

Neighborhood Salaries**ID: 12542****Time required***45 minutes***Activity Overview**

This activity explores what happens to measures of center and spread when outliers are introduced and when sample size varies.

Topic: Numbers and Operations

- *Develop and evaluate inferences and predictions that are based on data*
- *Use observations about differences between two or more samples to make conjectures about the populations from which the samples were taken*

Teacher Preparation and Notes

- *The lists provided with this activity need to be loaded on all calculators.*
- *TI-Navigator is not required for this activity, but an extension is given for those teachers that would like to use it. TI-Navigator can also be used to transfer the lists and then this activity can be used as-is.*
- ***To download the student worksheet, calculator lists, and TI-Navigator file, go to education.ti.com/exchange and enter “12542” in the quick search box.***

Associated Materials

- *MGAct27_Salaries_worksheet_TI73.doc*
- *NHBR.73I*
- *TOWN.73I*
- *MGAct27_LrnChk_TI73.edc*

Suggested Related Activities

To download the activity listed, go to education.ti.com/exchange and enter the number in the quick search box.

- *Keeping Up With the Joneses (TI-73 Explorer and TI-Navigator) — 6695*
- *Measures of Central Tendency (TI-73 Explorer and TI-Navigator) — 2148*
- *Math TODAY – Humidity Makes the Air Feel Even Hotter (TI-73 Explorer and TI-Navigator) — 2976*

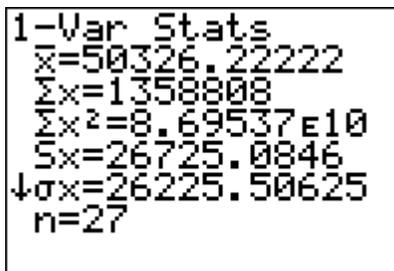
Problem 1 – What is Average

Questions 1-3

Begin the activity with a review or discussion around mean, median, and range. Students should already be familiar with these concepts and will now look at them in a real-world situation. Discuss list **NHBR**, which is shown at the right.

Question 4

To find the mean, median, and quartiles, students will need to have the lists provided in this activity. If you have already sent them to their calculators, students can press **2nd** **LIST** **◀** and select **1-Var Stats**. Then press **2nd** **LIST** again and select the list **NHBR**. When the student presses **ENTER** the calculator will display the mean, median, quartiles, and so on.



Students can find the range by subtracting the **minX** value from the **maxX** value.

Questions 5-8

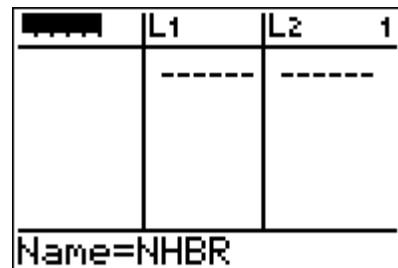
Students can use the **▾** to move through the information on the screen to see the quartiles. Engage students in a discussion about the data, what it tells them about the list, and see if they think the data is “typical” of the town.

Occupation	Salary
Financial Manager	\$50,458
Funeral Director	\$41,800
Engineering Manager	\$80,943
Electrical Engineer	\$63,247
Actuary	\$72,449
Surveying and Mapping Technician	\$36,583
Lawyer	\$80,137
Podiatrist	\$83,111
Doctor	\$124,125
Restaurant Hostess	\$16,506
Cashier	\$18,844
Bartender	\$17,048
Mail Person	\$39,642
Electrician	\$37,757
Automotive Body and Repair	\$30,754
Dentist	\$102,843
Psychologist	\$50,984
Computer Programmer	\$54,858
Architect	\$51,081
Librarian	\$36,866
Police Officer	\$42,193
Trucker	\$35,275
Machinist	\$35,140
Furniture Maker	\$26,586
Airplane Pilot	\$62,415
Elevator Installer	\$51,647
Maid	\$15,516

Problem 2 – Investigating Outliers

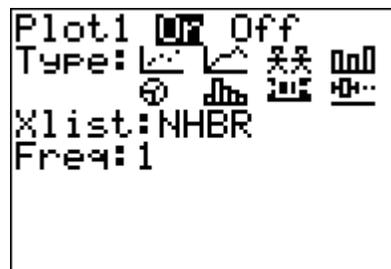
Question 9

Students will need to open the list to find the cashier’s salary. Press **LIST** then move to the top of **L1** and press **2nd** **DEL** to insert a blank column. With the cursor in the top of the column, press **2nd** **LIST**, scroll down to the **NHBR** name and press **ENTER** again. This will paste the name to the entry line. Press **ENTER** again and it will copy the list contents into the column.

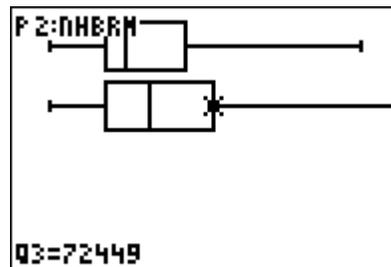


Questions 10-12

To create a box-and-whisker plot, students need to press **2nd** **Y=** and choose **Plot1**. The set up should match that at the right. Press **ZOOM** and select **ZoomStat** to view the plot.



If you would like the students to keep the original data, you will want to have them save **NHBR** to a second list, perhaps **NHBRM** (modified), and change the cashier's salary in the second list. This can be done on the home screen by pressing **2nd** **LIST** and select **NHBR**, then **STO>**, **2nd** **LIST** and select **NHBR**, **2nd** **MATH** and select **M**. Then press **ENTER**.



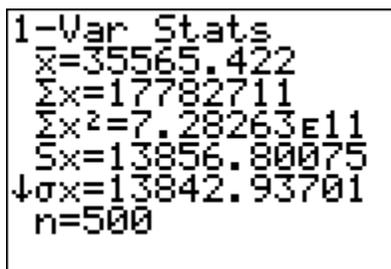
Otherwise, students will need to graph the first set of data, sketch the graph, and then graph the second set.

Press **GRAPH** to view both plots. With the second graph, students should notice that the maximum goes off the end of the screen. Why is this the case? What happened to the maximum from the first set of data? How did the other important numbers in the plots change?

Problem 3 – Investigating Sample Size

Questions 13-15

Students repeat the process of finding mean, median, and quartiles using the whole population of the town, using the list **TOWN**. Ensure that students understand the town is being compared to the original neighborhood data, not the modified cashier's salary.



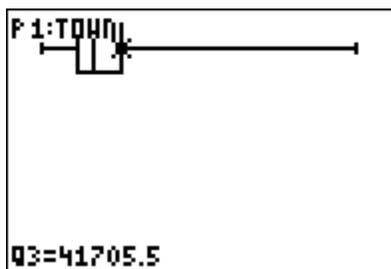
Ask questions for students to explore the similarities and differences between the two sets of data and their statistics.

You may want to have students change one salary to \$1.1 Million and discuss how it affects the data.

Problem 4 – Using Box-and-Whisker Plots

Questions 16-18

Students will use the process for setting up a stat plot to view a box-and-whisker plot of the town data. Looking at the minimum, quartiles, median, and maximum should allow the students to easily compare the sets of data.



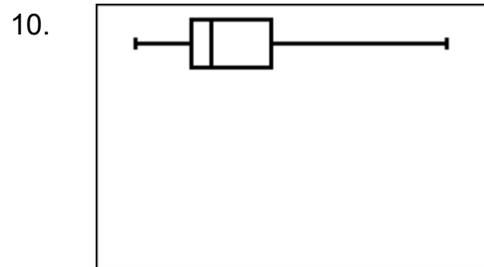
Solutions – student worksheet

Problem 1

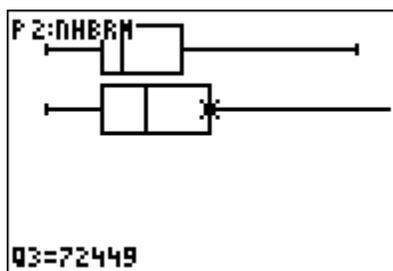
1. Answers will vary. Should include reference to average or the sum of the data values divided by the number of data points.
2. The range is the difference between the maximum and minimum.
(124125 – 15516 = 108609)
3. The median is the value in the middle of a list, when the numbers are ordered from least to greatest.
4. mean: 50326, median: 42193, range: from 15516 to 124125, or 108,609.
5. quartile 1: 35140, quartile 3: 63247
6. The quartiles separate the list into sections of 25%. The first quartile number means that 25% of the data fall below this number. Quartile 3 is 75% of the set of data.
7. The median is 42,193. This means that half of the data values are below this number and half are above this number.
8. Answers will vary. Check students' reasoning.

Problem 2

9. Answers will vary. Students should state that the maximum will go up and that the other statistics will change (most increasing). The median will shift up one number in the list while the mean will likely be affected even more.



11. mean: 90369, median: 50458, range: 15516 to 1,100,000 or 1,084,484, quartile 1: 35275, quartile 3: 72449

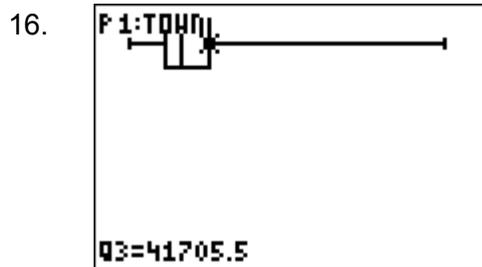


12. It is easy to see that the minimum stayed the same, that the first quartile stayed the same but then the median, third quartile, and the maximum have all changed.

Problem 3

13. mean: 35565, median: 32114, range: 13722 to 124,125 or XXXX, quartile 1: 26305, quartile 3: 41705
14. The neighborhood is considerably different from the town as a whole. The average salaries in the neighborhood are much higher than the town.
15. No, the neighborhood is not representative of the town in general.

Problem 4



17. The data is much more closely centered around the median with 75% of the data being below 41705.
18. Using the neighborhood data will overstate the average salary of the town. It does not do a good job of representing the town's characteristics.

Extension – TI-Navigator™

1. Use TI-Navigator to send the lists used in the activity to students. This will eliminate any error associated with the students modifying the neighborhood salary.
2. **Screen Capture** can be used throughout the activity to monitor student progress
3. Any of the questions provided in the activity can be set up as a **Quick Poll** to gather quantitative input from students. This will allow you to monitor student understanding as they progress through the activity. A LearningCheck™ file has been provided with the standard questions about the data sets (mean, median, range, etc.). Open the EDC file, select a question, and use the **“Send as Quick Poll”** feature to present the question to the students.