

Example:

In how many ways 3 mathematics books, 4 history books, 3 chemistry books and 2 biology books can be arranged on a shelf so that all books of the same subjects are together.

Solution:

First we take books of a particular subject as one unit. Thus there are 4 units which can be arranged in $4! = 24$ ways. Now in each of arrangements, mathematics books can be arranged in $3!$ ways, history books in $4!$ ways, chemistry books in $3!$ ways and biology books in $2!$ ways. Thus the total number of ways = $4! \times 3! \times 4! \times 3! \times 2! = 41472$.