

Reteaching (continued)

Compound Probability

Events that have outcomes in common are *overlapping events*.

For overlapping events: $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$.

Problem

You put 8 tiles, numbered 3 through 10, into a bag. What is the probability of choosing a tile that is both an odd number and a prime number?

The two events are: Event A : randomly choose a tile that is an odd number

Event B : randomly choose a tile that is a prime number

It is possible to choose a tile that is an odd number *and* a prime number, because all prime numbers between 3 and 10 are odd. Since the odd-numbered tiles in the bag include some prime numbers (3, 5, 7), the events are overlapping.

There are 4 odd tiles: $P(A) = \frac{4}{8} = \frac{1}{2}$

There are 3 prime number tiles: $P(B) = \frac{3}{8}$

Using substitution, $P(\text{odd or prime})$ is

$$\begin{aligned} P(A \text{ or } B) &= P(A) + P(B) - P(A \text{ and } B) = \frac{1}{2} + \frac{3}{8} - \left(\frac{1}{2}\right)\left(\frac{3}{8}\right) = \frac{1}{2} + \frac{3}{8} - \frac{3}{16} \\ &= \frac{8}{16} + \frac{6}{16} - \frac{3}{16} = \frac{11}{16} \end{aligned}$$

Exercises

4. Event A and Event B are overlapping events.
 - a. Evaluate $P(A \text{ or } B)$ when $P(A) = \frac{1}{4}$ and $P(B) = \frac{3}{8}$.
 - b. Evaluate $P(A \text{ or } B)$ when $P(A) = \frac{1}{5}$ and $P(B) = \frac{3}{11}$.
5. The chess team consists of $\frac{5}{12}$ boys, $\frac{7}{12}$ girls, and $\frac{1}{4}$ sophomores. What is the probability of randomly choosing a member who is a boy or a sophomore?
6. A recent company survey revealed that 50% of the employees had been with the company more than 3 years, 25% of the employees had been with the company less than 1 year, and 60% of the employees are invested in the company stock plan. What is the probability of randomly choosing an employee who had been with the company more than 3 years or had invested in the company stock plan?