CBSE Test Paper 03

Chapter 15 Probability

1. Cards marked with numbers 1, 2, 3, ..., 25 are placed in a box and mixed thoroughly and one card is drawn at random from the box. The probability that the number on the card is a multiple of 3 and 5 is **(1)**
   a. $\frac{12}{25}$
   b. $\frac{4}{25}$
   c. $\frac{1}{25}$
   d. $\frac{8}{25}$
2. A game of chance consists of spinning an arrow which comes to rest pointing at one of the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and these values are equally likely outcomes. The probability that it will point at a number greater than 5 is **(1)**
   a. $\frac{1}{2}$
   b. $\frac{1}{4}$
   c. $\frac{1}{5}$
   d. $\frac{1}{3}$
3. One card is drawn from a well shuffled pack of 52 cards. The probability of getting an ace is **(1)**
   a. $\frac{1}{52}$
   b. $\frac{1}{13}$
   c. $\frac{4}{13}$
   d. $\frac{2}{13}$
4. The king, queen and jack of clubs are removed from a deck of 52 cards and the remaining cards are shuffled. A card is drawn from the remaining cards. The probability of getting a king is **(1)**
   a. $\frac{4}{52}$
   b. $\frac{3}{52}$
   c. $\frac{3}{49}$
   d. $\frac{4}{49}$
5. Two dice are thrown simultaneously. The probability that the sum of the numbers appearing on the dice is 1 is **(1)**

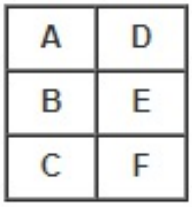
a. 3
b. 0
c. 2
d. 1

6. Tickets numbered from 1 to 20 are mixed up and a ticket is drawn at random. What is the probability that the ticket drawn has a number which is a multiple of 3 or 7? **(1)**
7. If three different coins are tossed together, then find the probability of getting two heads. **(1)**
8. If P(E) = 0.20, then what is the probability of 'not E'? **(1)**
9. The probability of selecting a rotten apple randomly from a heap of 900 apples is 0.18. What is the number of rotten apples in the heap? **(1)**
10. In tossing a die, what is the probability of getting an odd number or number less than 4? **(1)**
11. A box contains 90 discs which are numbered from 1 to 90. If one disc is drawn at random from the box, find the probability that it bears **(2)**
    i. a two-digit number
    ii. a perfect square number
    iii. a number divisible by 5.
12. A letter is chosen at random from the letters of the word ASSASSINATION. Find the probability that the letter chosen is an **(2)**
    i. vowel
    ii. consonant

13. The integers from 1 to 30 inclusive are written on cards (one number on one card). These card once put in a box and well mixed. Joseph picked up one card. What is the probability that his card has (i) number 7 (ii) an even number (iii) a prime number **(2)**

14. A box contains cards, number 1 to 90. A card is drawn at random from the box. Find the probability that the selected card bears a : **(3)**
    i. Two digit number.
    ii. Perfect square number.
15. Figure show the top view of an open square box that is divided into 6 compartments with walls of equal height. Each of the rectangles D, E, F has twice the area of each of the squares A, B and C. When a marble is dropped into the box at random, it falls into one of

the compartments. What is the probability that it will fall into compartment F? **(3)**



16. Peter throws two different dice together and finds the product of the two numbers obtained. Rina throws a die and squares the number obtained. Who has the better chance to get the number 25? **(3)**
17. One card is drawn from a well-shuffled deck of 52 cards. Find the probability of getting **(3)**
    a. Non face card,
    b. Black king or a Red queen,
    c. Spade card.
18. All the black face cards are removed from a pack of 52 playing cards. The remaining cards are well shuffled and then a card is drawn at random. Find the probability of getting a **(4)**
    i. face card,
    ii. red card,
    iii. black card,
    iv. king
19. All the red face cards are removed from a pack of 52 playing cards. A card is drawn at random from the remaining cards, after reshuffling them. Find the probability that the drawn card is: **(4)**
    i. of red colour
    ii. a queen
    iii. an ace
    iv. a face card.
20. A bag contains 15 balls of which x are blue and the remaining are red. If the number of red balls are increased by 5, the probability of drawing the red balls doubles. Find : **(4)**
    i. P(red ball)
    ii. P(blue ball)
    iii. P(blue ball if of 5 extra red balls are actually added)

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Chapter 15 Probability

Solution

1. c. $\frac{1}{25}$

   Explanation: Multiples of 3 = 3 6 9 12 15 18 21 24

   Multiples of 5 = 5 10 15 20 25

   Number of possible outcomes (multiple of 3 and 5) = {15} = 1

   Number of Total outcomes = 25

   ∴ Required Probability = $\frac{1}{25}$

2. a. $\frac{1}{2}$

   Explanation: Number of possible outcomes = {6, 7, 8, 9, 10} = 5

   Number of total outcomes = 10

   ∴ Required Probability = $\frac{5}{10} = \frac{1}{2}$

3. b. $\frac{1}{13}$

   Explanation: Number of possible outcomes = 4

   Number of Total outcomes = 52

   ∴ Probability of getting an ace = $\frac{4}{52} = \frac{1}{13}$

4. c. $\frac{3}{49}$

   Explanation: K , Q , J of clubs i.e 3 cards are removed , therefore remaining cards = 52 - 3 = 49

   3 kings are left in the pack

   Number of possible outcomes = 3

   Number of total outcomes = 52 – 3 = 49

   ∴ Required Probability = $\frac{3}{49}$

5. b. 0

   Explanation: Elementary events are

   (1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6)

   (2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6)

   (3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6)

   (4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6)

(5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6)

(6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)

∴ Number of Total outcomes = 36

And Number of possible outcomes (sum of numbers appearing on die is 1) = 0

∴ Required Probability = $\frac{0}{36} = 0$

6. Total number of tickets = 20

   {1,2,3....20}

   Favourable outcomes (tickets with number as a multiple of 3 or 7)=

   {3,6,9,12,15,18,7,14}

   Therefore,number of favourable cases to the event=8

   Required probability = $\frac{8}{20}$ = $\frac{2}{5}$.

7. All possible outcomes are : (HHH), (THH), (HTH), (HHT), (TTT), (TTH), (THT), (HTT).

   Total number of outcomes = 8

   No. of favourable outcomes = 3

   $probability \ = \ \frac{Number \ of \ \ favorable \ outcome}{Total \ number \ of \ outcome}$

   P(getting two heads) = $\frac{3}{8}$

8. $P(E) = 0.20$

   $\therefore P(notE) = 1 - P(E)$

   $= 1 - 0.20 = 0.80$

9. A = getting a rotten apple

   $n(S) = 900$ [Total apples]

   $P(A) = 0.18$

   Let, $n(A)$be number of rotten apples.

   Then, P(A)= $\frac{n(A)}{n(S)}$ = $\frac{n(A)}{900}$

   0.18 × 900 = $n(A)$

   $\therefore n(A) = 162$

   So, there are 162 rotten apples in the heap.

10. Odd numbers = 1,3,5,

    Numbers less than 4 = 1,2 ,3

    ∴ No. of favorable outcomes = 4

Probablity of event happen P(E)$= \frac{Number\ of\ favourable\ outcomes}{Total\ number\ of\ outcomes}$

$\therefore$ P(an odd no. or a no. < 4) $= \frac{4}{6} = \frac{2}{3}$

11. Total number of discs = 90

    $\therefore$ Number of all possible outcomes = 90

    Proabibilty of the event $= \frac{Number\ of\ favourble\ outcomes}{Total\ number\ of\ possible\ outcomes}$

    i. Let E be the event that the disc bears a two-digit number.

    Then, the number of outcomes favourable to E is 90 - 9 = 81 as from 1 to 9, the numbers are one-digited and their number is 9.

    $P(E) = P(a\ two-digit\ number) = \frac{81}{90} = \frac{9}{10}$

    ii. Let E be the event that the disc bears a perfect square number.

    Then, the number of outcomes favourable to E (1, 4, 9, 16, 25, 36, 49, 64, 81) is 9.

    $\therefore P(E) = P(a\ perfect\ square\ number) = \frac{9}{90} = \frac{1}{10}$

    iii. Let E be the event that the disc bears a number divisible by 5.

    Then, the number of outcomes favourable to E (5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90) is 18.

    $\therefore P(E) = P(a\ number\ divisible\ by\ 5) = \frac{18}{90} = \frac{1}{5}$

12. There are 13 letters in the word 'ASSASSINATION out of which one letter can be chosen in 13 ways.

    $\therefore$ Total number of elementary events = 13

    i. There are 6 vowels in the word 'ASSASSINATION'. So, there are 6 ways of selecting a vowel.

    $\therefore$ Probability of selecting a vowel $= \frac{6}{13}$

    ii. We have,

    Probability of selecting a consonant

    = 1- Probability of selecting a vowel $= 1 - \frac{6}{13} = \frac{7}{13}$

13. Total no. of possible outcomes = 30

    P(E)=Proabibilty of the event $= \frac{Number\ of\ favourble\ outcomes}{Total\ number\ of\ possible\ outcomes}$

i. P (the no.7) = $\frac{1}{30}$

ii. Even no. are 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30

Favourable outcomes = 15

Required probability , P(Even number)= $\frac{15}{30} = \frac{1}{2}$

iii. Prime numbers from 1 to 30 are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29

No. of favourable outcomes = 10

Required probability, P(prime numbers)= $\frac{10}{30} = \frac{1}{3}$

14. No. of all possible outcomes = 90

i. Total no of cards having 2 digit number = 90 - 9 = 81

P(card with two digit number) = $\frac{81}{90} = \frac{9}{10}$

ii. Perfect square numbers between 1 to 90 are 1,4,9,16,25,36,49,64,81

P(card with perfect square number) = $\frac{9}{90} = \frac{1}{10}$

15. An open square box that is divided into 6 compartments with walls of equal height. Each of the rectangles D, E, F has twice the area of each of the squares A, B and C. Therefore

Let x square units be the area of the upper face of each of the compartments A, B and C. Then, area of the upper face of each compartment D, E and F is 2x sq. units.

Area of the square box = {x + x + x + 2x + 2x+ 2x) sq. units = 9x sq. units.

P (Marble falls in compartment F) $= \frac{\text{Area of compartment } F}{\text{Area of square box}} = \frac{2x}{9x} = \frac{2}{9}$

16. The person having higher probability of getting the number 25 has the better chance.

When a pair of dice is thrown, there are 36 elementary events which are as follows:

(1, 1) , (1, 2), (1,3), (1,4), (1,5), (1, 6)

(2, 1) , (2, 2), (2,3), (2,4),(2,5), (2, 6)

(3,1) , (3,2), (3,3), (3,4), (3,5), (3,6)

(4,1) , (4,2), (4,3),(4,4), (4,5), (4,6)

(5,1) , (5,2), (5,3), (5,4), (5,5), (5,6)

(6, 1), (6, 2),(6, 3), (6, 4), (6, 5), (6, 6)

Therefore, the product of numbers on two dice can take values 1, 2, 3, ..., 36.

We observe that the product of two numbers on two dice will be 25 if both the dice show number 5. Therefore,

there is only one elementary event, viz., (5, 5), which is favourable for getting 25.

p_1 = Probability that Peter throws $25 = \frac{1}{36}$

Rina throws a die on which she can get any one of the six numbers 1, 2, 3, 4, 5, 6 as an outcome. If she gets number 5 on the upper face of the die thrown, then the square of the number is 25.

p_2 = Probability that the square of number obtained is$25 = \frac{1}{6}$

Therefore, $p_2 > p_1$. Therefore, Rina has better chance to get the number 25.

17. Total number of cards n = 52

    Number of face cards = 12

    So no. of non face cards m=52-12=40

    P(non-face cards) = $\frac{m}{n} = \frac{40}{52} = \frac{10}{13}$

    Number of black kings = 2

    Number of red queens = 2

    So m =2+2=4

    P(a black King or a red queen) = $\frac{m}{n} = \frac{4}{52} = \frac{1}{13}$

    Number of spade cards m=13

    So P(Spade cards) = $\frac{m}{n} = \frac{13}{52} = \frac{1}{13}$

18. Out of 52 playing cards; 2 black jacks, 2 black queens and 2 black kings have been removed.

    Total number of remaining cards = (52 - 6) = 46.

    i. Now, there are 6 face cards in the remaining cards.

       ∴P(getting a face card)$= \frac{6}{46} = \frac{3}{23}$

    ii. There are 26 red cards.

       ∴P(getting a red card)$= \frac{26}{46} = \frac{13}{23}$

    iii. Out of 46 cards, number of black cards = 26 - 6 = 20.

       ∴P(getting a black card)$= \frac{20}{46} = \frac{10}{23}$

    iv. Now, these 46 cards have 2 kings.

       P(getting a king)$= \frac{2}{46} = \frac{1}{23}$

19. No. of cards removed= 3 face cards of heart +3 face cards of diamond=6

    Remaining cards =52-6=46

So total No.of events are n=46

i. No. of red card left = 13-6=7 so m =7
   so P(E) = $\frac{7}{46}$

ii. No. of queen left = 4 - 2 queens of heart and diamond = 2
   So m = 2
   P (E) = $\frac{2}{46} = \frac{1}{23}$

iii. Total No. of aces = 4 so m=4
   P(E) = $\frac{4}{46} = \frac{2}{23}$

iv. No.of face cards left= 12 - total face cards removed =12 - 6 = 6
   So m = 6
   Hence P(E)= $\frac{6}{46} = \frac{3}{23}$

20. initially P(red ball)= $\frac{15-x}{15}$
   and after adding 5 red balls P(red ball)= $\frac{20-x}{20}$ So as per the question
   $\frac{20-x}{20} = 2 \times \left(\frac{15-x}{15}\right)$
   $\frac{20-x}{4} = 2 \times \left(\frac{15-x}{3}\right)$
   60 - 3x = 120 - 8x
   5x = 60
   x = 12
   So Blue balls = 12 and red balls =15-12= 3

i. P(red ball) = $\frac{3}{15} = \frac{1}{5}$
ii. P(blue ball) = $\frac{12}{15} = \frac{4}{5}$
iii. P(blue ball if 5 red balls are added) = $\frac{12}{20} = \frac{3}{5}$