

Permutations (Part 3)

These notes are intended as a supplement to sections 8.1 to 8.3 in your workbook. This topic is not directly covered by the book.

Permutations in which Certain Objects are Grouped Together

If certain objects are to be placed together, the number of permutations can be determined by taking the factorial of the number of groups and multiplying by the factorial of the size of each group.

Example

Five people (A, B, C, D, and E) are seated on a bench. In how many ways can they be seated if:

a) A and B must sit together?

b) A and B must NOT sit together?

c) A and C must sit together, and B and E must sit together?

Example

I want to arrange my 4 math books, 5 physics books, and 4 chemistry books on one shelf. How many ways can I arrange them if I want to keep the subject areas together?

Permutations with Cases

When two events occur independently, you can determine the total number of permutations by adding the permutations of each event.

Example

How many integers that do not contain repeated digits are there from 1 to 1000 inclusive?

Example

How many different 3-digit numbers that are even and greater than 300 can be formed using the digits 1, 2, 3, 4, 5, 6, 7 (without repetition)?

Homework: Supplemental Worksheet #11

Supplemental Worksheet #11

1. A student has 15 video games: 4 adventure games, 4 arcade games, 2 puzzle games, and 5 simulation games. How many ways can the games be positioned on a shelf if the games must stay with their genre?
2. How many ways can all the letters in the word ABACUS be arranged so that the vowels are always together?
3. How many ways can Amanda, Basil, Charles, Dennis, and Edna sit in a row if
 - a) Basil and Edna insist on sitting together?
 - b) Charles and Edith insist on NOT sitting together?
4. How many ways can four married couples sit in a row on a park bench if
 - a) every husband and wife must sit together?
 - b) the men and women must alternate?
5. How many ways can three brothers and three sisters be arranged in a row for a group photo if brothers and sisters must alternate?
6. There are 11 chairs in a row. In how many ways can five people be seated if they must sit in consecutive chairs?
7. How many four digit numbers greater than 5364 are possible using the digits 1, 2, 3, 5, 7, 8?