

### EXAMPLE 3 Find a probability using permutations

**PARADE** For a town parade, you will ride on a float with your soccer team. There are 12 floats in the parade, and their order is chosen at random. Find the probability that your float is first and the float with the school chorus is second.

#### Solution

**STEP 1** Write the number of possible outcomes as the number of permutations of the 12 floats in the parade. This is  ${}_{12}P_{12} = 12!$ .

**STEP 2** Write the number of favorable outcomes as the number of permutations of the other floats, given that the soccer team is first and the chorus is second. This is  ${}_{10}P_{10} = 10!$ .

**STEP 3** Calculate the probability.

$$\begin{aligned} P(\text{soccer team is first} \\ \text{chorus is second}) &= \frac{10!}{12!} && \text{Form a ratio of favorable to} \\ & && \text{possible outcomes.} \\ &= \frac{10!}{12 \cdot 11 \cdot 10!} && \text{Expand factorials. Divide} \\ & && \text{out common factor, } 10!. \\ &= \frac{1}{132} && \text{Simplify.} \end{aligned}$$



#### GUIDED PRACTICE for Example 3

4. **WHAT IF?** In Example 3, suppose there are 14 floats in the parade. Find the probability that the soccer team is first and the chorus is second.

## 13.2 EXERCISES

### HOMEWORK KEY

- = **WORKED-OUT SOLUTIONS**  
on p. WS1 for Exs. 21 and 35
- = **TAKS PRACTICE AND REASONING**  
Exs. 11, 30, 33, 35, and 40
- = **MULTIPLE REPRESENTATIONS**  
Ex. 34

### SKILL PRACTICE

- VOCABULARY** Copy and complete: An arrangement of objects in which order is important is called a(n) ?.
- WRITING** Explain what the notation  ${}_9P_2$  means. What is the value of this expression?

**COUNTING PERMUTATIONS** Find the number of ways you can arrange (a) all of the letters in the given word and (b) 2 of the letters in the word.

- |          |         |          |            |
|----------|---------|----------|------------|
| 3. AT    | 4. TRY  | 5. GAME  | 6. CAT     |
| 7. WATER | 8. ROCK | 9. APRIL | 10. FAMILY |

11. **TAKS REASONING** Describe a real-world situation where the number of possibilities is given by  ${}_5P_2$ .

#### EXAMPLES 1 and 2

on pp. 851–852  
for Exs. 3–11