# 10.3.1: Permutations (Exercises)

Do the following problems using permutations.

| | |
|---|---|
| 1. How many three-letter words can be made using the letters { a, b, c, d, e } if no repetitions are allowed? | 2. A grocery store has five checkout counters, and seven clerks. How many different ways can the 7 clerks be assigned to the 5 counters? |
| 3. A group of fifteen people who are members of an investment club wish to choose a president, and a secretary. How many different ways can this be done? | 4. Compute the following.<br>a. ${}_9P_2$<br>b. ${}_6P_4$<br>c. ${}_8P_3$<br>d. ${}_7P_4$ |
| 5. In how many ways can the letters of the word CUPERTINO be arranged if each letter is used only once in each arrangement? | 6. How many permutations of the letters of the word PROBLEM end in a vowel? |
| 7. How many permutations of the letters of the word SECURITY end in a consonant? | 8. How many permutations of the letters PRODUCT have consonants in the second and third positions? |
| 9. How many three-digit numbers are there? | 10. How many three-digit odd numbers are there? |
| 11. In how many different ways can five people be seated in a row if two of them insist on sitting next to each other? | 12. In how many different ways can five people be seated in a row if two of them insist on not sitting next to each other? |
| 13. In how many ways can 3 English, 3 history, and 2 math books be set on a shelf, if the English books are set on the left, history books in the middle, and math books on the right? | 14. In how many ways can 3 English, 3 history, and 2 math books be set on a shelf, if they are grouped by subject? |
| 15. You have 5 math books and 6 history books to put on a shelf with five slots. In how many ways can you put the books on the shelf if the first two slots are to be filled with math books and the next three with history books? | 16. You have 5 math books and 6 history books to put on a shelf with five slots. In how many ways can you put the books on the shelf if the first two slots are to be filled with the books of one subject and the next three slots are to be filled with the books of the other subject? |
| 17. A bakery has 9 different fancy cakes. In how many ways can 5 of the 9 fancy cakes be lined up in a row in the bakery display case? | 18. A landscaper has 6 different flowering plants. She needs to plant 4 of them in a row in a garden. How many different ways can 4 of the 6 plants be arranged in a row? |
| 19. At an auction of used construction vehicles, there are 7 different vehicles for sale. In how many orders could these 7 vehicles be listed in the auction program? | 20. A landscaper has 6 different flowering plants and 4 different non-flowering bushes. She needs to plant a row of 6 plants in a garden. There must be a bush at each end, and four flowering plants in a row in between the bushes. How many different arrangements in a row are possible? |
| 21. In how many ways can all 7 letters of the word QUIETLY be arranged if the letters Q and U must be next to each other in the order QU? | 22. a. In how many ways can the letters ABCDEXY be arranged if the X and Y must be next to each other in either order XY or YX?<br>b. In how many ways can the letters ABCDEXY be arranged if the X and Y can not be next to each other? |