EXAMPLE 2 Find the probability of *A* or *B*

You roll a number cube. Find the probability that you roll an even number or a prime number.

Solution

Because 2 is both an even number and a prime number, rolling an even number and rolling a prime number are overlapping events. There are 3 even numbers, 3 prime numbers, and 1 number that is both.

$$P(\text{even or prime}) = P(\text{even}) + P(\text{prime}) - P(\text{even and prime})$$

$$= \frac{3}{6} + \frac{3}{6} - \frac{1}{6}$$

$$= \frac{5}{6}$$

GUIDED PRACTICE for Examples 1 and 2

1. You roll a number cube. Find the probability that you roll a 2 or a 5.
2. You roll a number cube. Find the probability that you roll a number less than 4 or an odd number.

INDEPENDENT AND DEPENDENT EVENTS To find the probability that event *A* and event *B* both occur, determine how the events are related. Two events are **independent events** if the occurrence of one event has no effect on the occurrence of the other. Two events are **dependent events** if the occurrence of one event affects the occurrence of the other.

For instance, consider the probability of choosing a green marble and then a blue marble from the bag shown. If you choose one marble and replace it before choosing the second, then the events are independent. If you do not replace the first marble, then the sample space has changed, and the events are dependent.

Independent Events

With replacement:

$$P(\text{green and blue}) = \frac{4}{7} \cdot \frac{1}{7} = \frac{4}{49}$$

$$P(A \text{ and } B) = P(A) \cdot P(B)$$

Dependent Events

Without replacement:

$$P(\text{green and blue}) = \frac{4}{7} \cdot \frac{1}{6} = \frac{2}{21}$$

$$P(A \text{ and } B) = P(A) \cdot P(B \text{ given } A)$$