

Example 2 Draw Parallel Box-and-Whisker Plots

WEATHER Jalisa Thompson has job offers in Fresno, California, and Brownsville, Texas. Since she likes both job offers, she decides to compare the temperatures of each city.

Average Monthly High Temperatures (°F)												
Month	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Fresno	54.1	61.7	66.6	75.1	84.2	92.7	98.6	96.7	90.1	79.7	64.7	53.7
Brownsville	68.9	72.2	78.4	84.0	87.8	91.0	93.3	93.6	90.4	85.3	78.3	71.7

Source: www.stormfax.com

- a. Draw a parallel box-and-whisker plot for the data.

Determine the quartiles and outliers for each city.

Fresno

53.7, 54.1, 61.7, 64.7, 66.6, 75.1, 79.7, 84.2, 90.1, 92.7, 96.7, 98.6

$$\begin{array}{ccc} \uparrow & \uparrow & \uparrow \\ Q_1 = 63.2 & Q_2 = 77.4 & Q_3 = 91.4 \end{array}$$

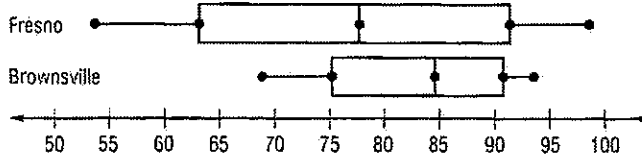
Brownsville

68.9, 71.7, 72.2, 78.3, 78.4, 84.0, 85.3, 87.8, 90.4, 91.0, 93.3, 93.6

$$\begin{array}{ccc} \uparrow & \uparrow & \uparrow \\ Q_1 = 75.25 & Q_2 = 84.65 & Q_3 = 90.7 \end{array}$$

Neither city has any outliers.

Draw the box-and-whisker plots using the same number line.



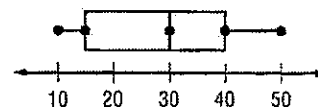
- b. Use the parallel box-and-whisker plots to compare the data.

The range of temperatures in Fresno is much greater than in Brownsville. Except for the fourth quartile, Brownsville's average temperatures appear to be as high or higher than Fresno's.

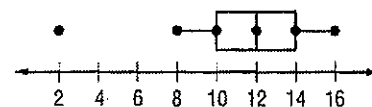
Check for Understanding

Concept Check

1. Describe the data represented by the box-and-whisker plot at the right. Include the extreme values, the quartiles, and any outliers.



2. Explain how to determine the scale of the number line in a box-and-whisker plot.
3. **OPEN ENDED** Write a set of data that could be represented by the box-and-whisker plot at the right.



Guided Practice

Draw a box-and-whisker plot for each set of data.

- 30, 28, 24, 24, 22, 22, 21, 17, 16, 15
- 64, 69, 65, 71, 66, 66, 74, 67, 68, 67



Draw a parallel box-and-whisker plot for each pair of data. Compare the data.

6. A: 22, 18, 22, 17, 32, 24, 31, 26, 28 7. A: 8, 15.5, 14, 14, 24, 19, 16.7, 15, 11.4, 16
 B: 28, 30, 45, 23, 24, 32, 30, 27, 27 B: 18, 14, 15.8, 9, 12, 16, 20, 16, 13, 15

Application CHARITY For Exercises 8 and 9, use the information in the table below.

Top Ten Charities	
Charity	Private Contributions (millions)
Salvation Army	\$1397
YMCA of the U.S.A.	\$693
American Red Cross	\$678
American Cancer Society	\$620
Fidelity Investments Charitable Gift Fund	\$573
Lutheran Services in America	\$559
United Jewish Communities	\$524
America's Second Harvest	\$472
Habitat for Humanity International	\$467
Harvard University	\$452

Source: *The Chronicle of Philanthropy*

8. Make a box-and-whisker for the data.
 9. Write a brief description of the data distribution.

Practice and Apply

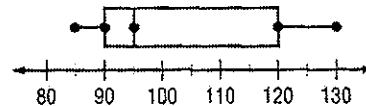
Homework Help

For Exercises	See Examples
10–19	1
20–27	2

Extra Practice
See page 850.

For Exercises 10–13, use the box-and-whisker plot at the right.

10. What is the range of the data?
 11. What is the interquartile range of the data?
 12. What fractional part of the data is less than 90?
 13. What fractional part of the data is greater than 95?

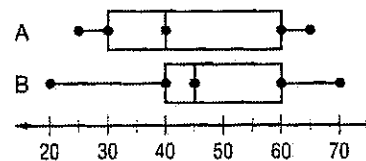


Draw a box-and-whisker plot for each set of data.

14. 15, 8, 10, 1, 3, 2, 6, 5, 4, 27, 1
 15. 20, 2, 12, 5, 4, 16, 17, 7, 6, 16, 5, 0, 5, 30
 16. 4, 1, 1, 1, 10, 15, 4, 5, 27, 5, 14, 10, 6, 2, 2, 5, 8
 17. 51, 27, 55, 54, 69, 60, 39, 46, 46, 53, 81, 23
 18. 15.1, 9.0, 8.5, 5.8, 6.2, 8.5, 10.5, 11.5, 8.8, 7.6
 19. 1.3, 1.2, 14, 1.8, 1.6, 5.7, 1.3, 3.7, 3.3, 2, 1.3, 1.3, 7.7, 8.5, 2.2

For Exercises 20–23, use the parallel box-and-whisker plot at the right.

20. Which set of data contains the least value?
 21. Which set of data contains the greatest value?
 22. Which set of data has the greatest interquartile range?
 23. Which set of data has the greatest range?



Draw a parallel box-and-whisker plot for each pair of data. Compare the data.

24. A: 15, 17, 22, 28, 32, 40, 16, 24, 26, 38, 19
 B: 24, 32, 25, 27, 37, 29, 30, 30, 28, 31, 27

25. A: 50, 45, 47, 55, 51, 58, 49, 51, 51, 48, 47
 B: 40, 41, 48, 39, 41, 41, 38, 37, 35, 37, 45
26. A: 1.5, 3.8, 4.2, 3.5, 4.1, 4.4, 4.1, 4.0, 4.0, 3.9
 B: 6.8, 4.2, 7.6, 5.5, 12.2, 6.7, 7.1, 4.8
27. A: 4.4, 4.5, 4.6, 4.5, 4.4, 4.4, 4.1, 4.9, 2.9
 B: 5.1, 4.9, 4.2, 3.9, 4.5, 4.1, 4.3, 4.5, 5.2

PROFESSIONAL SPORTS For Exercises 28 and 29, use the table at the right.

28. Draw a box-and-whisker plot for the data.
29. What does the box-and-whisker plot tell about the data?

Professional Athletes

Professional Sport	Average Length of Career (years)
Bowling	17
Surfing	10
Hockey	5.5
Baseball	4.5
Basketball	4.5
Tennis	4
Football	3.5
Boxing	3.5

Source: *Men's Health Fitness Special*

More About...



Life Expectancy

A newborn resident of the United States has a life expectancy of 77 years, while a newborn resident of Canada has a life expectancy of 79 years.

Source: UNICEF

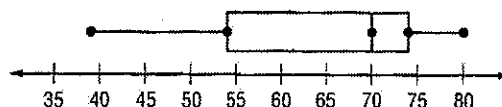
RACING For Exercises 30 and 31, use the following list of earnings in thousands from the November 2000 NAPA 500 NASCAR Race at the Atlanta Motor Speedway.

\$181, \$100, \$98, \$89, \$76, \$58, \$60; \$58; \$55, \$57, \$54, \$64, \$44, \$39, \$66, \$52, \$56, \$38, \$56, \$51, \$49, \$38, \$50, \$48, \$48, \$40, \$36, \$36, \$39, \$36, \$47, \$36, \$47, \$38, \$35, \$46, \$35, \$55, \$46, \$55, \$45, \$43, \$35

Source: *USA TODAY*

30. Draw a box-and-whisker plot for the data. Identify any outliers.
31. Determine whether the top half of the data or the bottom half of the data are more dispersed. Explain.

LIFE EXPECTANCY For Exercises 32–35, use the box-and-whisker plot depicting the UNICEF life expectancy data for 171 countries.



32. Estimate the range and the interquartile range.
33. Determine whether the top half of the data or the bottom half of the data are more dispersed. Explain.
34. State three different intervals of ages that contain half the data.
35. Jamie claims that the number of data values is greater in the interval 54 years to 70 years than the number of data values in the interval 70 years to 74 years. Is Jamie correct? Explain.

SOCCER For Exercises 36–38, use the following list of top 50 lifetime scores for all players in Division 1 soccer leagues in the United States from 1922 to 1999.

253, 223, 193, 189, 152, 150, 138, 137, 135, 131, 131, 129, 128, 126, 124, 119, 118, 108, 107, 102, 101, 100, 96, 92, 87, 83, 82, 81, 80, 78, 78, 76, 74, 74, 73, 73, 72, 71, 69, 68, 67, 65, 64, 63, 63, 63, 62, 61, 61, 61

Source: www.internetfootball.com

36. Draw a box-and-whisker plot for the data.
37. Draw a histogram to represent the data.
38. Compare and contrast the box-and-whisker plot and the histogram.



WebQuest

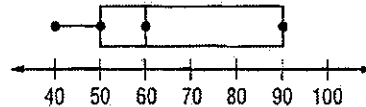
A box-and-whisker plot of population densities will help you compare the states. Visit www.algebra1.com/webquest to continue work on your WebQuest project.

NEW YORK
Test Practice

Standardized Test Practice

A B C D

39. **CRITICAL THINKING** Write a set of data that could be represented by the box-and-whisker plot at the right.



40. **WRITING IN MATH** Answer the question that was posed at the beginning of the lesson.

How are box-and-whisker plots used to display data?

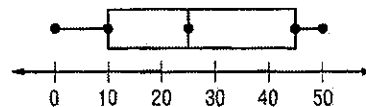
Include the following in your answer:

- a sample of a box-and-whisker plot showing what each part of the plot represents, and
- a box-and-whisker plot representing data found in a newspaper or magazine.

For Exercises 41 and 42, use the box-and-whisker plot below.

41. What is the median of the data?

- (A) 0 (B) 10
(C) 25 (D) 45



42. Which interval represents 75% of the data?

- (A) 0-25 (B) 10-45 (C) 25-50 (D) 0-45

Maintain Your Skills

Mixed Review For Exercises 43 and 44, use the following data.

13, 32, 45, 45, 54, 55, 58, 67, 82, 93

43. Find the range, median, lower quartile, upper quartile, and interquartile range of the data. Identify any outliers. (Lesson 13-4)
44. Create a histogram to represent the data. (Lesson 13-3)

Find each sum or difference. (Lesson 12-7)

45. $\frac{3}{y-3} - \frac{y}{y+4}$

46. $\frac{2}{r+3} + \frac{3}{r-2}$

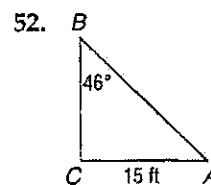
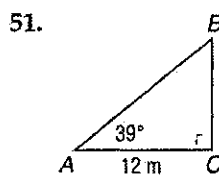
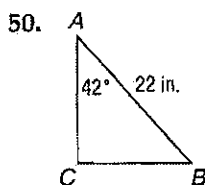
47. $\frac{w}{5w+2} - \frac{4}{15w+6}$

Find each product. Assume that no denominator has a value of 0. (Lesson 12-3)

48. $\frac{7a^2}{5} \cdot \frac{15}{14a}$

49. $\frac{6r+3}{r+6} \cdot \frac{r^2+9r+18}{2r+1}$

Solve each right triangle. State the side length to the nearest tenth and the angle measures to the nearest degree. (Lesson 11-7)



Solve each equation by completing the square. Approximate any irrational roots to the nearest tenth. (Lesson 10-3)

53. $a^2 - 7a + 6 = 0$

54. $x^2 - 6x + 2 = 0$

55. $t^2 + 8t - 18 = 0$

Find each sum or difference. (Lesson 8-5)

56. $(7p^2 - p - 7) - (p^2 + 11)$

57. $(3a^2 - 8) + (5a^2 + 2a + 7)$