13.2 **Find Probabilities Using Permutations**   *pp. 851–855*

EXAMPLE

You need to enter a 4 digit code in order to enter the building where you work. The digits are 4 different numbers from 1 to 5. You forgot the code and try to guess it. Find the probability that you guess correctly.

STEP 1 **Write** the number of possible outcomes as the number of permutations of 4 out of the 5 possible digits. This is $_5P_4$.

$$_5P_4 = \frac{5!}{(5-4)!} = \frac{5!}{1!} = 5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 120$$

STEP 2 **Find** the probability. Because only one of the permutations is the correct code, the probability that you guess the correct code is $\frac{1}{120}$.

EXERCISES

EXAMPLE 2
on p. 852
for Exs. 6–10

Evaluate the expression.

6. $_7P_6$ **7.** $_6P_2$ **8.** $_8P_5$ **9.** $_{13}P_{10}$

10. **MUSIC** You downloaded 6 songs. You randomly choose 4 of these songs to play. Find the probability that you play the first 4 songs you downloaded in the order in which you downloaded them.

13.3 **Find Probabilities Using Combinations**   *pp. 856–859*

EXAMPLE

For your government class, you must choose 3 states in the United States to research. You may choose your states from the 6 New England states. How many combinations of states are possible?

The order in which you choose the states is not important. So, to find the number of combinations of 6 states taken 3 at a time, find $_6C_3$.

$$_6C_3 = \frac{6!}{(6-3)! \cdot 3!}$$ **Combinations formula**

$$= \frac{6 \cdot 5 \cdot 4 \cdot 3!}{3! \cdot (3 \cdot 2 \cdot 1)}$$ **Expand factorials.**
                             Divide out common factor, 3!.

$$= 20$$ **Simplify.**

EXERCISES

EXAMPLE 2
on p. 857
for Exs. 11–15

Evaluate the expression.

11. $_7C_6$ **12.** $_6C_2$ **13.** $_8C_5$ **14.** $_{13}C_{10}$

15. **TICKETS** You win 5 tickets to a concert. In how many ways can you choose 4 friends out of a group of 9 to take with you to the concert?