Name _____ Class _____ Date _____

12-4 Reteaching

Box-and-Whisker Plots

Box-and-whisker plots are a visual representation of data that is divided into four parts or quartiles. The four divisions of the data are shown using the median, the upper and lower quartiles, and the greatest and least values of the data.

Problem

How is a box-and-whisker plot created for the data set shown below?

1, 2, 3, 3, 4, 4, 5, 6, 7, 7, 7, 8, 8, 9, 10

Step 1: Find the median of the data. 1, 2, 3, 3, 4, 4, 5, 5, 6, 7, 7, 8, 8, 9, 10

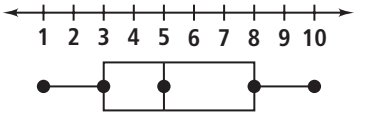
Step 2: To find the upper and the lower quartiles, find the median of the lower half and the upper half.

1, 2, 3, 3, 4, 4, 5, 5, 6, 7, 7, 8, 8, 9, 10
Q1 median Q3

Step 3: List the values for the minimum, Q_1, median, Q_3, and the maximum.

$$\text{minimum} = 1, Q_1 = 3, \text{median} = 5, Q_3 = 8, \text{maximum} = 10$$

Step 4: Draw a number line which includes all of the numbers in step 3. Below the number line, draw a box that runs from Q_1 to Q_3. Next, draw a vertical line at the median. Draw a line from the minimum to Q_1, the maximum to Q_3, and bullets at all of the values listed in step 3.



Often standardized tests divide scores into percentile rank in order to compare the individual test-taker with everyone else who took the test.

Problem

When Stefan received his score for the college readiness exam, his score placed him in the 80th percentile rank. If there were 850 test takers, how many scored lower than Stefan?

This means that 80% of the test takers scored lower than Stefan. The percent proportion can be used to determine the number who scored lower.

$\frac{80}{100} = \frac{x}{850}$ Percent Proportion

$100x = (80)(850)$ Cross Products Property

$100x = 68{,}000$ Multiply.

$x = 680$ Divide each side by 100.

680 test takers scored lower than Stefan.

Name _____ Class _____ Date _____

12-4 Reteaching (continued)

Box-and-Whisker Plots

Exercises

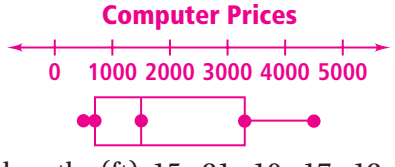
Find the minimum, first quartile, median, third quartile, and maximum of each data set.

1. 72, 78, 61, 48, 59, 76, 65
   minimum = 48; first quartile = 59; median = 65; third quartile = 76; maximum = 78
2. 11, 12, 8, 19, 16, 10, 14
   minimum = 8; first quartile = 10; median = 12; third quartile = 16; maximum = 19
3. 3.6, 5.7, 8.3, 6.5, 2.9, 4.3, 5.1
   minimum = 2.9; first quartile = 3.6; median = 5.1; third quartile = 6.5; maximum = 8.3
4. 155, 151, 158, 156, 155, 153, 158
   minimum = 151; first quartile = 153; median = 155; third quartile = 158; maximum = 158

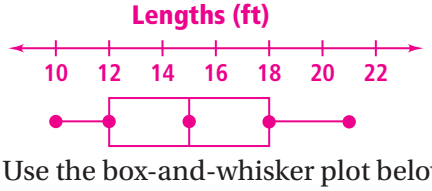
Make a box-and-whisker plot to represent each set of data.

5. daily fair visitors: 2576 3255 1876 2285 3589 4277 996

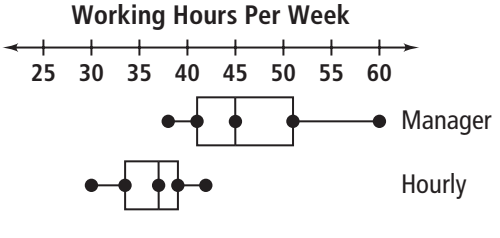
6. computer prices: $1499 $699 $999 $2999 $499 $4499 $3299



7. lengths (ft): 15 21 10 17 12 14 18



8. Use the box-and-whisker plot below. What does it tell you about the number of hours each type of employee works for the company per week? Explain.



Managers work more hours per week than hourly employees because the manager's data is to the right of the hourly employee's data on the number line.

9. In a certain city with a working population of 10,500, 8925 people earn less than $75,000 per year. What is the percentile rank of someone who earns $75,000 per year? **85**