Common Core Math 1 Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Univariate Data Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Boxplots and Outliers

1. Given the following grades on an English 11 test:

91, 98, 87, 76, 100, 45, 72, 85, 92, 88, 87, 90, 91, 66, 100, 99, 67, 85, 79, 80, 85

Do you think there will be an outlier? Answers may vary; students may say that 42 is an outlier.

Calculate the 5 number summary and any outliers. Min: 45, Q1: 77.5, Med: 87, Q3: 91.5, Max: 100

45 is an outlier.

Remove the outlier and recalculate the 5 number summary. What changes have occurred? Min: 66, Q1: 79.5, Med: 87, Q3: 91.5, Max: 100.

Minimum value and Q1 are both a little higher, but the median, Q3 and maximum values remained unchanged.

Why would it be useful to remove the outlier to look at this data? Explain a scenario in which we would want to leave the outlier in and a scenario in which we would want to remove the outlier. Answers will vary.

2. Given the box plot below, create a scenario that would produce this data.



3. In the table below, the public high school graduation rates for 1992-1993 are given for each state, including the District of Columbia. (Note: the rates are listed in ascending order)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **State** | **Rate** | **State** | **Rate** | **State** | **Rate** |
| Louisiana | 56.3 | Oregon | 72.6 | Arkansas | 78.4 |
| South Carolina | 59.2 | Kentucky | 72.7 | New Hampshire | 78.4 |
| Texas | 59.4 | Missouri | 72.8 | Kansas | 80.3 |
| Florida | 61.4 | Alaska | 73.4 | Pennsylvania | 80.6 |
| Georgia | 61.6 | Virginia | 74.2 | Utah | 80.7 |
| Alabama | 61.7 | Maine | 74.3 | Connecticut | 80.8 |
| Mississippi | 63.5 | Hawaii | 74.9 | Vermont | 82.0 |
| DC | 64.6 | Ohio | 75.0 | Idaho | 82.3 |
| New York | 65.4 | Indiana | 75.1 | Wisconsin | 83.5 |
| Tennessee | 67.4 | Colorado | 75.3 | New Jersey | 85.8 |
| North Carolina | 67.6 | Rhode Island | 75.5 | North Dakota | 85.8 |
| California | 67.9 | Maryland | 75.6 | Montana | 86.7 |
| New Mexico | 68.2 | Washington | 75.6 | Nebraska | 86.9 |
| Nevada | 69.6 | Oklahoma | 75.9 | Wyoming | 86.9 |
| Michigan | 69.9 | West Virginia | 77.9 | Iowa | 87.5 |
| Deleware | 70.2 | Illinois | 78.0 | Minnesota | 89.1 |
| Arizona | 72.0 | Massachusetts | 78.1 | South Dakota | 89.1 |

1. Find the mean 74.7
2. Find the median 75.1
3. Which measure of center would be the most appropriate to use? Support your answer with a reason. There are no outliers in this data, so either mean/standard deviation or median/IQR would be appropriate. Students should justify their choice.
4. Calculate the 5 number summary Min: 56.3, Q1: 68.2, median: 75.1, Q3: 80.7, max: 89.1
5. Find the range. 32.8
6. Find the interquartile range. Interpret what this gives you. 12.5
7. List the 7 states that have the highest graduation rates. What region of the country to they represent? ND, MT, NE, WY, IA, MN, SD; Midwest region
8. List the 7 states that have the lowest graduation rates. What region of the country do they represent? LA, SC, TX, FL, GA, AL, MS. Southeast region.
9. Name some factors that might account for your answers to “g” and “h.” Answers may vary. Some may include the fact that the southeast has a higher poverty rate.
10. Are there any outliers? No.
11. What graduation rate would a state have to be over or under to be considered an outlier? Under 49.45% or over 99.45%.
12. Create an outlier. Identify it here and explain (good or bad graduation rate?). Answers to l-n will vary.
13. Add this outlier to the data. Recalculate the mean and median.
14. As a North Carolinian, what does this outlier do for the “standing” of your state?