

# Theoretical and Experimental Probability

(pages 530–533)

**Theoretical probability** is the ratio of the number of ways an event can occur to the total number of possible **outcomes**. For example, the theoretical probability of rolling a 1 on a number cube is  $\frac{1}{6}$ . That's because only one side of a number cube shows a 1, the event you are trying to get, while there are six total sides, or possible outcomes.

<b>Finding Theoretical Probability</b>	$P(\text{event}) = \frac{\text{number of ways the event can occur}}{\text{number of possible outcomes}}$
<b>Experimental Probability</b>	The experimental probability of an event is the estimated probability based on the number of positive outcomes in an experiment. To find the experimental probability of rolling a 1 on a number cube, you would roll a number cube repeatedly and record the outcomes.

## EXAMPLE

A class of 32 students has 18 boys and 14 girls. If one student is chosen to take attendance for the semester, what is the probability that a boy is chosen?

$$\frac{18}{32} \leftarrow \text{number of ways to chose a boy}$$

$$\frac{18}{32} \leftarrow \text{number of possible students in the class}$$

$$\text{Therefore, } P(\text{a boy being chosen}) = \frac{18}{32} \text{ or } \frac{9}{16}.$$

## Try These Together

**If you have 12 coins (5 pennies, 4 nickels, 2 dimes, and 1 quarter) in a bag, find the theoretical probability of selecting:**

- one quarter in one draw.
- one penny in one draw.

*HINT: Think of the ratio of the number of coins in the bag that you want to draw to the total number of coins in the bag.*

## PRACTICE

**Use the same situation for drawing coins as above.**

- one dime in one draw
- one nickel in one draw



5. **Standardized Test Practice** Lavon had a bag of candies. There were 20 candies in the bag: 6 red, 5 orange, 3 brown, 2 yellow, and 4 blue. Without looking, she chose a candy, recorded the color, and returned the candy to the bag. She performed this experiment 100 times and found that she chose an orange candy 22 times. What was the experimental probability of choosing an orange candy?

**A**  $\frac{1}{5}$

**B**  $\frac{1}{4}$

**C**  $\frac{11}{50}$

**D**  $\frac{24}{100}$

Answers: 1.  $\frac{1}{12}$  2.  $\frac{12}{100}$  3.  $\frac{6}{100}$  4.  $\frac{3}{100}$  5. C