Data Analysis and Probability Workbook Answers

Section 1 Graphs

1. Frequency Tables, Line Plots, and Histograms

<table>
<thead>
<tr>
<th>Number of Rose Bushes</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tally</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

2. Rose Bushes Wanted

<table>
<thead>
<tr>
<th>Number of Rose Bushes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
</tbody>
</table>

3. Answers may vary. Sample:

<table>
<thead>
<tr>
<th>Number of Rose Bushes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
</tbody>
</table>

page 2 Practice: Frequency Tables, Line Plots, and Histograms

1. Boxes of Juice Sold

<table>
<thead>
<tr>
<th>Number of Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>8</td>
</tr>
</tbody>
</table>

2. a student 3. 3 students 4. 13 students 5. 80 and 85, 75 and 90 6. No; the interval includes 2–2.75 h.

page 3 Reteaching 1: Frequency Tables and Line Plots

1. Inches 3 4 5 6 7

<table>
<thead>
<tr>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 3 1 1 2</td>
</tr>
</tbody>
</table>

2. Inches 0 1 2 3 4

<table>
<thead>
<tr>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 2 0 4 1</td>
</tr>
</tbody>
</table>

3. Inches 3 4 5 6 7

<table>
<thead>
<tr>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 3 1 1 2</td>
</tr>
</tbody>
</table>

page 4 Reteaching 2: Frequency Distributions

1. Interval 95–100 90–94 85–89 80–84 75–79 70–74 under 70

<table>
<thead>
<tr>
<th>Tally</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>2</td>
</tr>
<tr>
<td>III</td>
<td>4</td>
</tr>
<tr>
<td>II</td>
<td>2</td>
</tr>
<tr>
<td>IIIII</td>
<td>7</td>
</tr>
<tr>
<td>III</td>
<td>4</td>
</tr>
<tr>
<td>III</td>
<td>4</td>
</tr>
<tr>
<td>II</td>
<td>2</td>
</tr>
</tbody>
</table>
Data Analysis and Probability Workbook Answers

2.

<table>
<thead>
<tr>
<th>Interval</th>
<th>Tally</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>700–749</td>
<td>III</td>
<td>3</td>
</tr>
<tr>
<td>750–799</td>
<td>III</td>
<td>4</td>
</tr>
<tr>
<td>800–849</td>
<td>III</td>
<td>3</td>
</tr>
<tr>
<td>850–899</td>
<td>IV</td>
<td>5</td>
</tr>
<tr>
<td>900–949</td>
<td>III</td>
<td>4</td>
</tr>
<tr>
<td>950–999</td>
<td>II</td>
<td>2</td>
</tr>
<tr>
<td>1000 and over</td>
<td>III</td>
<td>3</td>
</tr>
</tbody>
</table>

3.

<table>
<thead>
<tr>
<th>Interval</th>
<th>Tally</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>60–79</td>
<td>III</td>
<td>4</td>
</tr>
<tr>
<td>80–99</td>
<td>V</td>
<td>7</td>
</tr>
<tr>
<td>100–119</td>
<td>III</td>
<td>6</td>
</tr>
<tr>
<td>120–139</td>
<td>I</td>
<td>2</td>
</tr>
<tr>
<td>140–159</td>
<td>III</td>
<td>4</td>
</tr>
<tr>
<td>160–179</td>
<td>I</td>
<td>1</td>
</tr>
<tr>
<td>180 and over</td>
<td>II</td>
<td>2</td>
</tr>
</tbody>
</table>

page 5 Reteaching 3: Histograms
1. Answers may vary. Sample:

<table>
<thead>
<tr>
<th>Number of Raisins</th>
<th>Tally</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>25–29</td>
<td>III</td>
<td>4</td>
</tr>
<tr>
<td>30–34</td>
<td>III</td>
<td>8</td>
</tr>
<tr>
<td>35–39</td>
<td>III</td>
<td>4</td>
</tr>
<tr>
<td>40–44</td>
<td>III</td>
<td>4</td>
</tr>
</tbody>
</table>

2.

<table>
<thead>
<tr>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

page 6 Bar and Line Graphs
1. tens 2. fives 3. thousands 4. hundreds 5. fives
6. tens 7. Bar graph; data shows amounts, but not changes over time. 8. Line graph; data shows change over time.

page 7 Practice: Bar and Line Graphs
1. names of the athletes 2. Answers may vary. Sample: 5

3.

<table>
<thead>
<tr>
<th>All-Time Favorite Sports Figures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Votes</td>
</tr>
<tr>
<td>Ruth</td>
</tr>
</tbody>
</table>

4. Daily Use of Petroleum in the U.S.

<table>
<thead>
<tr>
<th>Year</th>
<th>Millions of Barrels</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>2.5</td>
</tr>
<tr>
<td>1965</td>
<td>2.0</td>
</tr>
<tr>
<td>1970</td>
<td>1.5</td>
</tr>
<tr>
<td>1975</td>
<td>1.0</td>
</tr>
<tr>
<td>1980</td>
<td>0.5</td>
</tr>
<tr>
<td>1985</td>
<td>0.0</td>
</tr>
<tr>
<td>1990</td>
<td>2.5</td>
</tr>
<tr>
<td>1995</td>
<td>2.0</td>
</tr>
<tr>
<td>2000</td>
<td>1.5</td>
</tr>
</tbody>
</table>

5. Answers may vary. Sample: Daily petroleum use has been declining since 1970.

page 8 Stacked Bar and Multiple Line Graphs
1. grade 7 2. grade 7; grade 8 3. Sample: Find the total, subtract the bottom part. 4. 1993 5. Find the number of each item sold and add the two.

page 9 Practice: Stacked Bar and Multiple Line Graphs
1. Average Viewing Time
8:00 P.M.–11:00 P.M. (Mon.–Sun.)

<table>
<thead>
<tr>
<th>Time (Hours)</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>18–24</td>
<td>55+</td>
<td></td>
</tr>
<tr>
<td>25–54</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>101214</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>
Data Analysis and Probability Workbook Answers

2. **Average Viewing Time**

   8:00 P.M.–11:00 P.M. (Mon.–Sun.)

   ![Average Viewing Time Graph](image)

   - **Time (Hours)**: 0, 3, 6, 9, 12
   - **Ages**: 18–24, 25–54, 55+

3. double bar graph

4. sliding bar graph

5. **Population**

   ![Population Graph](image)

   - **Population (100,000s)**: 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0

6. **Population**

   ![Population Graph](image)


7. multiple line graph

8. 30°

9. **Budget**

   ![Budget Graph](image)

   - **Categories**: Rent, Misc., Gas, Clothes, Food

10. **Children per Family**

    ![Children per Family Graph](image)

11. **Practice: Circle Graphs**

    1–4. Sample graph shown.

    | Category | Amount Budgeted | Percent of Total | Degrees in Central Angle |
    |----------|-----------------|------------------|--------------------------|
    | Gas      | $200            | 10%              | 36°                      |
    | Meals    | $400            | 20%              | 72°                      |
    | Motels   | $500            | 30%              | 108°                     |
    | Other    | $800            | 40%              | 144°                     |

**Rahman Family Budget**

![Rahman Family Budget Graph](image)
5–8. Sample graph shown.

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount Budgeted</th>
<th>Percent of Total</th>
<th>Degrees in Central Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Clothing</td>
<td>$50</td>
<td>40%</td>
<td>36°</td>
</tr>
<tr>
<td>6. Entertainment</td>
<td>$40</td>
<td>32%</td>
<td>72°</td>
</tr>
<tr>
<td>7. Savings</td>
<td>$25</td>
<td>20%</td>
<td>108°</td>
</tr>
<tr>
<td>8. Transportation</td>
<td>$10</td>
<td>8%</td>
<td>144°</td>
</tr>
</tbody>
</table>

Lucy’s Budget

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount Budgeted</th>
<th>Percent of Total</th>
<th>Degrees in Central Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clothing</td>
<td>$50</td>
<td>40%</td>
<td>36°</td>
</tr>
<tr>
<td>Entertainment</td>
<td>$40</td>
<td>32%</td>
<td>72°</td>
</tr>
<tr>
<td>Savings</td>
<td>$25</td>
<td>20%</td>
<td>108°</td>
</tr>
<tr>
<td>Transportation</td>
<td>$10</td>
<td>8%</td>
<td>144°</td>
</tr>
</tbody>
</table>

Milk Drunk

<table>
<thead>
<tr>
<th>State</th>
<th>Amount Budgeted</th>
<th>Percent of Total</th>
<th>Degrees in Central Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>not sure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>less</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>more</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>the same</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.1%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.1%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>56.3%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

page 12 Reteaching: Circle Graphs
1. 97°  2. 86°  3. 47°  4. 65°  5. 65°

page 13 Stem-and-Leaf Plots
1. Times for the 200-M Dash
   38 | 5 6
   37 | 3
   36 | 0 4 7 9
   35 | 2 3
   34 | 4 7 7 7
   33 | 4
   32 | 1 2 2 5
   31 | 4 7 9
   30 | 2
   29 | 3 5
   28 | 8 means 38.8
2. 34.7 s  3. 9.3 s  4. 34.7 s  5. 16 students

page 14 Practice: Stem-and-Leaf Plots
1. 0 6 8
   1 5 6 9
   2 0 3 4 4 7
   3 5 6 8
   3 | 8 means 38
   23; 24; 32
5. 6 | 3 3
   7 | 0 1 4 5 9
   8 | 1 2 2 6
   9 | 0 1 6 9
   9 | 9 means 9.9
   8.1; 8.2 and 6.3; 3.6
6. 4 | 17 36 70
   5 | 21 26 86
   6 | 34 75 92
   7 | 19
   8 | 17
   4 | 17 means 17.4
   18.5; 18.5; 3
7. 17 | 4 6 9
   18 | 5 5 6
   19 | 4 5
   20 | 4
   17 | 4 means 17.4
   18.5; 18.5; 3
8. 15°  9. 64°  10. 69°  11. 76; 75; 79; 80

page 15 Reteaching: Stem-and-Leaf Plots
1. 1 5 6
   2 | 4 7
   3 | 6 6 9
   4 | 2 5
   5 | 1 4 9
   6 | 1 3 4
   1 | 5 means 15
3. 14 | 7 8 9
   8 | 2 3 4 4 5 6 6 7 9
   9 | 0 1 2
   7 | 8 means 78
   8 | 1 2 3 5
   8 | 1 means 81

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Data Analysis and Probability Workbook Answers

page 16  Activity: Relating Stem-and-Leaf Plots to Histograms

16 a. Stem  Leaf
   3           2 7
   4           4 4 6 7
   5           7 8
   6           1 3 4 8
   7           6 9

b. Frequency Table

<table>
<thead>
<tr>
<th>Grouping Intervals</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>30–39</td>
<td>2</td>
</tr>
<tr>
<td>40–49</td>
<td>4</td>
</tr>
<tr>
<td>50–59</td>
<td>2</td>
</tr>
<tr>
<td>60–69</td>
<td>4</td>
</tr>
<tr>
<td>70–79</td>
<td>2</td>
</tr>
</tbody>
</table>

c. Number of Teams

<table>
<thead>
<tr>
<th>Score</th>
<th>Number of Teams</th>
</tr>
</thead>
<tbody>
<tr>
<td>30–39</td>
<td>2</td>
</tr>
<tr>
<td>40–49</td>
<td>4</td>
</tr>
<tr>
<td>50–59</td>
<td>2</td>
</tr>
<tr>
<td>60–69</td>
<td>4</td>
</tr>
<tr>
<td>70–79</td>
<td>2</td>
</tr>
</tbody>
</table>

6. [Graph of a stem-and-leaf plot showing data with stems 0-15 and leaves 0-9.]

7. [Graph of a stem-and-leaf plot showing data with stems 60-90 and leaves 0-9.]

8. [Graphs of two sets of data with stems 0-15 and leaves 0-9.]

page 17  Puzzle: Keeping Score

<table>
<thead>
<tr>
<th>Stem</th>
<th>Leaf</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>.75, .90</td>
</tr>
<tr>
<td>6</td>
<td>.35, .45, .75</td>
</tr>
<tr>
<td>7</td>
<td>.20, .50, .50, .40, .75</td>
</tr>
<tr>
<td>8</td>
<td>.75, .75, .75</td>
</tr>
<tr>
<td>7</td>
<td>.20 means 7.20</td>
</tr>
</tbody>
</table>

page 18  Practice: Box-and-Whisker Plots

1. 98, 80, 5, 118

2. 13, 4, 21

page 19  Practice: Box-and-Whisker Plots

1. 55 miles, 15 miles
2. 35 miles
3. 75%
4. 6 runners
5. 10 15 20 25 30

page 20  Reteaching: Box-and-Whisker Plots

1. 1, 2, 2, 2, 2, 2, 2, 3, 3, 3, 3, 3, 3, 3, 4, 4, 5, 5, 6, 7, 7, 8, 8, 8, 9, 9, 9, 10, 11, 13
2. median = 4  3. lower median = 3; upper median = 8

4. [Graph showing a box-and-whisker plot with values 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13.]

page 21  Reading and Understanding Graphs

1. 20 books
2. January
3. 10 books
4. October and November
5. English and Spanish
6. 12 people
7. 12 people
8. Polish

page 22  Practice: Reading and Understanding Graphs

1. oxygen
2. oxygen, carbon, hydrogen
3. There are other elements in quantities too small to be labeled individually.

page 23  Reading Graphs Critically

1. the first graph  2. about 3 times  3. The second graph; since the scale is smaller, the bars can be read more accurately.
4. By using the break, most of the bar for the United States has been left out.

page 24  Practice: Reading Graphs Critically

1. 45–64 year olds  2. 45–64 year olds  3. Answers may vary. Check students’ graphs.  4. Answers may vary.  5. Answers may vary. Check students’ graphs.  6. Answers may vary. Check students’ graphs.  7. Answers may vary.  8. Answers may vary. Sample: to convince people that one program is more popular than it is

page 25  Activity: Organizing and Analyzing Data

1. no; too wide a range of data  2. D.C., N.J., and R.I.  3. possible answer: 100 people per square mile  4. People might assume that the two places have similar densities.
5. You could list the three places individually.  6. nothing
Data Analysis and Probability Workbook Answers

page 26 Scatter Plots and Trends

1.  

Test Scores and TV

<table>
<thead>
<tr>
<th>Hours of TV</th>
<th>Test Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>1</td>
<td>90</td>
</tr>
<tr>
<td>2</td>
<td>80</td>
</tr>
<tr>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>4</td>
<td>60</td>
</tr>
<tr>
<td>5</td>
<td>50</td>
</tr>
</tbody>
</table>

2. Negative; as one value goes up, the other goes down.
3. The more TV students watch, the lower their test scores.

page 27 Practice: Scatter Plots and Trends

1. positive trend  
2. negative trend  
3. no trend
4. Students’ graphs should show a negative trend. Sample:

page 28 Activity 1: Making a Scatter Plot

1–2. Check student’s work.  
3–4. Check students’ work.  
There should be a positive correlation.

page 29 Activity 2: Making a Scatter Plot

1.  

2. yes, no

page 30 Analyzing Scatter Plots

1. negatively correlated  
2. unrelated  
3. positive correlation  
4. positively correlated  
5. negatively correlated  
6. unrelated  
7. a. negatively correlated  

b. negatively correlated

page 31 Reteaching: Scatter Plots and Trends

1.  

Weight and Height Survey

<table>
<thead>
<tr>
<th>Weight in Pounds</th>
<th>Height in Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>70</td>
<td>70</td>
</tr>
</tbody>
</table>

2. about 61 in.  
3. about 63 lb  
4. yes  
5. Sample: As height increases, weight increases.
Data Analysis and Probability Workbook Answers

Section 2 Measures of Central Tendency

1. mean: 3; median: 3; mode: 4  
2. mean: 8.1; median: 8; mode: 5  
3. mean: 5.25; median: 5; mode: 0, 1  
4. mean: $3.25; median: $3.25; mode: $4  
5. Median; there is no mode and the median is greater than the mean.  
6. Mode; both the median and the mean are less than the mode.

Practice: Measures of Central Tendency

1. 1.5; 2; 2  
2. 3; 3.3; 1; 0  
3. 29.1; 29.5; 25; 30, and 35  
4. 8.1; 9.9; 5.7; 6; 72; no mode  
5. 153.2; 146; no mode  
6. Mode; data are nonnumerical.  
7. Mode; data are nonnumerical.  
8. Mean; there should be no outliers.  
9. Mean or median; use median if there are outliers.  
10. Mean or median; use mean if there are outliers.  
11. 92; 12; at least an 87  
12. 85; 13; 85  
13. 4; 86

Activity 1: Choosing an Appropriate Measure

1. Check students' work.  
2. a, b, c, d, g  
3. all of them, where the mode exists  
4. Check students' work.

Activity 2: Average Temperature

<table>
<thead>
<tr>
<th>Stem</th>
<th>Leaf</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>0 2 3</td>
</tr>
<tr>
<td>7</td>
<td>0 0 4 5 5 5 6 6 7 7 8 8 8 8 8 9 9</td>
</tr>
<tr>
<td>8</td>
<td>0 0 0 1 2 3 4 5 5 6 6 7 7 7 8 8 8 8 9 9 9 9</td>
</tr>
<tr>
<td>9</td>
<td>0 1 6</td>
</tr>
<tr>
<td>10</td>
<td>2 7</td>
</tr>
</tbody>
</table>

Activity 3: Wink Count

1–6. Answers depend upon class data. EXTRA 7. They must score at least 12 runs during the 3 games. One way to find the different ways in which this can be done is to make a chart.

Game 1 | Game 2 | Game 3
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>11</td>
<td>0</td>
</tr>
</tbody>
</table>

There are 91 ways in all in which the additional 12 runs may be scored.

Puzzle: Mean, Median, and Mode

1. [2, 4, 5, 7, 7]  
2. All should have found the same set.  
3. One 4. a, b, 1 c, 0 d, 0 e, 0 5. Several solutions are possible, including [5, 5, 5, 5, 5], [5, 5, 5, 6, 6], [3, 5, 5, 7], etc.  
6. Conditions: 0 ≤ a ≤ b ≤ c ≤ d ≤ e ≤ 20, and 2a + d + e ≤ 4c. Several solutions are possible, including [0, 0, 0, 20, 20].  
7. Conditions: a + b + c + d + e ≤ 5c, and a + b + c + d + e < mode. One possible solution is [0, 0, 5, 5, 5].  
8. no solution  
9. Answers may vary. Samples: [0, 0, 0, 20, 20] and [0, 0, 20, 20]

Reteaching: Mean, Median, and Mode

1. 12, 11.5, none  
2. 87¢, 86.5¢, none  
3. 231, 231, none  
4. 50, 49, 43  
5. $130, $129, none

Assessment 2

1. 3:03  
2. 2:04; 1:55  
3. 1:58  
4. 2:03  
5. Answers may vary. Sample: The median, because it eliminates the effect of the outlier and gives a representative time.

Assessment 3

1. 34  
2. All 4 students  
3. 91 ways  
4. a, b, c, d, g  
5. Several solutions are possible, including {0, 0, 5, 5, 5}.  
6. Conditions: 0 ≤ a ≤ b ≤ c ≤ d ≤ e ≤ 20, and 2a + d + e ≤ 4c. Several solutions are possible, including [0, 0, 0, 20, 20].  
7. Conditions: a + b + c + d + e ≤ 5c, and a + b + c + d + e < mode. One possible solution is [0, 0, 5, 5, 5].  
8. no solution  
9. Answers may vary. Samples: [0, 0, 0, 20, 20] and [0, 0, 20, 20]

Choosing an Appropriate Graph

1. multiple line graph: shows changes in two sets of data over time  
2. circle graph: shows how the club's budget is divided into parts  
3. double bar graph: compares two sets of data  
4. circle graph: shows how 100% is divided into parts  
5. line graph: shows change over time

Use and Misuse of Data Displays

Page 42

1. Answers will vary.  
2. mode = 78 and 89 (bimodal) No city has the mean, although Columbus and Seattle are close. No city has the median, although Albany, Pittsburgh, St. Louis, and Salt Lake City lie just below, and Columbus and Seattle lie just above. The data is bimodal: Denver, Detroit, Spokane, Topeka, and Tulsa all have 78; Albuquerque, Portland, Raleigh, Richmond, and San Antonio all have 89.  
4. Check students' work.
Data Analysis and Probability Workbook Answers

page 43 Practice: Choosing an Appropriate Graph
1. private owners
2. about 25,000 people
3. line graph, shows change over time
4. bar graph, compares quantities
5. scatter plot, shows a relationship between sets of data
6. circle graph, compares parts of a whole
7. bar graph: See students’ graphs. Sample:

U.S. Endangered Animals

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mammals</td>
<td>80</td>
</tr>
<tr>
<td>Birds</td>
<td>70</td>
</tr>
<tr>
<td>Reptiles</td>
<td>40</td>
</tr>
<tr>
<td>Amphibians</td>
<td>30</td>
</tr>
<tr>
<td>Fish</td>
<td>20</td>
</tr>
<tr>
<td>Seals</td>
<td>10</td>
</tr>
<tr>
<td>Crustaceans</td>
<td>0</td>
</tr>
</tbody>
</table>

page 44 Activity: Appropriate Graphs
1. line graph
2. bar graph
3. no
4. Bar graph; it compares amounts.

page 45 Misleading Graphs
1. graph A
2. graph B
3. The years on the horizontal axis are spaced differently; graph A seems to rise more steeply than graph B.
4. graph D
5. graph C
6. vertical scale is unbroken on one, and broken on the other; difference in the bars seems greater on graph D.

page 46 Practice: Misleading Graphs
1. 15
2. 10
3. 2 cars
4. Probably not; car sales vary greatly and information from the first three months is not necessarily indicative of the whole year.
5. The vertical axis changes units; the graph continues through a break.
6. The number of people who prefer Yummy Cereal is increasing sharply.

page 47 Activity: Analyzing Graphs
1. Lois’s Graph
2. Harold’s Graph

Teachers’ Years of Service

<table>
<thead>
<tr>
<th>Number of Teachers</th>
<th>1-5</th>
<th>6-10</th>
<th>11-15</th>
<th>16-20</th>
<th>21-25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

page 48 Using Graphs to Persuade
1. no
2. 2.0 to 120
3. Answers may vary. Sample:

Average Number of Clear Days per Year

<table>
<thead>
<tr>
<th>Cities</th>
<th>Number of Clear Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albany</td>
<td>150</td>
</tr>
<tr>
<td>Atlanta</td>
<td>100</td>
</tr>
<tr>
<td>Boise</td>
<td>70</td>
</tr>
<tr>
<td>Houston</td>
<td>50</td>
</tr>
<tr>
<td>St. Louis</td>
<td>125</td>
</tr>
<tr>
<td>Seattle</td>
<td>75</td>
</tr>
</tbody>
</table>

4. Answers may vary. Sample:
Using Graphs to Persuade 2

1. The first graph implies prices decreased rapidly from 1997 to 1998, then increased rapidly from 1999 to 2000. The second graph implies slower changes.

2. The differences seem much less.

3. The horizontal scales are different.

Practice: Using Graphs to Persuade

1. birds 2. no 3. the break in the vertical axis.

U.S. Endangered Species

- Mammals: 70, 60, 50, 40, 30, 20, 10, 0
- Birds: 80, 70, 60, 50, 40, 30, 20, 10
- Fish: 80, 70, 60, 50, 40, 30, 20, 10

Type

- Number of Species
- 80, 70, 60, 50, 40, 30, 20, 10
- Mammals, Birds, Fish

Analyzing Games and Making Predictions

1. No; it suggests that Player A wins 3 and Player B wins 5.
2. HTHH, THHT, HTHT, HTTH, HHTH, THHT, THTT, TTHT, TTHH; Player A wins 4 and B wins 6.
4. Yes; in 16 rounds, both players are likely to win 8 points.

Practice: Analyzing Games and Making Predictions

1. not fair 2. fair 3. fair 4. not fair 5. Possible answers: 0–1 for correct, 2–9 for incorrect
6. Check students’ work. 11 = 22% if answer shown here for Exercise 5 is used.
7. possible answer: 0–4 for correct, 5–9 for incorrect
8. Check students’ work. 29 = 58% if answer shown here for Exercise 7 is used.
9. Possible answer: 0–7 for correct, 8–9 for incorrect
10. Check students’ work. 41 = 82% if answer shown here for Exercise 9 is used.

U.S. Union Membership

- Year

- 20 18 16 14 12 10 8 6
- Union members (millions)

U.S. Union Membership

- Year

- 20 18 16 14 12 10 8 6
- Union members (millions)
Data Analysis and Probability Workbook Answers

1. Answers will vary. Sample:

2. Answers will vary. Sample:

3. Answers will vary. Graph A is good for giving the impression that something is decreasing rapidly. Sample: showing the change in a bank account over time to explain why a bigger allowance is needed. Graph B is good for giving the impression that something is decreasing more slowly. Sample: showing the change in a bank account over time to convince one’s self that a job is needed.

Section 4 Counting Principles

1. Answers will vary. Sample:

2. Answers will vary. Sample:

3. Answers will vary. Graph A is good for giving the impression that something is decreasing rapidly. Sample: showing the change in a bank account over time to explain why a bigger allowance is needed. Graph B is good for giving the impression that something is decreasing more slowly. Sample: showing the change in a bank account over time to convince one’s self that a job is needed.

Section 4 Counting Principles

1. 12 2. 15 3. 16 4. 20 5. 12 6. 30

Practice: Counting Outcomes

1. 1st choice 2nd choice 3rd choice

blue small
beige snaps
blue
beige
blue
beige
blue
beige
blue
beige

2. 1st choice 2nd choice 3rd choice

buttons
snaps
blue
beige
blue
beige
blue
beige

3. 45,697,600 license plates 4. 6,760,000 license plates 5. 24 types 6. 19,656 results 7. 1,000 codes 8. 358,800 passwords

Page 56 Permutations

1. 24 2. 6 3. 4 4. 90 5. 1 6. 240 7. 120

Page 57 Practice: Permutations

1. 720 2. 479,001,600 3. 362,880 4. 336 5. 79,833,600

Page 58 Combinations

1. 20 2. 10 3. 21 4. 4 5. 28 6. 15 7. 126 8. 10 9. 6

Page 59 Practice 1: Combinations

1. 10 2. 5 3. 3 4. 7 5. 9 6. 10 7. 20

Page 60 Practice 2: Permutations and Combinations

1. 42 2. 21 3. 336 4. 3,024 5. 6 6. 210 7. a. 24

Page 61 Assessment 4

1. 5040 2. There would be 8 times as many (or 40,320).

3. 15 4. \( \frac{1}{2} \) or 20% 5. 60 ways 6. Answers will vary. Sample: \( \frac{6!}{3!} \) could represent how many ways you could make a 3-digit combination out of the numbers 1 to 6; \( \frac{6!}{3!} \) could represent how many ways you select three students from a group of six. 

7. \( \frac{24C6}{23P6} \), and 24!
Data Analysis and Probability Workbook Answers
Data Analysis and Probability Workbook Answers

11a.  

<table>
<thead>
<tr>
<th>trash</th>
<th>laundry</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/7</td>
<td>3/13</td>
</tr>
<tr>
<td>brown</td>
<td>brown</td>
</tr>
<tr>
<td>5/7</td>
<td>10/13</td>
</tr>
<tr>
<td>black</td>
<td>black</td>
</tr>
</tbody>
</table>

11b.  

| 6/91 | 12/43 | 17/100 | 17/200 |

page 82  
Activity 2: Theoretical and Experimental Probability

1-2. Check students’ work. 3. no 4. 1/6  5. no 6. For a large number of rolls, you will likely roll a 3 one-sixth of the time. 7. Since $P$ (any number from 1 through 6) = 1, students should be able to predict that this result will occur 12 times. Since $P(7) = 0$, students should be able to predict that this result will occur 0 times. 8. Yes, because through repeated trials the experimental results should approach the theoretical probability. 9-10. Check students’ work.

page 83  
Activity 3: Increasing the Number of Trials

Check students’ tables. 1. 40 2. Answer should be close to 24. 3. answer should be about 3.16. 4. Check students’ calculations.

page 84  
Predictions Based on Experimental Probabilities

1. $P(broken) = \frac{2}{50} = 0.04$ 2. Yes; $P(defective) = \frac{9}{500} = 0.016$ 3. $0.04 \times 18,000 = 720$ crayons 4. $0.016 \times 18,000 = 288$ crayons 5. 98.4%

page 85  
Practice: Predictions Based on Experimental Probabilities

1. $\frac{\text{(defective)}}{\text{(broken)}}$ now is $\frac{3}{7}$, which is less than $\frac{1}{20}$. 2. 175 g 3. 250 g 4. 100 g 5. 150 g 6. The mass must be within 75 g of 175 g. 7. 87 cars 8. 8,000 bearings

page 86  
Reteaching: Predictions Based on Experimental Probabilities

1. 160 shirts $\times \frac{4}{100} = \frac{4}{25}$. 2. 144 shirts $\times \frac{9}{500} = \frac{9}{1250}$. 3. 480 games $\times \frac{4}{100} = \frac{16}{25}$. 4. 450 games $\times \frac{30}{100} = \frac{9}{20}$. 5. 456 games $\times \frac{19}{100} = \frac{93}{50}$. 6. 459 games $\times \frac{65}{700} = \frac{321}{350}$. 7. 70. 8. 8,000 bearings

Section 7 Statistical Investigations and Simulations

page 88  
Random Samples and Biased Questions

1. C 2. B 3. No; you are more likely to interview homeowners. 4. No; you are more likely to interview renters. 5. Yes; you can’t tell if people own or rent.

page 89  
Practice: Random Samples and Biased Questions

1-10. Answers may vary. Samples are given. 1. random sample 2. Not a random sample; students who use the vending machine may not represent all types of students. 3. fair 4. Biased; Do you prefer hardwood floors in your home? 5. fair 6. Biased; How many servings of fruits and vegetables do you eat? 7. Biased; Do you prefer thick carpeting? 8. fair 9. fair 10. Biased; Does TV news portray life accurately?
Data Analysis and Probability Workbook Answers

page 90  Planning A Survey
1. No; the sample includes only students interested in art, not the whole population.
2. Yes; every student has an equal chance of being selected. 3. Closed-option; Which sport do you think is the most exciting? 4. Open-option; Did you enjoy the book we just read in English? 5. Questioner is suggesting a preferred answer. 6. Question assumes that the movie was boring.

page 91  Practice 1: Planning a Survey
1. shoppers in a mall who are at least 16 years old 2. 966 never, 644 occasionally, 536 regularly
3. This is not a good sample because it does not represent the population. It would also include people who do not vote. This is not a city telephone book may cover more than one school district.
4. No. People who work full-time are more likely to shop after work than midday.
6. Answers may vary. Some things to consider are using good questions, getting a large enough random sample, and avoiding biased questions.

page 92  Practice 2: Random Samples and Surveys
1. 320 students 2. 352 students 3. 200 students
4. 192 students 5. The views of people coming out of a computer store may not represent the views of other voters. This is not a good sample because it is not random. 6. The city telephone book may cover more than one school district. It would also include people who do not vote. This is not a good sample because it does not represent the population.
7. This is a good sample. It is selected at random from the population you want to study.

page 93  Conducting a Statistical Investigation
1. Check students’ work.

page 94  Investigation 1: Happy Birthday
1–6. Check students’ work. EXTRA: James Polk (1796) and Warren Harding (1865) were born on November 2. John Adams (1826), Thomas Jefferson (1826), and James Monroe (1831) all died on July 4.

page 95  Investigation 2: Hits and Misses (Geometric Probability)
1. \(A = \pi r^2\)
2. \(2r \cdot 2r = 4r^2\)
3. \(\frac{\pi r^2}{4r^2} = \frac{\pi}{4}\)
4. 0.785
6–8. Answers may vary.

page 96  Investigation 3: Sticky Dot Number Cubes
1–5. Answers may vary. 6. \(P(0) = \frac{1}{36}\), \(P(1) = \frac{2}{36}\), \(P(2) = \frac{4}{36}\), \(P(3) = \frac{3}{36}\), \(P(4) = \frac{4}{36}\), \(P(5) = \frac{5}{36}\).
7. \(P(0) = \frac{1}{36}\), \(P(1) = \frac{2}{36}\), \(P(2) = \frac{4}{36}\), \(P(3) = \frac{3}{36}\), \(P(4) = \frac{4}{36}\), \(P(5) = \frac{5}{36}\).
8. \(P(10) = \frac{2}{36}\), \(P(11) = \frac{1}{36}\).

page 97  Planning a Simulation
1. The probability that out of 3 children, one will be a girl 2. The probability that out of 6 trees, there will be 2 red, 2 white, and 2 blue
3. The probability that out of 2 number cubes, 2 numbers assigned to each color
4. The probability that out of 12 rolls of the number cube, 2 numbers assigned to each color

page 98  Simulation 1: A Multiple Choice Test
1. \(\frac{1}{2}\)
2. Answers may vary. Theoretically, 8.4 rolls
3. Answers may vary. The theoretical probability is \(\frac{31}{36}\).
4. Answers may vary. The theoretical value is \(\frac{36}{30}\).
5. Answers may vary. The theoretical probability is \(\frac{31}{36}\).
6. Answers may vary. The theoretical value is \(\frac{17}{15}\).
7. Answers may vary. The theoretical probability is \(\frac{17}{15}\).
8. Answers may vary. The theoretical probability is \(\frac{17}{15}\).
9. Answers may vary. The theoretical probability is \(\frac{17}{15}\).
10. Answers may vary. The theoretical probability is \(\frac{17}{15}\).

page 99  Simulation 2: Dyeing T-Shirts
1. 12 2. \(\frac{2}{3}\) 3. 18 4. \(\frac{1}{3}\)
5. Answers may vary. Theoretically, 11.25 shirts.
6. Answers may vary. The theoretical probability is \(\frac{5}{8}\).
7. Answers may vary. The theoretical value is \(18.75\).
8. Answers may vary. The theoretical probability is \(\frac{5}{8}\).
10. Answers may vary. The theoretical probability is \(\frac{5}{8}\).

page 100  Simulation 3: A Fair Game?
In game 1, there is 1 chance out of 3 to match. In game 2, chances are 1 out of 2 that there will be a match.

page 101  Analyzing Simulations
1. \(\frac{6}{15}\) 2. \(\frac{7}{15}\) 3. \(\frac{7}{15}\) 4. 1 5. 0.15
6. 0.15 7. 25, 15 8. \(\frac{5}{8}\) 9. \(\frac{1}{3}\)

page 102  Reteaching 1: Simulations
1. Sample: Use a spinner with 8 equal parts. 4. Sample: Roll a 12-sided number cube, letting each of the numbers represent a different symbol.

page 103  Reteaching 2: Simulations
1. Sample: Use a spinner divided into four parts, one for each symbol. 2. Sample: Roll two number cubes, letting each of the 36 combinations represent a different symbol.

page 104  Practice 1: Simulations
1a. \(\frac{1}{10}\) 1b. \(\frac{7}{10}\) 2a. \(\frac{1}{10}\) 2b. \(\frac{5}{10}\)
3. Check students’ work. Answer should be about 12.5%.
4. Check students’ work. Answer should be about 12.5%.
5. Check students’ work. Answer should be about 12.5%.
6. Check students’ work. Answer should be about 12.5%.
7. Possible answer: Let 1 = basket made, 2–6 = basket missed.

page 105  Practice 2: Simulations
1. Sample: Use a number cube with one number for W, I, E, and R, and two numbers for N.

page 106  Assessment 7
1. Answers may vary. Sample: Registered drivers selected randomly is best because that represents a fair sample of the
Data Analysis and Probability Workbook Answers

relevant population, while people at the restaurant, waiting to buy tickets, or visiting the dealership probably do not.
2. Open and fair. The question lets people answer generally rather than having them pick from limited choices, so it is open. It asks their opinion neutrally without suggesting an answer so it is fair.  
3. 260 people  
4. $20,000  
5. The simulation shows that even with a 50/50 chance, the outcomes will not be exactly equal. In the simulation, the 75 coin flips come out 41 heads and 34 tails. The number of students is 10 times the number of coin flips, so this is equivalent to 410 students preferring one beverage and 340 wanting the other drink (rather than exactly 375 of each). Based on this result, the beverage committee should buy 35 extras of each drink (410 instead of 375) if they want a good chance of being able to satisfy everyone.

pages 107–108 Cumulative Assessment

1.  

2. 86.8, 88, 88  
3. The median, because there is an outlier and there is no mode.  
4. Any number greater than or equal to 27.  
5. 44  
6. One or both of the axes can be stretched or compressed so that the rate of change looks bigger or smaller than it really is. Or the y-axis can be broken so that the differences in magnitude are exaggerated.  
7. 35, 210  
8. 13,440  
9. 9,000 more  
10. \( \frac{1}{256} \)  
11. \( \frac{3}{8} \)  
12. \( \frac{1}{17} \)  
13. \( \frac{1}{27} \)  
14. \( \frac{1}{120} \)  
15. 8  
16. 160  
17. \( \frac{4}{25} \) \( \frac{1}{5} \)  
18. Answers will vary. Sample answer: Do you prefer the greasy pizza from Joe’s or the fancier pizza from Pistachios? Re-write: Which pizza do you prefer, Joe’s or Pistachios?  
19. 40,000 people