

Name _____ Date: _____ Period: _____

Activity: Using MEASURES OF CENTER to Analyze Data*This activity*

will provide an opportunity to practice computing the mean and the median. In addition, the activity will emphasize the relevance of a distribution's shape to the relationship between the mean and median. You will need to access Stemplots from the Interactive Tools menu:

<http://www.learner.org/courses/againstalldds/interactives>

1. Work in Quiz mode. Set the number of observations to 10 and the maximum to 100. Assume that the Stemplots tool is generating 10 hypothetical test scores.

a. Make a copy of the stemplot. Based only on the shape of the stemplot, which do you think is larger, the mean or the median? Justify your choice.

b. Calculate the mean and median. Show your calculations. Submit your answers to make sure they are correct. (If not, revise your answers and re-submit.) Now that you have done the calculations, was your answer to (a) correct?

2. Repeat question 1 with a new sample of 10 test scores.

3. Use the Stemplots tool to generate 17 final exam scores. The final exam is worth 150 points; so, set the Maximum Observation Value to 150.

a. Make a copy of the stemplot.

b. Based only on the shape of the stemplot, which do you think is larger, the mean or the median? Justify your choice.

c. Calculate the mean and median. Use the Stemplots tool to check that your calculations are correct. Was your answer to (b) correct?

4. Repeat question 3 with a new sample of 17 final exam scores.

5. Below are 70 exam scores from a very difficult exam given to a large class.

64	78	67	35	74	73	69	66	36	69
74	38	72	79	36	46	77	69	39	38
63	32	36	80	35	35	36	39	35	35
67	73	58	43	64	64	69	69	69	37
50	63	36	39	74	36	35	60	62	65
69	69	35	34	49	67	65	61	33	36
36	37	36	36	65	69	40	72	69	66

a. Work in *Plot your Data* mode. Enter the exam scores into the Stemplots tool. Use the interactive tool to make the stemplot. Describe the shape of the plot.

b. Determine the median, mean, and mode(s) for the exam scores.

c. Based on the plot, which gives a better description of the location of these data, the median, mean, or mode(s)? Explain.

6. Below are 30 exam scores from a statistics exam.

90	76	78	76	75	74	85	74	65	78
75	60	75	76	75	78	70	75	65	85
72	74	70	76	72	80	80	72	78	74

a. Work in *Plot your Data* mode. Enter the exam scores into the Stemplots tool. Use the interactive tool to make the stemplot. Describe the shape of the plot.

b. Determine the median, mean, and mode(s) for the exam scores.

c. Based on the plot, which gives a better description of the location of these data, the median, mean, or mode(s)? Explain.

MEASURES OF CENTER Unit Activity Solutions

KEY

1.a. *Sample answer* (answers differ since the data are randomly generated):
For the stemplot below, the mean should be smaller than the median.
The few really small test scores should pull the mean down.

1	6
2	
3	56
4	
5	
6	12
7	4
8	235
9	5

b. There were 10 test grades: $(10 + 1)/2 = 5.5$. So, the median = $(62 + 74)/2 = 68$. To find the mean, the sum of the test scores is 629. So, the mean = $(629)/10 = 62.9$. The median is larger than the mean.

2.a. *Sample answer:* The mean and median should be fairly close. However, the graph is somewhat skewed to the left, so the mean should be lower than the median.

3	26
4	447
5	1258
6	6

b. median = $(47 + 51)/2 = 49$; mean = $485/10 = 48.5$. The median is larger than mean.

3.a. *Sample answer:*

1	389
2	3
3	
4	2
5	268
6	1
7	59
8	88
9	
10	
11	
12	
13	256
14	3

b. The mean should be larger because there are 4 extremely large test scores in comparison to the other test scores. Those large scores will pull the mean up but should not affect the median.

c. median = 61; mean = 71.6.
The mean was larger than the median.

4.a. *Sample answer:*

```
5 | 19
6 | 116
7 | 256
8 | 33445
9 | 57
10 | 38
```

b. The mean should be somewhat smaller than the median because the distribution is skewed to the left.

c. median = 83 and mean = 79.

The median was larger than the mean.

5.a. The plot has two peaks, one in the 30s and the other in the 60s.

```
3 | 234555555566666666667788999
4 | 0369
5 | 08
6 | 012334445556677799999999999
7 | 2233444789
8 | 0
```

b. median = 61.5; mean \approx 53.3; there are two modes, one at 36 and the other at 69.

c. The median locates the upper peak, but does nothing to summarize the location of the lower peak. The mean is located where there is little data, and is not close to identifying the location of either of the peaks where there is a lot of data. Using the two modes gives the locations of the two peaks. So, in this case, the modes would be the best choice to describe the location of these data.

6.a. The plot appears roughly symmetric, with a single peak.

```
6 | 055
7 | 0022244445555566668888
8 | 0055
9 | 0
```

b. median = 75; mean = 75.1; mode = 75.

c. In this case, it doesn't really matter which of the three numeric descriptors for the center you choose. They are all about the same.