ILLAWARRA TUTORING

In this worksheet the students will practise counting outcomes using permutations and combinations to solve complex probability problems. Make sure you show your working and check your results.

Easy Questions

1. Arrange 3 different books on a shelf. How many different orders are possible if no book is repeated?
2. Choose 2 fruits from a basket of 4 different fruits (order does not matter). How many selections are possible?
3. Form a 2-letter arrangement from the letters A, B, C and D with no repetition. How many arrangements can be made?
4. Two cars are to park in a row of 5 available spots. How many different arrangements are possible if each car parks in a different spot?
5. Form a 3-digit number using the digits 1, 2 and 3 (each digit used at most once). How many numbers can be formed?

Intermediate Questions

6. Find the number of ways to arrange the letters in the word $MATH$.
7. From 8 students, select a group of 3. How many groups are possible if the order of selection does not matter?
8. Assign 3 different tasks to 7 students. In how many different ways can the assignments be made if each task is given to a different student?
9. In a race with 6 runners, how many ways can first, second and third positions be awarded?
10. From 4 different ice cream flavours, choose 2 flavours for a double scoop cone (no repetition, order does not matter). How many selections are possible?
11. Form a committee of 3 members from 10 candidates. How many different committees can be formed?
12. From 5 different books, how many ways can 3 be arranged on a shelf if the order matters?

13. In 4 coin tosses, how many sequences result in exactly 2 heads appearing?

14. From 9 distinct marbles, select 4 and arrange them in order. How many such arrangements are possible?

15. Seven candidates apply for 3 distinct job positions. Determine the number of ways to assign the positions.

16. How many ways can 5 different paintings be arranged in a row on a wall?

17. From a group of 8 people, how many unique pairs can be formed for a partnership activity?

18. In a race with 12 runners, how many ways can the gold, silver and bronze medals be awarded?

19. A pizza can be topped with 2 different toppings chosen from 7 options (order does not matter). How many topping combinations are possible?

20. Determine the number of distinct arrangements of 5 different keys on a circular keyring if rotations are considered identical.

Hard Questions

21. A team of 4 is to be selected from 10 players and then each member is assigned a unique role. How many ways can both the team be selected and the roles assigned?

22. Determine the number of different 5-digit numbers that can be formed using the digits 0, 1, 2, 3 and 4 if no digit is repeated and the number does not begin with 0.

23. Six friends are to be seated in a row. If two specified friends refuse to sit together, how many seating arrangements are possible?

24. Calculate the number of distinct arrangements of the letters in the word $LEVEL$.

25. A password consists of 3 letters followed by 2 digits. If letters may be repeated while digits must be distinct, how many passwords are possible?

26. In a knockout tournament, 8 players are paired into 4 matches for the quarterfinal. If the order of the matches does not matter, how many possible match-ups can be arranged?

27. Determine the number of distinct circular arrangements of 7 different beads in a necklace if two arrangements are considered the same when one can be obtained from the other by rotation or reflection.

28. From a club of 9 members, form a 3-person executive committee and, from the remaining members, a 2-person subcommittee. How many different ways can both committees be formed?

29. A bookshelf contains 6 different books. Two of these are math books and must always be kept together. How many different arrangements of the books on the shelf are possible?

30. In a race with 10 runners, only the top three positions (gold, silver and bronze) are awarded such that the order of these medals matters while the remaining positions are unranked. How many possible outcomes are there?