

SERERE TOWNSHIP SS

Probability – 100 Scenario Questions

Basic Probability

1. A coin is tossed once. What is the probability of getting a head?
2. A die is rolled. What is the probability of obtaining an odd number?
3. A bag contains 6 red and 4 blue balls. One ball is picked at random. What is the probability it is red?
4. A student chooses a digit at random from 0–9. What is the probability it is a prime number?
5. A letter is chosen from the word **SCHOOL**. Find the probability it is a vowel.

Complementary Events

6. The probability it rains tomorrow is 0.3. What is the probability it does not rain?
7. A fair die is rolled. Find the probability of **not** obtaining a multiple of 3.
8. A card is drawn from a pack. Find the probability it is not a king.
9. In a class, 70% of students like mathematics. If a student is chosen, what is the probability they do not like mathematics?
10. A basket contains 12 mangoes, 5 of which are rotten. If one is picked, find the probability it is not rotten.

Combined Events

11. A coin is tossed twice. What is the probability of getting exactly one head?
12. A die is rolled twice. Find the probability the sum is 7.
13. A bag has 5 white and 3 black balls. Two are drawn without replacement. Find the probability both are black.
14. Two cards are drawn from a standard deck. Find the probability both are aces.
15. Two dice are rolled. Find the probability both show even numbers.

Conditional Probability

16. A card is drawn from a pack. Given that it is red, what is the probability it is a king?

17. In a class of 40, 25 are boys and 10 boys wear glasses. If a student wearing glasses is chosen, what is the probability it is a boy?
18. A bag has 4 blue and 6 green marbles. If one is drawn and replaced, what is the probability the second is blue given the first was green?
19. Two dice are rolled. Find the probability the sum is 9 given that one die shows a 5.
20. A committee of 3 is formed from 5 men and 3 women. What is the probability the committee has 2 women given that it has at least 1 woman?

Independent Events

21. A coin is tossed and a die is rolled. Find the probability of getting a head and a 4.
22. A bag has 3 red and 2 white balls. If two balls are drawn with replacement, what is the probability both are red?
23. A card is drawn twice with replacement. Find the probability both are spades.
24. A person spins two fair wheels numbered 1–6. Find the probability both land on the same number.
25. A coin is tossed three times. Find the probability of getting three heads.

Mutually Exclusive Events

26. A card is drawn from a pack. Find the probability it is either a king or a queen.
27. A die is rolled. Find the probability of getting a 4 or a 6.
28. From 1–20, a number is chosen at random. Find the probability it is divisible by 3 or 5.
29. A letter is chosen from the alphabet. Find the probability it is a vowel or consonant.
30. A ball is chosen from a bag of 5 red and 7 blue. Find the probability it is red or blue.

Probability Rules

31. A die is rolled. Find the probability of getting a number greater than 4 or an even number.
32. A box has 6 green, 3 yellow, and 5 red balls. If one is drawn, find the probability it is green or red.
33. From 1–50, a number is chosen. Find the probability it is even or a multiple of 7.

34. A bag has 10 sweets: 3 orange, 2 lemon, and 5 mango. Find the probability of picking orange or lemon.
35. A student is chosen from 60 students: 40 like music, 30 like art, and 20 like both. Find the probability the student likes music or art.

Tree Diagrams

36. A coin is tossed twice. Draw a tree diagram and find the probability of two heads.
37. A bag has 2 red and 3 blue balls. Two are drawn without replacement. Draw a tree diagram and find the probability both are red.
38. A factory makes bulbs: 2% are defective. A bulb is chosen. Find the probability it is good.
39. A coin is tossed and a die is rolled. Draw a tree diagram and find the probability of a head and a 6.
40. In a box are 5 white and 2 black balls. If two are drawn with replacement, find the probability they are of the same color.

Bayes' Theorem

41. A company has 3 machines producing 40%, 35%, and 25% of items. The defect rates are 2%, 3%, and 4% respectively. If an item is defective, what is the probability it came from the first machine?
42. A school has 60% boys and 40% girls. 70% of boys and 90% of girls pass an exam. If a student is chosen and found to have passed, what is the probability it was a girl?
43. A medical test is 95% accurate. If 1% of the population has a disease, find the probability a person testing positive actually has the disease.
44. A bag has 3 red and 2 blue marbles. Another bag has 4 red and 6 blue marbles. A bag is chosen at random and a marble is drawn. If it is red, what is the probability it came from the first bag?
45. A company hires 40% of applicants with degrees and 10% without degrees. If 30% of applicants have degrees, what is the probability a hired person has a degree?

Probability Distributions

46. A fair die is rolled. Write the probability distribution of outcomes.
47. A coin is tossed 3 times. Write the probability distribution of the number of heads.

48. A bag has 3 red and 5 white balls. Two are drawn without replacement. Write the distribution of the number of red balls.
49. A student guesses answers to a 3-question true/false test. Write the distribution of the number of correct answers.
50. A die is rolled twice. Write the distribution of the sum of outcomes.

Expected Value

51. A fair coin is tossed 4 times. Find the expected number of heads.
52. A die is rolled. Find the expected value of the score.
53. A box has 3 red and 2 blue balls. One is drawn. If red gives Shs.5 and blue gives Shs.10, find the expected winnings.
54. A card is drawn. If a king gives Shs.20 and others give nothing, find the expected gain.
55. A spinner has 4 equal parts: 1, 2, 3, 4. Find the expected score.

Variance & Standard Deviation

56. A fair die is rolled. Find the variance of the score.
57. A coin is tossed twice. Find the variance of the number of heads.
58. A bag has 3 red and 1 blue ball. One is drawn. If red = 2 points and blue = 5 points, find the variance.
59. A random variable XXX has distribution: 1 ($p=0.2$), 2 ($p=0.3$), 3 ($p=0.5$). Find mean and variance.
60. A die is rolled. Find the standard deviation of the score.

Binomial Probability

61. A coin is tossed 5 times. Find the probability of exactly 3 heads.
62. A die is rolled 6 times. Find the probability of exactly two 6s.
63. A student guesses on 10 true/false questions. Find the probability of 7 correct.
64. A coin is tossed 4 times. Find the probability of at least 2 heads.
65. The probability of winning a game is 0.3. Find the probability of 2 wins in 5 games.

Poisson Probability

66. A call center receives 3 calls per minute on average. Find the probability of 5 calls in a given minute.
67. A shop sells 4 pens per hour on average. Find the probability it sells exactly 6 in an hour.
68. A hospital records 2 births per hour. Find the probability of no births in 2 hours.
69. A bus stop has 10 buses per hour on average. Find the probability exactly 8 arrive in an hour.
70. A machine produces 1 defective item per 100. Find the probability of 3 defectives in 200 items.

Normal Approximation

71. A coin is tossed 100 times. Approximate the probability of 60 or more heads.
72. A die is rolled 120 times. Approximate the probability of 25 sixes.
73. In a test, the chance of passing each question is 0.4. Find the probability at least 50 out of 150 are correct using normal approximation.
74. A factory produces bolts: 5% are defective. In 400 bolts, find the probability at most 10 are defective.
75. A school reports 40% of students like football. In a group of 200, approximate the probability that fewer than 70 like football.

Advanced Scenarios

76. A committee of 4 is chosen from 6 men and 5 women. What is the probability the committee has equal men and women?
77. In a survey, 40% of people like tea, 30% like coffee, and 20% like both. Find the probability a person likes neither.
78. Two dice are rolled. What is the probability the product of the numbers is even?
79. A student randomly answers 5 multiple-choice questions with 4 options each. What is the probability they get exactly 2 correct?
80. A class has 12 boys and 8 girls. If 3 are chosen, what is the probability all are boys?

Challenging Applications

81. A die is rolled twice. Find the probability the larger number is 4.

82. A bag has 6 red, 4 blue, and 5 green balls. Two are drawn. What is the probability they are different colors?
83. A family has 3 children. What is the probability they have at least 2 boys?
84. A die is rolled. What is the probability the square of the outcome is less than 20?
85. A fair spinner has 5 equal parts labeled 1–5. Find the probability of an even number greater than 2.

Real-Life Extensions

86. A factory makes 1000 bulbs, 10 of which are defective. If 2 are chosen, what is the probability both are good?
87. A school has 20 teachers, 8 teach science. If 3 are chosen, what is the probability at least one teaches science?
88. A basket has 12 oranges, 3 bad. If 4 are picked, what is the probability none are bad?
89. A farmer plants 10 seeds, each with 0.8 chance of germination. Find the probability at least 9 germinate.
90. A bus has 50 seats. If tickets are sold randomly, what is the probability seat 25 is occupied?

Mixed / Higher Order

91. A box has 4 red and 6 blue balls. If 3 are drawn, find the probability of at least 2 red.
92. Two dice are rolled. Find the probability the sum is a prime number.
93. In a raffle, 10 tickets are sold, 3 win. If you buy 2, what is the probability you win at least once?
94. A group of 8 friends toss coins. What is the probability exactly 5 get heads?
95. A student guesses 20 multiple-choice questions with 5 options each. Find the probability of exactly 4 correct.

Final Applications

96. A bag has 7 red and 5 white balls. If 3 are drawn, find the probability of exactly 2 red.
97. A dice game scores Shs.10 for a 6, Shs.5 for a 5, and nothing otherwise. Find the expected score.
98. A pack of 52 cards is shuffled. What is the probability of drawing a red face card?

99. A fair coin is tossed until a head appears. Find the probability it occurs on the 3rd toss.
100. In a test, the probability a student passes is 0.7. If 5 students sit, what is the probability at least 4 pass?