Chapter 12 Answers

Practice 12-1

1a. about 0.66 **1b.** about 81 persons **1c.** about 0.05
1d. about 0.15 **1e.** about 0.37

2a. **Rolling Two Number Cubes**

Sum	5 or less	Greater than 5
Frequency	10	26
Probability	$\frac{10}{36}$	$\frac{26}{36}$

2b. **Rolling Two Number Cubes**

Sum	Prime	Composite
Frequency	15	21
Probability	$\frac{15}{36}$	$\frac{21}{36}$

2c. **Rolling Two Number Cubes**

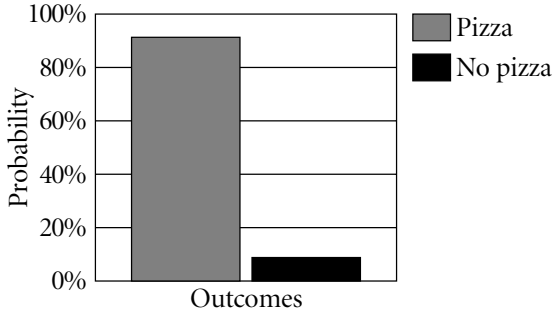
Numbers showing	Only 1 Cube shows 2	Both cubes show same number	Cubes show different numbers, neither is 2
Frequency	10	6	20
Probability	$\frac{10}{36}$	$\frac{6}{36}$	$\frac{20}{36}$

3a. Student Pizza Preferences

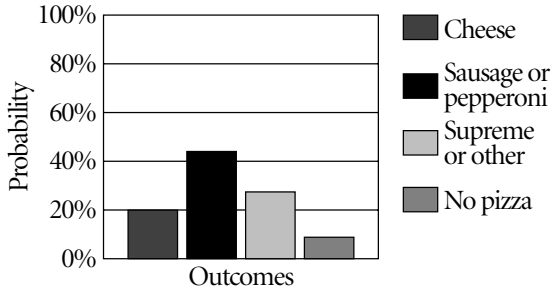
Sausage	56
Cheese	43
Pepperoni	39
Supreme	28
Other pizza	31
No pizza	19

3b. sausage: 25.9%, cheese: 19.9%, pepperoni: 18.1%, supreme: 13.0%, other pizza: 14.4%, no pizza: 8.8%; 100.1%; There is a rounding error of 0.1%.

3c.



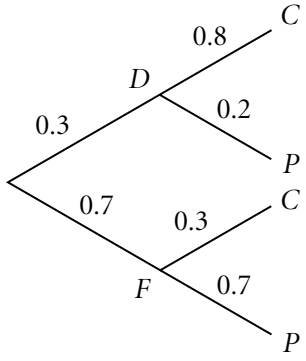
3d.



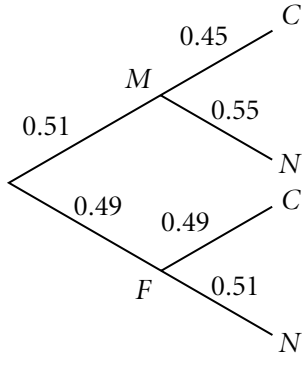
3e. The sum of the probabilities of pizza categories in part **d** equals the probability of pizza in part **c**. The overall total in both is 100.1% (0.1% rounding error).
4a. Check student's work. **4b.** Check student's work.

Practice 12-2

1a. 8.9% **1b.** 24.6% **1c.** 0.2% **1d.** 1.1% **1e.** 6.3% **1f.** 4.0% **2a.** 11.7% **2b.** 36.8% **2c.** 21.0% **2d.** 47.2% **2e.** 14.4% **2f.** 16.0% **2g.** 48.9% **2h.** 51.1% **3.** about 58.2% **4.** D = drizzle, F = fog without drizzle, C = cancelled game, P = played game



4a. 45% **4b.** 6%
5. M = male, F = female, C = attend concert, N = not attend concert

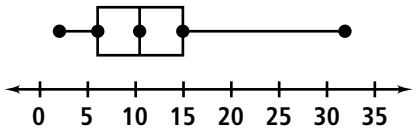


5a. about 47% **5b.** about 25%

Practice 12-3

1. 23 **2.** 78 **3.** 3 **4.** 110 **5.** about 93.3; 97; 97 **6.** about 47.6; 48; 41, 49 **7.** about 2.6; 2.45; 2.4 **8.** about 15.7; 15.6; no mode **9.** about 418.8; 423; no mode **10.** about 1021.9; 1023; 1023 **11.** about 0.019; 0.019; 0.018, 0.019 **12.** about 26.4; 27; 29 **13.** about 44.8; 45; 42, 45, 49 **14.** about 48.1; 50.5; no mode **15.** 18; 16.5; 15 **16.** about 1.5; 1.5; 1.3, 1.5 **17.** about 9.2; 9; no mode **18.** about 116.2; 116; 114 **19.** about 4.29; 4.26; 4.25 **20.** about 32.4; 34; no mode

21.



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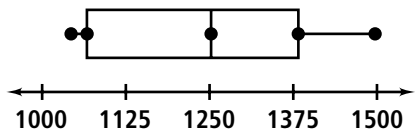

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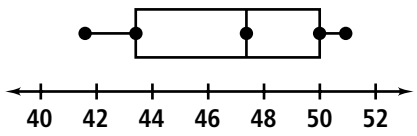

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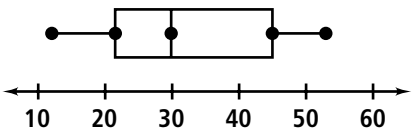
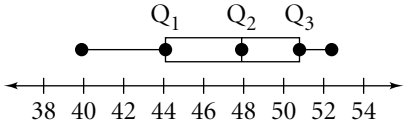


25. 174; 188 **26.** 346; 368 **27.** 94; 98 **28.** 22; 86
29a. about 47.4 **29b.** 47.9 **29c.** 50.8 **29d.** 44.1, 47.9, 50.8;



Practice 12-4

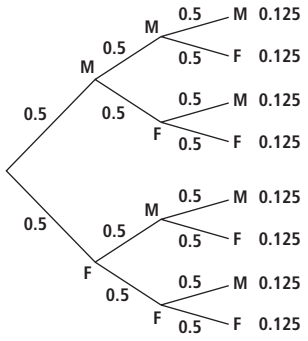
1. 295.7; 47.4 **2.** 30.3; 3.2 **3.** 2.4; 0.1 **4.** 74.3; 3.9 **5.** 66.8; 33.1 **6.** 8; 9.5; 4 **7.** 189; about 109.6; 114.5 **8.** 15; about 531.4; 6.5 **9.** 1.7; 2.3; 1.05 **10.** 4; 46.7; 2 **11.** 8; 100.5; 2.5 **12.** 5 **13.** 3 **14a.** about 3.49 **14b.** about 0.55 **14c.** 1.7 **14d.** 2; 1 **15a.** 33 **15b.** 18.5 **15c.** about 88.2 **15d.** about 10.5 **15e.** 3 **15f.** 2 **16.** +0.375 **17.** +2.75

Practice 12-5

1. It is most likely that Sample C was largest since it has the smallest standard deviation, implying less variation than Samples A and B. **2.** This sample is likely to contain a disproportionate number of readers. Selecting students in random classrooms would be more accurate. **3.** The pizza restaurant sells to many different groups of people. The class might not like the same kinds of pizza as the population as a whole. The poll should be of class members. **4.** The people eating in the restaurant probably are not indicative of the population as a whole, either geographically or economically. The poll should be a random sample of the residents, possibly a random sample from each phone exchange to include people from all the different areas of the county. **5.** This excludes the people who are working during the day. Contacting randomly selected people, either from the phone book or voter registration lists, would be more accurate. **6.** This is fairly accurate usually. **7.** about 44 **8.** about 2500 **9.** about 12,346 **10.** about 27,778 **11.** 53%; ±16%; 37% to 69% **12.** 72%; ±4%; 68% to 76% **13.** 62%; ±8%; 54% to 70% **14.** 30%; ±6%; 24% to 36% **15.** 42%; ±3%; 39% to 45%

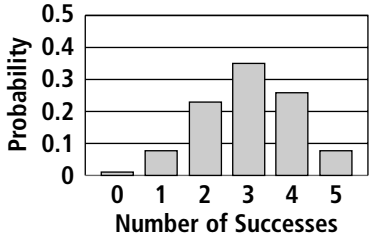
Practice 12-6

1.



1a. 87.5% **1b.** 50% **1c.** 37.5% **2.** the weather outcome on a given day, acceptable weather; Check students' work. **3.** asking a person chosen at random; favoring an early curfew; Check students' work. **4.** selecting a part; part is defective; Check students' work. **5.** about 1% **6.** about 0.002% **7.** about 25% **8.** about 38%

9.



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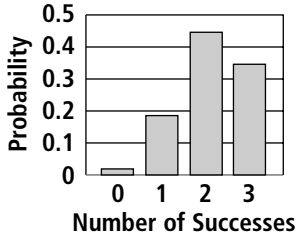

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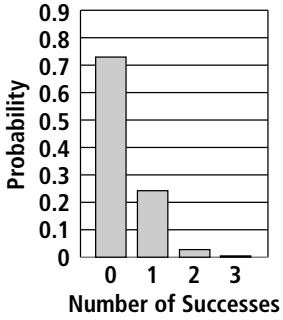

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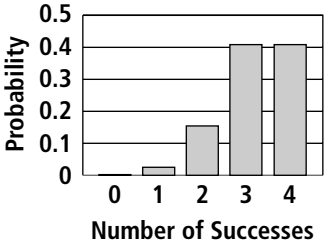
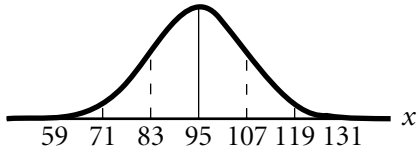


13a. 68% **13b.** 99% **13c.** 97% **13d.** 84% **14a.** 18%
14b. 6% **14c.** 56%

Practice 12-7

1. 53.3 **2.** 69.9 **3.** 36.7 **4.** 28.4

5.



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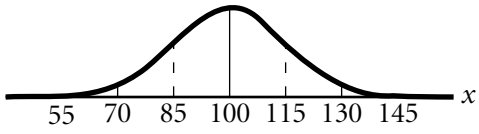

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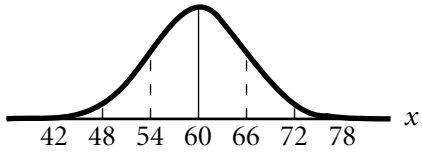

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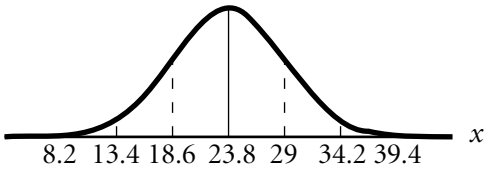

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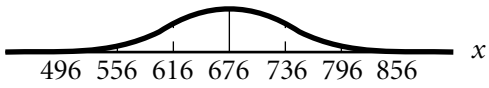

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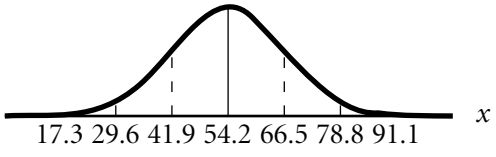


11. about 34% **12.** about 13.5% **13.** about 2.5%
14. about 68% **15.** about 16% **16.** about 50%
17a. about 6 students **17b.** about 37 students
17c. about 156 students **18a.** about 3 nails
18b. about 82 nails **18c.** about 19 nails **19a.** about 10%
19b. about 5 bags **19c.** about 40 bags

Reteaching 12-1

1.

Amount of Rain	No. of years
Less than 1 in.	3
Exactly 1 in.	1
More than 1 in.	9
Total	13

; $\frac{3}{13}$

2.

Status	No. of Professors
Beginning	3
Tenured	5
Nontenured	7
Total	15

; $\frac{1}{3}$

Reteaching 12-2

1. $\frac{7}{18}$ **2.** $\frac{11}{18}$ **3.** $\frac{5}{9}$ **4.** $\frac{4}{9}$ **5.** $\frac{2}{9}$ **6.** $\frac{5}{18}$ **7.** $\frac{2}{5}$ **8.** $\frac{5}{8}$ **9.** $\frac{5}{11}$

Reteaching 12-3

1. about 883.8; 888; 888 **2.** about 0.9; 0.8; 0.5
3. about 2116.9; 2068; no mode **4.** about 266.8; 289; no mode
5. 27; 26.5; 26 **6.** 15; 14; 21 **7.** 3.4; 3.3; 4.7 **8.** 6375; 6374; 6371
9. 546; 502; no mode **10.** 84; 84; 81

Reteaching 12-4

1. about 0.86 **2.** about 0.18 **3.** about 3.93 **4.** about 2.42
5. \$72.98 **6.** \$11.78 **7.** 2 **8.** 3 **9.** 253 mi; 69.5 mi **10.** 5; 8

Reteaching 12-5

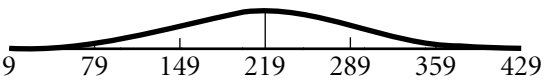
1. ±2.8%; 69.2% to 74.8% **2.** ±4.2%; 81.8% to 90.2%
3. ±5.6%; 6.4% to 17.6% **4.** ±2.6%; 51.4% to 56.6%
5. ±1.9%; 76.1% to 79.9%

Reteaching 12-6

1. 7.6% **2.** 0.1% **3.** 2.1% **4.** 1.0% **5.** about 73.5%
6. about 23.2% **7.** about 8.2%

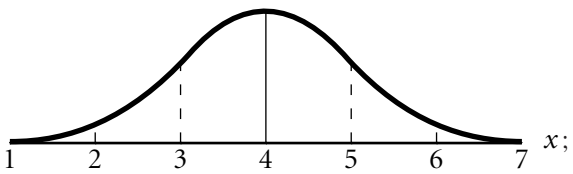
Reteaching 12-7

1.



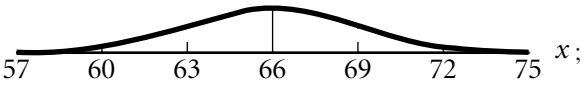
;
About 25 light bulbs will not last 79 h.

2.



About 4 students would still be working after 5 min.

3.



About 2 frogs will hop more than 72 in.

Enrichment 12-1

1. 31 to 5 **2.** $\frac{5}{36}$ or about 13.9% **3.** 1 to 3 **4.** $\frac{9}{36}$ or 25% **5.** 3 to 2 **6.** 2 to 3 **7.** $\frac{3}{23}$ or about 13.0% **8.** $\frac{20}{23}$ or about 87.0% **9.** 3 to 7 **10.** 3 to 2 **11.** 7 to 1 **12.** 1 to 7 **13.** 1 to 3

Enrichment 12-2

1. $\frac{47}{50}; \frac{3}{50}$ **2.** $\frac{{}_{47}C_2}{{}_{50}C_2}; \frac{{}_3C_2}{{}_{50}C_2}$ **3.** $\frac{15}{16}; \frac{1}{16}$ **4a.** $\frac{{}_{75}C_3}{{}_{80}C_3}$

4b. $\frac{{}_{75}C_2 \times {}_5C_1}{{}_{80}C_3}$ **4c.** $\frac{{}_{75}C_1 \times {}_5C_2}{{}_{80}C_3}$ **4d.** $\frac{{}_5C_3}{{}_{80}C_3}$

4e. $\frac{{}_{75}C_2 \times {}_5C_1 + {}_5C_3}{{}_{80}C_3}$ **5a.** $\frac{{}_{45}C_3}{{}_{85}C_3}$ **5b.** $\frac{{}_{45}C_2 \times {}_{40}C_1}{{}_{85}C_3}$

5c. $\frac{{}_{81}C_2 \times {}_4C_1}{{}_{85}C_3}$ **5d.** $\frac{{}_{38}C_2 \times {}_2C_1}{{}_{85}C_3}$

5e. $\frac{{}_{43}C_1 \times {}_2C_1 \times {}_2C_1}{{}_{85}C_3}$

Enrichment 12-3

1. $f_i x_i$ **2.** $\sum_{i=1}^{n} f_i x_i$ **3.** $\overline{x} = \frac{\sum_{i=1}^{n} f_i x_i}{\sum_{i=1}^{n} f_i}$ **4.** $f_i(x_i - m)$

5. $\sum_{i=1}^{n} f_i(x_i - m)$ **6.** $y = \sum_{i=1}^{n} f_i x_i - \left(\sum_{i=1}^{n} f_i\right)m$ **7.** linear **8.** Any linear function with nonzero slope meets the x-axis at only one point.

9. $M = \frac{\sum_{i=1}^{n} f_i x_i}{\sum_{i=1}^{n} f_i}$ **10.** mean **11.** mean; sum; zero **12.** 12

13. $\sum_{i=1}^{n} f_i(x_i - m) = 1(15 - 12) + 4(14 - 12) + 7(13 - 12) + 13(12 - 12) + 18(11 - 12) = 0$

Enrichment 12-4

1. $\overline{x} = \frac{\sum_{i=1}^{n} x_i}{n}$ **2.** $\sigma^2 = \frac{1}{n}\sum_{i=1}^{n}(x_i - \overline{x})^2$

3. $\sigma^2 = \frac{1}{n}\sum_{i=1}^{n}({x_i}^2 - 2x_i\overline{x} + \overline{x}^2)$

4. $\sigma^2 = \frac{1}{n}\left(\sum_{i=1}^{n} {x_i}^2 - 2\overline{x}\sum_{i=1}^{n} x_i + n\overline{x}^2\right)$

5. $\sigma^2 = \frac{1}{n}\left[\sum_{i=1}^{n} {x_i}^2 - \frac{1}{n}\left(\sum_{i=1}^{n} x_i\right)^2\right]$

6. $\sigma = \sqrt{\frac{1}{n}\sum_{i=1}^{n} {x_i}^2 - \frac{1}{n^2}\left(\sum_{i=1}^{n} x_i\right)^2}$

7. $\sum_{i=1}^{n} f_i x_i$ **8.** $\sum_{i=1}^{n} f_i(x_i)^2$ **9.** about 20.4 **10.** about 3.1

Enrichment 12-5

1. 25%; 25% **2.** 40%; 40% **3.** Check student's work. **4.** Check students' work. **5.** about 32% **6.** Check students' work. **7.** Check students' work. **8.** Check students' work. **9.** Check student's work. **10.** about 12% **11.** Check student's work. **12.** Check students' work. **13.** smaller intervals for the true proportion

Enrichment 12-6

1. $\frac{5}{6}; \frac{1}{6}$ **2.** $\frac{4!}{2!2!} = 6$; $NN33, N3N3, N33N, 33NN, 3N3N, 3NN3$ **3.** $[P(N)]^2[P(3)]^2$ **4.** $\frac{25}{1296}$ **5.** $\frac{25}{216}$ **6.** $1 - p$ **7.** $n - r$ **8.** $p^r(1 - p)^{n-r}$ **9.** ${}_nC_r$ **10.** ${}_nC_r\, p^r(1 - p)^{n-r}$ **11.** about 0.0754; -0.4 **12.** about 0.0485; about 0.0108; 1; 2 **13.** about 0.00003; about 0.0664; 4; 0 **14.** about 0.0354; about 5 fish

Enrichment 12-7

1. that $\frac{3}{4}$ of data lie within 55 and 95 **2.** 19 **3.** that $\frac{8}{9}$ of data lie within 45 and 105 **4.** 23 **5.** No; it says that at least 0 measurements lie within 65–85. **6.** 52; 22 **7.** 27; between 8 and 96 **8.** 36 **9.** 32; between 0 and 118 **10.** 36

Chapter Project

Activity 1: Interviewing
Check students' work.

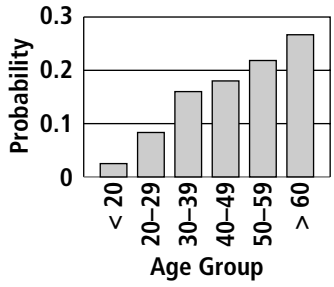
Activity 2: Analyzing
Check students' work.

Activity 3: Creating
Check students' work.

Activity 4: Interviewing
Check students' work.

✔ Checkpoint Quiz 1

1.



2. 46.4% **3.** $\frac{2}{9}$ **4.** $\frac{2}{3}$ **5.** $\frac{7}{9}$ **6.** $\frac{1}{3}$ **7.** 7; 7; 7 **8.** 10.5; 10.5; none

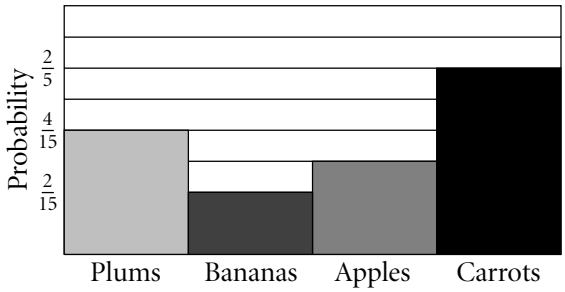
9. Mean is the sum of data values in a data set divided by the number of data values. Median is the middle value or mean of the two middle values of a data set that has been arranged in increasing or decreasing order. Mode is the most frequently occurring value in a data set.

✔ Checkpoint Quiz 2

1. about 67.9; 10; about 3.5 **2.** about 11.3; 12; about 3.9
3. about 10.4; 8; about 2.6 **4.** 130 **5a.** about 73%
5b. about ±4% **5c.** 69% to 77% **6.** about 278 **7.** 6.25%
8. about 5.95% **9.** about 12.4%

Chapter Test, Form A

1a.

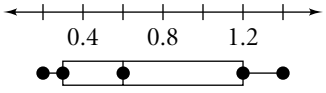


1b. $\frac{18}{30} = 60\%$ **2.** $\frac{5}{11}$ **3.** $\frac{5}{22}$ **4.** $\frac{4}{25}$ **5.** $\frac{15}{22}$ **6.** D

7. Answers may vary. Sample: Arrange the data set into increasing or decreasing order. The median is the middle value. If there is an even number of values in the data set, the median is the mean of the two middle values.

8. 0.75; 0.6; 0.2, 0.6

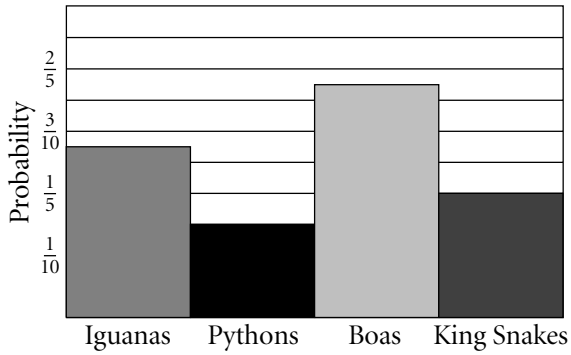
9.



10. 1.2 **11.** 0.9 **12.** 0.43 **13.** 0.3; 1.2 **14.** Answers may vary. Sample: {5, 12, 15, 17, 20, 22, 40}, {5, 20, 31, 32, 33, 39, 40}
15. 4 **16.** about 4.4% **17.** about 81.0%
18. ±5%; 13% to 23% **19.** ±2%; 39% to 43%
20. ±4%; 2% to 10% **21.** ±2%; 95% to 99% **22.** D
23. about 16% **24a.** 11% **24b.** 1% **25.** about 68 students
26. about 5 students **27.** about 100 students
28. about 163 students **29.** 45.4

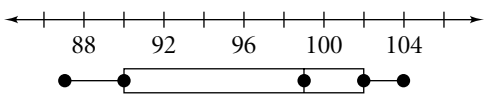
Chapter Test, Form B

1a.



1b. $\frac{6}{40} = 15\%$ **2.** D **3.** H **4.** A **5.** F **6.** B

7.



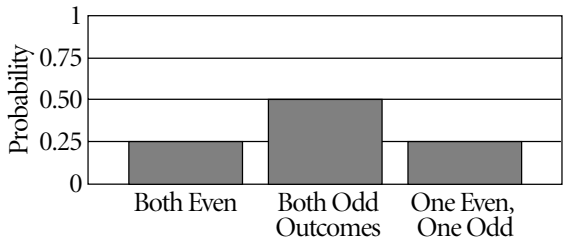
8. 17

9. 12 **10.** C **11.** about 17.8% **12.** about 68.3%
13. ±5%; 13% to 23% **14.** ±6%; 0% to 12% **15.** H
16. about 1% **17.** A **18.** G **19.** 46.7

Alternative Assessment, Form C

TASK 1 Scoring Guide:

a.



3 Graph is accurate and neatly done. Simulation is conducted, and explanation is sufficiently detailed to indicate a clear understanding of all aspects of probability distribution.

2 Graph is mostly accurate but contains minor errors. Simulation is conducted, but more detail is needed in the explanation.

1 Graph contains major errors. Simulation is incomplete, and explanation contains major errors that indicate lack of understanding of probability distribution.

0 Student makes no attempt, or no response is given.

TASK 2 Scoring Guide:

3 Student conducts survey and records data correctly in the table. Probabilities are calculated correctly based on the data collected. Tree diagram is neatly drawn, and the data is accurate.

2 Student conducts survey and records data correctly in the table. Probabilities are calculated with only minor errors based on the data collected. Tree diagram is neatly drawn, with only minor mistakes in the data presented.

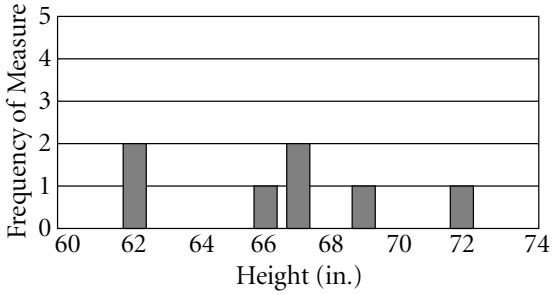
1 Student does not record all the data in the table. Probability calculations contain significant computational errors. Tree diagram is not constructed correctly, and data is inaccurate.

0 Student makes no attempt, or no response is given.

TASK 3 Scoring Guide:

a. about 66.4"; 67"; 62", 67" **b.** about 3.33"

c.



d. No, there is no central grouping of data that falls off as you move away from the mean.

3 Student's calculations are correct. Graph is neatly drawn and accurately represents data. Student correctly identifies whether data represents a normal curve with an explanation that indicates a clear understanding of data spread.

2 Student's calculations contain only minor errors. Graph is neatly drawn with only minor errors in data. Student correctly identifies whether data represents a normal curve, but explanation could have more detail.

1 Student's calculations contain major errors. Graph could be neater, and data is not represented accurately. Student's explanation of normal curve is unclear and does not indicate an understanding of data spread.

0 Student makes no attempt, or no response is given.

TASK 4 Scoring Guide:

3 Student selects an unbiased sample to conduct the survey. Explanation is sufficient to explain the choice. Margin of error is calculated correctly. Probabilities based on the percent from the sample are calculated correctly.

2 Student selects an unbiased sample to conduct the survey. Explanation could be more detailed to explain the choice. Margin of error is calculated with only minor errors. Probabilities based on the percent from the sample are calculated with only minor errors.

1 Student selects a more biased sample to conduct the survey. Explanation does not contain sufficient detail. Margin of error is calculated with only minor errors. Probabilities based on the percent from the sample are calculated incorrectly.

0 Student makes no attempt, or no response is given.

Cumulative Review

1. A **2.** G **3.** A **4.** F **5.** C **6.** J **7.** B **8.** H **9.** A

10. G **11.** A **12.** G **13a.** $-\frac{1}{3}$ **13b.** 4 **14.** 81.3; 81; 82

15. $\pm\sqrt{5}$ **16.** 4; 4, 2, or 0; $\pm\frac{1}{2}$, ±1, ±2, ±4, ±8

17. $3 - \sqrt{3}$ **18.** $\frac{x^2}{36} + \frac{y^2}{64} = 1$

19. Answers may vary. Sample: $\begin{cases} y = x + 1 \\ y = 2x \end{cases}$; $(1, 2)$

20. Check students' work.