STEP/Counting Q4 (11/6/23)

The following books are on a bookshelf: 4 novels, 3 history books, 2 biographies and 1 dictionary. In how many ways can they be arranged if the novels have to be together, and similarly for the history books and biographies?

Solution

[Note that we treat the novels etc as being distinguishable from each other.]

There are 4! ways of arranging the items N, H, B & D. Then to allow for the 4! ways of arranging the novels etc, we multiply by 4!3!2!, to give: $4!4!3!2! = 6912$