CBSE Test Paper 04
Chapter 15 Probability

1. A ticket is drawn from a bag containing 100 tickets numbered from 1 to 100. The probability of getting a ticket with a number divisible by 10 is **(1)**
   a. $\frac{3}{10}$
   b. $\frac{1}{10}$
   c. $\frac{4}{10}$
   d. $\frac{1}{5}$
2. 3 rotten eggs are mixed with 12 good ones. One egg is chosen at random. The probability of choosing a rotten egg is **(1)**
   a. $\frac{1}{15}$
   b. $\frac{4}{5}$
   c. $\frac{1}{5}$
   d. $\frac{2}{5}$
3. A letter of English alphabets is chosen at random. The probability that the letter chosen is a vowel is **(1)**
   a. $\frac{2}{26}$
   b. $\frac{4}{26}$
   c. $\frac{1}{26}$
   d. $\frac{5}{26}$
4. If S is the sample space of a random experiment, then P(S) = **(1)**
   a. $\frac{1}{4}$
   b. $\frac{1}{8}$
   c. 1
   d. 0
5. A bag contains 6 red, 8 white, 4 green and 7 black balls. One ball is drawn at random. The probability that the ball drawn is neither green nor white is **(1)**
   a. $\frac{8}{25}$
   b. $\frac{12}{25}$
   c. $\frac{13}{25}$

d. $\frac{4}{25}$

6. 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 and these are equally likely outcomes. Find the probability that the arrow will point at any factor of 8? **(1)**
7. An unbiased die is thrown. What is the probability of getting a number between 3 and 6? **(1)**
8. A bag contains 18 balls out of which x balls are red. If one ball is drawn at random from the bag, what is the probability that it is not red? **(1)**
9. A die is thrown. Find the probability of getting a number lying between 2 and 6. **(1)**
10. 20 tickets, on which numbers 1 to 20 are written, are mixed thoroughly and then a ticket is drawn at random out of them. Find the probability that the number on the drawn ticket is a multiple of 3 or 7. **(1)**
11. It is known that a box of 600 electric bulbs contains 12 defective bulbs. One bulb is taken out at random from this box. What is the probability that it is a non-defective bulb? **(2)**
12. From a group of 3 boys and 2 girls we select two children. What is the set representing the event: **(2)**
    i. one girl is selected
    ii. at least one girl is selected?
13. A card is drawn from a well shuffled pack of 52 cards. Find the probability that the card is neither a red card nor a queen. **(2)**
14. A bag contains 4 white balls, 5 red balls, 2 black balls and 4 green balls. A ball is drawn at random from the bag. Find the probability that it is **(3)**
    i. black,
    ii. not green,
    iii. red or white,
    iv. neither red nor green.
15. A bag contains 5 red and some blue balls, **(3)**
    i. if probability of drawing a blue ball from the bag is twice that of a red ball, find the number of blue balls in the bag.

ii. if probability of drawing a blue ball from the bag is four times that of a red ball, find the number of blue balls in the bag.

16. In a game, the entry fee is Rs 5. The game consists of tossing a coin 3 times. If one or two heads show, Shweta gets her entry fee back. If she throws 3 heads, she receives double the entry fees. Otherwise, she will lose. For tossing a coin three times, find the probability that she **(3)**

i. loses the entry fee.
ii. gets double entry fee.
iii. just gets her entry fee.

17. Cards marked with numbers 1,3,5,..., 101 are placed in a bag and mixed thoroughly. A card is drawn at random from the bag. Find the probability that the number on the drawn cards is **(3)**

i. less than 19,
ii. a prime number less than 20.

18. From a pack of 52 playing cards jacks, queens, kings and aces of red colour are removed. From the remaining, a card is drawn at random. Find the probability that the card drawn is **(4)**

i. a black queen
ii. a red card
iii. a ten
iv. a picture card (jacks, queens and kings are picture cards).

19. All the three face cards of spades are removed from a well-shuffled pack of 52 cards. A card is drawn at random from the remaining pack. Find the probability of getting **(4)**

i. a black face card
ii. a queen
iii. a black card
iv. a spade

20. The houses in a row are numbered consecutively from 1 to 49. Show that there exists a value of X such that sum of numbers of houses proceeding the house numbered X is equal to sum of the numbers of houses following X. **(4)**

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Solution

1. b. $\frac{1}{10}$

   Explanation: Number of possible outcomes = {10, 20, 30, 40, 50, 60, 70, 80, 90, 100} = 10

   Number of Total outcomes = 100

   ∴ Required Probability = $\frac{10}{100} = \frac{1}{10}$

2. c. $\frac{1}{5}$

   Explanation: Number of possible outcomes = 3

   Number of Total outcomes = 15

   ∴ Required Probability = $\frac{3}{15} = \frac{1}{5}$

3. d. $\frac{5}{26}$

   Explanation: We know that "A, E, I, O, U" are vowels

   Number of vowels = 5

   Number of possible outcomes = 5

   Number of total outcomes = 26

   ∴ Required Probability = $\frac{5}{26}$

4. c. 1

   Explanation: If S is the sample space of a random experiment, then P(S) = 1

5. c. $\frac{13}{25}$

   Explanation: Total number of balls = 25

   Number of Green and White balls = 4 +8 = 12

   Number of balls neither green nor white = 25 - 12 =13

   Number of possible outcomes = 13

   Number of total outcomes = 25

   ∴ Required Probability = $\frac{13}{25}$

6. Total number of points = 8

   Total number of possible outcomes = 8

   = $(1 \times 8), (2 \times 4), (8 \times 1), (4 \times 2)$

No. of favourable outcomes = 4

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

$\therefore$ P(Factor of 8) = $\frac{4}{8} = \frac{1}{2}$

7. The event "Getting a number between 3 and 6" occurs if we obtain either 4 or 5 as an outcome.

   Favourable number of outcomes = 2

   Hence, required probability $= \frac{2}{6} = \frac{1}{3}$

8. The total number of balls = 18.

   Number of red balls = x.

   i. Number of balls which are not red = 18 – x

      Therefore, P(getting a ball which is not red) = $\frac{\text{Number of favorable outcomes}}{\text{Number of all possible outcomes}} = \frac{18-x}{18}$

      Thus, the probability of drawing a ball which is not red is $\frac{18-x}{18}$.

9. Favourable outcomes of getting a number lying between 2 and 6= {3,4,5}

   Therefore, number of favourable outcomes=3

   Hence, Probability of getting a number lying between 2 and 6 = $\frac{number\ of\ favourable\ outcomes}{number\ of\ total\ outcomes} = \frac{3}{6} = \frac{1}{2}$

10. Total number of cases = 20

    $\Rightarrow$ n(s) = 20

    A = favourable cases = (3, 6, 7,9,12,14,15,18}

    $\therefore$ n(A) = 8

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

    $\therefore$ Required probability = P(A) = $\frac{n(A)}{n(S)} = \frac{8}{20} = \frac{2}{5}$

11. Out of 600 electric bulbs one bulb can be chosen in 600 ways.

    Total number of elementary events = 600

    There are 588 (= 600 - 12) non-defective bulbs out of which one bulb can be chosen in 588 ways.

    Favourable number of elementary events = 588

    Hence, P (Getting a non-defective bulb) $= \frac{588}{600} = \frac{49}{50} = 0.98$

12. Let boys be B_1 B_2, B_3 (3 Boys)

Let girls be G_1, G_2(2 girls)

Therefore, the set which represents, one girl is selected and at least one girl is selected are respectively as,

i. $\{B_1G_1, B_2G_1, B_3G_1, B_1G_2, B_2G_2, B_3G_2\}$

ii. $\{B_1G_1, B_2G_1, B_3G_1\ B_1G_2, B_2G_2, B_3G_2, G_1G_2]$

13. Total number of red cards = 26 (including 2 queens)

Total number of queen in pack of 52 cards is 4 , out of which 2 are black queen cards and 2 are red queen cards.

Total number of red cards and queen cards = 26 + 2 = 28

Number of favourable outcomes = 52 - 28 = 24

∴P(neither red nor queen) = $\frac{24}{52} = \frac{6}{13}$

14. Total number of balls = 4 + 5+ 2+ 4=15.

i. Number of black balls = 2.

P(getting a black ball) = $\frac{2}{15}$

ii. Number of balls which are not green = 4 + 5+ 2 = 11

P(getting a ball which is not green) = $\frac{11}{15}$

iii. Number of balls which are red or white = 5+4 = 9.

P(getting a ball which is red or white) = $\frac{9}{15}$ = $\frac{3}{5}$

iv. Number of balls which are neither red nor green = 4+2 = 6

P(getting a ball which is neither red nor green) = $\frac{6}{15}$ = $\frac{2}{5}$

15. Let number of blue balls $= x$

Total number of balls = 5 x

$+$ Probability of red ball $\frac{5}{5+x}$

Probability of blue ball =$\frac{x}{5+x}$

By given condition,

i. $\frac{x}{5+x} = 2(\frac{5}{5+x})$

x = 10

No. of blue balls = 10

ii. Here, $\frac{5}{5+x} = 4 \times \frac{x}{5+x}$

x = 20

Hence, the number of blue balls = 20

16. Possible outcomes when a coin is tossed 3 times:

HHH, HHT, HTH, THH, TTH, THT, HTT, TTT

$\Rightarrow$ Total number of outcomes = 8

i. Shweta will lose the entry fee if she gets 'TTT'.

P(Shweta losses the entry fee) = $\frac{1}{8}$

ii. Shweta will get double the entry fee if she gets HHH,

P(Shweta will get double the entry fee) = $\frac{1}{8}$

iii. Shweta will get her entry fee, if she get HHH, HTH, THH, TTH, THT or TTT

P(Shweta will get her entry fee) = $\frac{6}{8} = \frac{3}{4}$

17. Given numbers 1, 3, 5, ..., 101 form an AP with a = 1 and d = 2.(first term is one and common difference is two)

Let T_n = 101. Then,

1 + (n – 1)2 = 101

$\Rightarrow$ 1 + 2n – 2 = 101

$\Rightarrow$ 2n = 102

$\Rightarrow$ n = 51

Therefore, total number of outcomes = 51.

i. Suppose E_1 be the event of getting a number less than 19.

Out of these numbers, less than 19 are 1, 3, 5, ..., 17.

Given number 1, 3, 5, ... , 17 form an AP with a = 1 and d = 2.(first term is one and common difference is two)

Suppose Tn = 17. Then,

1 + (n – 1)2 = 17

$\Rightarrow$ 1 + 2n – 2 = 17

$\Rightarrow$ 2n = 18

$\Rightarrow$ n = 9

Thus, number of favorable outcomes = 9.

Therefore, P(getting a number less than 19) = P(E_1) =

$$\frac{\text{Number of outcomes favorable to } E_1}{\text{Number of all possible outcomes}} = \frac{9}{51} = \frac{3}{17}$$

Therefore, the probability that the number on the drawn card is less than 19 is $\frac{3}{17}$.

ii. Suppose E_2 be the event of getting a prime number less than 20.

Out of these numbers, prime numbers less than 20 are 3, 5, 7, 11, 13, 17 and 19.

Therefore,the number of favorable outcomes = 7.

Therefore, P(getting a prime number less than 20) = P(E_2) =

$\frac{\text{Number of outcomes favorable to } E_2}{\text{Number of all possible outcomes}} = \frac{7}{51}$

Thus, the probability that the number on the drawn card is a prime number less than 20 is $\frac{7}{51}$.

18. There will be 52 cards in a deck.

There are four different suits: Diamonds, Clubs, Hearts, and Spades.

There will be thirteen cards in each suit , they are :

Ace, 2,3,4,5,6,7,8,9,10,Jack , Queen , King.

From a pack of 52 cards jacks, queens, kings and aces of red colour are removed.

Number of cards removed = 2 + 2 + 2 + 2 = 8.

Total number of remaining cards = 52 - 8 = 44.

Now, there are 2 jacks, 2 queens, 2 kings and 2 aces of black colour only.

i. Number of black queens = 2.

$\therefore$ P(getting a black queen)$= \frac{2}{44} = \frac{1}{22}$

ii. Remaining number of red cards = 26 - 8 = 18.

$\therefore$P(getting a red card)$= \frac{18}{44} = \frac{9}{22}$

iii. Number of tens = 4.

$\therefore$ P(getting ten)$= \frac{4}{44} = \frac{1}{11}$

iv. We know that jacks, queens and kings are picture cards.

Out of 12 picture cards, it is given that 6 have been removed.

So, the remaining number of picture cards = 12-6 = 6.

$\therefore$ P(getting a picture card)$= \frac{6}{44} = \frac{3}{22}$.

19. Here, all face cards of spades are removed from a deck of 52 playing cards.

So, remaining cards in deck = 52 - 3 = 49

$\therefore$ Total number of outcomes n = 49

i. We know that there are 6 black face cards in a deck of cards. Afte removing face cards of spades only 3 face cards of club are left.

so number of favorable outcomes m= 3

$\therefore$ Required Probability = $P(E) = \frac{m}{n} = \frac{3}{49}$

ii. There are 4 queens in a deck . After removing a queen of spade, we are left with 3 queens.

Then, number of favorable outcomes m= 3

∴ Required Probability = P(E)= $\frac{m}{n}$ = $\frac{3}{49}$

iii. There are 26 black cards in a regular deck of cards.

After removing 3 face cards of spades , there are only 23 black cards.

Then, number of favorable outcomes m= 23

∴ Required Probability = P(E)= $\frac{m}{n}$ = $\frac{23}{49}$

iv. There are 13 cards of spade in a deck.After removing 3 face cards of spade only 10 spades cards are left .

So number of favorable outcomes m= 10

∴ Required Probability = P(E) = $\frac{m}{n}$ = $\frac{10}{49}$

20. The houses are numbered consecutively from 1 to 49.

1, 2, 3....................(x - 1), x, (x+1).......... 49

Sum of number of houses preceding x numbered house = Sum of number following x

Sum of number of houses preceding x numbered house=

$$S_1 = \frac{x-1}{2} \times (1 + x - 1) = \frac{x(x-1)}{2} \ldots\ldots(1)$$

Sum of number following x=

$$S_2 = (1 + 2 + 3 + \ldots\ldots.49) - \frac{x}{2} \times (x + 1)$$

$$= \frac{49 \times 50}{2} - \frac{x^2 + x}{2} = \frac{2450 - x^2 - x}{2} \ldots\ldots(2)$$

As $S_1 = S_2$

$$\frac{2450 - x^2 - x}{2} = \frac{x(x-1)}{2}$$

$2450 - x^2 - x = x^2 - x$

$2x^2 = 2450$

$x^2 = 1225$

$x = 35$

Hence sum of numbers of houses proceeding the house numbered 35 is equal to sum of the numbers of houses following 35