ILLAWARRA TUTORING

This worksheet focuses on practising counting outcomes using permutations and combinations to solve complex probability problems. You will solve problems that require you to decide when order matters (permutations) and when it does not (combinations).

Easy Questions

1. Calculate the number of ways to arrange 3 distinct objects in a row.
2. Find the number of ways to choose 2 items from 5 distinct items where the order does not matter.
3. Evaluate the permutation $P(5, 3)$ which represents the number of ways to choose and arrange 3 objects from 5 distinct objects.
4. Compute the combination $C(6, 2)$, that is, the number of ways to choose 2 objects from 6 when the order is not important.
5. Determine the value of $4!$.

Intermediate Questions

6. A club has 8 members. In how many ways can 3 officers (president, secretary and treasurer) be chosen, where each position is distinct?
7. In a club of 10 people, how many different committees of 4 members can be formed if the order of selection does not matter?
8. Determine the number of ways to arrange 5 different books on a shelf.
9. 6 items are to be arranged in a row if one specified item must always be placed in the first position. Calculate the number of possible arrangements.
10. The word *BANANA* is formed from 6 letters with repetitions. Find the number of distinct arrangements of its letters.
11. Three boys and three girls are to be arranged in a row so that they alternate in gender. Determine the total number of possible arrangements.
12. When tossing 4 coins, how many outcomes result in exactly 2 heads?
13. From 5 dessert options, in how many ways can you choose 2 desserts if the order in which they are selected does not matter?

14. In a race with 7 runners, how many different orders can they finish if there are no ties?

15. If 8 people are to be seated around a round table where rotations are considered identical, calculate the number of distinct seating arrangements.

16. A lock uses a code consisting of 3 distinct digits chosen from 0–9. Find the total number of possible codes.

17. A team of 5 is to be formed from 5 boys and 4 girls by selecting 3 boys and 2 girls. Determine the number of ways to form the team.

18. In a class of 12 students, how many ways can a committee of 4 students be formed when the order does not matter?

19. In a race among 8 competitors, medals are awarded to the top 5 finishers (order matters). Compute the number of possible ways the medals can be awarded.

20. A committee of 4 is to be formed from 3 men and 4 women, with the requirement that exactly 2 men and 2 women are selected. How many committees are possible?

Hard Questions

21. Determine the number of distinct arrangements of the letters in the word $STATISTICS$.

22. In how many ways can 10 people be seated around a round table if two particular people must not be seated next to each other?

23. A committee of 4 is to be formed from 6 men and 5 women, with the restriction that the committee must include at least 2 women. Find the number of ways to form such a committee.

24. In a race with 12 runners, calculate the number of different orders in which the top 3 finishers can be arranged (with no ties).

25. From 8 candidates, in how many ways can a president, vice-president and treasurer be selected if one person cannot hold more than one position?

26. A shelf contains 7 different books. In how many ways can they be arranged if 2 particular books must always be together?

27. Find the number of ways to arrange 8 people in a row if two specified people must have exactly 2 persons between them.

28. A task force of 5 is to be formed from 12 employees, but two specific employees cannot work together. How many different task forces are possible?

29. A password is created by concatenating 4 distinct letters followed by 2 digits (digits may be repeated). Determine the total number of possible passwords.

30. In a lottery, 6 numbers are drawn from 49 without replacement. Veronica wishes to purchase a ticket that contains exactly 3 of the winning numbers. Calculate the number of different tickets she can choose.