13-4

Study Guide

Probabilities of Compound Events

Example 1 **Using a standard deck of playing cards, find the probability of drawing a king, replacing it, then drawing a second king.**

Since the first card is returned to the deck, the outcome of the second draw is not affected by the first. The events are independent. The probability is the product of each individual probability.

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

Let A represent the first draw and B the second draw.

$P(A) = P(B) = \frac{4}{52} = \frac{1}{13}$

$\frac{\textit{4 kings}}{\textit{52 cards in a standard deck}}$

$P(A \text{ and } B) = \frac{1}{13} \cdot \frac{1}{13} \cdot = \frac{1}{169}$

The probability of selecting a king, replacing it, and then selecting another king is $\frac{1}{169}$.

Example 2 **What is the probability of selecting a yellow or a blue marble from a box of 5 green, 3 yellow, and 2 blue marbles?**

A yellow marble and a blue marble cannot be selected at the same time. Thus, the events are mutually exclusive. Find the sum of the individual probabilities.

$P(\text{yellow or blue}) = P(\text{yellow}) + P(\text{blue})$

$= \frac{3}{10} + \frac{2}{10}$ $\quad P(yellow) = \frac{3}{10};\ P(blue) = \frac{2}{10}$

$= \frac{5}{10}$ or $\frac{1}{2}$

Example 3 **What is the probability that a card drawn from a standard deck is either a face card or black?**

The card drawn could be both a face card and black, so the events are mutually inclusive.

$P(\text{face card}) = \frac{12}{52}$

$P(\text{black}) = \frac{26}{52}$

$P(\text{face card and black}) = \frac{6}{52}$

$P(\text{face card or black}) = \frac{12}{52} + \frac{26}{52} - \frac{6}{52} = \frac{32}{52}$ or $\frac{8}{13}$