

Lesson 9-8

Example 1 Independent Events

A coin is tossed and a number cube is rolled. Find the probability of tossing tails and rolling a number less than 3.

List the sample space. Use H for heads and T for tails.

H, 1	H, 2	H, 3	H, 4	H, 5	H, 6
T, 1	T, 2	T, 3	T, 4	T, 5	T, 6

$$P(\text{T and less than 3}) = \frac{\text{number of times tails and a number less than 3 occurs}}{\text{number of possible outcomes}}$$

$$P(\text{T and less than 3}) = \frac{2}{12} \text{ or } \frac{1}{6}$$

So, the probability is $\frac{1}{6}$ or about 16.67%.

Example 2 Independent Events

SHOPPING While shopping together at the mall, Sarah and Emily each make a purchase. Sarah chooses one t-shirt from a selection of red, blue, pink, green, and yellow t-shirts. Emily chooses one pair of shoes from a selection of sneakers, sandals, loafers, and clogs. If the girls make their choices independently of one another, what is the probability that Sarah chooses a pink t-shirt and Emily chooses sandals?

$$\begin{aligned} P(\text{pink t-shirt and sandals}) &= P(\text{pink t-shirt}) \cdot P(\text{sandals}) \\ &= \frac{1}{5} \cdot \frac{1}{4} \quad \text{1 out of 5 t-shirts is pink; 1 out of 4 pairs of shoes is sandals.} \\ &= \frac{1}{20} \quad \text{Simplify.} \end{aligned}$$

So, the probability is $\frac{1}{20}$ or 5%.

Example 3 Dependent Events

There are 6 cherry, 5 grape, and 2 orange lollipops in a bag. Jamal randomly selects two lollipops without replacing the first lollipop. What is the probability that he selects two cherry lollipops?

Since the first lollipop is not replaced, the first event affects the second event. These are dependent events.

$$P(\text{first lollipop is cherry}) = \frac{6}{13} \quad \begin{array}{l} \leftarrow \text{number of cherry lollipops} \\ \leftarrow \text{total number of lollipops} \end{array}$$

$$P(\text{second lollipop is cherry}) = \frac{5}{12} \quad \begin{array}{l} \leftarrow \text{number of cherry lollipops after one} \\ \text{cherry lollipop is removed} \\ \leftarrow \text{total number of lollipops after one} \\ \text{cherry lollipop is removed} \end{array}$$

$$P(\text{two cherry lollipops}) = \frac{6}{13} \cdot \frac{5}{12} \text{ or } \frac{5}{26}$$

So, the probability of selecting two cherry lollipops is $\frac{5}{26}$, or about 19%.

Example 4 Disjoint Events

Each letter of the alphabet is written on a card and placed in a box. What is the probability of choosing a vowel or a B?

These are disjoint events since it is impossible to choose a vowel and a B at the same time.

$$P(\text{vowel or B}) = \frac{6}{26} \quad \begin{array}{l} \leftarrow \text{There are 6 favorable outcomes: A, E, I, O, U, B} \\ \leftarrow \text{There are 26 total possible outcomes.} \end{array}$$

So, the probability of choosing a vowel or a B is $\frac{6}{26}$, or $\frac{3}{13}$.