B) = n(B)/n(S)

= [4 x48!/4! 44!] ÷[52!/ (7! 45!]

= 9/1547

Therefore, the probability of getting 3 kings is 9/1547

Question 3:

An urn contains 6 balls of which two are red and four are black. Two balls

are drawn at random. The probability that they are of different colours is

(i)⅖ (ii)1/15 (iii)8/15 (iv)4/15

Solution:

A correct answer is **an option (c)**

Explanation:

Given that, the total number of balls = 6 balls

Let A and B be the red and black balls respectively,

The probability that two balls drawn, are different = P(the first ball drawn is red)(the second ball drawn is black)+ P(the first ball drawn is black)P(the second ball drawn is red)

$= (2/6)(4/5) + (4/6)(2/5)$

$=(8/30)+ (8/30)$

$= 16/30$

$= 8/15$

Question 4:

A couple has two children,

(i) Find the probability that both children are males if it is known that at least one of the children is male.

(ii) Find the probability that both children are females if it is known that the elder child is a female.

Solution:

A couple has two children,

Let, the boy be denoted by b & girl be denoted by g

So, S = {(b, b) ,(b, g),(g, b), (g, g)}

To find probability that both children are males, if known that at least one of children is male

Let E : Both children are males
F : At least one child is male

To find P(E|F)

E : Both children are males

E = {(b, b)}

$P(E) = 1/4$

F : At least one child is male

F = {(b, g), (g, b), (b, b)}

P(F) = 3/4

E ∩ F = {(b, b)}

P(E ∩ F) = 1/4

P(E|F) = $(P(E \cap F))/(P(F))$

= (1/4)/(3/4)

= 1/3

∴ Required Probability is **1/3**

(ii) Find the probability that both children are females if it is known that the elder child is a female.

S = {(b, b) ,(b, g),(g, b), (g, g)}

To find the probability that both children are females, if from that the elder child is a female.

Let E : both children are females
F : elder child is a female

To find P(E|F)

E : both children are females

E = {(g, g)}

P(E) = 1/4

F : elder child is a female

F = {(g, b), (g, g)}

P(F) = 2/4=1/2

Also, E ∩ F = {(g, g)}

So, P(E ∩ F) = 1/4

P(E|F) = $(P(E \cap F))/(P(F))$

= (1/4)/(1/2)

= ½

Question 5:

One card is drawn from a well-shuffled pack of 52 cards. What is the probability that a card will be

(i) a diamond

(ii) Not an ace

(iii) a black card

(iv) not a diamond

Solution:

(i) the probability that a card is a diamond

We know that there are 13 diamond cards in a deck. Therefore, the required probability is:

P(getting a diamond card) = 13/52 = ¼

(ii) the probability that a card is not an ace

We know that there are 4 ace cards in a deck.

Therefore, the required probability is:

P(not getting an ace card) = 1-(4/52)

= 1- (1/13)

=(13-1)/13

= 12/13

(iii) the probability that a card is a black card

We know that there are26 black cards in a deck.

Therefore, the required probability is:

P(getting a black card) = 26/52 = ½

(iv) the probability that a card is not a diamond

We know that there are 13 diamond cards in a deck.

We know that the probability of getting a diamond card is 1/4

Therefore, the required probability is:

P(not getting a diamond card) = 1- (1/4)

= (4-1)/4

= 3/4

Question 6:

A pack of 50 tickets is numbered from 1 to 50 and is shuffled. Two tickets are drawn at random. Find the probability that (i) both the tickets drawn bear prime numbers (ii) Neither of the tickets drawn bear prime numbers.

Solution:

The total number of tickets = 50

Prime numbers from 1 to 50 are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, and 47.

The total number of prime numbers between 1 and 50 is 15.

(i) Probability that both tickets are drawn bears prime numbers:

P(Both tickets bearing prime numbers) = $^{15}C_2$ / $^{50}C_2$

= 3/35

Hence, the probability that both tickets are drawn bear prime numbers is 3/35.

(ii) Probability that neither of the tickets drawn bears prime numbers:

P (Neither of the tickets bearing prime numbers) = $^{35}C_2$ / $^{50}C_2$

= 17/35.

Therefore, the probability that neither of the tickets drawn bears a prime number is 17/35.

Question 7:

20 cards are numbered from 1 to 20. If one card is drawn at random, what is the probability that the number on the card is:

1. Prime number
2. Odd Number
3. A multiple of 5
4. Not divisible by 3

Solution:

Let S be the sample space.

S = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20}

(1) Probability that the card drawn is a prime number:

Let E_1 be the event of getting a prime number.

$E_1 = \{2, 3, 5, 7, 11, 13, 17, 19\}$

Hence, $P(E_1) = 8/20 = 2/5$.

(2) Probability that the card drawn is an odd number:

Let E_2 be the event of getting an odd number.

$E_2 = \{1, 3, 5, 7, 9, 11, 13, 15, 17, 19\}$

Hence, $P(E_2) = 10/20 = 1/2$.

(3) Probability that the card drawn is a multiple of 5

Let E_3 be the event of getting a multiple of 5

$E_3 = \{5, 10, 15, 20\}$

Hence, $P(E_3) = 4/20 = 1/5$.

(4) Probability that the card drawn is not divisible by 3:

Let E_4 be the event of getting a number that is not divisible by 3.

$E_4 = \{1, 2, 4, 5, 7, 8, 10, 11, 13, 14, 16, 17, 19, 20\}$

Hence, $P(E_4) = 14/20 = 7/10$.