CBSE Test Paper 05

CH-15 Probability

1. A die is thrown once. The probability of getting a number greater than 3 is

   a. 0

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

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

   d. $\frac{1}{3}$

2. Two dice are rolled simultaneously. The probability of getting two 5s is

   a. $\frac{1}{36}$

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

   c. $\frac{1}{18}$

   d. $\frac{1}{6}$

3. Two dice are thrown simultaneously. The probability of getting a doublet or a total of 4 is

   a. $\frac{4}{9}$

   b. $\frac{2}{9}$

   c. $\frac{3}{9}$

   d. $\frac{5}{9}$

4. If two coins are tossed, then the probability of getting no tail is:

   a. $\frac{1}{4}$

   b. $\frac{1}{5}$

c. $\frac{1}{4}$

d. $\frac{3}{4}$

5. A card is drawn from an ordinary pack and a gambler bets that it is a spade or an ace. Then, the odds against his winning the bet is

   a. It is 7 : 4

   b. it is 13 : 4

   c. It is 9 : 4

   d. It is 4 : 9

6. Fill in the blanks:

   A coin is tossed 100 times and head appears 46 times. Now, if we toss a coin at a random, then the probability of getting a tail is _____.

7. Fill in the blanks:

   A die is thrown once, the probability of getting a prime number on the die is _____.

8. The heights of 50 students, measured to the nearest centimetre, have been found to be as follows :
   161 150 154 165 168 161 154 162 150 151
   162 164 171 165 158 154 156 172 160 170
   153 159 161 170 162 165 166 168 165 164
   154 152 153 156 158 162 160 161 173 166
   161 159 162 167 168 159 158 153 154 159
   Find the probability that the height of a student, chosen at random, is more than 160 cm.

9. Three coins are tossed simultaneously 200 times with the following frequencies of different outcomes:

Outcome	3 heads	2 heads	1 head	No heads

Frequency	23	72	77	28

Find the probability of getting:

i. three heads
ii. two heads and one tail
iii. at least two heads

10. 80 bulbs are selected at random from a lot and their lifetime (in hrs) is recorded in the form of a frequency table given below

Lifetime (in hours)	300	500	700	900	1100
Frequency	10	12	23	25	10

Find the probability that bulb selected randomly from the lot has life less than 900 hours.

11. To know the opinion of the students about the subject statistics, a survey of 200 students was conducted. The data is recorded in the following table:

Opinion	**No. of students**
Likes	13
Dislikes	65

Find the probability that a student chosen at random:
(i) likes statistics
(ii) dislikes it.

12. Three coins are tossed simultaneously 200 times with the following frequencies of different outcomes:

Outcomes	No tail	One Tail	Two Tails	Three tails
Frequency	70	210	135	85

What is the probability of getting more than one tail in the next toss?

13. Probability of getting a blue ball is $\frac{2}{3}$, from a bag containing 6 blue and 3 red balls. 12 red balls are added in the bag, then find the probability of getting

    i. a blue ball.
    ii. a red ball

14. Cards marked 2 to 101 are placed in a box and mixed thoroughly. One card is drawn from the box. Find the probability that number on the card is (i) an even number (ii) a number less than 14 (iii) a number which is a perfect square (iv) a prime number less than 20. (v) an odd number.

15. Given below is the frequency distribution of daily wages (in Rs.) of 30 workers in a certain factory

Daily wages (in Rs.)	110-130	130-150	150-170	170-190	190-210	210-230	230-250
Number of workers	3	4	5	6	5	4	3

    A worker is selected at random. Find the probability that his wage is

    i. less than Rs.150
    ii. atleast Rs.210
    iii. more than or equal to Rs. 150 but less than Rs.210
    iv. in the interval Rs.190 - Rs.250

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Solution

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

   Explanation: Total number of outcomes = 6

   Numbers greater than 3 = 3 (4, 5, 6)

   The probability of getting a number greater than 3 = 3 / 6 = 1 / 2

2. (a) $\frac{1}{36}$

   Explanation: In a simultaneous throw of two dice, we have total possible outcomes, n(S) = (6 6) = 36.

   Then, the favourable outcome of getting two 5s , n(E) = {(5,5)} = 1

   ∴ The probability of getting two 5s ,P(E) = $\frac{n(E)}{n(S)}$ = $\frac{1}{36}$

3. (b) $\frac{2}{9}$

   Explanation: The total number of outcomes = 36

   Favourable outcomes for getting a doublet = 6 { (1,1) (2,2) (3,3) (4,4) (5,5) (6,6) }
   Probability of getting a doublet,P(A) = $\frac{6}{36}$

   Favorable outcomes for getting a total of 4 =3 { (1,3) (2,2) (3,1) }
   Probability of getting a total of 4 ,P(B)= $\frac{3}{36}$
   Favourable outcomes for getting both sum as 4 and also a doublet =1 {2,2}

   Probability of getting both sum as 4 and also a doublet,P(A∩B) =$\frac{1}{36}$

   So,probability of getting a doublet or a total of 4 is calculated using addition theorem of probability

   P(A∪ B) = P(A) + P(B) - P(A∩B) = $\frac{6}{36}$ + $\frac{3}{36}$ - $\frac{1}{36}$ = $\frac{8}{36}$ = $\frac{2}{9}$

4. (a) $\frac{1}{4}$

   Explanation: Let E_5 = event of getting no tail. Then,

E_5 = {HH} and, therefore, n(E_5) = 1.

Therefore, P(getting no tail) = P(E_5) = n(E_5)/n(S) = ¼.

5. (c) It is 9 : 4
   Explanation: Total Number of Possible Choices = Number of ways in which one card can be drawn from the total 52 = 52

   The gambler wins, if the card drawn is a spade or an ace.

   Let, A : The event of the card drawn being a spade or an ace.

   For event A,

   There are 13 spades.

   There are 4 aces, one of each type (spades, clubs, hearts and diamonds).

   The 13 spades include the ace of spades. Thus there would be 3 aces (of clubs, hearts and diamonds in the remaining cards.)

   The set of cards from which any card can appear to make the event a success would include the 13 spades and the 3 other aces.

   Number of favorable/favourable choices = Number of ways in which one card which is a spade or an ace can be drawn from the total 16 = 16

   Number of unfavorable choices = Total number of possible choices - Number of favorable choices = 52 - 16 = 36

   Odds against the gambler winning the bet

   ⇒ Odds against the card drawn being a spade or an ace.

   ⇒ Odds against Event A = Number of unfavourable choices : Number of favorable choices = 36 : 16 = 9 : 4

6. $\frac{27}{50}$

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

8. Total number of students = 50
   Number of students whose heights are more than 160 cm = 27
   ∴ Required probability =27/50

9. Let us define the following events:
   A = Getting three heads
   B = Getting two heads and one tail
   C = Getting at least two heads.
   We have, Total number of trials = 200
   Number of trials in which we get three heads i.e. in which event A happens = 23
   Number of trials in which we get two heads and one tail i.e. in which event B happens = 72
   Number of trials in which we get either two heads and one tail or all heads i.e. in which event C happens = 72 + 23 = 95
   Hence, P(A) = $\frac{23}{200}$ = 0.165, P(B) = $\frac{72}{200}$ = 0.36 and P(C) = $\frac{95}{200}$ = 0.475

10. Number of bulbs having a life less than 900 hours = 10 + 12 + 23 = 45
    P (a bulb has a life less than 900 hours) = $\frac{45}{80} = \frac{9}{16}$

11. Total no. of students on which the survey about the subject of statistics was conducted = 200
    (i)No. of students who like statistics = 135
    ∴ P (a student likes statistics) = $\frac{135}{200} = \frac{27}{40}$
    (ii)No. of students who do not like statistics = 65
    ∴ P (a student does not like statistics) = $\frac{65}{200} = \frac{13}{40}$

12. Frequency of more than one tail $= 135 + 85 = 220$
    $\therefore P(\text{more than one tail}) = \frac{220}{500} = \frac{11}{25}$

13. Initially, it was given that the total number of balls in the bag = 6 + 3 = 9 balls

    Now,
    After adding 12 red balls,
    Total number of balls becomes = 9 + 12 = 21 balls
    No. of blue balls = 6 balls
    No. of red balls = 3 + 12 = 15 balls

i. P(getting a blue ball)
= $\frac{Number\ of\ blue\ balls}{Total\ number\ of\ balls}$ = $\frac{6}{21}$ = $\frac{2}{7}$

ii. P(getting a red ball)
= $\frac{Number\ of\ red\ balls}{Total\ number\ of\ balls}$ = $\frac{15}{21}$ = $\frac{5}{7}$

14. Total number of cards = 100

(i) even numbers are = 50

P (even number) = $\frac{50}{100} = \frac{1}{2}$

(ii) no. less than 14 are

$= (2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13)$

$= 12$

P (no. less than 14) = $\frac{12}{100} = 0.12$

(iii) Number which is a Perfect square

$= \{4, 9, 16, 25, 36, 49, 64, 81, 100\}$

$= 9$

P (number which is a perfect square) $= \frac{9}{100} = 0.09$

(iv) Prime no. less than 20 are

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

$= 8$

P (Prime no. less than 20) $= \frac{8}{100} = \frac{2}{25}$

(v) P (odd number) $= 1 - P$(an even no.)

= 1 - $\frac{50}{100}$

= $\frac{50}{100}$ = $\frac{1}{2}$

15. It is given that, the total number of workers = 30

Probability of an event = $\frac{Favourable\ no.\ of\ outcomes}{Total\ no.\ of\ outcomes}$

Thus, using the above formula we will find the required probabilities in all the following parts, as follows.

i. No. of workers whose wages are less than Rs.150 = 3 + 4 = 7
Thus, Probability that a worker gets wage less than Rs.150 = $\frac{7}{30}$.

ii. No. of workers whose wages is at least Rs. 210 = 4 + 3 = 7

Thus, Probability that a worker gets a wage of at least Rs.210 = $\frac{7}{30}$.

iii. No. of workers whose wages is more than or equal to Rs.150 but less than Rs.210 = 5 + 6 + 5 = 16

Thus, Probability that a worker gets a wage of more than or equal to Rs.150 but less than Rs.210 = $\frac{16}{30} = \frac{8}{15}$.

iv. No. of workers whose wages lies in the interval Rs.190 - Rs.250 = 5 + 4 + 3 = 12

Thus, Probability that a worker gets a wage lies in the interval Rs.190 - Rs.250 = $\frac{12}{30} = \frac{2}{5}$.