Algebra 2
Lesson 11-1 - Practice and Problem-Solving Exercises Answers

9. 20

10. 26,000

11. 12

12. 120

13. 3,628,800

14. 6,277,020,800

15. 720

16. 665,280

17. 120

18. 120

19. 3003

20a. 24

20b. 120

21. 8

22. 56

23. 336

24. 1680

25. 6

26. 120

27. 60,480

28. 840

29. 10,897,286,400

30. 15

31. 56

32. 1

33. 4

34. 35

35. 15

36. 35

37. $\dfrac{5}{18}$

38. $_8C_3 = \dfrac{8!}{3!\left(8-3\right)!}$

$= \dfrac{8\cdot 7\cdot 6\cdot 5!}{3!\cdot 5!}$

$= 8\cdot 7$

$= 56$

39. combination; 4368

40. combination; 21

41. combination; 70

42. true, because of the Commutative Property of Addition

43. true, because of the Associative Property of Multiplication

44. False; Answers may vary. Sample:
$\left(3+2\right)! = 120$ and $3!+2! = 8$

45. False; Answers may vary. Sample:
$\left(3\cdot 2\right)! = 6! = 720$ and $3!\cdot 2! = 6\cdot 2 = 12$

46. False; Answers may vary. Sample:

$(3!)! = 6! = 720$ and $(3!)^2 = 6^2 = 36$

47. False; Answers may vary. Sample:

$(3!)^2 = 6^2 = 36$ and $3^{(2!)} = 3^2 = 9$

48. 35

49. C

50. 60

51. two ways, because order matters

52. sometimes; $_nC_r = {}_nP_r$ when $\dfrac{n!}{r!(n-r)!} = \dfrac{n!}{(n-r)!}$ or when

$r! = 1$, or $r = 1$ or 0.

53a. 2

53b. 6

53c. $(n-1)!$

54a. 8568

54b. 658,008

55a. 35

55b. 6

55c. $_7C_3 = \dfrac{7!}{3!4!}$, so $_7C_3 \cdot 3! = \dfrac{7!}{4!}$ which is the permutation
formula for $_7P_3$

56. D

57. H

58. D

59. G

60.

$$\sum_{n=1}^{\infty}\left(\frac{2}{3}\right)^{n-1} = \frac{1}{1-\dfrac{2}{3}} = 3 \text{ and } \sum_{n=1}^{\infty}\left(\frac{2}{3}\right)^{n} = \frac{\dfrac{1}{3}}{1-\dfrac{2}{3}} = 2 \text{ so}$$

$$\sum_{n=1}^{\infty}\left(\frac{2}{3}\right)^{n-1} + \sum_{n=1}^{\infty}\left(\frac{2}{3}\right)^{n} = 3+2 = 5$$

61. center $(2, 1)$; vertices $(2, 6)$ and $(2, -4)$; co-vertices $(5, 1)$ and
$(-1, 1)$; foci $(2, 6)$ and $(2, -3)$

62. $(x-1)^2 + (y-1)^2 = 36$ is a circle (not an ellipse) with center $(1, 1)$
and radius 6.

63. $4(x-1)^2$

64. $-(x+3)^2$

65. $3(x-5)(x+5)$

66. 30,240

67. 70

68. 210

8. 53%

9. Total number of rolls = 42 + 44 + 45 + 44 + 47 + 46 = 268

$P(\text{number 1}) = \dfrac{42}{268} = \dfrac{21}{134} \approx 15.7\%$

$P(\text{number 2}) = \dfrac{44}{268} = \dfrac{11}{67} \approx 16.4\%$

$P(\text{number 3}) = \dfrac{45}{268} \approx 16.8\%$

$P(\text{number 4}) = \dfrac{44}{268} = \dfrac{11}{67} \approx 16.4\%$

$P(\text{number 5}) = \dfrac{47}{268} \approx 17.5\%$

$P(\text{number 6}) = \dfrac{46}{268} = \dfrac{23}{134} \approx 17.2\%$

10. Answers may vary. Sample:
     Generate random numbers between 0 and 1 using a graphing
     calculator. Examine the first five digits of each random number.
     Let even digits represent correct answers and odd digits
     incorrect answers. If there are two or more even digits, make a
     tally mark for that number. Do this 100 times. Find the total
     number of tally marks. This, as a percent, gives the
     experimental probability. The simulated probability should be
     about 80%.

11. Answers may vary. Sample:
     Toss 5 coins. Keep a tally of the times three or more heads are
     tossed. (A head represents a correct answer.) Do this 100 times.
     The total number of tally marks, as a percent, gives the
     experimental probability. The simulated probability should be
     about 50%.

12. Answers may vary. Sample:
     Randomly generate a 1, 2, 3, 4, or 5 five times. Let 1 represent a
     correct guess and 2–5 represent incorrect guesses. Tally the
     recorded numbers with exactly one digit that represents a
     correct answer. Tally the recorded numbers with exactly two
     digits that represent correct answers. Tally the recorded
     numbers with exactly three digits that represent correct
     answers. The tally totals, as percents, give the experimental
     probabilities. They should be about 40%, 20%, and 5%,
     respectively.

13. $\dfrac{3}{10}$, or 30%

14. $\dfrac{1}{2}$, or 50%

15. $\dfrac{4}{5}$, or 80%

16. $\dfrac{4}{5}$, or 80%

17. $\dfrac{48}{125}$, or 38.4%

18. $\dfrac{19}{125}$, or 15.2%

19. $\dfrac{103}{125}$, or 82.4%

20. $\dfrac{14}{25}$, or 56%

21. $\dfrac{77}{125}$, or 61.6%

22. $\dfrac{89}{125}$, or 71.2%

23. $\dfrac{_{30}C_3 \cdot {}_{120}C_6}{{}_{150}C_9} \approx 0.17879 \approx 17.9\%$

24. $\dfrac{1}{16}$, or 6.25%

25. $\dfrac{5}{8}$, or 62.5%

26. $\dfrac{1}{4}$, or 25%

27. $= \dfrac{3}{4}$, or 75%

28. $\dfrac{1}{6}$

29. $\dfrac{116}{147} \approx 78.9\%$

30. $\dfrac{52}{147} \approx 35.4\%$

31. $\dfrac{43}{147} \approx 29.3\%$

32. $\dfrac{31}{147} \approx 21.1\%$

33. 1 chance in 2,869,685 or $\approx 0.00003485\%$.

34a. $\dfrac{1}{4}, \dfrac{3}{4}$

34b. Answers may vary. Sample:
Variables such as injuries make probability a poor predictor.

35. To determine the theoretical probability of a five-digit postal ZIP code ending in 1, you would need to know if there are any restrictions on the last digit of a ZIP code.
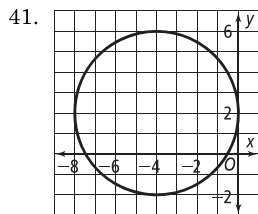
36a. $\dfrac{a}{a+b}$

36b. $\dfrac{a}{b-a}$

36c. When the odds of winning are $\dfrac{1}{2}$, the probability of winning is only $\dfrac{1}{3}$. So, you would rather play a game where your probability of winning is $\dfrac{1}{2}$, since $\dfrac{1}{2} > \dfrac{1}{3}$.

37. B

38. I

39. B

40. H

41.

42. 20

43. 840

44. 10

45. 45

46. $\dfrac{-7a^3 + 25b}{5a^2 b^2}$

47. $\dfrac{7p + 3q}{pq}$

48. 0

49. $\dfrac{7}{36} \approx 19.\overline{4}\%$

50. $\dfrac{25}{36} \approx 69.\overline{4}\%$

51. $\dfrac{1}{2}$ or 50%

9. independent

10. dependent

11. dependent

12. independent

13. $\dfrac{1}{6}$

14. $\dfrac{9}{34}$

15. 0.54

16. $\dfrac{2}{7}$

17. $\dfrac{9}{25}$

18. The events are not mutually exclusive since 2 is a prime number and less than 4.

19. The events are mutually exclusive since if the numbers are equal, then the sum is even.

20. The events are not mutually exclusive since $6 \cdot 4 = 24$, which is greater than 20 and a multiple of 3.

21. $\dfrac{3}{4}$

22. $\dfrac{14}{15}$

23. 39%

24. 47%

25. $\dfrac{1}{2}$

26. $\dfrac{1}{2}$

27. $\dfrac{5}{6}$

28. $\dfrac{5}{6}$

29. $\dfrac{2}{3}$

30. $\dfrac{5}{6}$

31. $\dfrac{1}{64}$

32. $\dfrac{2}{5}$

33. 16.5%

34. 41.3%

35. 87.6%

36. 58.7%

37. $\dfrac{4}{15}$

38. $\dfrac{4}{15}$

39. $\dfrac{8}{15}$

40. $\dfrac{1}{15}$

41. not mutually exclusive

42. mutually exclusive

43. $\dfrac{4}{9}$

44a. $\dfrac{2}{x+2}$

44b. $\dfrac{x-3}{2x-1}$

44c. $\dfrac{x-1}{(2x-1)}$

45. $\dfrac{8}{11}$

46. $\dfrac{1}{3}$

47. 8

48. $\dfrac{1}{3}$

49. 5

50. 6720

51. $\dfrac{1}{6}$

52. $\dfrac{1}{2}$

53. $\dfrac{1}{2}$

54. $\dfrac{3}{7}$

55. $x = -\dfrac{3}{2}$ or $x = 2$

56. $\dfrac{1}{6}$

57. $\dfrac{e^3}{2} \approx 10.04$

58. $\dfrac{e^6}{2} \approx 201.71$

59. $\pm e^2 \approx \pm 7.39$

60. $\dfrac{1}{16}$

61. $\dfrac{1}{16}$

62. $\dfrac{3}{16}$

8. 0.9

9. 0.6

10. $0.\overline{6}$

11. ≈ 0.085

12. ≈ 0.395

13. ≈ 0.682

14. ≈ 0.639

15. ≈ 0.709

16. about 45%

17. about 23%

18.

P(W) = 55%

19.

$P\left(\text{left-handed} \mid \text{female}\right) = 0.1$

$P\left(\text{right-handed} \mid \text{male}\right) \approx 0.114$

20a. 0.15

20b. 0.60

20c. Since $P\left(A\right) = P\left(A \mid B\right)$, the probability of A is the same, regardless of the occurrence of B.

20d. Since $P\left(A\right) = P\left(A \mid B\right)$, the probability of A is the same, regardless of the occurrence of B.

21. 75%.

22. $P\left(\text{C}\right)$

23. $P\left(\text{S and W}\right)$

24. $P\left(\text{R} \mid \text{W}\right)$

25. $\dfrac{2}{3}$ or 66.67%

26. 0.5 or 50%

27. 0.08 or 8%

28. 0.64

29. 0.84

30. 0.36

31. 0.16

32a. The last four branches represent probabilities conditional upon the person being an adult or a minor. For example, the top branch represents the probability that a person is licensed given that he or she is an adult.

32b. No; the probability of a minor being licensed is not the same as the probability of an adult being licensed.

32c. Check students' work.

33.
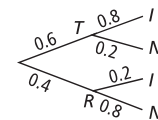
T = representative that completed training seminars
R = representative that didn't complete a training seminar
I = representative with increased sales
N = representative without increased sales

T = representative that completed training seminars
R = representative that didn't complete a training seminar
I = representative with increased sales
N = representative without increased sales

$P\left(I \mid N\right) = 0.2$

34. C

35. H

36. A

37. $(1, 1), (1, 2), (1, 3), (2, 1), (2, 2), (2, 3), (3, 1), (3, 2), (3, 3).$
yes

38. $\dfrac{1}{3} = 33.\overline{3}\%$

39. $\dfrac{17}{76} \approx 0.22368 \approx 22.37\%$

40. $x = \dfrac{1}{4}(y - 2)^2 + 5$

41. $y = \dfrac{1}{12}(x + 2)^2 + 3$

42. 2

43. 0.830

44. 1.404

45. 3.465

46. 0.2, 0.3, 0.6, 0.7, 0.8, 0.9, 1.2;
0.7

47. 11, 15, 17, 18, 21, 21, 23;
18

7. Mean: $112.\overline{3}$
   Median: 95
   Mode: none

8. Mean: ≈ 15.23
   Median: 15
   Mode: 15
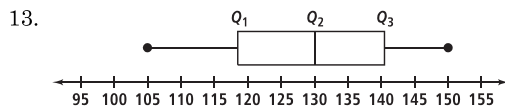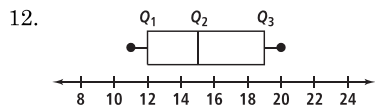
9. 9.8

10. 0

11. Jacksonville:
    Mean: $67.991\overline{6}$
    Mode: none
    Range: 29.2
    Median: 68.4
    Interquartile range: 20.45

    Austin:
    Mean: $68.58\overline{3}$
    Mode: none
    Range: 36

    Median: 70.5
    Interquartile range: 23.9

    The range and the interquartile range show the temperatures
   varying less at Jacksonville than at Austin.

12.

13.

14. 5700; 6283

15. 5; 17

16. Outlier: 103
    Mean with outlier included: ≈ 684.92
    Median with outlier included: 661
    Mode with outlier included: none
    Mean with outlier excluded: $733.41\overline{6}$
    Median with outlier excluded: 694.5
    Mode with outlier excluded: none

17. Outlier: 381
    Mean with outlier included: ≈ 161.214
    Median with outlier included: 158
    Mode with outlier included: none
    Mean with outlier excluded: ≈ 144.308
    Median with outlier excluded: 142
    Mode with outlier excluded: none

18. Outliers: 22.2, 99.9
    Mean with outliers included: ≈ 60.74
    Median with outliers included: 58
    Mode with outliers included: none
    Mean with outliers excluded: 60.681
    Median with outliers excluded: 58
    Mode with outliers excluded: none

19.

20a.

20b.
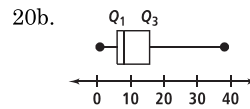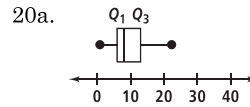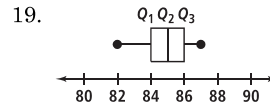
20c. The main effect of removing the outliers is a shortening of the
     long whisker. The median decreases from 8.5 to 8.

21. 30th

22. 65th

23. 89 is at the 100th percentile, since 100% of the values are less
    than or equal to 89.

24a. Mean: $1047.88
     Median: $1049.50
     Mode: $695

24b. Mode; it gives the lowest price.

24c. Median; when extreme values (outliers) are involved ($695 and
     $1499), the median gives a more accurate measure of central
     tendency.

25. The median is a better representation for the data. A few outliers can heavily influence the mean without drastically affecting the median.

26a. 7

26b. 4

26c. 4

27. 83.9

28. Adding 10 will add 10 to the mean, median, Q_1, Q_3, and mode which translates the box-and-whisker plot to the right by 10. The range remains the same.

    Multiplying by 10 will multiply the mean, median, Q_1, Q_3, and mode by 10 which translates the box-and-whisker plot to the right by a factor of 10. The range also increases by a factor of 10.

29. Answers may vary. Sample:
    The range for women's shot put is greater than men's.
    The men are more consistent, as indicated by the shorter box-and-whiskers. Overall the men tend to throw farther.

30. C

31. G

32. B

33.
$$P(H\mid I) = 0.40$$
$$P(H \text{ and } I) = 0.20$$
$$P(H\mid I) = \frac{P(H \text{ and } I)}{P(I)}$$
$$0.40 = \frac{0.20}{P(I)}$$
$$P(I) = 0.50$$

34. 0.20

35. 0.56

36. Yes; -9

37. Yes; 17

38. no

39. Yes; 0

40. ±16

41. ±0.09

42. $\pm\dfrac{11}{4}$

43. $\pm\dfrac{19}{5}$

6.　$\overline{x} \approx 258.6$

　　$\sigma^2 \approx 52{,}136.81$

　　$\sigma \approx 228.3$

7.　$\overline{x} \approx 15.1$

　　$\sigma^2 \approx 12.4$

　　$\sigma \approx 3.5$

8.　$\overline{x} = 5.5$

　　$\sigma^2 \approx 10.9$

　　$\sigma \approx 3.3$

9.　$\overline{x} = 43.8$

　　$\sigma^2 \approx 75.76$

　　$\sigma \approx 8.7$

10.　$\overline{x} = 1984.98$
　　$\sigma \approx 57.62$

11.　$\overline{x} = 12{,}320.00$
　　$\sigma \approx 273.71$

12.　2 standard deviations

13.　3 standard deviations

14.　cats: standard deviation ≈ 14.6
　　birds: standard deviation ≈ 52.3
　　The speeds of the birds are more spread out than the
　　speeds of the cats.

15.　$\overline{x} = 53.8$

　　$\sigma^2 \approx 11.67$

　　$\sigma \approx 3.4$

16.　2001: mean ≈ 6707
　　2002: mean ≈ 6738

17.　Overall farm income increased slightly, but there was less
　　variability among the states in 2002. The income in 2001
　　clustered more tightly around the mean.

18.　Iowa, North Dakota, and South Dakota

19a.　Check students' work.

19b.　Check students' work.

20a.　$\overline{x} = 82.3$
　　　$\sigma \approx 4.3$

20b.　1 standard deviation:
　　　$82.3 - 4.3 \le x \le 82.3 + 4.3$
　　　　　$78 \le x \le 86.6$
　　　7 values fall within one standard deviation of the mean.

　　　2 standard deviations:
　　　$82.3 - 2(4.3) \le x \le 82.3 + 2(4.3)$
　　　　　$73.7 \le x \le 90.9$
　　　9 values fall within two standard deviations of the mean.

　　　3 standard deviations:
　　　$82.3 - 3(4.3) \le x \le 82.3 + 3(4.3)$
　　　　　$69.4 \le x \le 95.2$
　　　10 values fall within three standard deviations of the mean.

21.　Your first friend. One standard deviation encompasses all values within
　　standard deviation above and below the mean. The graph
　　actually shows that all values are within 3 standard deviations
　　of the mean.

22a.　Men:
　　　Range: $36 - 18 = 18$ years
　　　$\overline{x} \approx 22.44$
　　　$\sigma \approx 3.58$

　　　Women:
　　　Range: $33 - 20 = 13$ years
　　　$\overline{x} \approx 25.78$
　　　$\sigma \approx 4.04$

22b.　No. For the given data, the larger range has the smaller
　　　standard deviation.

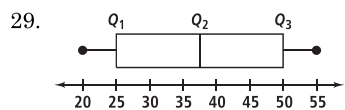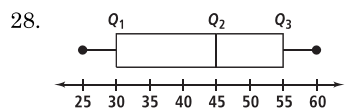23a.　There is no change to the standard deviation.

23b.　The standard deviation increases by a factor of 10.

24.　194

25.　13

26.　0.8

27.　$\dfrac{5}{6}$

28.

29.

30. center $(2, -1)$ and radius $= 6$

31. center $(1, 1)$ and radius $= 2$

32. $\dfrac{1}{2}$

33. $-\dfrac{1}{3}$

34. $\dfrac{1}{6}$

35. $-\dfrac{1}{11}$

36. $-\dfrac{1}{9}$

37. $\dfrac{1}{7}$

6. convenience sampling

7. systematic sampling

8. convenience sampling

9. The question asks about two issues, academic homework and household chores.

10. The question is loaded and suggests you want a particular answer by using the adjectives "exciting" and "dull."

11. The question is leading. It suggests you want a certain answer, that the wrestling team doesn't get enough coverage in the school paper.

12a. Answers may vary. Sample:
systematic sampling: call every 50th listing from the local phone book.

12b. Answers may vary. Sample:
Please circle all the methods you think should be used to expand energy resources in America.
A. wind
B. solar
C. nuclear power
D. oil/gas
E. coal
F. hydroelectric
Rotate the order equally among A–F for the questionnaire.

13. Answers may vary. Sample:
convenience sampling
Interview students at a local high school.

14. Answers may vary. Sample:
systematic sampling
Contact every 50th homeowner on a list of homeowners in the community.

15. Answers may vary. Sample:
self-selected sampling
A newspaper article invites females over the age of 21 to call the newspaper and express their opinions.

16. Answers may vary. Sample:
convenience sampling
Contact pediatricians in the community to ask them to have parents of all children under the age of 13 complete a questionnaire.

17. self-selected sampling
The sampling method is biased because only those who spend time online will respond.

18. Answers may vary. Sample:
Given the increased unemployment and decreased number of students pursuing higher education, don't you think Congress should change the education system?

19. Answers may vary. Sample:
Do you think career opportunities will decrease if Congress considers additional unemployment control laws?

20. Answers may vary. Sample:
Do you think additional career opportunities for illegal immigrants and educated citizens will be effective?

21. Answers may vary. Sample:
Do you think opening more colleges and encouraging students to complete their education will help provide careers to financially challenged people?

22a. Check students' work.

22b. Check students' work.

22c. Check students' work.

23. Systematic and self-selected sampling; the sample may have bias if the subscriber list chosen is for a magazine connected with a certain leisure-time activity; also, people with no strong interest in any leisure-time activity may choose not to respond.

24. $\approx \pm 0.0203$ or $\pm 2.03\%$

25. $\approx \pm 0.01988$ or $\pm 1.988\%$

26. 34% to 50%

27. 37% to 47%

28. 41% to 43%

29. 38.5% to 45.5%

30. Exercise 26: ≈ 156
Exercise 27: $= 400$
Exercise 28: $= 10,000$
Exercise 29: ≈ 816

31. Doubling the sample size decreases the margin of error by a factor of $\dfrac{1}{\sqrt{2}}$.

32a. $22,240

32b. $50,000; More than doubling the cost of the survey makes only a small improvement in the margin of error.

33. Yes, the margin of error is $\pm 8\%$ so as few as 48% of the people might prefer the candidate, and $\left(100\% - 48\%\right)$, or 52%, could actually prefer the opponent.

34. D

35. G

36. C

37. $$\text{Sum} = \dfrac{\dfrac{2}{5}}{1 - \dfrac{2}{5}} = \dfrac{2}{3}$$

38. $\overline{x} \approx 2.83$
    $\sigma^2 \approx 6.47$
    $\sigma \approx 2.54$

39. $\overline{x} \approx 5.62$
    $\sigma^2 \approx 13.47$
    $\sigma \approx 3.67$

40. $y = \dfrac{1}{2}\left(x - 5\right)$; yes

41. $y = \pm\sqrt{x}$; no

42. $y = \pm\sqrt{\dfrac{9x}{5}}$; no

43. $y = \dfrac{x^2}{9}$
    $x \geq 0$;
    yes

44. 6

45. 1

46. 10

47. 792

- 2 -

8. ≈ 0.2541 or 25.41%

9. ≈ 0.1361 or 13.61%

10. ≈ 0.2461 or 24.61%

11. ≈ 0.0015 or 0.15%

12. 0.6561 or 65.61%

13. $a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$

14. $m^3 + 15m^2n + 75mn^2 + 125n^3$

15. $243x^5 + 810x^4y + 1080x^3y^2 + 720x^2y^3 + 240xy^4 + 32y^5$

16. $256c^4 - 256c^3d + 96c^2d^2 - 16cd^3 + d^4$

17. $896g^6h$

18. $5xy^4$

19. e^6

20. $-24xy^7$

21. $P(6) \approx 0.0007$
    $P(5) \approx 0.0102$
    $P(4) \approx 0.0595$
    $P(3) \approx 0.1852$
    $P(2) \approx 0.3241$
    $P(1) \approx 0.3025$
    $P(0) \approx 0.1176$

22. $P(6) \approx 0.0156$
    $P(5) \approx 0.0938$
    $P(4) \approx 0.2344$
    $P(3) \approx 0.3125$
    $P(2) \approx 0.2344$
    $P(1) \approx 0.0938$
    $P(0) \approx 0.0156$

23. $P(6) \approx 0.5314$
    $P(5) \approx 0.3543$
    $P(4) \approx 0.0984$
    $P(3) \approx 0.0146$
    $P(2) \approx 0.0012$
    $P(1) \approx 0.000054$
    $P(0) \approx 0.000001$

24. $P(8) \approx 0.0017$
    $P(7) \approx 0.0164$
    $P(6) \approx 0.0703$
    $P(5) \approx 0.1719$
    $P(4) \approx 0.2627$
    $P(3) \approx 0.2568$
    $P(2) \approx 0.1569$
    $P(1) \approx 0.0548$
    $P(0) \approx 0.0084$

25. 0.99328

26. 0.784 or 78.4%

27. ≈ 0.2824

28. ≈ 0.8891

29. ≈ 0.1109

30. Check students' work.

31. ≈ 0.2461

32. ≈ 0.2051

33. ≈ 0.6230

34. Each term of a binomial expansion $(p + q)^n$ contains a power of p times a power of q. The coefficient of each term is the number of times that is combination of powers results when $(p + q)^n$ is expanded. In a binomial experiment of n trials, each trial results in success or failure, with probabilities p and q. The probability of each outcome contains n factors, each of which is either p or q. The coefficient of each term is the number of ways that outcome can be achieved.

35a. ≈ 0.0914

35b. The probability that three boxes would be underweight is 0.0001. You can conclude that there might be a malfunction in the machinery or that the company's claim may be false.

36a. 0.001

36b. 0.027

36c. 0.243

36d. 0.729

37. The probability of a group of 30 students having 4 fewer left-handed students is about 77.05%. This means that more than three quarters if the classes will have enough left-handed desks, therefore 4 is an adequate number.
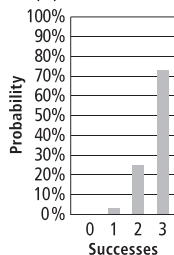
38. Answers may vary. Sample:
60% of the summer days in Eastport are sunny. What is the probability of a week containing exactly two sunny days?

39a. $P(0) = 0.001$
$P(1) = 0.027$
$P(2) = 0.243$
$P(3) = 0.729$

39b. $P(0) = 0.166375$
$P(1) = 0.408375$
$P(2) = 0.334125$
$P(3) = 0.091125$
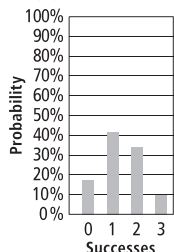
39c. The probabilities of each graph sum to 1; $P(0) + P(1) + P(2) + P(3) = 1$. The probabilities of part (a) increase with increasing success numbers; the maximum probability occurring at $P(3)$. The probabilities of part (b) peak with a maximum at $P(1)$ and then decrease with increasing success numbers.

40. Getting 5 or more items correct by guessing would be statistically rare. The probability of getting 10, 9, 8, 7, or 6 correct is each less than 1%. The probability of getting 5 correct is 2.6%. The probability of getting 4 correct is 8.8%.

41. Check students' work.
Answers may vary. Sample:
Use a graphing calculator to generate a random number between 1 and 5. Let 1 represent a correct answer. Do this ten times to simulate guessing for each problem on the test. Record how many times you come up with a 1.

42. 70; Eighth row fifth term; 1716

43a. The graph is symmetrical about the line $x = 3.5$.

43b.

x	y
0	0.0078
1	0.0547
2	0.1641
3	0.2734
4	0.2734
5	0.1641
6	0.0547
7	0.0078

43c. No; the bulge in the graph has shifted right.

44. B

45. G

46. B

47. H

48. $a_n = a_1 r^{n-1}$. Use $a_1 = 3$ and $a_4 = 192$ to find r.

$$\left(192\right) = \left(3\right) r^{(4-1)}$$

$$4 = r$$

Use a_1 and r to find a_2 and a_3.

$$a_2 = 3\left(4\right)^1$$

$$= 12$$

$$a_3 = 3\left(4\right)^2$$

$$= 48$$

49. The question is loaded and leading because of the use of the word "beautiful" and the phrase "Do you agree".

50. The question does not provide enough information about the amendments to make a decision.

51. vertices: $\left(0, \pm 7\right)$

foci: $\left(0, \pm\sqrt{74}\right)$

asymptotes: $y = \pm\dfrac{a}{b}x = \pm\dfrac{7}{5}x$

52. vertices: $\left(0, \pm 3\right)$

foci: $\left(0, \pm\sqrt{13}\right)$

asymptotes: $y = \pm\dfrac{a}{b}x = \pm\dfrac{3}{2}x$

53. vertices: $\left(0, \pm 3\right)$

foci: $\left(0, \pm 5\right)$

asymptotes: $y = \pm\dfrac{a}{b}x = \pm\dfrac{3}{4}x$

54. $\dfrac{2}{3}$

55. $\dfrac{1}{2}$

56. $\dfrac{2}{3}$

57. $\bar{x} = 24.4$

$\sigma \approx 5.04$

58. $\bar{x} = 81.8$

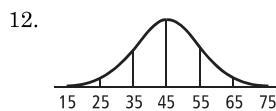$\sigma \approx 4.77$

59. $\bar{x} = 8.6$

$\sigma \approx 0.47$

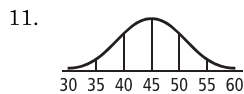60. $\bar{x} = 24.74$

$\sigma \approx 2.046$

7. 43%

8. 39%

9. 43 men

10. 66%

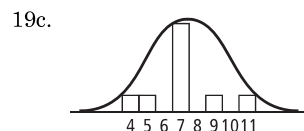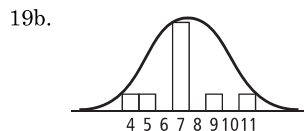11.

12.

13.

14.
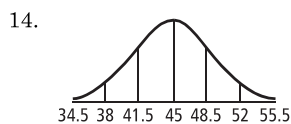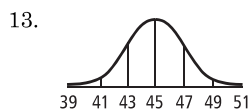
15. 68%

16. 97.5%

17. 50%

18. 32%

19a. Set 2

19b.

19c.

20. Yes. 99% of all grades are expected to be within 3 standard deviations of the mean, and this score is 4.4 standard deviations above the mean.

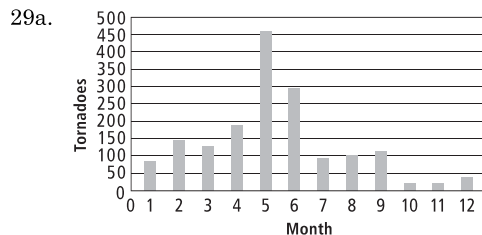21. 59 min

22. 2.5%

23. 47.5%

24. 99.7%

25. 81.5%

26. 50%

27. 84%

28. 97.5%

29a.

29b. Yes. The histogram has a bell shape, but it is skewed to the left.

30. No. The mean could be 206 with a standard deviation of 42 or the mean could be 269 with a standard deviation of 21.

31. Jake's group: $80 + 6 = 86$, the score at 1 standard deviation above the mean
87 is close to 86, so about $13.5\% + 2.5\% = 16\%$ of the students scored higher than Jake, and he did not score in the top 10%.

Elena's group: $76 + 2(4) = 84$, the score at 2 standard deviations above the mean
Since 2.5% of the scores were higher than 84, including Elena's score of 87, Elena did score in the top 10%.

32. 480 tubs

33. A binomial distribution has a finite number of possible probability events which sum to 1 and are a subset of a larger normal distribution. For example using, $n = 6$, $p = 0.5$, the binomial distribution probabilities are $P(0) \approx 0.0156$, $P(1) \approx 0.0938$, $P(2) \approx 0.2344$, $P(3) \approx 0.3125$, $P(4) \approx 0.2344$, $P(5) \approx 0.0938$, $P(6) \approx 0.0156$.
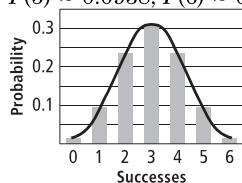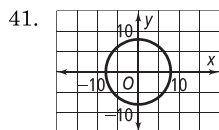

34. D

35. I

36. B

37. For Distribution A, with 50 data values, 25 values are at or below 40, which is the mean. For Distribution B, with 30 data values, 15 values are at or below the mean, 40. So, Distribution A has more values at or below 40.
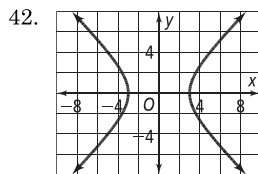
38. 0.02867
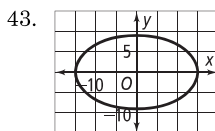
39. 0.1612

40. 0.03676

41.

The conic section is a circle with radius 8 and center (0, 0).
Lines of symmetry: All lines which intersect the center of the circle are lines of symmetry.
The domain is $-8 \le x \le 8$, and the range is $-8 \le y \le 8$.

42.

The conic section is an hyperbola with center (0, 0) and vertices $(\pm 3, 0)$.
Lines of symmetry: $x = 0$ and $y = 0$
The domain is $x \le -3$ or $x \ge 3$, and the range is all real numbers.

43.

The conic section is an ellipse with center (0, 0) and foci $(\pm 4, 0)$.
Lines of symmetry: $x = 0$ and $y = 0$
The domain is $-5 \le x \le 5$, and the range is $-3 \le y \le 3$.

44.

$y = x - 3$

45.

$y = x$

46.

$y = x - \dfrac{5}{4}$