# 10.6 Construct and Interpret Binomial Distributions

TEKS a.1, a.5

**Before** You found probabilities of events.

**Now** You will study probability distributions.

**Why?** So you can describe interest in museums, as in Ex. 46.

**Key Vocabulary**
- **random variable**
- **probability distribution**
- **binomial distribution**
- **binomial experiment**
- **symmetric**
- **skewed**

A **random variable** is a variable whose value is determined by the outcomes of a random event. For example, when you roll a six-sided die, you can define a random variable $X$ that represents the number showing on the die. So, the possible values of $X$ are 1, 2, 3, 4, 5, and 6. For every random variable, a *probability distribution* can be defined.

## KEY CONCEPT *For Your Notebook*

### Probability Distributions

A **probability distribution** is a function that gives the probability of each possible value of a random variable. The sum of all the probabilities in a probability distribution must equal 1.

**Probability Distribution for Rolling a Die**

| $X$ | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| $P(X)$ | $\frac{1}{6}$ | $\frac{1}{6}$ | $\frac{1}{6}$ | $\frac{1}{6}$ | $\frac{1}{6}$ | $\frac{1}{6}$ |

## EXAMPLE 1 Construct a probability distribution

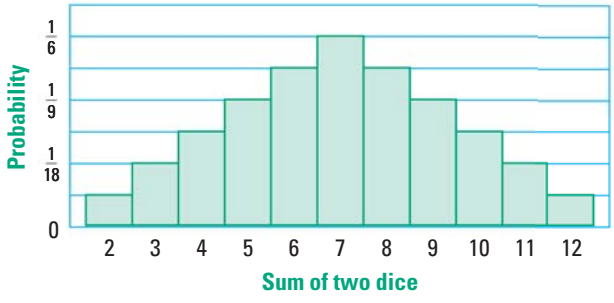
**Let $X$ be a random variable that represents the sum when two six-sided dice are rolled. Make a table and a histogram showing the probability distribution for $X$.**

**REVIEW COMPOUND EVENTS**

Recall that there are 36 possible outcomes when rolling two six-sided dice. These are listed in Example 4 on page 709.

**Solution**

The possible values of $X$ are the integers from 2 to 12. The table shows how many outcomes of rolling two dice produce each value of $X$. Divide the number of outcomes for $X$ by 36 to find $P(X)$.




| $X$ (sum) | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Outcomes | 1 | 2 | 3 | 4 | 5 | 6 | 5 | 4 | 3 | 2 | 1 |
| $P(X)$ | $\frac{1}{36}$ | $\frac{1}{18}$ | $\frac{1}{12}$ | $\frac{1}{9}$ | $\frac{5}{36}$ | $\frac{1}{6}$ | $\frac{5}{36}$ | $\frac{1}{9}$ | $\frac{1}{12}$ | $\frac{1}{18}$ | $\frac{1}{36}$ |