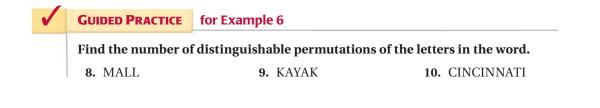
### **EXAMPLE 6** Find permutations with repetition

Find the number of distinguishable permutations of the letters in (a) MIAMI and (b) TALLAHASSEE.

### Solution

- **a.** MIAMI has **5** letters of which M and I are each repeated **2** times. So, the number of distinguishable permutations is  $\frac{5!}{2! \cdot 2!} = \frac{120}{2 \cdot 2} = 30$ .
- **b.** TALLAHASSEE has 11 letters of which A is repeated 3 times, and L, S, and E are each repeated 2 times. So, the number of distinguishable permutations is  $\frac{11!}{3! \cdot 2! \cdot 2! \cdot 2!} = \frac{39,916,800}{6 \cdot 2 \cdot 2 \cdot 2} = 831,600.$



HOMEWORK

KEY

**10.1 EXERCISES** 

## Skill Practice

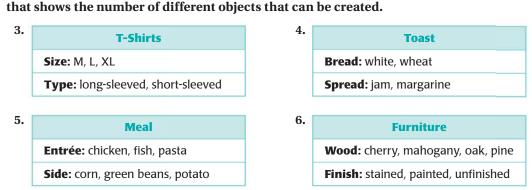
- 1. **VOCABULARY** What is a permutation of *n* objects?
- **2. WRITING** Simplify the formula for  ${}_{n}P_{r}$  when r = 0. *Explain* why this result makes sense.

TREE DIAGRAMS An object has an attribute from each list. Make a tree diagram

### EXAMPLE 1 on p. 682

for Exs. 3–6

on p. 683 for Exs. 7–10



# EXAMPLE 2<br/>on p. 683FUNDAMENTAL COUNTING PRINCIPLEEach event can occur in the given number<br/>of ways. Find the number of ways all of the events can occur.

- 7. Event A: 2 ways; Event B: 4 ways
- **9.** Event *A*: 4 ways; Event *B*: 3 ways; Event *C*: 5 ways
- 8. Event A: 5 ways; Event B: 2 ways

= WORKED-OUT SOLUTIONS

on p. WS1 for Exs. 13, 35, and 65 **TAKS PRACTICE AND REASONING** Exs. 17, 42, 55, 57, 68, 72, and 73

**10.** Event *A*: 3 ways; Event *B*: 6 ways; Event *C*: 5 ways; Event *D*: 2 ways