

Probability of Independent Events

4.4.8.B.2



Getting the Idea

Sometimes, you need to find the probability that two **independent events** will occur.

Two events are independent when the outcome of one event has no effect on the outcome of the other event. Below is an example.

First event: tossing a coin and getting tails.

Second event: rolling a number cube, with faces numbered 1 to 6, and having it land on a number less than 5.

You can find the probability of two independent events by multiplying:

$$(P \text{ of first event}) \times (P \text{ of second event})$$

EXAMPLE 1

Find the probability of tossing a coin and getting tails and tossing a number cube and getting a number less than 5.

STRATEGY Find the probability of each event and use the multiplication rule.

STEP 1 Find the probability of each event.

Tossing the coin and getting tails:

$$P(\text{tails}) = \frac{\text{favorable outcomes}}{\text{total possible outcomes}} = \frac{1}{2}$$

Rolling the number cube and getting a number less than 5:

There are 4 favorable outcomes: 1, 2, 3, and 4.

$$P(<5) = \frac{\text{favorable outcomes}}{\text{total possible outcomes}} = \frac{4}{6} = \frac{2}{3}$$

STEP 2 Apply the multiplication rule.

$$P(\text{tails}) \times P(<5) = \frac{1}{2} \times \frac{2}{3} = \frac{2}{6} = \frac{1}{3}$$

SOLUTION The probability of both events occurring is $\frac{1}{3}$. This probability could also be expressed as a decimal, $0.\bar{3}$, or as a percent, $33.\bar{3}\%$.