

# GRAPHICAL REPRESENTATIONS OF DATA

## BOX PLOTS

Another way to display a distribution of one-variable numerical data is with a box plot. A box plot is the only display of data that clearly shows the median, quartiles, range, and outliers of a data set.

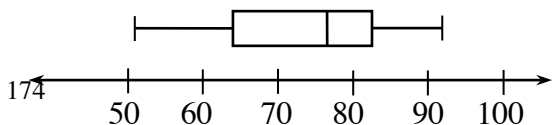
For additional information, see the Math Notes boxes in Lessons 8.1.4 and 8.1.5 of the *Core Connections, Course 1* text, or Lessons 7.1.2 and 7.1.5 of the *Core Connections, Course 2* text. For additional examples and practice, see the *Core Connections, Course 1* Checkpoint 9A materials or the *Core Connections, Course 2* Checkpoint 7B materials in the back of the text.

### Example 5

Display this data in a box plot:

51, 55, 55, 62, 65, 72, 76, 78, 79, 82, 83, 85, 91, and 93.

- Since this data is already in order from least to greatest, the range is  $93 - 51 = 42$ . Thus you start with a number line with equal intervals from 50 to 100.
- The median of the set of data is 77. A vertical segment is drawn at this value above the number line.
- The median of the lower half of the data (the lower quartile) is 62. A vertical segment is drawn at this value above the number line.
- The median of the upper half of the data (the upper quartile) is 83. A vertical segment is drawn at this value above the the number line.
- A box is drawn between the upper and lower quartiles.
- Place a vertical segment at the minimum value (51) and at the maximum value (93). Use a line segment to connect the minimum to the box and the maximum to the box.

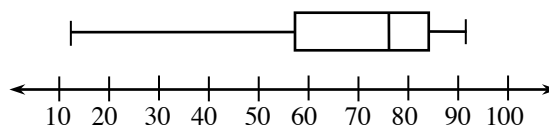


### Example 6

Display this data in a box plot:

62, 65, 93, 51, 12, 79, 85, 55, 72, 78, 83, 91, and 76.

- Place the data in order from least to greatest: 12, 51, 55, 62, 65, 72, 76, 78, 79, 83, 85, 91, 93. The range is  $93 - 12 = 81$ . Thus you want a number line with equal intervals from 10 to 100.
- Find the median of the set of data: 76. Draw the line segment.
- Find the lower quartile:  $55 + 62 = 117$ ;  $117 \div 2 = 58.5$ . Draw the line segment.
- Find the upper quartile:  $83 + 85 = 168$ ;  $168 \div 2 = 84$ . Draw the line segment.
- Draw the box connecting the upper and lower quartiles. Place a line segment at the minimum value (12) and a line segment at the maximum value (93). Connect the minimum and maximum values to the box.



## Problems

Create a stem-and-leaf plot and a box plot for each set of data in problems 5 through 8.

11. 45, 47, 52, 85, 46, 32, 83, 80, and 75.
12. 75, 62, 56, 80, 72, 55, 54, and 80.
13. 49, 54, 52, 58, 61, 72, 73, 78, 73, 82, 83,  
73, 61, 67, and 68.
14. 65, 35, 48, 29, 57, 87, 94, 68, 86, 73, 58,  
74, 85, 91, 88, and 97.
15. Given a set of data: 265, 263, 269, 259, 267, 264, 253, 275, 264, 260, 273, 257, and 291.
  - a. Make a stem-and-leaf plot of this data.
  - b. Find the mean and median of this data.
  - c. Find the range of this data.
  - d. Make a box plot for this data.
16. Given a set of data: 48, 42, 37, 29, 49, 46, 38, 28, 45, 45, 35, 46.25, 34, 46, 46.5, 43, 46.5, 48, 41.25, 29, and 47.75.
  - a. Make a stem-and-leaf plot of this data.
  - b. Find the mean and median of this data.
  - c. Find the range of the data.
  - d. Make a box plot for this data.

# Answers

1.

1	8
2	6 8 9
3	0 3 4 4

2.

1	9
2	5 5 7
3	0 1 4 5
4	2

3.

6	7
7	6 9 9
8	0 1 2 4 9 9 9
9	2 5
10	
11	
12	3

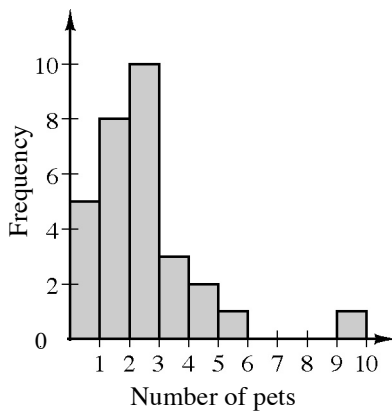
4.

9	1
10	0 1 1 3 4 5 7 8 9
11	1 3 3 6 8

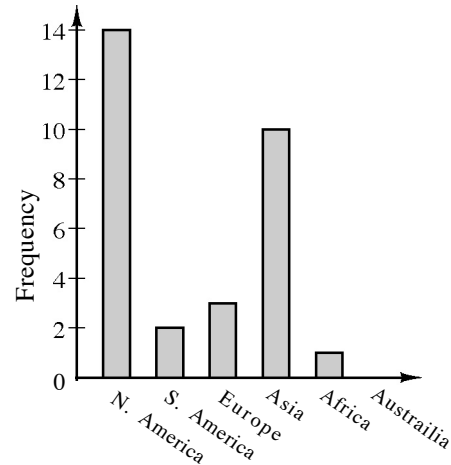
5. a. 24   b. 6   c. 14   d. 0

6. a. ice cream 20   b. 10  
c. 12   d. 15

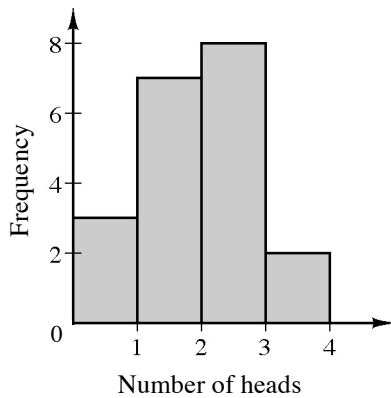
7.



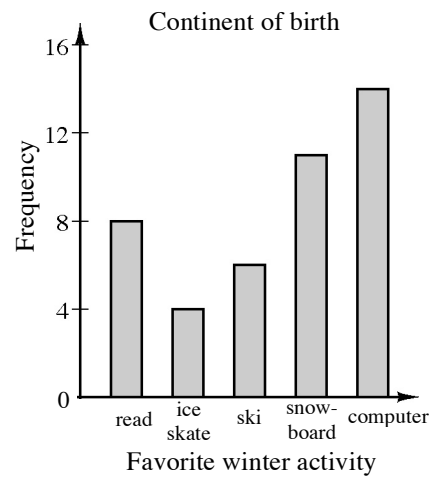
8.



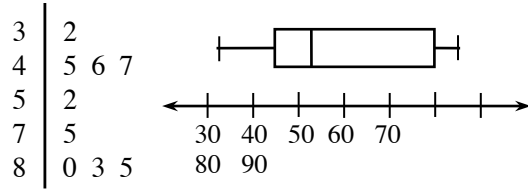
9.



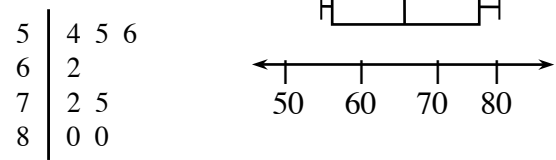
10.



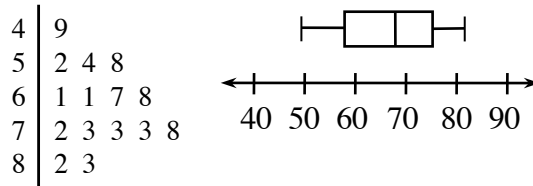
11.



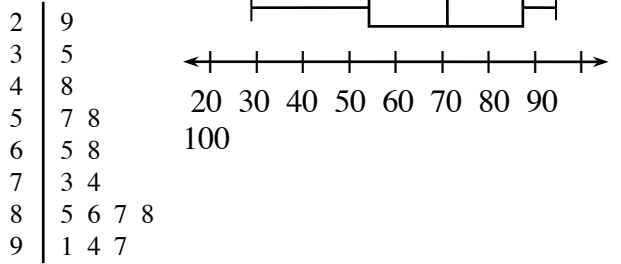
12.



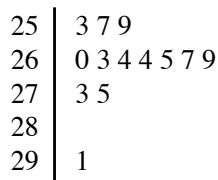
13.



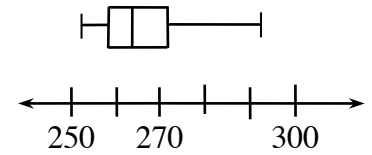
14.



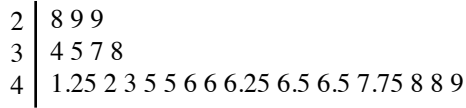
15.



Mean: 266.15  
Median: 264  
Range: 38



16.



Mean: 41.4405  
Median: 43  
Range: 21

