

# Answer Key

## Chapter 1.R: Introduction to Statistics

### 1.R.1 Exercises

#### Concept Check

- True
- False; Quotient indicates division.

#### Applications

- 1103 calories
- 380 sq in.

#### Writing & Thinking

- Answers will vary.

### 1.R.2 Exercises

#### Concept Check

- True
- False; On a number line, any number to the right of another number is larger than that other number.

#### Practice

- 2.57
- 6.028

- 5
  - 2
  - 2, 5, 2
  - 3.0065

#### Applications

- Two and eight-hundred twenty-five ten-thousandths
- Parameter since the reference is to the population of all Americans in 1990.

#### Writing & Thinking

- Numbers in word form are often used for official documents and/or on checks.

### 1.R.3 Exercises

#### Concept Check

- True
- False; When estimating  $16.469 \div 3.87$ , the answer would be 5.
- False; According to the rules for order of operations, multiplication

and division should be performed before addition and subtraction.

#### Practice

- 20; 26.08
- 2; 2.05

#### Applications

- 39 pounds
  - 38.43 pounds
- 13.

$$\frac{25.88 + (-12.65) + 10.31 + 15.47 + (-30.49)}{5} = \frac{8.52}{5} = 1.704$$

### 1.R.4 Exercises

#### Concept Check

- True
- False; A decimal number that is between 0.01 and 0.10 is between 1% and 10%.

#### Practice

- 20%
- 2%

- 0.07

#### Applications

- 4%
- Americans over the age of 18
  - 3,297 adults surveyed
  - 73%
  - 0.73

#### Writing & Thinking

- Sometimes it is possible to have percentages over 100%. For example, if a bank account had \$50 and someone put in \$75, the amount deposited would have been 150% (starting \$50 + \$25 more) of the original amount. However, sometimes more than 100% is not possible. For example, if a gas tank can hold exactly 16 gallons of gas, 110% of the capacity could not be put into the tank.

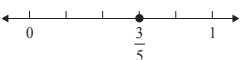
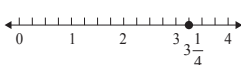
## Chapter 2.R: Graphical Descriptions of Data

### 2.R.1 Exercises

#### Concept Check

- False; The numerator is 11.
- True

#### Practice

- 
- 
- $1\frac{1}{3}$

#### Applications

- $\frac{115}{146}$

#### Writing & Thinking

- The two parts are the numerator and the denominator. The denominator represents the number of pieces in a whole and the numerator represents the number of these pieces being considered.

### 2.R.2 Exercises

#### Concept Check

- True
- False; In some cases, fractions can be converted

to decimal form without losing accuracy.

#### Practice

- $\frac{9}{50}$
- 6.67
- 0.7

#### Applications

- 17.92 inches
- 99 respondents

#### Writing & Thinking

- For the numerator, write the whole number formed by all the digits of the decimal number, and for the denominator, write the power of 10 that corresponds to the rightmost digit. Reduce the fraction, if possible.

### 2.R.3 Exercises

#### Concept Check

- True
- True

Practice

5.  $\frac{17}{20}$  by  $\frac{1}{20}$
7.  $\frac{2}{3}$
9.  $\frac{22}{45}$

Applications

11.  $2\frac{1}{12}$  inches
13.  $0.26 \cdot 150 + 0.22 \cdot 150 = 72$

2.R.4 Exercises

Concept Check

1. False; Fractions that have denominators other than 100 can be changed to a percent.
3. False; When changing from a percent to a mixed number, the fraction should be reduced.

Practice

5. 75%
7.  $1\frac{1}{5}$

Applications

9. 85%
11. 54%

Writing & Thinking

13. 100% = 1 so anytime there is a mixed number, which has a value greater than 1, the percentage will be greater than 100%. Proper fractions (numerator is smaller than denominator) have a value less than 1 and therefore the percentage will be less than 100%.

2.R.5 Exercises

Concept Check

1. True
3. True

Applications

5. a. Social Science  
b. Humanities and Chemistry & Physics  
c. About 3300  
d. About 21.2%

7. a. February and May  
b. 6 inches  
c. March  
d. 3.58 inches

Writing & Thinking

9. All graphs should be 1. clearly labeled, 2. easy to

read, and 3. have appropriate titles.

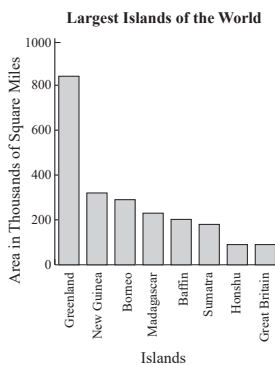
2.R.6 Exercises

Concept Check

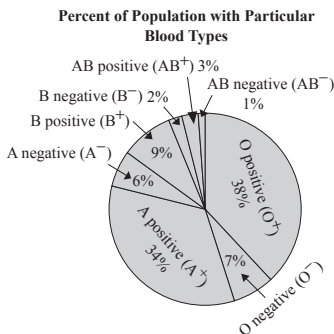
1. False; In creating a vertical bar graph, all bar widths should be the same.
3. True

Applications

5.



7.



Writing & Thinking

9. Constructing a graph would require a thorough understanding of the data and concepts represented in the graph as well as the proper type of graph to best communicate the information.

2.R.7 Exercises

Concept Check

1. True
3. True
- 5.
7. 0, 4, 8
9. True

Applications

11. -4500 meters
13. -37 points

Writing & Thinking

15. If  $y$  is a negative number then  $-y$  represents a positive number. For example, if  $y = -2$ , then  $-y = -(-2) = 2$ .

Chapter 3.R: Numerical Descriptions of Data

3.R.1 Exercises

Concept Check

1. False; The sum of a positive and negative number can be positive, negative, or zero.
3. False; The sum of two positive numbers is always positive, zero is neither positive nor negative.

Practice

5. -6
7. -0.5

Applications

9. a.  $\$45,000 + (-\$8,000) + (-\$2,000) + \$15,000$   
b.  $\$50,000$
11. Mean  $\approx 0.93$

Writing & Thinking

13.  $|0| + |0| = 0$

3.R.2 Exercises

Concept Check

1. False; The sum of a number and its additive inverse is zero.
3. True

Practice

5. -11
7. 3
9. -15

Applications

11.  $-18^\circ\text{F}$  (a decrease of 18 degrees Fahrenheit)
13. For example: 3, 3, 3, 3 (Note: There are many possibilities.)

Writing & Thinking

15. Add the opposite of the second number to the first number.

### 3.R.3 Exercises

#### Concept Check

1. True
3. False; The product and quotient will be positive.

#### Practice

5. 48
7. 2

#### Applications

9. \$15,200,000

#### Writing & Thinking

11. Negative; The product of every two negative numbers will be positive and this result multiplied by the remaining negative will give a negative answer.

### 3.R.4 Exercises

#### Concept Check

1. False; If there is no exponent written, the exponent is assumed to be 1.

3. True

#### Practice

5.  $y^{11}$
7.  $\frac{1}{x}$

#### Applications

9.  $2^8$  GBs
11. 156.71

### 3.R.5 Exercises

#### Concept Check

1. True
3. False; In the term “ $12a$ ,” 12 is the coefficient.

#### Practice

5.  $-5$ , 3, and 8 are like terms;  $7x$  and  $9x$  are like terms.
7.  $10x$
9.  $3y + 4$ ; 13

#### Applications

11. \$50,000
13. ACT Mathematics  $z$ -score: 2.08  
SAT Mathematics  $z$ -score: 1.84  
Carlita did better on the ACT because of the higher  $z$ -score for the ACT Mathematics Test.

#### Writing & Thinking

15.  $-13^2$  is the square of 13 multiplied by  $-1$  while  $(-13)^2$  is the square of  $-13$ . This means that  $-13^2 = -169$  and  $(-13)^2 = 169$ .

### 3.R.6 Exercises

#### Concept Check

1. False; If the original number is negative, the principal square root will not be the same as the original number.
3. False; The radicand is underneath the radical symbol.

#### Practice

5. 7
7. 10
9. 0.2

#### Applications

11. a. 4 cm  
b. 20 cm

#### Writing & Thinking

13. There is no real number that results in a negative number when squared.

## Chapter 4.R: Probability, Randomness, and Uncertainty

### 4.R.1 Exercises

#### Concept Check

1. True
3. False; The statement  $\frac{1}{3} \cdot \frac{2}{5} = \frac{2}{5} \cdot \frac{1}{3}$  is an example of the commutative property of multiplication.

#### Practice

5.  $\frac{1}{4}$
7.  $\frac{1}{3}$

#### Applications

9.  $\frac{3}{8}$
11.  $\frac{1}{15} \cdot \frac{1}{14} = \frac{1}{210} \approx 0.0048$
13.  $\frac{18}{200} \cdot \frac{17}{198} = \frac{16}{7,880,400} = \frac{34}{54,725} \approx 0.0006$

#### Writing & Thinking

15. To multiply two fractions, multiply the numerators, multiply the denominators, and then reduce the product to lowest terms. Examples will vary.

### 4.R.2 Exercises

#### Concept Check

1. False; The reciprocal of 1 is 1.
3. False; The reciprocal of 12 is  $\frac{1}{12}$ .

#### Practice

5.  $\frac{8}{9}$
7. Undefined

#### Applications

9. 200 years
11.  $\frac{1}{6} \div \frac{1}{2} = \frac{1}{6} \cdot \frac{2}{1} = \frac{2}{6} = \frac{1}{3} \approx 0.3333$

#### Writing & Thinking

13.  $0 = \frac{0}{1}$  and the reciprocal would be  $\frac{1}{0}$  but division by 0 is undefined. So 0 has no reciprocal.

### 4.R.3 Exercises

#### Concept Check

1. False; The LCM of 15 and 25 is 75.
3. False; The first five multiples of 4 are 4, 8, 12, 16, and 20.

#### Practice

5. 30
7. a. LCM = 490  
b.  $490 = 14 \cdot 35$   
 $= 35 \cdot 14$   
 $= 49 \cdot 10$

9. 45

#### Applications

11. a. 360 pieces  
b. 15 boxes, 10 boxes, and 8 boxes, respectively

#### Writing & Thinking

13. Multiplying the two numbers together will give the LCM if those two numbers have no common factors. If they have any factors in common, then you would only use that common factor once. Examples will vary.

### 4.R.4 Exercises

#### Concept Check

1. True

3. False; LCD stands for least common denominator.

5. True

Practice

7.  $\frac{17}{21}$

9.  $\frac{23}{42}$

Applications

11. 1 ounce

13.  $\frac{\frac{125}{200+100+125+200} + \frac{100}{200+100+125+200}}{\frac{9}{25}} \approx 0.36$

15.  $\frac{1}{4} + \frac{1}{8} - \frac{1}{12} = \frac{6}{24} + \frac{3}{24} - \frac{2}{24} = \frac{7}{24} \approx 0.2917$

(Note: The LCM of 4, 8, and 12 is 24.)

Writing & Thinking

17. Answers will vary. Adding or subtracting with fractions may be used when

cooking or when measuring sewing or construction materials.

Practice

5. Union:  $\{-4, -3, -2, -1, 0, 1, 2, 4, 6\}$ ;  
Intersection:  $\{0\}$

Applications

7. a.  $\frac{5}{6}$  because

$(E \cup F) = \{1, 3, 4, 5, 6\}$

b.  $\frac{1}{6}$  because

$(E \cap F) = \{5\}$

### 4.R.5 Exercises

Concept Check

1. False; The union of two sets contains elements that belong to either one set, the other set, or both sets.

3. True

## Chapter 5.R: Discrete Probability Distributions

### 5.R.1 Exercises

Concept Check

1. True  
3. True

Practice

5. a. 36  
b. 16  
7. -10  
9. 129

Applications

11. a.  $-\$42 - \$35 - (3 \cdot \$5)$ .  
b.  $-\$92$ .

Writing & Thinking

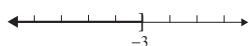
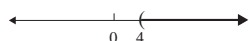
13.  $(3^2 - 9) = 0$  and division by 0 is undefined.

### 5.R.2 Exercises

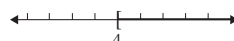
Concept Check

1. True  
3. False; Only one value in the solution set needs to be checked.

Practice

5.   
Half-open interval  
7.  $(4, \infty)$   


9.  $[4, \infty)$



Applications

11. a. The student would need a score higher than 102 points, which is not possible. Thus he cannot earn an A in the course.  
b. The student must score at least 192 points to earn an A in the course.

Writing & Thinking

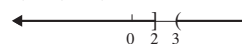
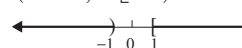
13. a. Answers will vary.  
b. Answers will vary.

### 5.R.3 Exercises

Concept Check

1. False; The solution is the intersection of the solution sets of the two inequalities.

Practice

3.  $(3, \infty) \cup (-\infty, 2]$   
  
5.  $(-\infty, -1) \cup [1, \infty)$   


Applications

7.  $0.0278 + 0.0556 = 0.0834$   
9.  $0.0833 + 0.1111 + 0.1389 + 0.1667 = 0.5$

## Chapter 6.R: Normal Probability Distributions

### 6.R.1 Exercises

Concept Check

1. False; The  $(b + c)$  in the trapezoid area formula represents the sum of the lengths of the two parallel bases.  
3. False; The area formula for a triangle is  $A = \frac{1}{2}bh$ .

Practice

5. 81 ft<sup>2</sup>  
7. 48 in.<sup>2</sup>  
9. 36 cm<sup>2</sup>

Applications

11. a. 75 cm  
b. 336 cm<sup>2</sup>  
13.  $0.9554 - 0.0062 = 0.9492$

Writing & Thinking

15. The expression  $(b + c)$  represents the sum of the two bases in a trapezoid. The bases are the two sides that are parallel in a trapezoid.

### 6.R.2 Exercises

Concept Check

1. False; The addition and multiplication principles

of equality can be used with decimal or fractional coefficients.

3. True

Practice

5.  $x = -3$   
7.  $x = -\frac{27}{10}$

Applications

9. 14,000 tickets per hour  
11. 157.4

Writing & Thinking

13. a. The 4 should have been multiplied by 3 so that the 3 was distributed over the entire left-hand side of the equation; Correct answer is  $x = 15$ .

- b. 3 should be subtracted from each side, not from each term, and  $5x - 3$  doesn't simplify to  $2x$ ; Correct answer is  $x = \frac{8}{5}$ .

6.R.3 Exercises

Concept Check

1. False; Case matters in formulas.  
3. True

Practice

5.  $s = \frac{P}{3}$

7.  $r = \frac{A - P}{Pt}$

Applications

9. \$1030  
11. 150

Chapter 8.R: Confidence Intervals

8.R.1 Exercises

Concept Check

1. False; Equations involving absolute value can have more than one solution.  
3. True

Practice

5. No solution  
7. No solution

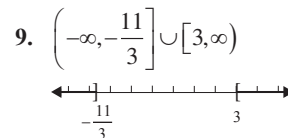
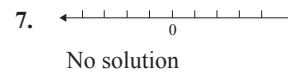
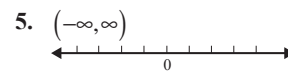
9.  $x = -10, \frac{18}{7}$

8.R.2 Exercises

Concept Check

1. False; Only one statement/inequality must be true.  
3. False; Must be greater than 2

Practice



11. a.



b.  $|x| \leq 10$

c.  $[-10, 10]$ , Closed interval

Applications

13. a.   
b. (41, 49)  
15. 15.7

Chapter 10.R: Hypothesis Testing

10.R.1 Exercises

Concept Check

1. True  
3. False; Subtraction is indicated by the phrase "five less than a number."

Practice

5.  $x + 6$   
7.  $\frac{x}{2} - 18$   
9. a.  $4n - 6$   
b.  $6 - 4n$

11. The product of a number and negative nine

13.  $H_0 : \mu = 225$   
 $H_a : \mu > 225$

Writing & Thinking

15. The Commutative Property of Addition and Multiplication permits the order of items being added or multiplied to change and still have the same result. This property does not hold true for subtraction or division. There-

fore, order is important for subtraction and division problems or the answer will change or be incorrect.

10.R.2 Exercises

Concept Check

1. True  
3. False;  $3.53 \times 10^5$  is greater than  $8.72 \times 10^{-4}$ .

Practice

5.  $8.6 \times 10^4$   
7. 0.042

9.  $(3 \times 10^{-4})(2.5 \times 10^{-6}); 7.5 \times 10^{-10}$

Applications

11.  $4.0678 \times 10^{16}$  m  
13. 0.0045; Reject the null hypothesis.

# Chapter 12.R: Regression, Inference, and Model Building

## 12.R.1 Exercises

### Concept Check

1. True
3. True

### Practice

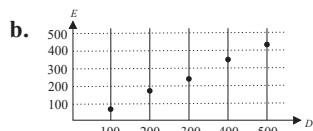
5.  $\left\{ \begin{array}{l} A(-5, 1), B(-3, 3), \\ C(-1, 1), D(1, 2), \\ E(2, -2) \end{array} \right\}$

7. a. (0, -1)  
b. (4, 1)  
c. (2, 0)  
d. (8, 3)
9. b, c

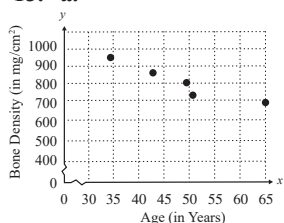
### Applications

11. a.

	D	E
	100	85
	200	170
	300	255
	400	340
	500	425



13. a.



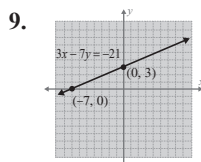
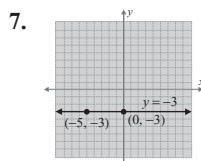
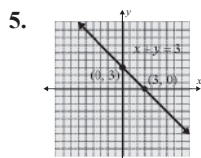
b. negative correlation

## 12.R.2 Exercises

### Concept Check

1. True
3. False; Horizontal lines have y-intercepts

### Practice



### Applications

11. The y-intercept is (0, 30), meaning that if a student does no homework at all, the student will get a score of 30 points on the exam.

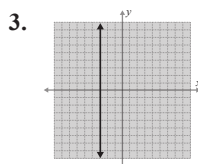
## Writing & Thinking

13. Two (unique) points determine a line.

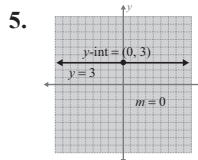
## 12.R.3 Exercises

### Practice

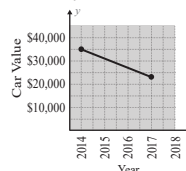
1.  $m$  is undefined



Vertical line;  $m$  is undefined



7. \$4000/year



9. a. Each additional hour playing video games will decrease the predicted test score by 11 points.

b. The y-intercept tells us that the expected test score for a student who played 0 hours of video games two weeks before the test is 243.

## Writing & Thinking

11. a. For any horizontal line, all of the y-values will be the same. Thus the formula for slope will always have 0 in the numerator making the slope of every horizontal line 0.
- b. For any vertical line, all of the x-values will be the same. Thus the formula for slope will always have 0 in the denominator making the slope of every vertical line undefined.