Advanced Math 3200

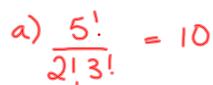
Chapter 11: Permutations, Combinations, and the Binomial Theorem

Your Turn

- a) How many different 5-digit numbers can you make by arranging all of the digits of 17 171?
- b) In how many different ways can you walk from A to B in a three by five rectangular grid if you must move only down or to the right?



Solution







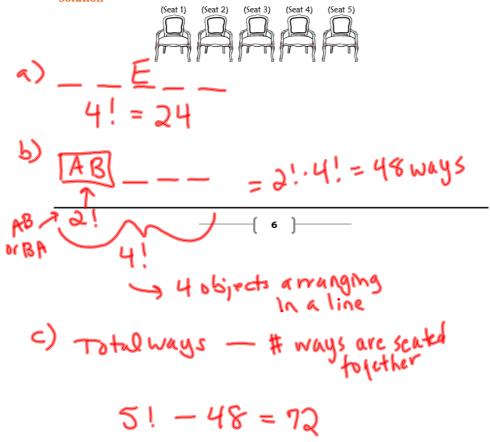
Example 4

Permutations with Constraints

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

- a) E is seated in the middle?
- b) A and B must be seated together?
- c) A and B cannot be together?

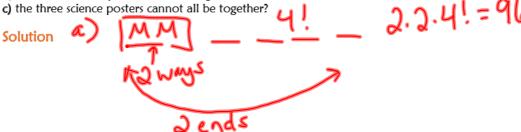
Solution



Your Turn

How many ways can one French poster, two mathematics posters, and three science posters be arranged in a row on a wall if:

- a) the two mathematics posters must be together on an end?
- b) the three science posters must be together?

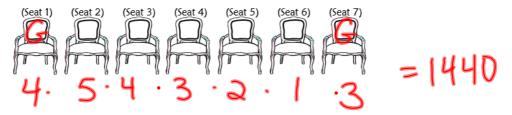


Example 5a

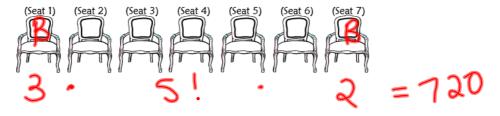
Arrangements Requiring Cases

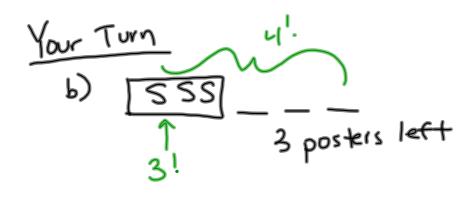
To solve some problems, you must count the different arrangements in cases. For example, you might need to determine the number of arrangements of four girls and three boys in a row of seven seats if the ends of the rows must be either both female or both male.

Case 1: Girls on Ends of Rows Arrangements



Case 2: Boys on Ends of Rows





c)
$$A11 - together$$

 $(0! - 144 = 576)$

Using Cases to Determine Permutations 2,4,4

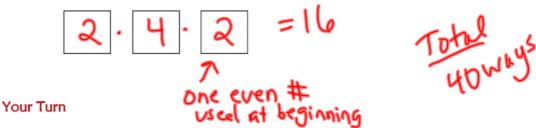
How many different 3-digit even numbers greater than 300 can you make using the digits 1, 2, 3, 4, 5, and 6? No digits are repeated.

Solution

When determining the number of permutations for a situation in which there are restrictions, you must first address the choices with the restrictions.

Case 1: Numbers That Are Even and Start With 3 or 5

Case 2: Numbers That Are Even and Start With 4 or 6



How many 4 digit odd numbers can you make using the digits 1 to 7 if the numbers must be less than 6000? No digits are repeated.

Solution

