CBSE Test Paper 01

Chapter 15 Probability

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1. A letter is chosen at random from the word 'ASSASSINATION'. The probability that it is a vowel is **(1)**
   a. $\frac{6}{13}$
   b. $\frac{7}{13}$
   c. $\frac{6}{31}$
   d. $\frac{3}{13}$
2. A number 'x' is chosen at random from the numbers -4, -3, -2, -1, 0, 1, 2, 3, 4, 5. The probability that $|x| < 3$ is **(1)**
   a. 1
   b. 0
   c. $\frac{1}{2}$
   d. $\frac{7}{10}$
3. An unbiased die is thrown once. The probability of getting an odd number is **(1)**
   a. $\frac{1}{3}$
   b. $\frac{1}{2}$
   c. $\frac{2}{5}$
   d. $\frac{2}{3}$
4. A number is selected at random from 1 to 75. The probability that it is a perfect square is **(1)**
   a. $\frac{10}{75}$
   b. $\frac{8}{75}$
   c. $\frac{6}{75}$
   d. $\frac{4}{75}$
5. A lot consists of 40 mobile phones of which 32 are good, 3 have only minor defects and 5 have major defects. Ram will buy a phone if it is good or have minor defects. One phone is selected at random. The probability that it is acceptable to Ram is___. **(1)**
   a. $\frac{3}{40}$
   b. $\frac{4}{5}$
   c. $\frac{3}{5}$

d. $\frac{7}{8}$

6. A black dice and a white dice are thrown at the same time. Write all the possible outcomes. What is the probability that the difference of the numbers appearing on the top of the two dice is 2? **(1)**

7. Three unbiased coins are tossed together. Find the probability of getting at least two heads? **(1)**

8. Why is tossing a coin considered as the way of deciding which team should get the ball at the beginning of a football match? **(1)**

9. Two dice are thrown simultaneously. Find the probability of getting a multiple of 2 on one dice and a multiple of 3 on the other. **(1)**

10. In a simultaneous throw of a pair of dice, find the probability of getting a number other than 5 on any dice. **(1)**

11. Two coins are tossed together. Find the probability of getting both heads or both tails. **(2)**

12. A bag contains 5 black, 7 red and 3 white balls. A ball is drawn from the bag at random. Find the probability that the ball drawn is(i) red (ii) black or white (iii) not black. **(2)**

13. A bag contains lemon flavoured candies only. Malini takes out one candy without looking into the bag. What is the probability that she takes out? **(2)**
    i. an orange flavoured candy?
    ii. a lemon flavoured candy?
14. Cards marked with numbers 5 to 50 are placed in a box and mixed thoroughly. A card is drawn from the box at random. Find the probability that the number on the taken out card is **(3)**
    i. a prime number less than 10
    ii. a number which is a perfect square.

15. Cards numbered 11 to 60 are kept in a box. If a card is drawn at random from the box, find the probability that the number on the drawn card is (i) an odd number, (ii) a

perfect square number, (iii) divisible by 5, (iv) a prime number less than 20. **(3)**

16. A bag contains, white, black and red balls only. A ball is drawn at random from the bag. If the probability of getting a white ball is $\frac{3}{10}$ and that of a black ball is $\frac{2}{5}$, then find the probability of getting a red ball. If the bag contains 20 black balls, then find the total number of balls in the bag. **(3)**

17. The probability of selecting a red ball at random from a jar that contains only red, blue and orange balls is $\frac{1}{4}$. The probability of selecting a blue ball at random from the same jar is $\frac{1}{3}$. If the jar contains 10 orange balls, find the total number of ball in the jar. **(3)**

18. All red face cards are removed from a pack of playing cards. The remaining cards are well-shuffled and then a card is drawn at random from them. Find the probability that the drawn card is **(4)**
    i. a red card,
    ii. a face card,
    iii. a card of clubs.
19. A box contains cards bearing numbers 6 to 70. If one cards is drawn at random from the box, find the probability that it bears **(4)**
    i. a one digit number.
    ii. a number divisible by 5,
    iii. an odd number less than 30,
20. A box contains 90 discs which are numbered 1 to 90. If one disc is drawn at random from the box, find the probability that it bears **(4)**
    i. a two digit number,
    ii. number divisible by 5.

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Solution

1. a. $\frac{6}{13}$

   Explanation: Vowels present in the given word are A, A, I, A, I, O = 6

   Number of possible outcomes = {A, A, I, A, I, O} = 6

   Number of total outcomes = 13

   Required Probability = $\frac{6}{13}$

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

   Explanation: Number of total outcomes = 10

   Number of possible outcomes = $\{-2, -1, 0, 1, 2\}$ = 5

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

3. b. $\frac{1}{2}$

   Explanation: Number of odd numbers on a dice = {1, 3, 5}, = 3

   Number of possible outcomes = 3

   Number of Total outcomes = 6

   ∴ Required Probability = $\frac{3}{6} = \frac{1}{2}$

4. b. $\frac{8}{75}$

   Explanation: Number of possible outcomes = {1, 4, 9, 16, 25, 36, 49, 64} = 8

   Number of Total outcomes = 75

   ∴ Probability (of getting a perfect square) = $\frac{8}{75}$

5. d. $\frac{7}{8}$

   Explanation: Number of phones which are good and minor defects = 32 + 3 = 35

   Number of possible outcomes = 35

   Number of Total outcomes = 40

   ∴ Required Probability = $\frac{35}{40} = \frac{7}{8}$

6. Consider the set of ordered pairs

   {(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)}

Clearly, there are 36 elementary events.

∴ n(Total number of throws) = 36

number of pairs such that difference of the numbers appearing on top of the two dice is 2 can be selected as listed below:

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

Therefore, n(Favourable events) = 8

P(difference of the number is 2) = (Number of pairs such that difference of the numbers Appearing on the top of the two dice is 2) / (Total number of throws)

= $\frac{8}{36}$ = $\frac{2}{9}$

7. If any of the elementary events HHH, HHT, HTH, and THH is an outcome, then we say that the event "Getting at least two heads" occurs.
   Favourable number of elementary events = 4
   total no. of possible events when three coins are tossed = 8
   Hence, required probability$= \frac{4}{8} = \frac{1}{2}$

8. Proabibilty of the event$= \frac{Number\ of\ favourble\ outcomes}{Total\ number\ of\ possible\ outcomes}$
   Probability of head= P(H)=$\frac{1}{2}$
   Probability of tail = P(T)=$\frac{1}{2}$
   i.e. $P(H) = \frac{1}{2} = P(T) = \frac{1}{2}$
   Probability of getting head and tail both are same.
   ∴Tossing a coin considered to be fairway.

9. Two dice are thrown simultaneously. We have to find the probability of getting a multiple of 2 on one dice and a multiple of 3 on the other.
   Let A be the event of getting a multiple of 2 on one die and a multiple of 3 on the other.
   Then, the elementary events favourable to A are:
   (2, 3), (2, 6), (4, 3), (4, 6), (6, 3), (6, 6), (3, 2), (3, 4),
   (3, 6), (6, 2), (6, 4). Favourable number of elementary events =11
   Hence, required probability $= \frac{11}{36}$

10. Favourable outcomes of a number other than 5 on any dice =

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

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

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

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

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

Therefore, favourable number of cases to the event=25

∴ Probability of a number other than 5 on any dice = $\frac{number\ of\ favourable\ outcomes}{number\ of\ total\ outcomes}$ = $\frac{25}{36}$

11. Two coins are tossed together.

Possibilities are HH, HT, TH, TT

Total outcomes = 4

Both heads or both tails = HH, TT

Number of favourable outcome = 2

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

P(HH or TT)= $\frac{2}{4} = \frac{1}{2}$

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

Total number of balls = 5 + 7 + 3 = 15

i. Number of red balls = 7

∴ P(drawing a red ball) = $\frac{7}{15}$

ii. Number of black or white balls = 5 + 3 = 8

∴ P(drawing a black or white ball) = $\frac{8}{15}$

iii. Number of balls which are not black = 15 - 5=10

∴ P(drawing a ball that is not black)= $\frac{10}{15} = \frac{2}{3}$

Hence, the probability of getting a red ball, a black or white ball and a not black ball are $\frac{7}{15}$, $\frac{8}{15}$ and $\frac{2}{3}$ respectively.

13. i. The probability that she takes out an orange flavoured candy is 0 because the bag contains lemon flavoured candies only.

ii. Probability that she takes out a lemon flavoured candy is 1 because the bag contains lemon flavoured candies only.

14. According to question we are given that Cards marked with numbers 5 to 50 are placed in a box and mixed thoroughly. A card is drawn from the box at random.

Therefore All possible outcomes are 5, 6, 7, 8 .... 50.

Number of all possible outcomes = 46

i. Out of the given numbers, the prime numbers less than 10 are 5 and 7.

   Suppose E_1 be the event of getting a prime number less than 10.

   Then, number of favorable outcomes = 2

   Therefore, P(getting a prime number less than 10) = P(E) = $\frac{2}{46} = \frac{1}{23}$

ii. Out of the given numbers, the perfect squares are 9, 16, 25, 36 and 49.

   Suppose E_2 be the event of getting a perfect square.

   Then, number of favorable outcomes = 5

   Therefore, P(getting a perfect square) = P(E) = $\frac{5}{46}$

15. According to the question,

All possible outcomes are $11, 12, 13, \ldots, 60$.

Total number of possible outcomes $= (60 - 10) = 50$.

i. Suppose, E_1 be the event that the number on the drawn card is an odd number.

   $\Rightarrow$ the favourable outcomes are $11, 13, 15, \ldots, 59$.

   Clearly, these numbers form an AP with a = 11 and d=2.

   $T_n = 59 \Rightarrow 11 + (n - 1) \times 2 = 59 \Rightarrow (n - 1) \times 2 = 48 \Rightarrow n - 1 = 24 \Rightarrow n = 25$

   So, the number of favourable outcomes $= 25$.

   $\therefore$ P(getting an odd number) = $P(E_1) = \frac{25}{50} = \frac{1}{2}$.

ii. Suppose, E_2 be the event that the number on the drawn card is a

   perfect square number.

   $\Rightarrow$ the favourable outcomes are $16, 25, 36, 49$.

   The number of favourable outcomes = 4.

   $\therefore$ P(getting a perfect square number) $P(E_2) = \frac{4}{50} = \frac{2}{25}$..

iii. Suppose, E_3 be the event that the number on the drawn card is divisible by 5.

   $\Rightarrow$ the favourable outcomes are $15, 20, 25, \ldots, 60$.

   Clearly, these numbers form an AP with a = 15 and d=5.

   $T_m = 60 \Rightarrow 15 + (m - 1) \times 5 = 60 \Rightarrow (m - 1) \times 5 = 45 \Rightarrow m - 1 = 19 \Rightarrow m = 10$

   So, the number of favourable outcomes $= 10$.

   P(getting a number divisible by 5) $= P(E_3) = \frac{10}{50} = \frac{1}{5}$

iv. Suppose, E_4 be the event that the number on the drawn card is a prime number

   less than 20.

$\Rightarrow$ the favourable outcomes are $11, 13, 17, 19.$

So, the number of favourable outcomes $= 4.$

$\therefore$ P(getting a prime number less than 20) $= P\left(E_4\right) = \frac{4}{50} = \frac{2}{25}$

16. P (White ball) = $\frac{3}{10}$

P(Black ball) = $\frac{2}{5}$

P(E) = 1 - P(not E)

Probability of not getting white and black ball is equals to probability of getting red balls.

P(Red ball) =$1 - \left(\frac{3}{10} + \frac{2}{5}\right) = \frac{3}{10}$

$\frac{2}{5}$ x Total no of balls = 20 (red balls)

Hence, Total numbers of balls = $\frac{20 \times 5}{2}$ = 50

17. P(red ball) = $\frac{1}{4}$, P(blue ball) = $\frac{1}{3}$

$\Rightarrow$P(orange ball) =$1 - \frac{1}{4} - \frac{1}{3} = \frac{5}{12}$

Suppose total no. of balls = x

Then $\frac{10}{x} = \frac{5}{12}$

Hence $x = 24$

18. There are 6 red face cards. These are removed.

Thus, remaining number of card = 52 – 6 = 46.

i. Number of red cards now = 26 – 6 = 20.

Therefore, P(getting a red card)=$\frac{\text{Number of favorable outcomes}}{\text{Number of all possible outcomes}} = \frac{20}{46} = \frac{10}{23}$

Thus, the probability that the drawn card is a red card is $\frac{10}{23}$.

ii. Number of face cards now = 12 – 6 = 6.

Therefore, P(getting a face card) = $\frac{\text{Number of favorable outcomes}}{\text{Number of all possible outcomes}} = \frac{6}{46} = \frac{3}{23}$

Thus, the probability that the drawn card is a face card is $\frac{3}{23}$.

iii. The number of card of clubs = 12.

Therefore, P(getting a card of clubs) =$\frac{\text{Number of favorable outcomes}}{\text{Number of all possible outcomes}} = \frac{12}{46} = \frac{6}{23}$

Thus, the probability that the drawn card is a card of clubs is $\frac{6}{23}$.

19. i. Let E be the event of getting a one digit number.

Number of possible outcomes =70-6+1=65

The outcomes favourable to E are 6,7,8 and 9

$\therefore$ Number of favourable outcomes =4

P(E)=P(Getting a one digit number) $= \frac{4}{65}$

ii. Let F be the event of getting a number divisible by 5.

Number of possible outcomes =65

The outcomes favourable to the event F are 10,15,20,...., 65,70.

$\therefore$ Number of outcomes favourable to F = 13

P(F)=P(Getting a number divisible by 5) $= \frac{13}{65} = \frac{1}{5}$

iii. Let G be the event of getting an odd number less than 30.

Number of possible outcomes =65

The outcomes favourable to the event G are 7,9,11,13,....., 29.

$\therefore$ Number of favourable outcome =12

P(G)=P(Getting an odd number less than 30)$= \frac{12}{65}$

20. No. of all possible outcomes = 90

i. Discs with two digit number are 10 to 90

No. of discs with two digits numbers = 90 - 10 +1 = 81

$\therefore$ No of favourable outcomes = 81

P(a disc with two digit number) $= \frac{\text{No. of favourable outcomes}}{\text{No. of all possible outcomes}} = \frac{81}{90} = \frac{9}{10}$

ii. The numbers having 0 or 5 at its once place are divisible by 5 = 5,10,15.....90

Total no. of favourable outcomes = 18

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