

Challenge: Skills and Applications

For use with pages 701–707

In Exercises 1 and 2, use the following information.

Flags of 6 countries are to be displayed in a row along the back of the stage. The flags of two of the countries, A and B, must be next to each other.

1. In how many ways can this be done if the flag of country A must be to the left of the flag of country B?
2. In how many ways can the flags be hung if the 2 flags can be in either order?
3. A discussion panel consisting of 4 women and 3 men is to be seated behind a long table at an open town meeting. In how many ways can the panel be seated if women and men must be placed in alternate seats?
4. Each grouping in the Morse Code is a sequence of 4 or fewer dots and/or dashes that stands for a letter of the alphabet or a punctuation mark. For example, the grouping consisting of 3 dots stands for the letter “S.” How many distinct groupings are possible in this system?

In Exercises 5 and 6, eight students are to be seated in a classroom with 11 desks.

5. Calculate the number of seatings by choosing one of the desks for each student.
6. Calculate the number of seatings by choosing one student for each of the desks, after increasing the number of students to 11 by imagining that there are 3 “invisible” students (who are, of course, indistinguishable). Do you get the same answer as in Exercise 5?
7. Twelve people enter a movie theater in which there are 15 scattered empty seats.
 - a. Suppose a specific group of 7 of the people finds seats immediately. In how many ways can they be seated?
 - b. After the 7 people are seated, suppose the remaining 5 people choose seats. In how many ways can they do this?
 - c. Show that the number of ways that the actions in parts (a) and (b) can be carried out consecutively is the same as the number of ways all 12 people could have seated themselves to begin with.