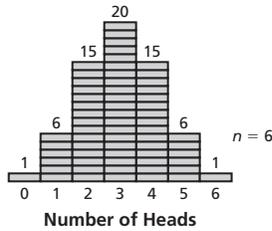


2. a. 3,628,800  
 b. 720  
 3. 15,120  
 5. 35  
 4.  $\frac{1}{30}$   
 6.  $8x^{12} + 12x^8y^3 + 6x^4y^6 + y^9$

### 10.6 Explorations

1. a. 10  
 b.



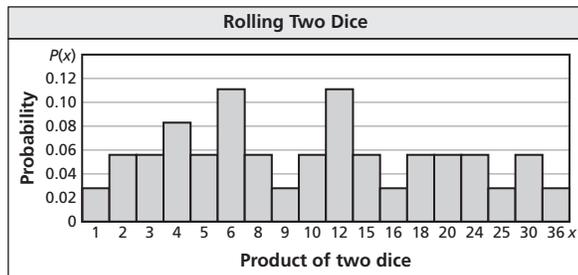
- c. 20  
 2. a. 3, 6, 10, 15, 21  
 b.  ${}_nC_2$ ; 28  
 3. List the possible outcomes, create a histogram, or use combinations.  
 4. Divide the total number of occurrences of an event by the total in the sample space.

### 10.6 Extra Practice

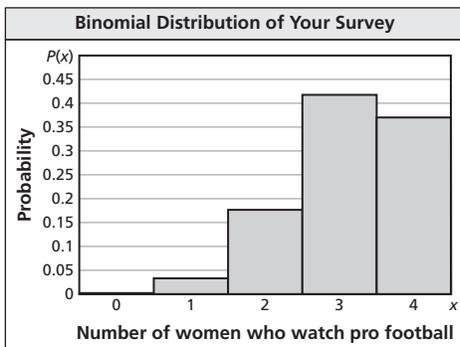
1.

<b>P (product)</b>	1	2	3	4	5	6	8	9	10	12	15
<b>Outcomes</b>	1	2	2	3	2	4	2	1	2	4	2
<b>P(P)</b>	$\frac{1}{36}$	$\frac{1}{18}$	$\frac{1}{18}$	$\frac{1}{12}$	$\frac{1}{18}$	$\frac{1}{9}$	$\frac{1}{18}$	$\frac{1}{36}$	$\frac{1}{18}$	$\frac{1}{9}$	$\frac{1}{18}$

<b>P (product)</b>	16	18	20	24	25	30	36
<b>Outcomes</b>	1	2	2	2	1	2	1
<b>P(P)</b>	$\frac{1}{36}$	$\frac{1}{18}$	$\frac{1}{18}$	$\frac{1}{18}$	$\frac{1}{36}$	$\frac{1}{18}$	$\frac{1}{36}$



2. a. 4    b. 0.6  
 3. about 0.000019  
 4. a.



- b. The most likely outcome is that 3 of the 4 women watch professional football.  
 c. about 0.036

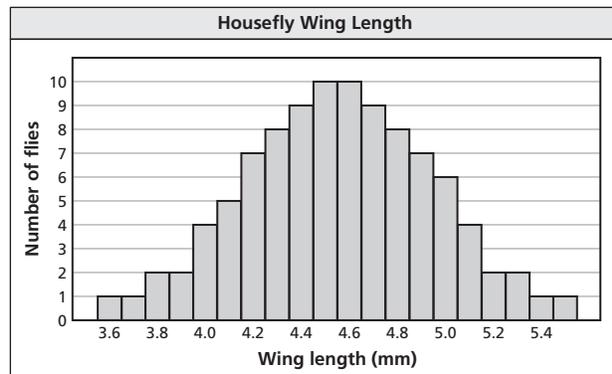
## Chapter 11

### Maintaining Mathematical Proficiency

- about 30.7, 26, 26; median or mode; The mean is greater than most of the data.
- 65.5, 65.5, 63; mean or median; The mode is less than most of the data.
- 36, 37, 37; mean, median, or mode; They all represent the data well.
- about 3.03; The typical data value differs from the mean by about 3.03 units.
- about 10.35; The typical data value differs from the mean by about 10.35 units

### 11.1 Explorations

- Sample answer: 68%, 95%, 100%
- yes; The histogram of the Scottish Militiamen is similar in shape to the histogram for the normal distribution.
- about 68%, about 95%, about 99.7%
- Sample answer:



### 11.1 Extra Practice

- 0.025
- 0.9985
- 0.975
- 0.0015
- 0.8385
- 0.815
- a. 13.5%  
b. 16%
- a. 0.0548  
b. 0.0002  
c. 0.0546  
d. 0.2119
- no
- yes

### 11.2 Explorations

- a.  $\frac{1}{6}$ , or about 0.167  
 b. Sample answer: 100 rolls; This was a relatively large sample compared to the number of possible outcomes.  
 c. Sample answer: 10, 0.1; 86, 0.172; 164, 0.164; 836, 0.1672; 1670, 0.167; yes; The experimental probability gets closer to the theoretical probability.

2.
  - a.  $\frac{1}{36}$ , or about 0.028
  - b. The probability of rolling the same number on 3 dice is less likely than rolling the same number on 2 dice.
  - c. increases the sample size; There are more possible outcomes.
  - d. The experimental probability gets closer to the theoretical probability.
3. Determine how close the experimental probability from the sample data is to the theoretical probability.
4. *Sample answer:* experimental probability: 0.15; theoretical probability:  $\frac{1}{6}$ , or about 0.167; They are about the same.

### 11.2 Extra Practice

1. population: every adult ages 18 and over in the city, sample: the 3257 adults ages 18 and over who were surveyed; The sample consists of 2605 adults who own a tablet and 652 adults who do not.
2. population: every athlete who drinks sports drink, sample: the 1000 athletes who drink sports drink and were surveyed; The sample consists of 726 athletes who like the new sports drink flavor and 274 of them who do not.
3. population: every high school student in the school district, sample: the 1500 high school students in the district who were surveyed; The sample consists of 824 high school students who have a part time job in the summer and 676 of them who do not.
4. statistic; The percentage of the residents in one neighborhood, a subset of the population, was calculated.
5. parameter; The percentage of every student in the science class was calculated.
6. parameter; The median household income in the entire country was calculated.
7. statistic; The percentage of a subset of the population was calculated.
8.
  - a. The maker's claim is most likely true.
  - b. The maker's claim is most likely false.

### 11.3 Explorations

1.
  - a. no; Random digit dialing will not necessarily give a random sample of any population. Many people will not answer the phone, possibly even because they are exercising, and some people do not have a phone, especially if they are younger in age.
  - b. no; Members of the population who do not have Facebook accounts cannot be surveyed.
  - c. no; Students who are not in the library cannot be chosen for the survey.
  - d. no; Only those customers who choose to respond are surveyed.
2.
  - a. yes; It encourages a yes response; *Sample answer:* What effect does eating whole-grain food have on health?
  - b. yes; It encourages a no response; *Sample answer:* Do you ever text while driving?
  - c. no; It is a simple question to which an accurate response can be given.
  - d. yes; It implies the mayor needs to improve his or her public image; *Sample answer:* How would you describe the mayor's public image?

3.
  - a. *Sample answer:* It is possible to select a group that would not be representative of the population as a whole; Choose a random sample.
  - b. *Sample answer:* The people choosing not to respond may represent a response different from those choosing to respond; Offer some type of reward to encourage participation.
  - c. *Sample answer:* The results would not be representative of the true opinions of the population; Provide a method of completing the survey anonymously.
  - d. *Sample answer:* The people selected may not respond in a way that represents their true opinion; Rewrite the survey question so it is clear.
4. sampling technique and wording of survey questions
5. *Sample answer:* Because people pay sales tax when they purchase an item in the store, should they also pay sales tax when they purchase the item through the Internet?; Should people pay sales tax when they purchase an item through the Internet?

### 11.3 Extra Practice

1. systematic sample
2. self-selected sample
3. stratified sample
4. convenience sample; Employees who use the lounge room probably have a strong opinion about the lounge room.
5. self-selected sample; Only those viewers with a strong opinion on the presidential candidates are likely to respond.
6. observational study
7. simulation

### 11.4 Explorations

1. 1, 2, 3, 4, 5, 6; *Sample answer:* 3, 2, 6, 3, 8, 3; no; The numbers 1 and 6 came up the same amount of times.
2. The conjecture from the first exploration is correct; The data shows the number 6 appearing 468 more times than the number 1.
3. see if the results of the experiment support the conjecture
4. The large number of trials allows you to see small differences in probability.
5. *Sample answer:* Each value on the 12-sided die has the same probability of being rolled: You and nine friends roll a 12-sided die 30 times each for a total of 300 trials.

### 11.4 Extra Practice

1. The study is not a randomized comparative experiment; The babies were not randomly assigned to a control group and a treatment group. The conclusion that baby DVDs improve language ability may or may not be valid. There may be other reasons why babies who watched the DVDs have better language skills. *Sample answer:* For instance, babies who watch the DVDs may have parents who read a lot to them, watch the DVDs together with them and encourage interactions, or the babies could only watch the DVDs occasionally.
2. The study is a randomized comparative experiment; The treatment group is the drug for Type 1 Diabetes. The treatment group is the individuals who received the drug. The control group is the individuals who received the placebo.
3. observational study; *Sample answer:* Randomly choose a group of individuals who come from high crime neighborhoods. Then, randomly choose one group of individuals who are not from high crime neighborhoods. Observe their behaviors in both groups on a regular basis.

4. experiment; *Sample answer:* Randomly choose the same number of individuals who have such medical condition to be placed in each of two groups. One group uses the new medication and the other uses the old medication. Keep all other variables constant such as diet and exercises and record any side effects they may experience.
5. a. *Sample answer:* The sample size is not large enough to produce valid results. To improve the validity of the experiment, increase the sample size and the experiment must be replicated.
- b. *Sample answer:* Because the individuals are given either the new moisturizing cream or have the choice to use different products or none, the groups cannot be compared. Using a different product may produce different results. The control group should be given a placebo so that a comparison is possible.

### 11.5 Explorations

1. a. 40%; The sample is representative of the population, so the results of the survey can be used to infer the population parameter.
- b. yes; Because the entire population was not surveyed, the actual percentage can be different than the sample percentage.
- c. about 0.042; no; The probability is small.
- d. *Sample answer:* Assign each high school student a different consecutive integer starting at 1. Generate 50 unique random integers from 1 to the number of high school students using the random number function in a spreadsheet program. Contact and survey the 50 students who correspond to the 50 integers generated.
2. Conduct a survey using a random sample, and use the survey statistics to infer the population parameters.
3. about 0.112

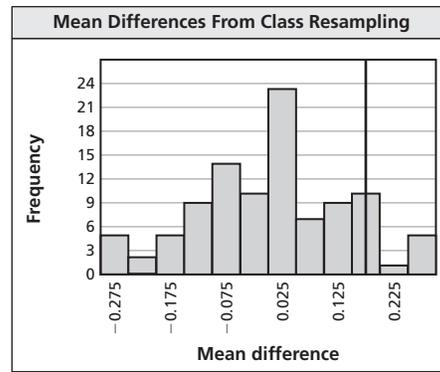
### 11.5 Extra Practice

1. 181.0
2. a. about 0.767
- b. 0.1
3. a. yes; The first two samples show that the majority of the students will vote for Candidate A.
- b. no; As the sample size increases, the percent of students who will vote for Candidate A approaches 42.7%, which is a minority.
4. The company's claim is probably accurate.
5. a. about  $\pm 1.9\%$
- b. between 58.1% and 61.9%

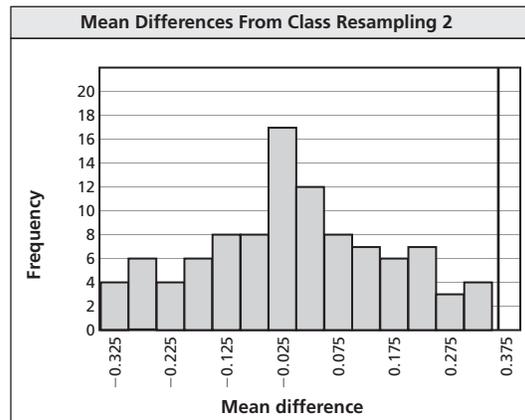
### 11.6 Explorations

1. a. 1.17, 1.35; 0.18
- b. *Sample answer:* 1.26, 1.26, 0; 1.34, 1.18,  $-0.16$ ; 1.16, 1.36, 0.2; 1.27, 1.25,  $-0.02$ ; 1.27, 1.25,  $-0.02$
- c. *Sample answer:* The difference in the means of the control and treatment groups is greater than most of the differences resulting by chance.

2. a. *Sample answer:*



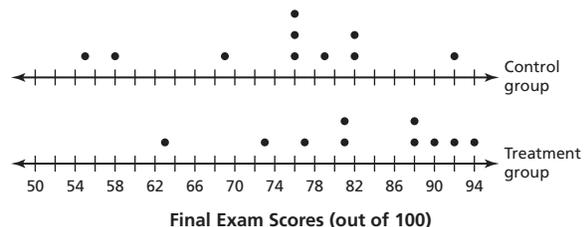
- b. See 2(a).
- c. *Sample answer:* near one of the tails
- d. *Sample answer:* yes; Only 6 of the 100 values lie above 0.18, so a value of 0.18 is unlikely if you assume the difference is 0.
3. Resample data and evaluate the hypothesis.
4.  $\bar{x}_{\text{control}} = 0.97$ ;  $\bar{x}_{\text{treatment}} = 1.33$ ;  $\bar{x}_{\text{treatment}} - \bar{x}_{\text{control}} = 0.36$ ;  
*Sample answer:*



All of the values are below 0.36, so you can reject the hypothesis.

### 11.6 Extra Practice

1. a. 74.5
- b. 82.7
- c. 8.2
- d.



- e. The weekly quizzes may be effective in improving students' final exam scores.
2. *Sample answer:*  $-0.6$
3. The hypothesis is most likely false; Weekly quizzes improve final exam scores.