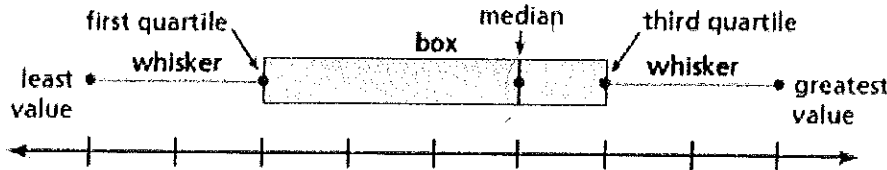


~~100~~ Box-and-Whisker Plots

Box-and-Whisker Plot: shows the variability of a data set along a number line using the least value, the greatest value, and the quartiles of the data.

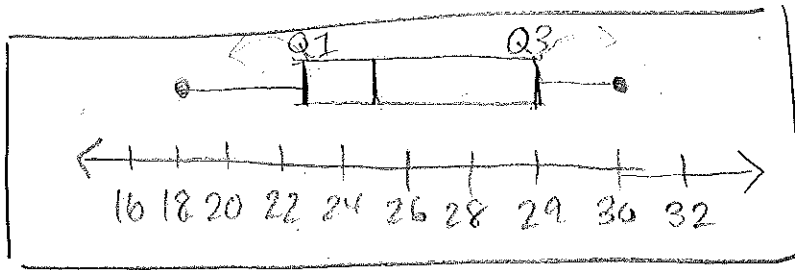
Quartiles: divide the data set into four equal parts. The median (second quartile, Q2) divides the data set into two halves. The median of the lower half is the first quartile, Q1. The median of the upper half is the third quartile, Q3.

Five-number summary: the five numbers that make up a box-and-whisker plot.



Example 1: Make a box and whisker plot that represents the ages of the members of a backpacking expedition in the mountains.

18 22 22 | 24 25 25 | 25 27 28 30 30 30
 24, 30, 30, 22, 25, 22, 18, 25, 28, 30, 28, 27



"5-Number Summary"

LE, Q1, Q2, Q3, UE
 (Min) LQ, Med, UQ, (Max)

18, 23, 25, 29, 30.

IQR: 6

test for outliers.

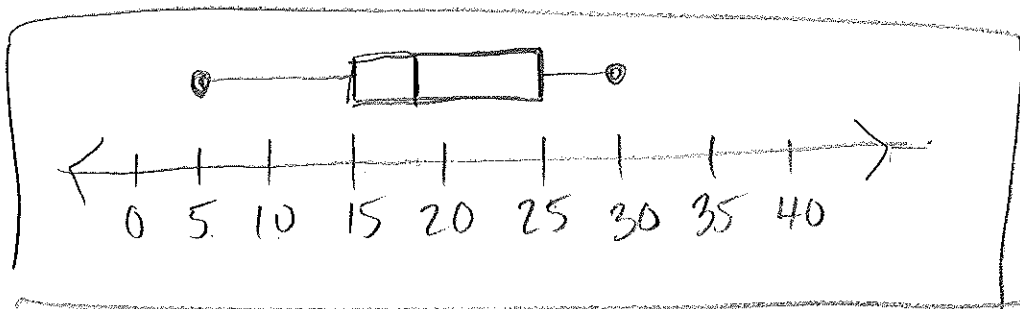
1.5 IQR = 9 Q3+ = 30
 9 Q1- = 22

No outliers

Example 2: A basketball player scores 14, 16, 20, 22, 30, 16, and 28 points during a tournament. Make a box-and-whisker plot that represents the data.

14, 16, 16 | 20, 22, 28, 30
 15 16 25

IQR = 10



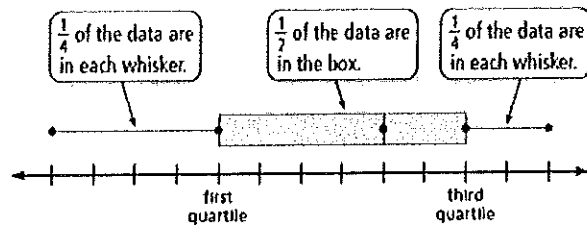
1.5(10) = 15

25 + 15 = 40

15 - 15 = 0

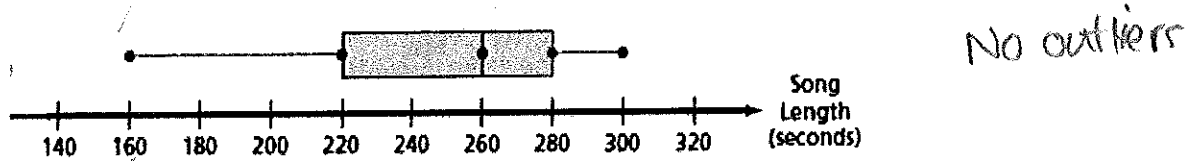
No outliers

The figure shows how data are distributed in a box-and-whisker plot.



Another measure of variation for a data set is the **interquartile range (IQR)**, which is the difference of the third quartile, Q_3 , and the first quartile, Q_1 . It represents the range of the middle half of the data.

Example 3: The box-and-whisker plot represents the lengths (in seconds) of the songs played by a rock band at a concert.



a. Find and interpret the range of the data.

Range: 140 the diff b/w the longest & shortest song is 140 sec.

b. Describe the distribution of the data.

skewed left : most data is on the right (longer songs)

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

IQR: 60 : 50% of songs are b/w 220 and 280 seconds, which is a diff of 60 sec.

d. Are the data more spread out below Q_1 or above Q_3 ? Explain.

Below Q_1 - its more condensed to the right

Shapes of Box-and-Whisker Plots:



Skewed left

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



Symmetric

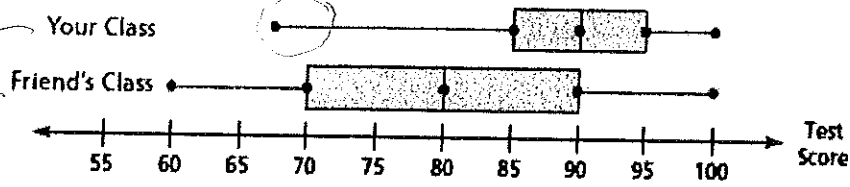
- Whiskers about same length
- Median in the middle of the data



Skewed right

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

Example 4: The double box-and-whisker plot represents the scores for your class and your friend's class.



a. Identify the shape of each distribution.

skewed left

Outliers in "your class"?

Yes!!!

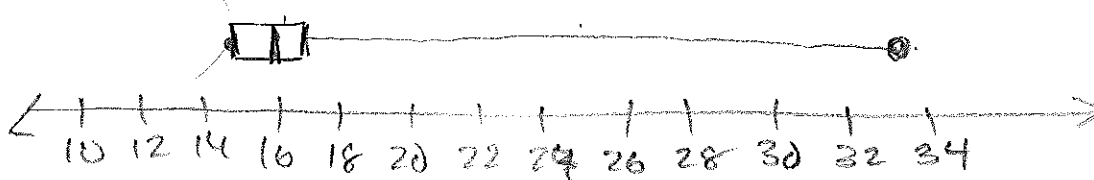
Any data below 70

b. Which test scores are more spread out? Explain.

Symmetric

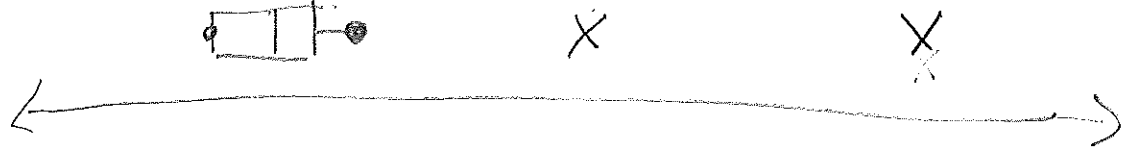
When you have an outlier, you make a "Modified" Box-and-whisker plot

15, 15, 15, 15, 16, 16, 16, 16, 16, 16, 17, 17, 25, 33



$IQR: 2 \quad 16.5 + 3 = 19.5$

$1.5 IQR = 3 \quad 15 - 3 = 12$



Student Name: _____

Score: _____

Box – Whisker Plot - Medium

Problem 1:

Draw box and whisker for the given data:

23, ~~10~~, ~~18~~, 30, ~~26~~, ~~8~~, 25, ~~18~~

Work Space:

8, 10, 11, 13, 18, 20.5, 23, 25, 26, 30

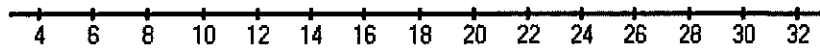
25.5

First Quartile = 11

Second Quartile or Median = 20.5

Third Quartile = 25.5

Range = 22



Problem 2:

Draw box and whisker for the given data:

35, 60, 20, 80, 95, 15, 40, 85, 75

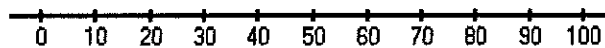
Work Space:

First Quartile =

Second Quartile or Median =

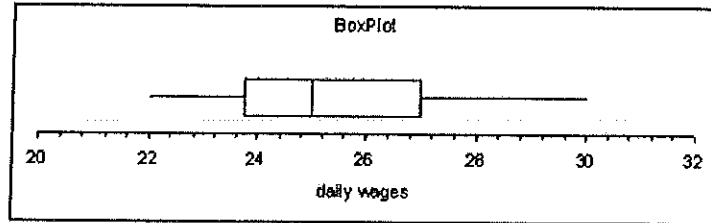
Third Quartile =

Range =



~~10/12~~ Box-and-Whisker Plot Homework

1. Use the box-and-whisker plot to find the given measure.



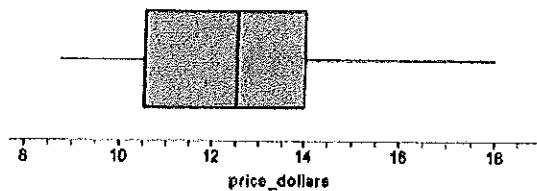
- | | |
|---------------------|--------------------|
| a. Least value: | b. Greatest value: |
| c. Third quartile : | d. First quartile: |
| e. Median: | f. Range: |

2. Make a box-and-whisker plot that represents each data set below.

a. Hours of television watched: 0, 3, 4, 5, 2, 4, 6, 5

b. MP3 player prices (in dollars): 124, 95, 105, 110, 95, 124, 300, 190, 114

3. The box-and-whisker plot represents the prices (in dollars) of the entrees at a restaurant.



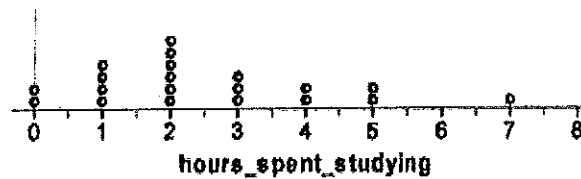
a. Find and interpret the range of the data.

b. Describe the distribution of the data.

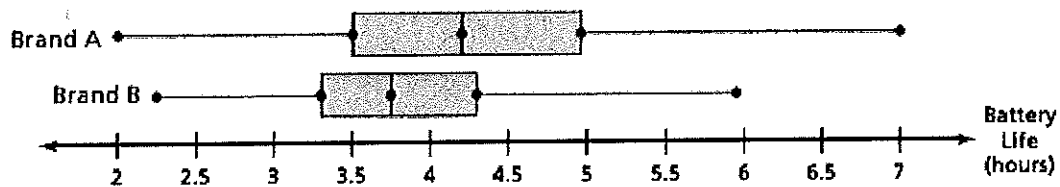
c. Find and interpret the interquartile range of the data.

d. Are the data more spread out below Q1 or above Q3?

4. The dot plot represents the numbers of hours students spent studying for an exam. Make a box-and-whisker plot that represents the data.



5. The double box-and-whisker plot represents the battery lives (in hours) of two brands of cell phones.



a. Identify the shape of each distribution.

b. What is the range of the upper 75% of each brand?

c. Compare the interquartile ranges of the two data sets.

d. You need a cell phone that has a battery life of more than 3.5 hours most of the time. Which brand should you buy?