This worksheet will help you master the multiplication rule of probability for calculating the probability of independent or dependent events occurring together. Work through each question and show all your workings.

Easy Questions

1. A fair coin is tossed twice. Calculate the probability that the first toss results in head and the second toss results in tail.

2. A fair coin is tossed and a fair six-faced die is rolled. Find the probability of obtaining head on the coin and 4 on the die.

3. A bag contains 2 green and 3 yellow marbles. If one marble is drawn, replaced, and then a second marble is drawn, what is the probability that both marbles drawn are green?

4. Suppose event A has probability 0.7 and event B has probability 0.4, and they are independent. Calculate the probability that both events occur.

5. In an experiment, event A has probability 0.2 and event B has probability 0.5. Assuming the events are independent, what is the probability that both A and B occur?

Intermediate Questions

6. A fair coin is tossed three times. Compute the probability of obtaining head on each toss.

7. A fair six-faced die is rolled twice. What is the probability of rolling a 2 on the first roll and a 5 on the second roll?

8. A bag contains 5 red marbles and 3 blue marbles. If two marbles are drawn one after another without replacement, find the probability that both marbles drawn are red.

9. In a class of 10 students, 4 students are in the chess club. If two students are selected at random without replacement, determine the probability that both selected students are members of the chess club.

10. From a standard deck of 52 cards, if two cards are drawn without replacement, what is the probability that both cards drawn are aces?

11. A fair spinner divided into 4 equal sectors (labelled 1, 2, 3, 4) is spun twice. Calculate the probability that the spinner lands on 3 on both spins.

12. A bag contains 6 white and 4 black balls. If one ball is drawn, replaced, and then a second ball is drawn, what is the probability that both drawn balls are white?

13. Two independent spinners are spun. The first spinner lands on red with probability 0.4 and the second spinner lands on red with probability 0.5. What is the probability that both spinners land on red?

14. In a raffle with 100 tickets, 5 tickets are winners. If a ticket is drawn, replaced, and then drawn again, calculate the probability that a winning ticket is drawn both times.

15. An urn contains 8 white balls and 2 black balls. If two balls are drawn with replacement, what is the probability that both balls drawn are white?

16. A game involves two independent actions: drawing a ball from a basket containing 5 numbered balls (1 to 5) and rolling a fair die. Find the probability that the ball drawn is numbered 3 and the die shows 6.

17. A fair wheel is divided into 10 equal segments numbered 1 to 10. If the wheel is spun twice, what is the probability that both outcomes are even numbers?

18. A box contains 3 red, 4 blue, and 5 green balls. If one ball is drawn, replaced, and then another ball is drawn, determine the probability that a blue ball is drawn both times.

19. A spinner divided into 6 equal regions is spun once and a die is rolled. Find the probability that the spinner shows 2 and the die shows a number greater than 4.

20. For two independent events A and B, if $P(A) = 0.8$ and $P(B) = 0.25$, use the multiplication rule to calculate $P(A \text{ and } B)$.

21. In a lottery game, one ball is drawn from a basket of 7 distinct balls and a fair coin is tossed. If the winning combination is drawing ball number 4 and the coin landing head, what is the probability of winning?

Hard Questions

21. A jar contains 5 red, 4 blue, and 6 yellow balls. If three balls are drawn one after another without replacement, compute the probability that all three drawn balls are red.

22. In a class of 30 students, 12 are members of the drama club. Two students are selected at random without replacement. Determine the probability that at least one of the selected students is a drama club member. (Hint: First compute the probability that neither is a drama club member and then subtract from 1.)

23. An urn contains 3 red and 2 green balls. Two balls are drawn without replacement. Find the probability that the first ball drawn is green and the second ball drawn is red.

24. Two cards are drawn consecutively without replacement from a standard deck of 52 cards. Calculate the probability that the first card is a heart and the second card is a diamond.

25. A bag contains 7 marbles: 3 black and 4 white. Two marbles are drawn without replacement. Compute the probability that both marbles drawn are of the same colour.

26. In a manufacturing process, a lot contains 50 items, 5 of which are faulty. If two items are randomly inspected without replacement, determine the probability that both items inspected are faulty.

27. A spinner is divided into 8 equal sectors numbered 1 to 8. It is spun three times. Find the probability that the outcomes are 2, 4, and 6 in that precise order.

28. A box contains 10 balls, of which 4 are red and 6 are blue. Two balls are drawn one after the other without replacement. What is the probability that the first ball is red and the second ball is blue?

29. A container holds 6 coins, of which 4 are fair coins and 2 are biased coins (the biased coins show head with probability 0.8). One coin is randomly selected and then tossed twice. Determine the overall probability of obtaining head on both tosses.

30. A bowl contains 7 cookies: 3 are chocolate and 4 are plain. Two cookies are selected at random without replacement. Compute the probability that the first cookie is chocolate and the second cookie is plain.