

## What is a Box and Whisker Plot?

- 1) **Teaching objective(s):**
  - A. The student will collect, organize, and display data in an appropriate chart or graph.
  - B. The student will find and interpret basic statistical measures.
  
- 2) **Instructional Activities**
  - A. Explain to students that a box-and-whisker plot can be useful for handling many data values. They allow people to explore data and to draw informal conclusions when two or more variables are present. It shows only certain statistics rather than all the data. Another name for the visual representations of a box-and-whisker plot is a five number summary. The five number summaries consist of the median, the quartiles, and the smallest and greatest values in the distribution. Immediate visuals of a box-and-whisker plot are the center, the spread, and the overall range of the distribution.
  - B. Next, I give students the steps in constructing a box-and-whisker. (Below)
    - a) The first step in constructing a box-and-whisker plot is to first find the median, the lower quartile and the upper quartile of a given set of data. (Show this example on Dry erase Board)  
Example: These are the averages of 11 students in Mrs. Johnson math class: **45, 55, 66, 66, 70, 80, 88, 90, 95, 98, 100.**
      - 1) First find the median. The median is the value exactly in the middle of an ordered set of numbers. **80** is the median
      - 2) Next we consider only the values to the left of the median: **45, 55, 66, 66, 70.** We now find the median of this set of numbers. Remember, the median is the value exactly in the middle of an ordered set of numbers. Thus **66** is the median of the averages less than the median of all averages, and therefore the lower quartile.
      - 3) Now consider only the values to the right of the median: **88, 90, 95, 98, 100.** We now find the median of this set of numbers. The median of this set of averages is **95**; therefore called the upper quartile.  
Now we begin to draw our graph (Attachment 1)
      - 4) After you have successfully demonstrated the first example; give them example with an even number of items.  
**Second example: 66, 67, 85, 88, 90, 100**  
In this example the median would be the sum of the two numbers in the middle divided by 2.  **$85 + 88 = 173$**

Divide **173 by 2** and you will get a median of **86.5**

- b) Explain three more problems dealing with box-and-whisker. Another problem dealing with the construction of a Box-and-whisker plot and two with reading of box an whisker plots.(Attachment 2)
  
- 3) **Materials and resources**  
Dry erase board and markers, Activity sheets on Box-and-whisker, rulers, pencils.
  
- 4) **Assessment**  
Teacher Observation: To assess student's comprehension of the activity, give them a similar data set and have them go through the process on paper. They should identify the median, upper and lower quartiles, and upper and lower endpoints, then draw the graph on a number line. (Attachment 3).



(Attachment 1)

Name \_\_\_\_\_ Date \_\_\_\_\_

### Assessing Box-and-Whisker Plots Worksheet

The following box-and-whisker plot represents the test scores for students in two different classes:



Class A



Class B

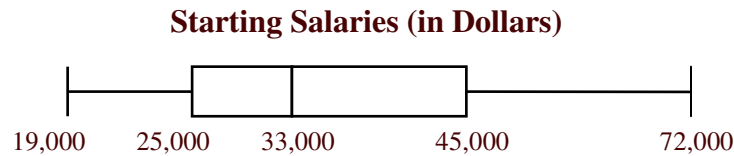


Write a paragraph comparing how these two classes did on this test. Give as much information as you can.



(Attachment 2)

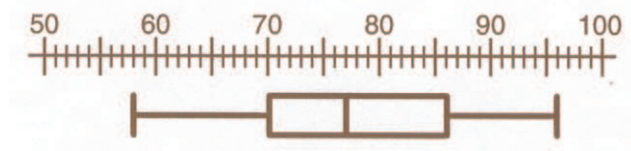
1. The box-and-whisker plot below shows the starting salaries for graduates of a small college.



What is the range of the starting salaries?

- A \$20,000
- B \$33,000
- C \$53,000
- D \$72,000

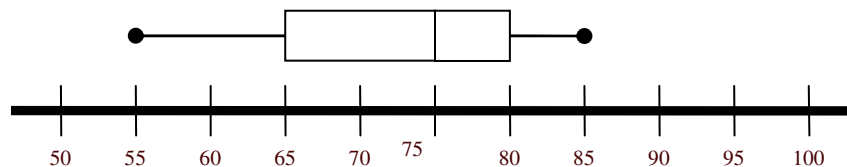
2. Mr. Andrews made a box-and-whisker graph of the quiz grades in his chemistry class.



Which is the median quiz grade for the class?

- A. 70
- B. 77
- C. 80
- D. 85

3. Mr. Fourman grades on a curve in which the top 25% of the test scores earn A's, the middle 50% earn C's, and the bottom 25% earn F's. The box and whisker plot below shows the distribution of scores on the last test.



What is the range of scores for people who earned Cs?

- A 5
- B 10
- C 15
- D 30

(Attachment 3)



Name \_\_\_\_\_ Date \_\_\_\_\_

- The first step in constructing a box-and-whisker plot is to first find the median, the lower quartile and the upper quartile of a given set of data. (Show this example on Dry erase Board)
- Example: These are the averages of 7 students in Mrs. Johnson math class: **45, 55, 66, 66, 70, 80, 88, 90, 95, 98, 100**.
- First find the median. The median is the value exactly in the middle of an ordered set of numbers. **80** is the median
- Next we consider only the values to the left of the median: **45, 55, 66, 66, 70**. We now find the median of this set of numbers. Remember, the median is the value exactly in the middle of an ordered set of numbers. Thus **66** is the median of the averages less than the median of all averages, and therefore the lower quartile.
- Now consider the only the values to the right of the median: **88, 90, 95, 98, 100**. We now find the median of this set of numbers. The median of this set of averages is **95**; therefore called the upper quartile.
- Now we begin to draw our graph

