

BHARATIYA VIDYA BHAVAN'S V M PUBLIC SCHOOL, VADODARA

QUESTION BANK

CHAPTER -13. PROBABILITY

1. Evaluate: $P(A \cup B)$; if $2P(A) = P(B) = \frac{5}{13}$ and $P(A/B) = \frac{2}{5}$.
2. A biased die is twice as likely to show an even number as an odd number. The die is rolled three times. If occurrence of an even number is considered a success, then write the probability distribution of number of successes. Also find the mean number of successes.
3. If A and B are two events such that $P(A) = \frac{1}{4}$; $P(B) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{8}$, find $P(\text{not } A \text{ and not } B)$.
4. A box contains 13 bulbs out of which 5 bulbs are defective. 3 bulbs are drawn one by one from the box with replacement. Find the probability distribution of the number of defective bulbs drawn. Also find mean and variance.
5. There is a group of 50 people who are patriotic out of which 20 believe in non violence. Two persons are selected at random out of them. Write the probability distribution for the selected persons who are non-violent. Explain the importance of non violence in patriotism.
6. Two independent events A and B are given such that $P(A) = 0.3$ and $P(B) = 0.6$.
Find $P(A \text{ and not } B)$. Ans. 0.12
7. If X has Binomial distribution $B(4, \frac{1}{3})$, Find $P(X=1)$. Ans. $\frac{32}{81}$
8. How many times must a man toss a fair coin so that the probability of having at least 1 head is more than 80%? Ans. 3 times
9. X is taking up 3 subjects Math, Physics and Chemistry in the examination. His probability of getting grade A in these subjects is 0.2, 0.3 and 0.5 respectively. Find the probability that he gets grade A in (i) all subjects. (ii) no subjects. (iii) two subjects.
Ans. 0.03, 0.28, 0.22
10. A speak truth in 75% of the cases, while B in 90% of the cases. In what % of cases are they likely to contradict each other in stating the fact? Ans. $\frac{3}{10}$
11. Two cards are drawn without replacement from a well shuffled pack of 52 cards. Find the probability that one is red and the other is queen of red colour. Ans. $\frac{1}{51}$
12. The probability that a student entering a university will graduate is 0.4. Find out the probability that out of three students of university (i) none will graduate (ii) only one will graduate (iii) all will graduate. Ans. 0.216, 0.432, 0.064
13. An experiment succeeds twice often as it fails. Find the probability that in the next 6 trials there will be at least 4 successes. Ans. $\frac{496}{729}$
14. In a certain college, 4% of boys and 1% of girls are taller than 1.75 meters. 60% of the students are girls. A student is selected at random from the college and is found to be taller than 1.75 meters. Find the probability that the selected student is a girl. Ans. $\frac{3}{11}$

15. A box contains 30 bulbs out of which 6 bulbs are defective. A sample of 4 bulbs is drawn one by one from the box with replacement. Find the probability distribution of the number of defective bulbs drawn. Also find mean and variance. Ans. Mean = $\frac{4}{5}$, Variance = $\frac{16}{25}$.
16. A box contains 12 bulbs out of which 3 bulbs are defective. A sample of 3 bulbs is selected from the box. Let X denote the number of defective bulbs in the sample; Find the probability distribution of X .
17. A letter is known to have come from TATANAGAR or from CALCUTTA. On the envelope, just two consecutive letters TA are visible. What is the probability that the letter has come from TATANAGAR?
18. An insurance company insured 2000 scooter drivers, 4000 car drivers and 6000 truck drivers. The probability of an accident is 0.01, 0.03 and 0.15 respectively. One of the insured persons meets with an accident. What is the probability that he is a scooter driver?
19. Three cards are drawn successively with replacement from a well shuffled deck of 52 playing cards. If getting a card of spade is considered a success, find the probability distribution of the number of successes. Also find the mean of the distribution.
20. A man is known to speak the truth 3 out of 5. He throws a die and reports that it is 1, find the probability that it is actually 1.
21. A class has 15 students whose ages are 14,17,15,14,21,17,19,20,16,18,20,17,16,19 and 20 years. One student is selected in such a manner that each has the same chance of being chosen and the age X of the selected student is recorded. What is the probability distribution of the random variable X ? Find the mean of X .
22. Find $P(A/B)$ if $P(A) = 0.4$, $P(B) = 0.8$ and $P(B/A) = 0.6$
23. A soldier fires three bullets on enemy. The probability that the enemy will be killed by one bullet is 0.7. What is the probability that the enemy is still alive?
24. What is the probability that a leap year has 53 Sundays?
25. 20 cards are numbered 1 to 20. One card is drawn at random. What is the probability that the number on the card will be a multiple of 4?
26. Three coins are tossed once. Find the probability of getting at least one head.
27. The probability that a student is not a swimmer is 1. Find the probability that out of 5 students, 4 are swimmers.
28. A die is rolled. If the outcome is an even number, what is the probability that it is a prime?
29. In a class of 25 students with roll numbers 1 to 25, a student is picked up at random to answer a question. Find the probability that the roll number of the selected student is either a multiple of 5 or of 7.
30. A can hit a target 4 times in 5 shots, B three times in 4 shots and C twice in 3 shots. They fire a volley. What is the probability that at least two shots hit.
31. Two dice are thrown once. Find the probability of getting an even number on the first die or a total of 8.
32. A and B throw a die alternatively till one of them throws a '6' and wins the game. Find their respective probabilities of winning, if A starts the game.
33. A man takes a step forward with probability 0.4 and backward with probability 0.6. Find the probability that at the end of eleven steps he is one step away from the starting point.
34. Two cards are drawn from a pack of well shuffled 52 cards one by one with replacement. Getting an ace or a spade is considered a success. Find the probability distribution for the number of successes.

35. In a game, a man wins a rupee for a six and loses a rupee for any other number when a fair die is thrown. The man decided to throw a die thrice but to quit as and when he gets a six. Find the expected value of the amount he wins/loses.
36. Suppose that 10% of men and 5% of women have grey hair. A grey haired person is selected at random. What is the probability that the selected person is male assuming that there are 60% males and 40% females.
37. A card from a pack of 52 cards is lost. From the remaining cards of the pack, two cards are drawn. What is the probability that they both are diamonds?
38. Ten eggs are drawn successively with replacement from a lot containing 10% defective eggs. Find the probability that there is at least one defective egg.
39. Find the variance of the number obtained on a throw of an unbiased die.
40. In a hurdle race, a player has to cross 8 hurdles. The probability that he will clear a hurdle is $\frac{4}{5}$, what is the probability that he will knock down in fewer than 2 hurdles?
41. Bag A contains 4 red, 3 white and 2 black balls. Bag B contains 3 red, 2 white and 3 black balls. One ball is transferred from bag A to bag B and then a ball is drawn from bag B. The ball so drawn is found to be red. Find the probability that the transferred ball is black.
42. If a fair coin is tossed 10 times, find the probability of getting (i) exactly six heads, (ii) at least six heads (iii) at most six heads.
43. Two cards from a pack of 52 cards are lost. One card is drawn from the remaining cards. If drawn card is heart, find the probability that the lost cards were both hearts.
44. A box X contains 2 white and 3 red balls and a bag Y contains 4 white and 5 red balls. One ball is drawn at random from one of the bags and is found to be red. Find the probability that it was drawn from bag Y.
45. Suppose a girl throws a die. If she gets 5 or 6, she tosses a coin three times and notes the number of heads. If she gets 1, 2, 3 or 4 she tosses a coin once and notes whether a head or tail is obtained. If she obtained exactly one head. What is the probability that she throws 1, 2, 3 or 4 with the die?
46. In a bolt factory machines A, B and C manufacture 60%, 30% and 10% of the total bolts respectively, 2%, 5% and 10% of the bolts produced by them respectively are defective. A bolt is picked up at random from the product and is found to be defective. What is the probability that it has been manufactured by machine A?
47. Two urns A and B contain 6 black and 4 white, 4 black and 6 white balls respectively. Two balls are drawn from one of the urns. If both the balls drawn are white, find the probability that the balls are drawn from urn B.
48. Two cards are drawn from a well shuffled pack of 52 cards. Find the mean and variance for the number of face cards obtained.
49. Write the probability distribution for the number of heads obtained when three coins are tossed together. Also, find the mean and variance of the number of heads.
50. Two groups are competing for the position on the Board of Directors of a corporation. The probabilities that the first and the second groups will win are 0.6 and 0.4 respectively. Further if the first group wins, the probability of introducing a new product is 0.7 and the corresponding probability is 0.3 if the second group wins. Find the probability that the new product introduced was by the second group.
51. A doctor is to visit a patient. From the past experience, it is known that the probabilities that he will come by train, bus and scooter or by other means of transport are respectively $\frac{3}{10}, \frac{1}{5}, \frac{1}{10}$ and $\frac{2}{5}$. The probabilities that he will be late are $\frac{1}{4}, \frac{1}{3}, \frac{1}{12}$, if he comes by train,

bus and scooter respectively, but if he comes by other means, he will not be late. He is late when he arrives. What is the probability that he comes by train?

52. Find the probability distribution of the number of white balls drawn in a random draw of 3 balls without replacement from a bag containing 4 white and 6 red balls. Also find the mean and variance of the distribution.

53. A random variable X has the following probability distribution: Determine $P(x \geq 6)$.

X	0	1	2	3	4	5	6	7
P(x)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

54. In a self-assessment survey 60% persons claimed that they never indulged in corruption, 40% persons claimed that they always spoke the truth and 20% said that they neither indulged in corruption nor told lies. A person is selected at random out of this group. (i) What is the probability that the person is either corrupt or tells lie? (ii) If the person never indulged in corruption, find the probability that she/he speaks the truth. (iii) If the person always speaks the truth then find the probability that she/he claims to have never indulged in corruption (iv) What values have been discussed in this question and why is it must for all to practice these values in our life?

55. An experiment succeeds twice often as it fails. Find the probability that in the next 6 trials there will be at least 4 successes.
