**EXAMPLE 2** **TAKS PRACTICE: Multiple Choice**

A card is randomly selected from a standard deck of 52 cards. What is the probability that it is a heart *or* a three?

Ⓐ $\frac{4}{13}$ Ⓑ $\frac{17}{52}$ Ⓒ $\frac{25}{52}$ Ⓓ $\frac{7}{13}$

Solution

Let event A be selecting a heart and event B be selecting a three. A has 13 outcomes and B has 4 outcomes. Of these, 1 outcome is common to A and B. So, the probability of selecting a heart *or* a three is:
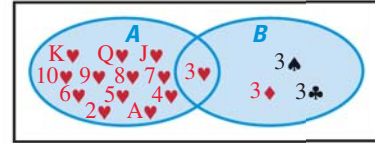
$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B) = \frac{13}{52} + \frac{4}{52} - \frac{1}{52} = \frac{16}{52} = \frac{4}{13}$$

▶ The correct answer is A. Ⓐ Ⓑ Ⓒ Ⓓ

EXAMPLE 3 **Use a formula to find $P(A$ and $B)$**

SENIOR CLASS Out of 200 students in a senior class, 113 students are either varsity athletes *or* on the honor roll. There are 74 seniors who are varsity athletes and 51 seniors who are on the honor roll. What is the probability that a randomly selected senior is both a varsity athlete *and* on the honor roll?

Solution

Let event A be selecting a senior who is a varsity athlete and event B be selecting a senior on the honor roll. From the given information you know that

$P(A) = \frac{74}{200}$, $P(B) = \frac{51}{200}$, and $P(A \text{ or } B) = \frac{113}{200}$. Find $P(A \text{ and } B)$.

$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$	**Write general formula.**
$\frac{113}{200} = \frac{74}{200} + \frac{51}{200} - P(A \text{ and } B)$	**Substitute known probabilities.**
$P(A \text{ and } B) = \frac{74}{200} + \frac{51}{200} - \frac{113}{200}$	**Solve for $P(A$ and $B)$.**
$P(A \text{ and } B) = \frac{12}{200} = \frac{3}{50} = 0.06$	**Simplify.**

✓ **GUIDED PRACTICE** **for Examples 1, 2, and 3**

A card is randomly selected from a standard deck of 52 cards. Find the probability of the given event.

1. Selecting an ace *or* an eight
2. Selecting a 10 *or* a diamond

3. **WHAT IF?** In Example 3, suppose 32 seniors are in the band and 64 seniors are in the band *or* on the honor roll. What is the probability that a randomly selected senior is both in the band *and* on the honor roll?