

10.6

Binomial Distributions

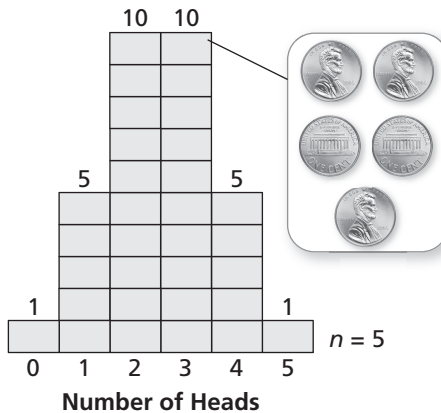
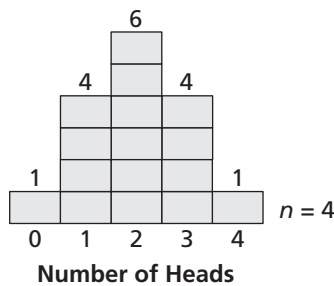
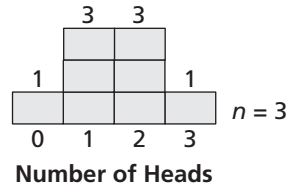
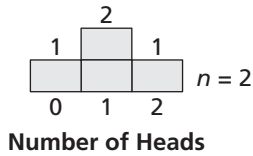
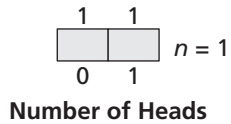
For use with Exploration 10.6

Essential Question How can you determine the frequency of each outcome of an event?

1 EXPLORATION: Analyzing Histograms

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner. The histograms show the results when n coins are flipped.



- In how many ways can 3 heads occur when 5 coins are flipped?
- Draw a histogram that shows the numbers of heads that can occur when 6 coins are flipped.
- In how many ways can 3 heads occur when 6 coins are flipped?

10.6 Binomial Distributions (continued)**2** **EXPLORATION:** Determining the Number of Occurrences

Work with a partner.

- a. Complete the table showing the numbers of ways in which 2 heads can occur when n coins are flipped.

n	3	4	5	6	7
Occurrences of 2 heads					

- b. Determine the pattern shown in the table. Use your result to find the number of ways in which 2 heads can occur when 8 coins are flipped.

Communicate Your Answer

3. How can you determine the frequency of each outcome of an event?
4. How can you use a histogram to find the probability of an event?

10.6**Notetaking with Vocabulary**

For use after Lesson 10.6

In your own words, write the meaning of each vocabulary term.

random variable

probability distribution

binomial distribution

binomial experiment

Core Concepts**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 Six-Sided Die						
x	1	2	3	4	5	6
$P(x)$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

Notes:

10.6 Notetaking with Vocabulary (continued)**Binomial Experiments**

A **binomial experiment** meets the following conditions.

- There are n independent trials.
- Each trial has only two possible outcomes: success and failure.
- The probability of success is the same for each trial. This probability is denoted by p . The probability of failure is $1 - p$.

For a binomial experiment, the probability of exactly k successes in n trials is

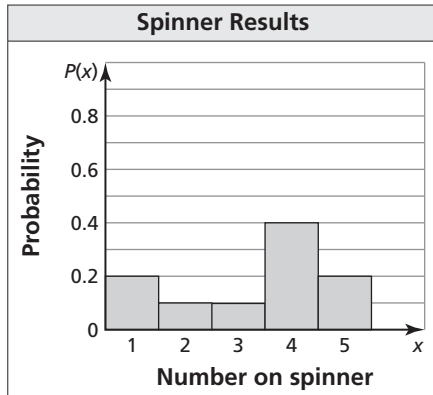
$$P(k \text{ successes}) = {}_n C_k p^k (1 - p)^{n-k}.$$

Notes:**Extra Practice**

1. Make a table and draw a histogram showing the probability distribution for the random variable P if $P =$ the product when two six-sided dice are rolled.

10.6 Notetaking with Vocabulary (continued)

2. Use the probability distribution to determine (a) the number that is most likely to be spun on a spinner, and (b) the probability of spinning a perfect square.



3. Calculate the probability of flipping a coin twenty times and getting nineteen heads.
4. According to a survey, 78% of women in a city watch professional football. You ask four randomly chosen women from the city whether they watch professional football.
- Draw a histogram of the binomial distribution for your survey.
 - What is the most likely outcome of your survey?
 - What is the probability that at most one woman watches professional football?