GCSE Maths Probability Questions – SET 1

1. Basic Probability and Events

1. What is the probability of rolling an even number on a fair six-sided dice?
2. A coin is flipped twice. What is the probability of getting exactly one head?
3. A bag has 3 red, 5 blue, and 2 green balls. What is the probability of picking a blue ball?
4. A spinner is divided into 4 equal sections numbered 1 to 4. What's the probability it lands on number 3?
5. Two coins are tossed. What's the probability of getting two tails?
6. A card is drawn from a standard 52-card deck. What's the probability it is a heart?
7. If the probability of rain today is 0.3, what is the probability it doesn't rain?
8. A jar contains candies: 5 chocolates, 8 gummies, and 7 mints. What is the probability of picking a candy that is not chocolate?
9. What is the complement of drawing a spade from a deck of cards?
10. What is the probability of drawing a face card or a 10 from a deck?

2. Combined and Independent Events

11. If two dice are rolled, what is the probability that the sum is 7?
12. A bag contains 10 balls: 6 red and 4 yellow. Two balls are drawn one after the other without replacement. What is the probability both are red?
13. Two coins are tossed. What is the probability of getting two tails?
14. Two dice are rolled. What is the probability both show the same number?
15. A dice is rolled, and a card is drawn from a deck. What is the probability the dice shows 3 and the card is a heart?
16. Two cards are drawn from a deck without replacement. What is the probability they are both kings?
17. If event A and B are independent with probabilities 0.3 and 0.5, find P(A and B).

18. What is the probability of getting a sum of 6 when rolling two dice?
19. A biased die has given probabilities for faces 1 to 5. Calculate the probability of face 6.
20. Two balls are drawn from a bag with green and blue balls without replacement. Calculate the probability both are green.

3. Conditional Probability and Bayes' Theorem

21. In a class of 18 girls and 12 boys, fractions of each walk to school. Given that a student walks to school, find the probability they are a boy.
22. A biased coin lands heads with probability 0.4 per flip. What's the probability of getting two tails in two coin flips?
23. Given that the second ball drawn was green, find the probability that the first ball was green.
24. Given event A or B occurs, with certain probabilities, find the probability of A given B.
25. Rachel flips a biased coin. Probability of two heads is 0.16. Find the probability of two tails.
26. A student guesses answers to 5 true/false questions. Find the probability exactly 4 are correct.
27. There are 12 marbles in a bag. Expression for probability of taking one red and one blue marble?
28. From total students choosing options in sports, find probability that the student choosing a specific event is female.
29. Given that a person likes pepperoni pizza, find the probability that they do not like vegetable pizza.
30. In a game, probability of winning is 0.6. Find probability of winning at least one out of two games.

4. Tree Diagrams and Sequential Events

31. A restaurant offers 2 starters, 3 mains, and 2 desserts. How many meal combinations?
32. Dexter runs a game: probability of winning is $(1/2) \times (4/13)$. Calculate expected profit if 260 people play.
33. William plays badminton with winning probability 0.6. Calculate probability he wins at least one out of two matches.
34. Two balls are drawn from a bag with replacement. Construct a probability tree and find probabilities of sequences.

35. A spinner with 4 sectors of different probabilities. What is the probability of landing on a particular sector?
36. A class has 30 students: 18 boys and 12 girls. What is probability that a randomly chosen student is a girl?
37. What is the probability that a randomly selected letter from "PROBABILITY" is the letter "A"?
38. A dice is rolled twice. Construct a tree diagram for sums and compute probability sum is 7.
39. In a biased game, find probability distribution for outcomes using tree diagrams.
40. A bag contains marbles of different colors. Write probabilities for each color and find overall probabilities of sequences.

5. Experimental, Theoretical and Expected Probability

41. A dice is rolled 60 times. If 15 times it shows 4, calculate experimental probability of getting 4.
42. Calculate theoretical probability of getting a number divisible by 3 on a 12-sided dice.
43. In a game with random outcomes, compare theoretical and experimental probabilities from data.
44. Find expected value in a game where you win £3 for success and lose £1 otherwise.
45. If probability of drawing an orange jelly bean is 0.25, how many would you expect in 60 draws?
46. Dexter plays a game for £1, winning £3 if success. Calculate expected profit after 260 plays.
47. Experimental probability: You flip coin 100 times and get 54 heads. Compare to theoretical probability.
48. Define relative frequency and explain how it estimates probability.
49. Work out expected profit if probability of winning is p and cost per play is c.
50. Calculate probability distributions for rolling a dice multiple times.

6. Binomial Probability and Distributions

51. What is the probability of getting exactly 3 heads in 5 coin tosses?
52. For probability of success p, find the probability of x successes in n independent trials.
53. Calculate P(X=4) in a binomial distribution with n=5, p=0.6.

54. Explain how binomial expansion relates to binomial probability.
55. What is the expected number of heads when flipping 8 coins?
56. Given a biased coin with p=0.7 for heads, calculate probability of exactly 2 tails in 5 flips.
57. Calculate cumulative probability of at most 3 successes in binomial distribution.
58. For a binomial random variable with n=10, calculate mean and variance.
59. How does increasing n affect the shape of a binomial distribution?
60. Using binomial tables, find probability of at least 1 success in 6 trials with p=0.4.

7. Venn Diagrams and Set Events

61. Given sets A and B with certain probabilities, calculate $P(A \cup B)$.
62. Find probability of elements in both sets A and B (intersection).
63. If probabilities for A and B are given with $P(A \cap B)$, find $P(A \cup B)$.
64. Calculate complement probability of an event given union or intersection probabilities.
65. From survey data, calculate probability a person likes only one of two items using a Venn diagram.
66. Solve probability problems involving exclusive events.
67. Given P(A) and P(B), find the probability neither A nor B occur.
68. Can events be mutually exclusive and independent? Explain with example.
69. Given conditional probability values, find missing probabilities using Bayes' theorem.
70. Use Venn diagrams to calculate probabilities involving three sets.

8. Word Problems and Real-Life Applications

71. A bag contains blue and red marbles. Find probabilities for sequential draws without replacement.
72. In a class, proportions of boys and girls take exams. Calculate probability a randomly chosen student is a girl who passed.
73. Find probability that first defective product is found on the third inspection.
74. Calculate probability of winning in a game where multiple events must occur.

75. Customers choose between dinner options; find probability of various meal combinations.
76. Calculate expected number of successes in a raffle given probabilities.
77. A spinner game has sectors with different payoffs; find expected value.
78. A football team has winning probability 60%. Find probability of winning both next two matches.
79. Customers pick products randomly; find probability no defective product is picked in sequence.
80. In a biased quiz, find probability of passing given partial knowledge.

9. Practice with Probability Equations

81. Given probability expression with variable n, solve for n.
82. Form equation for probability of drawing two balls, one red and one blue, and solve.
83. Create equation for probability involving total outcomes and find unknowns.
84. Solve quadratic probability equations arising from combined events.
85. Form and solve probability equations from tree diagrams.
86. Use probability equations to find probabilities of complementary events.
87. Calculate probabilities when the total number of outcomes or events is unknown.
88. Solve problems involving expected values using algebraic probability.
89. Given experimental data, find unknown parameters using probability equations.
90. Work on probability distributions using equations to balance discrete events.

10. Mixed Practice and Exam-style Questions

91. A dice is rolled twice. What is the probability the sum is 7 or 11?
92. Two spinners numbered 1 to 5 are spun. What is the probability their sum is 7?
93. A deck contains 52 cards. What is the probability of drawing a red card or a face card?
94. A fair coin is tossed 4 times. What is the probability of 3 heads?
95. Calculate probability both marbles drawn are the same color given proportions.
96. Given probabilities of various weather conditions, find compound event probabilities.

97. A game has stages with different event probabilities; find overall probability of winning.

98. Calculate probability difference if draws are with or without replacement.

99. Use tree diagrams to analyze probability distribution for multiple stages of a game.

100. A biased coin performs a sequence of tosses; calculate various compound event probabilities.