

## Counting Principle, Combinations, and Permutations Worksheet

Please complete each problem on a separate sheet of paper. Show all of your work!!

For questions 1-4, state whether the events are *independent* or *dependent*.

1. Choosing a president, vice-president, secretary, and treasurer for Student Council; assuming that a person can hold only one office.
2. Selecting a fiction book and a non-fiction book at the library.
3. Each of six people guesses the total number of points scored in a basketball game. Each person writes down his or her guess without telling what it is.
4. The letters A through Z are written on pieces of paper and placed in a jar. Four of them are selected one after the other without replacing any of them.

For questions 5-10, solve each problem.

5. Tim wants to buy one of three different albums he sees in a music store. Each is available on tape and on CD. From how many combinations of album and format does he have to choose?
6. A video store has 8 new releases this week. Each is available on videotape and on DVD. How many ways can a customer choose a new release and a format to rent?
7. Carlos has homework to do in math, chemistry, and English. How many ways can he choose the order in which to do his homework?
8. The menu for a banquet has a choice of two types of salad, five main courses, and three desserts. How many ways can a salad, main course, and dessert be selected to form a meal?
9. How many ways can six different books be arranged on a shelf if one of the books is a dictionary and it must be on an end?
10. Each question on a five-question multiple-choice quiz has answer choices labeled A, B, C, and D. How many different ways can a student answer the five questions?

For questions 11-18, evaluate each expression by hand and then with the calculator.

11.  $P(8, 2)$

12.  $P(9, 1)$

13.  $P(7, 5)$

14.  $C(5, 2)$

15.  $C(10, 4)$

16.  $C(12, 7)$

17.  $C(12, 4) \cdot C(8, 3)$

18.  $C(9, 3) \cdot C(6, 2)$

For questions 19-32, determine whether each situation involves a *permutation* or a *combination*. Then find the number of possibilities.

19. The winner and first, second, and third runners-up in a contest with 10 finalists.

20. Selecting two of eight employees to attend a business seminar.

21. An arrangement of the letters in the word “algebra”

22. Placing an algebra book, a geometry book, a chemistry book, an English book, and a health book on a shelf.

23. Selecting nine books to check out of the library from a reading list of twelve.

24. Choosing two CDs to buy from ten that are on sale.

25. Selecting three of fifteen flavors of ice cream at the grocery store.

26. An arrangement of the letters in the words “aloha”

27. Selecting five members of the 100-member US Senate to be on a committee.

28. Choosing a hand of five cards from a standard deck of cards consisting of four cards from one suit and one card from another suit.

29. Seating five men and five women alternately in a row, beginning with a woman.

30. An airline is hiring 5 flight attendants. If 8 people apply for the job, how many different groups of 5 attendants can the airline hire?

31. A photographer is taking pictures of a bride and groom and their 6 attendants. If she takes photographs of 3 people in a group, how many different groups can she photograph?

32. A school librarian would like to buy subscriptions to 7 new magazines. His budget, however, will allow him to buy only 4 new subscriptions. How many different groups of 4 magazines can he choose?