10.4

Box and Whisker Plots

Review 1

Find the median, first quartile, third quartile, and interquartile range of the data.

1, 5, 9, 13, 15, 17, 18, 21, 25, 28, 30

Review 2

Find the median, first quartile, third quartile, and interquartile range of the data.

18, 21, 22, 24, 28, 30, 31, 32, 36, 37

Parts of a Box and Whisker Plot

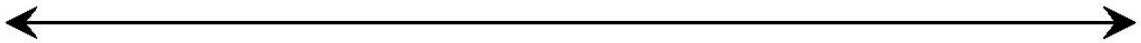
A **box-and-whisker plot** represents a data set along a number line by using the least value, the greatest value, and the quartiles of the data. A box-and-whisker plot shows the *variability* of a data set.

The five numbers that make up the box-and-whisker plot are called the **five-number summary** of the data set.

Making a Box and Whisker Plot

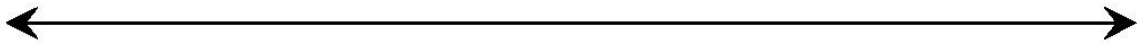
62, 23, 27, 56, 52, 34, 42, 40, 68, 45, 83

1) Find the Median _____	**Use the values above to make a box and whiskers plot**
2) Find the Lower Quartile _____	Step 1 – **Draw** a number line that includes the Lower and Upper extreme data values
3) Find the Upper Quartile _____	Step 2 – **Plot** the lower extreme, lower quartile, median, upper quartile, and upper extreme below the number line
4) Find the Lower Extreme _____	Step 3 – **Make** a box from the lower quartile to the upper quartile
5) Find the Upper Extreme _____	Step 4 – **Draw** a vertical line through the median
	Step 5 – **Draw** "whiskers" from the box to the lower and upper extremes.



Draw a box and whiskers plot for the following problems:

1) 2, 3, 6, 7, 6, 4, 8



2) 3, 7, 2, 10, 12, 5

3) 23, 27, 34, 40, 42, 45, 52, 56, 62, 68, 83, 90

4) 71, 50, 66, 71, 65, 60, 70, 71, 68, 57, 71, 53, 85, 71

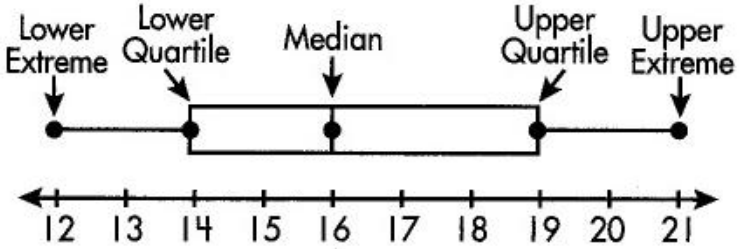
Practice 1

Make a box-and-whisker plot for the ages (in years) of the spider monkeys at a zoo:

15, 20, 14, 38, 30, 36, 30, 30, 27, 26, 33, 35

Analyzing Box and Whisker Plots

A **box-and-whisker** plot displays data along a number line. Quartiles are used to divide the data into four equal parts. Each quartile is 25% of the number of items. The upper and lower quartiles, representing 50% of the data, form the box. The upper extreme (highest value) and lower extreme (lowest value) form the whiskers.



This box-and-whisker plot represents the following data:

12, 13, 14, 14, 15, 16, 17, 18, 19, 19, 21

Upper Extreme: 21

Lower Extreme: 12

Middle Quartile (median): 16

Upper Quartile (median of upper half): 19

Lower Quartile (median of lower half): 14

Practice 2

Use the box-and-whisker plots below to answer the following questions.

1. What is the median number of miles walked? _____

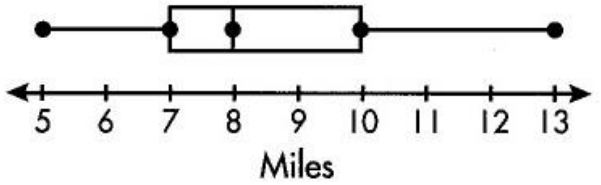
2. What are the lowest and highest numbers of miles walked?

lowest: _____ highest: _____

3. If 126 people participated in the walkathon, how many people walked 7–10 miles? _____

4. What percentage of the people walked more than 10 miles? _____

Miles Walked in Walk-a-Thon



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5. What is the median number of books read? _____

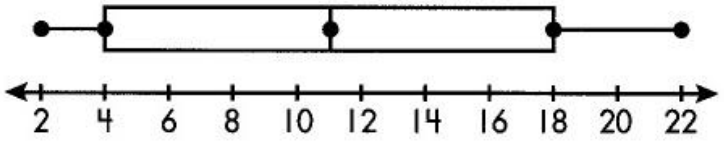
6. What is the upper quartile? _____

7. What percentage of the people who responded to the survey read 4 or fewer books? _____

8. What is the most number of books anyone read? _____

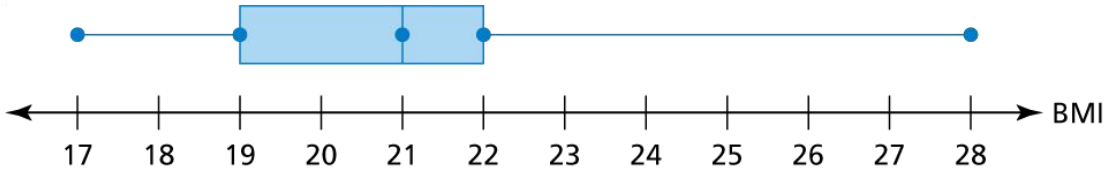
9. If 82 people responded to this survey, how many read from 4 to 18 books? _____

Books Read Over the Summer



Practice 3

The box-and-whisker plot shows the body mass index (BMI) of a sixth grade class.

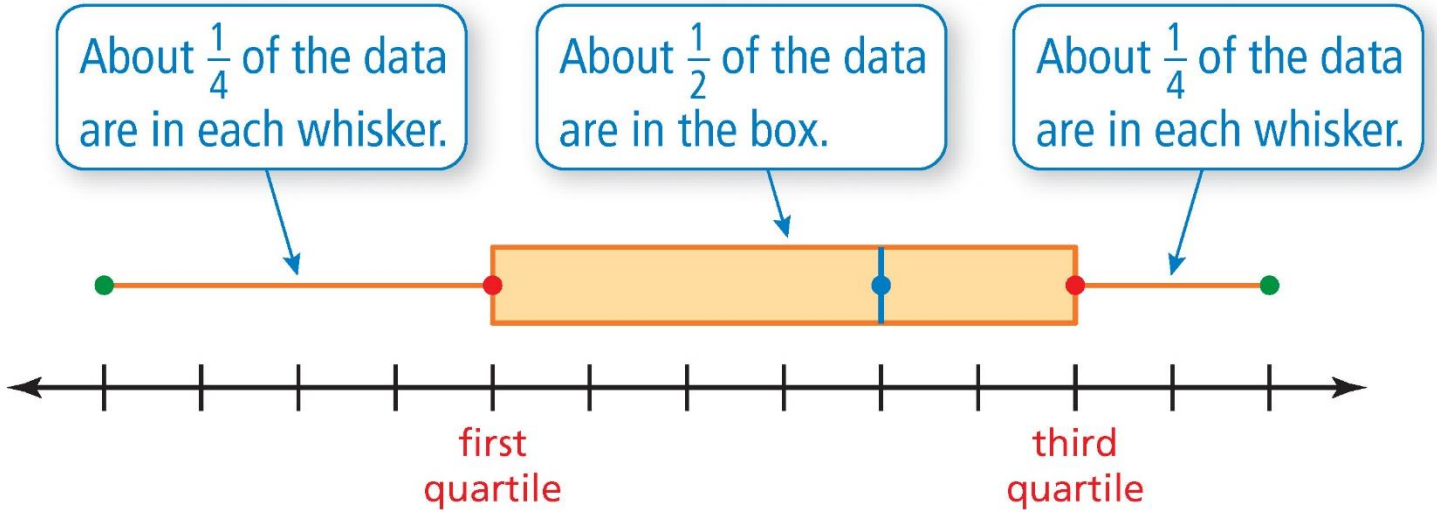


a. What fraction of the students have a BMI of at least 22?

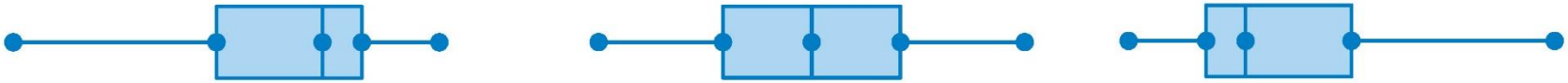
b. Are the data more spread out below the first quartile or above the third quartile? Explain.

c. Find and interpret the interquartile range of the data.

Analyzing Box and Whisker Plots II



Shapes of Box-and-Whisker Plots



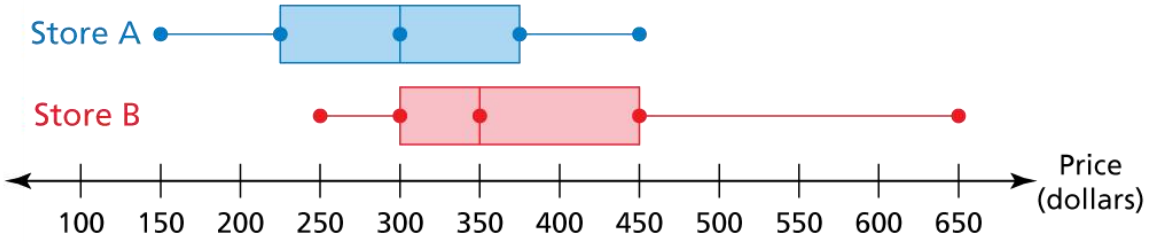
- Left whisker longer than right whisker
- Most data on the right

- Whiskers about same length
- Median in the middle of the box

- Right whisker longer than left whisker
- Most data on the left

Practice 4

The double box-and-whisker plot represents the prices of snowboards at two stores.



a. Identify the shape of each distribution.

b. Which store's prices are more spread out? Explain.

Both boxes appear to be the same length. So, the interquartile range of each data set is equal. However, the range of the prices in Store B is greater than the range of the prices in Store A. So, the prices in Store B are more spread out.