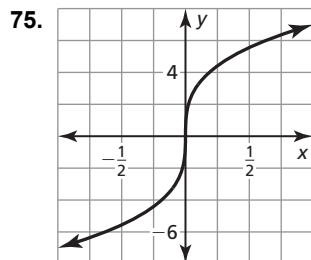
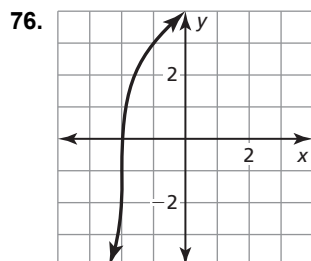


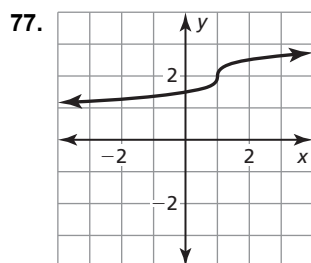
Answers



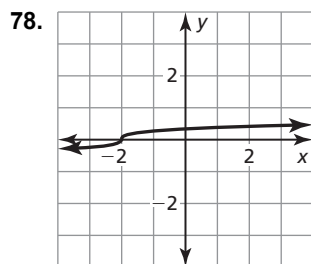
vertical stretch by a factor of 7



vertical stretch by a factor of 4 followed by a translation 2 units left and 1 unit down



vertical shrink by a factor of $\frac{1}{2}$ followed by a translation 1 unit right and 2 units up



translation 2 units left and a vertical shrink by a factor of 0.25

79. $x = 25$ 80. $x = 36$ 81. $y = 49$

82. $w = 11$ 83. $r = 102$ 84. $x = 1$

85. $x = 2$ 86. $x = 4$

87.

Input	6	5	4	3	2	1	0
Output	-2	-1	0	1	2	3	4

88.

Input	-9	-5	-1	3	7	11	15
Output	5	2	-1	-4	-7	-10	-13

89. $g(x) = \frac{x-10}{3}$

90. $g(x) = 5(x-2)$

Chapter 11

11.1 Start Thinking

Answers may include, but are not limited to: A list of test percentages from least to greatest, along with accurate answers showing the lowest score, the highest score, the range, the mode, and the median of all the scores.

11.1 Warm Up

1. -1.9 2. -7.9 3. -8

4. -14.3 5. -0.1 6. 20

7. -4.8 8. -13 9. -11

11.1 Cumulative Review Warm Up

1. vertex: $(0, 0)$; axis of symmetry: $x = 0$

2. vertex: $(-3, 0)$; axis of symmetry: $x = -3$

3. vertex: $(2, 0)$; axis of symmetry: $x = 2$

4. vertex: $(9, 0)$; axis of symmetry: $x = 9$

5. vertex: $(-4, 0)$; axis of symmetry: $x = -4$

6. vertex: $(-5, 0)$; axis of symmetry: $x = -5$

11.1 Practice A

1. a. mean = 5, median = 4, mode = 3

b. median; the mean is affected by the outlier and the median is a better choice than the mode.

2. a. mean = 13.2, median = 13, no mode

b. either the mean or the median, because they are close

3. a. mean \approx 3.94 minutes, median = 3.5 minutes, mode = 3.5 minutes

b. median or mode; the mean is affected by the outlier and the median and the mode are equal.

Answers

- c. The outlier is 7.2 minutes. It increases the mean, but does not affect the median or the mode.
- d. *Sample answer:* Some songs have longer instrumental portions.
- 4. $x = 7$ 5. $x = 19$
- 6. Boys: range = 9 in.; Girls: range = 9 in.; The range is the same for both teams.
- 7. a. range = 25
b. standard deviation = 8.60
- 8. a. range = 25
b. standard deviation = 9.21
- 9. a. standard deviation = 2.42; The typical height of a boy on the track team differs from the mean by about 2.4 inches.
b. standard deviation = 2.65; The typical height of a girl on the track team differs from the mean by about 2.6 inches.
c. The standard deviations are about the same, with the girls having a somewhat larger spread. It can be concluded that the girls' heights are slightly more variable than the boys' heights.

11.1 Practice B

- 1. a. mean = 5.5, median = 5, mode = 5 and 9
b. mean or median; both are around 5 and the median is equal to one of the modes.
- 2. a. mean = 20, median = 22, mode = 22 and 24
b. median; the mean is affected by the outlier and the median is equal to one of the modes.
- 3. a. mean = 8.83 pounds, median = 9.35 pounds, no mode
b. median; The mean and the median are close, but only 3 of the 9 values are less than the mean.
c. Still no mode, and the mean and the median drop to 8.59 pounds and 9.12 pounds, respectively.
- 4. $x = 16$ 5. $x = 77$
- 6. a. The outlier is 20 days. It increases the mean, but has no effect on the median or the mode.
b. *Sample answer:* It could be due to complications after surgery.
- 7. a. range = 22
b. standard deviation = 7.36

- 8. a. range = 3.9
b. standard deviation = 1.33
- 9. mean: 540; median: 525; mode: 450; range: 240; standard deviation: 73.5

11.1 Enrichment and Extension

- 1. *Sample answer:* The cafeteria staff at a high school wanted to see if they should keep making Caesar salad for lunch. For two school weeks, they kept track of the number of salads they sold each day. The data are 9, 8, 9, 10, 10, 10, 12, 13, 25, 29.
- 2. *Sample answer:* A restaurant owner wanted to figure out the ages of the people who were most likely to come to his establishment. On Saturday afternoon, he took a small sample size of guests and asked them their ages. The data are 21, 21, 22, 24, 25, 25, 25, 26, 26, 29.
- 3. *Sample answer:* For science class, you have to record the daily high temperatures this spring and keep them in a log book. The temperatures jump from mid-March into early April, and the temperatures for the first 10 days you record are 38, 40, 45, 55, 64, 70, 71, 72, 72, 73 degrees Fahrenheit.
- 4. *Sample answer:* You have ten cousins and you want to figure out their average age and median age for fun. Their ages are 18, 19, 20, 22, 22, 24, 25, 26, 26, 28.
- 5. a. mean: 11.75; median: 11.5; mode: 11; range: 8
b. mean: 5.875; median: 5.75; mode: 5.5; range: 8
c. mean: 8.75; median: 8.5; mode: 8; range: 8

11.1 Puzzle Time

PLUG ITS NOSE

11.2 Start Thinking

Answers may include, but are not limited to: A list of test percentages from least to greatest, along with accurate answers showing the lowest score, the highest score, the median of the entire list, as well as the median of the upper and lower halves plotted on a number line.

11.2 Warm Up

- 1. 9 2. 4.5 3. 20.5
- 4. 1 5. 215 6. 2.5

Answers

11.2 Cumulative Review Warm Up

$$1. x^2 + 11x + \frac{121}{4} - \frac{121}{4}; \left(x + \frac{11}{2}\right)^2 - \frac{121}{4}$$

$$2. x^2 - 15x + \frac{225}{4} - \frac{225}{4}; \left(x - \frac{15}{2}\right)^2 - \frac{225}{4}$$

$$3. x^2 - 6x + 9 - 9; (x - 3)^2 - 9$$

$$4. x^2 - 13x + \frac{169}{4} - \frac{169}{4}; \left(x - \frac{13}{2}\right)^2 - \frac{169}{4}$$

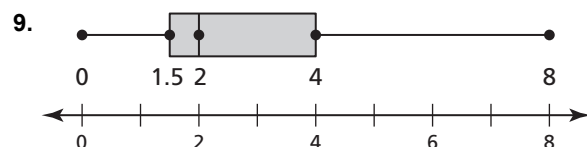
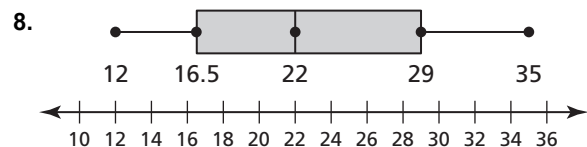
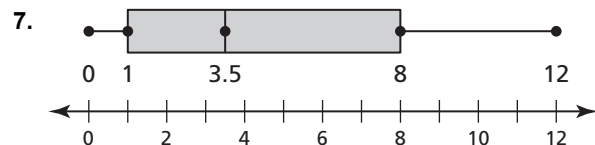
$$5. x^2 + 5x + \frac{25}{4} - \frac{25}{4}; \left(x + \frac{5}{2}\right)^2 - \frac{25}{4}$$

$$6. x^2 + 4x + 4 - 4; (x + 2)^2 - 4$$

11.2 Practice A

1. 2 2. 6 3. 10

4. 8 5. 8 6. 5

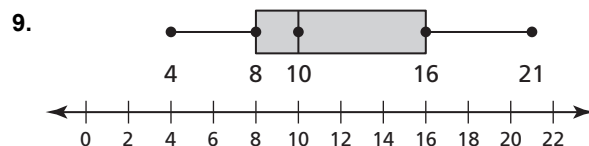
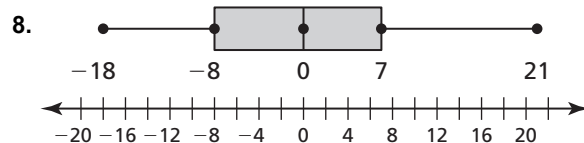
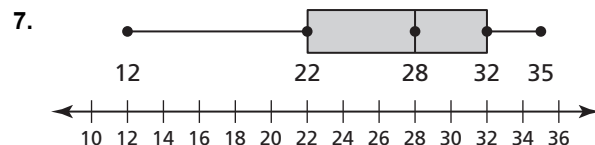


10. a. no; 11 is larger than the maximum value of 10.
b. yes; The left whisker is longer than the right whisker.

11.2 Practice B

1. 5 2. 10 3. 8

4. 12 5. 15 6. 9



10. a. no; 15 is the third quartile.
b. yes; The whiskers are the same lengths and the box is split in two even parts.

11.2 Enrichment and Extension

1. Sample answer: 2, 2, 2, 2, 2, 3, 3, 3, 4, 4, 4, 5, 5, 5, 5, 6, 6, 8

2. 2, 2, 2, 2, 2, 3, 3, 3, 4, 4, 4, 5, 5, 5, 5, 6, 6, 8

3. The mean is most likely close to 4 hours because it is in the center of the data and there are no outliers.

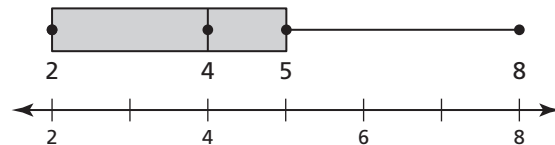
4. stem and leaf plot:

Stem	Leaf
0	2 2 2 2 2 3 3 3 4 4 4 5 5 5 5 6 6 8

5. mean: 3.94 hours; median: 4 hours;
mode: 2 hours; range: 6 hours

6. first quartile: 2 hours; third Quartile: 5 hours

7. box-and-whisker plot



8. The range of the data is 6 hours. The students watch TV or use their smart phones or tablets from anywhere between 2 hours and 8 hours.

9. The data is skewed to the right.

10. The data is more spread out in Q2 because Q1 consists entirely of data values of 2 hours.

11.2 Puzzle Time

I'M WIPED OUT

Answers

11.3 Start Thinking

Answers may include, but are not limited to: Three separate histograms, labeled and using equal intervals showing height in feet and inches, shoe sizes, and number of siblings. Each should have the mean and median marked within the histogram. The student should also state the mean and median of each set of data.

11.3 Warm Up

1. mean: 7.1; median: 7; mode: none
2. mean: 8.7; median: 8; mode: none
3. mean: 10.5; median: 10; mode: none
4. mean: 20.4; median: 13; mode: 6, 13
5. mean: 3.5; median: 3.5; mode: none
6. mean: 4.1; median: 4; mode: 2

11.3 Cumulative Review Warm Up

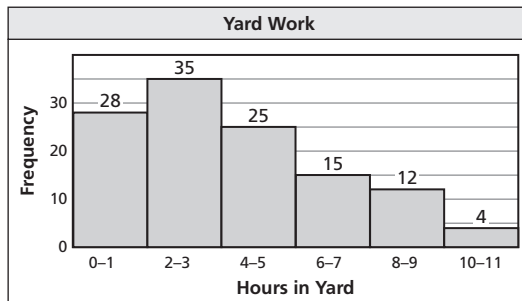
1. $(-1, 2)$, $(-9, 4)$, $(-4, 5)$, $(-6, 8)$, $(-2, 10)$
2. $(0, 3)$, $(-4, 5)$, $(6, 7)$, $(0, 9)$, $(-5, 11)$

3.

Input	7	5	1	5	7
Output	4	4	1	6	11

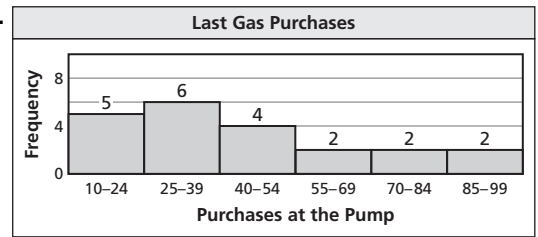
11.3 Practice A

1. skewed right



2. symmetric; The numbers of leaves are 3, 4, 5, 4, 3, which is symmetric.
3. skewed left; Most of the numbers are large.

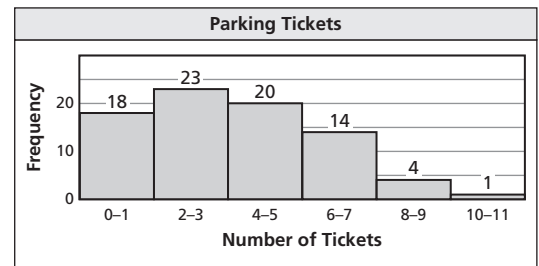
4. a.



- b. median and the 5-number summary; The data is skewed right.

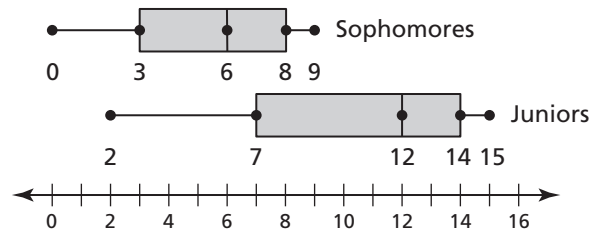
11.3 Practice B

1. skewed right



2. skewed right; Most of the numbers are small.
3. symmetric; The numbers of leaves are 1, 3, 5, 7, 5, 3, 1 which is symmetric.

4. a.



Both distributions are skewed left.

- b. In general, the juniors attended more school events than the sophomores.
- c. approximately 13

11.3 Enrichment and Extension

1. mean: 100; standard deviation: 18.239
2. mean: 4.5; standard deviation: 2.291
3. mean: 2.4; standard deviation: 1.497
4. mean: 71; standard deviation: 8.981

11.3 Puzzle Time

A HOLE

Answers

11.4 Start Thinking

Sample answer:

Which ice cream flavor do you like better, chocolate or vanilla?

	Chocolate	Vanilla
Boys	11	8
Girls	4	7

A two-way table gets its name because there are two separate categories of answers. So, there are two separate groups of information. In this example, there are 30 total people surveyed. This number is equivalent to the number of boys and girls in the class. The total can be found by finding the sum of the four boxes in the two-way table, because each person in the class was surveyed and gave a separate answer.

11.4 Warm Up

1. $\frac{2}{5}$
2. $\frac{1}{2}$
3. $\frac{31}{49}$
4. $\frac{3}{2}$ or $1\frac{1}{2}$
5. $\frac{1}{2}$
6. $\frac{4}{5}$
7. $\frac{38}{49}$
8. $\frac{18}{11}$ or $1\frac{7}{11}$
9. $\frac{4}{3}$ or $1\frac{1}{3}$
10. 1
11. 9
12. $\frac{1}{4}$

11.4 Cumulative Review Warm Up

1. $g = 3$
2. $t = -6$
3. $x = 2$
4. $t = 5$
5. $y = 6$
6. $x = -3$

11.4 Practice A

1. 126
2. 127
3. 59
4. 194

5.

		Skateboard		
		Yes	No	Total
Surf	Yes	32	65	97
	No	45	24	69
Total		77	89	166

97 students surf.
 69 students do not surf.
 166 students were surveyed.
 77 students skateboard.
 89 students do not skateboard.

6.

		Pet		
		Yes	No	Total
Job	Yes	74	13	87
	No	153	32	185
Total		227	45	272

87 students have a job.
 185 students do not have a job.
 272 students were surveyed.
 227 students have a pet.
 45 students do not have a pet.

7. a. 58.4%
- b. 53.6%
- c. 33.0%
- d. 14.5%

11.4 Practice B

1.

		Coffee		
		Yes	No	Total
Tea	Yes	33	112	145
	No	24	20	44
Total		57	132	189

145 people drink tea.
 44 people do not drink tea.
 189 people were surveyed.
 57 people drink coffee.
 132 people do not drink coffee.

2.

		Airplane		
		Yes	No	Total
Train	Yes	5	3	8
	No	278	321	599
Total		283	324	607

8 students have traveled by train.
 599 students have not traveled by train.
 607 students were surveyed.
 283 students have traveled by airplane.
 324 students have not traveled by airplane.

Answers

3.

		Participated in a Triathlon		
		Yes	No	Total
Gender	Female	24	113	137
	Male	27	142	169
	Total	51	255	306

4.

		Dual Enrollment Student		
		Yes	No	Total
Class	Sophomore	35	247	282
	Senior	83	185	268
	Total	118	432	550

5.

		Musical Instrument		
		Yes	No	Total
Sport	Yes	57	245	302
	No	61	34	95
	Total	118	279	397

11.4 Enrichment and Extension

	Frank	Ruby	Tom	Wendy	milk	green tea	water	iced tea	banana	apple	mango	grapefruit
\$5.99	×	×	×	0	×	×	0	×	0	×	×	×
\$6.99	0	×	×	×	0	×	×	×	×	0	×	×
\$7.99	×	0	×	×	×	×	×	0	×	×	×	0
\$8.99	×	×	0	×	×	0	×	×	×	×	0	×
banana	×	×	×	0	×	×	0	×				
apple	0	×	×	×	0	×	×	×				
mango	×	×	0	×	×	0	×	×				
grape fruit	×	0	×	×	×	×	×	0				
milk	0	×	×	×								
green tea	×	×	0	×								
water	×	×	×	0								
iced tea	×	0	×	×								

Prices	Names	Drinks	Fruit
\$5.99	Wendy	water	banana
\$6.99	Frank	milk	apple
\$7.99	Ruby	iced tea	grapefruit
\$8.99	Tom	green tea	mango

11.4 Puzzle Time

A QUARTER

11.5 Start Thinking

bar graph, circle graph, dot plot, pictograph; *Sample answer:* The best choice is a circle graph, because it would be easy to compare percentages to determine the favorite and least favorite video game systems.

11.5 Warm Up

1. continuous
2. discrete

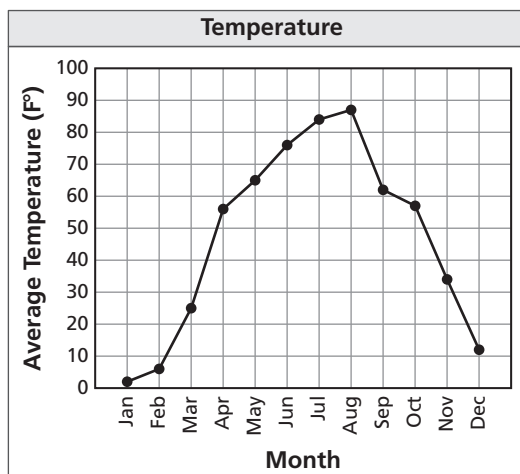
Answers

11.5 Cumulative Review Warm Up

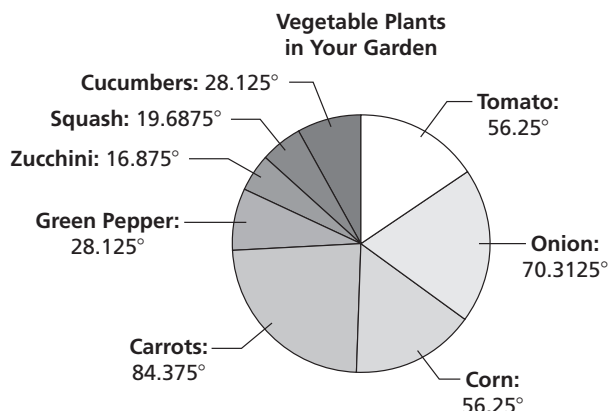
1. $f(-1) = -6$
2. $h(-1) = -7$
- $f(6) = 1$
- $h(6) = -14$
3. $p(-1) = 1$
4. $v(-1) = 18$
- $p(6) = -20$
- $v(6) = 25$

11.5 Practice A

1. quantitative; Costs are numerical values.
2. qualitative; Breeds of dogs are nonnumerical.
3. qualitative; It does not make sense to compare or measure apartment numbers. Apartment numbers are labels.
4. quantitative; Heights are numerical values.
5. *Sample answer:* histogram; the range could be large, so intervals may need to be used
6. *Sample answer:* pie chart; qualitative data and percentages would be applicable
7. *Sample answer:* line graph; data occurs over a time period



8. *Sample answer:* circle graph; percentages are appropriate



11.5 Practice B

1. quantitative; The numbers of cans are numerical values.
2. qualitative; Names are nonnumeric values.
3. quantitative; Balances are numerical values.
4. qualitative; It does not make sense to compare or measure jersey numbers. Jersey numbers are labels.
5. *Sample answer:* box-and-whisker plot; there could be a wide range of scores and bowling is a competitive sport, so quartiles are useful
6. *Sample answer:* line graph; data occurs over a period of time
7. The data for 2009 is missing; Someone may assume that there were no named winter storms in 2009.
8. The number line is not numbered as it should be; Someone may assume that the quartiles are all equally spaced.

11.5 Enrichment and Extension

1. $\frac{4 - \pi}{4} \approx 21.5\%$
2. $\frac{4}{5} = 80\%$
3. $\frac{6 - \pi}{6} \approx 47.6\%$
4. $\frac{1}{4} = 25\%$

11.5 Puzzle Time

YOUR AGE

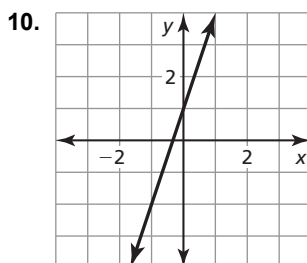
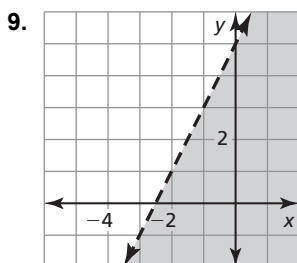
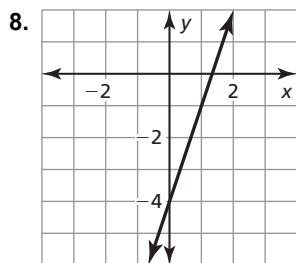
Cumulative Review

1. $x = -4$
2. $y = 0, y = 2$
3. not possible
4. $x \geq -9$
5. x is equal to all real numbers.

Answers

6. You must sell at least 34 subscriptions this week.

7. $4(x - 8) \leq 50$



11. $y - 5 = -(x + 1)$ 12. $y + 4 = -4(x - 2)$

13. $y + 0 = -\frac{1}{2}(x + 8)$ 14. $(0, 4)$

15. $(9, 1)$ 16. $(2, 3)$

17. 1500 children and 700 adults

18. $\frac{1}{16x^4}$ 19. $\frac{1}{2x^5}$ 20. $8x^8y^6$

21. $x = 3$ 22. $x = 4$ 23. $x = 4$

24. -25 25. $10y + 8$ 26. $x^2 - 6x + 5$

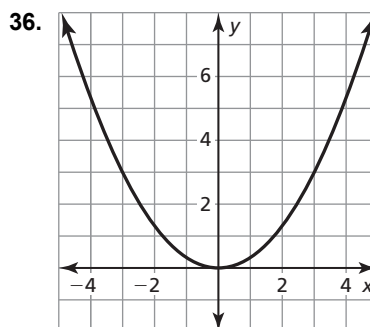
27. $16x^2 - 24xy + 9y^2$ 28. $(m - 3)(x + 7)$

29. $(z - 11)(z - 4)$ 30. $4(w + 3)(w + 8)$

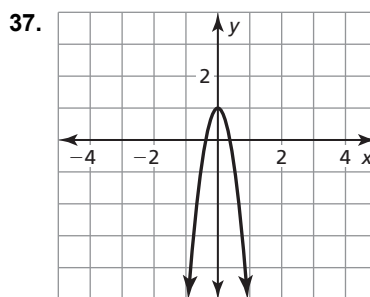
31. 3 sec 32. $z = -10, 10$

33. $y = -25, -2$ 34. $(3x^2 + 1)(2x - 5)$

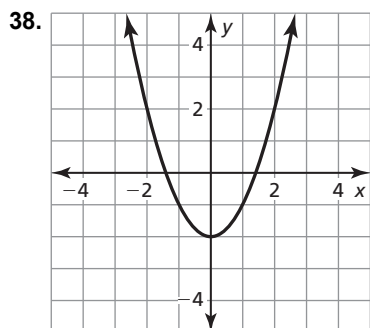
35. $(y^2 + 1)(y + 1)$



vertical shrink by a factor of $\frac{1}{3}$



reflection in x-axis, a vertical stretch by a factor of 7, and a translation 1 unit up



translation 2 units down

39. a. 7 sec

b. If k is positive, it will increase the time in part (a), and if k is negative, it will decrease the time in part (a).

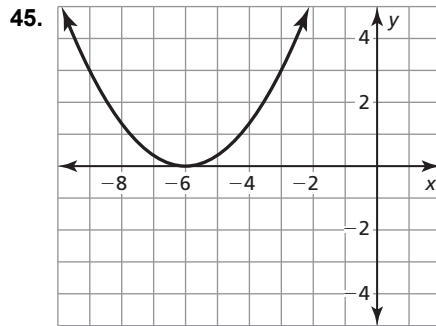
40. maximum: 51 41. minimum: -74

42. vertex: $(3, 0)$; axis of symmetry is $x = 3$

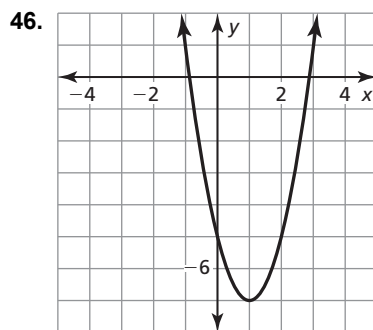
43. vertex: $(0, 0)$; axis of symmetry is $x = 0$

44. vertex: $(-6, 2)$; axis of symmetry is $x = -6$

Answers



translation 6 units left and a vertical shrink by a factor of $\frac{1}{3}$



translation 1 unit right and 7 units down, and a vertical stretch by a factor of 2

47. $\frac{2x^3 \sqrt[3]{2x}}{y}$

48. $\frac{25 - 15\sqrt{3}}{2}$

49. $-6\sqrt{5} + 6\sqrt{2}$

50. $x = -1, x = 3$

51. $x = 2, x = 5$

52. $x = \pm 4$

53. $x = \pm 7$

54. $x = \pm 3$

55. $x = 3, x = 5$

56. $y = -15, y = -4$

57. 25 ft by 25 ft by 50 ft

58. $x \approx -0.6, x \approx 2.6$

59. $y \approx -1.5, y \approx 5.5$

60. $(-4, -1)$ and $(2, 5)$

61. $(0, 1)$ and $(1, 2)$

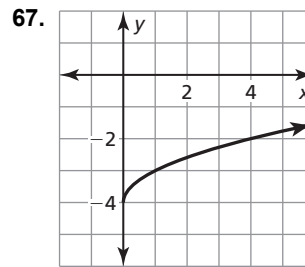
62. $(-3, 0)$ and $(5, 8)$

63. 18 m by 20 m

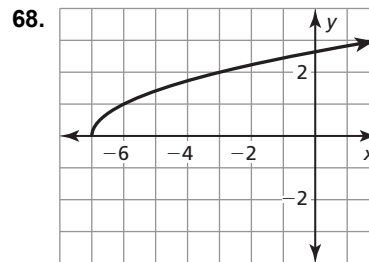
64. $x \geq 0$

65. $x \geq 4$

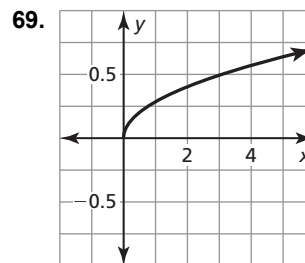
66. $x \leq 2$



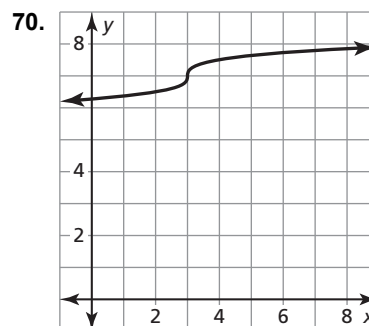
range: $y \geq -4$



range: $y \geq 0$

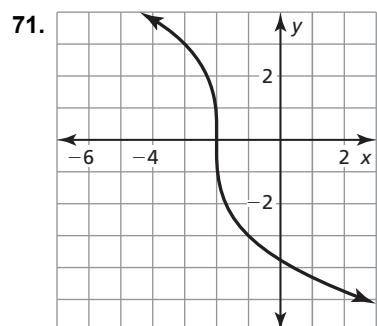


range: $y \geq 0$



translation 3 units right and 7 units up, and a vertical shrink by a factor of 0.5

Answers



translation 2 units left and 1 unit down, and a vertical stretch by a factor of 3

72. $w = 222$

73. $r = 16$

74. $x = 4$

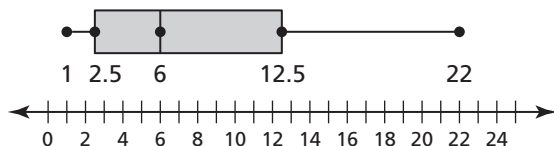
75. $g(x) = \frac{5(x+1)}{3}$

76. $g(x) = \frac{x+8}{7}$

77. mean: 15, median: 14, mode: 13; The median best represents the data. The mode is less than all of the other data values, and the mean is greater than most of the data.

78. mean = 25.75, median: 24, mode: 23; The median best represents the data. The mode is less than most of the other data values, and the mean is greater than most of the data.

79. 1, 1, 2, 2, 3, 3, 4, 4, 6, 7, 8, 10, 11, 14, 15, 20, 22; median: 6, lower quartile: 2.5, upper quartile: 12.5



80. symmetric distribution; The numbers of leaves are 3, 5, 3, which is symmetric.

81. qualitative

82. qualitative

83. 80