

Name _____

Investigation 3: How Good Is Your Memory?

Worksheet 3.3 Memory Test Investigation

Statistical Question: _____

Analyze the Data

1. To help answer the statistical question—“How do the memory test completion times of our class compare to the memory test completion times for fourth graders from around the United States?”—construct a dot plot of the fourth grade memory test times.
2. Describe the distribution of the fourth grade memory test times. Your description should include an estimate of the distribution’s center and a description of the spread around the center.
3. Copy the dot plot of the class memory completion times above the dot plot of the fourth grade completion times.
4. Using the dot plot of class memory completion times and the fourth grade dot plot of completion times, how do the two distributions compare?
5. Use technology (graphing calculator, spreadsheet, or app) and enter the fourth grade memory test times into a list. Use the technology to find the mean of the fourth grade memory test times. Mark the mean on the dot plot with a Δ , indicating the mean or the balance point of the distribution.

6. Draw an arrow from the mean of 59 sec. to the data point 45 sec. This arrow shows the distance that the point 45 is below the mean. This distance is called the *deviation* from the mean.
7. Find the deviation from the mean for this data point (45) by subtracting the mean from the value of the data point.
8. This deviation is negative. What does this tell you about the data point in relation to the mean?
9. Draw an arrow from the mean of 59 sec. to the data point 80 sec. Find the deviation for the data point 80. This deviation is positive. What does this tell you about the data point in relation to the mean?
10. Use technology, (list on a graphing calculator or spreadsheet) to find the deviation from the mean for all the fourth grade times. If using a spreadsheet or lists in a graphing calculator, set a formula for a column that takes all the values of the fourth grade times minus the mean of 59. Store these deviations in another list or column.
11. Using technology to find the sum of all the deviations. Why does this value make sense?

To find the population standard deviation—a measure that summarizes the spread of all the deviations or the typical deviation from the mean, complete the following steps using technology and the list or column of the fourth grade completion times.

12. Use technology and square each deviation found in Question 10. Store the squares in another column or list.
13. Use technology and find the sum of the squared deviations.
14. Use technology and find the mean of the squared deviations.
15. Take the square root of this mean of the squared deviations.

Explain that this value is called the *population standard deviation*. It is a measure used to describe the amount of variation or spread of a set of data values around the *population mean*. The fourth grade completion times had a mean of 59 seconds with a standard deviation of 19.2 seconds. This can be interpreted as the typical distance the data points are from the mean is approximately 19.2 seconds.

16. Enter the class times into a calculator, spreadsheet, or statistical software. Use the built-in standard deviation function and find the mean and standard deviation of your class completion times. Since the class is taken to be a population in this investigation, report the population standard deviation.
17. Interpret the mean and standard deviation of your class memory test completion times.
18. Compare the mean of your class completion times to the mean of the fourth grade completion times.
19. Interpret and compare the standard deviation of your class times to the standard deviation of the fourth grade times. What does the value of the smaller standard deviation indicate?

Interpret the results in the context of the original question

20. Using the results of your study of the fourth grade completion times and your class completion times, write a summary of your answer to the statistical question: "How do the memory test completion times of our class compare to the memory test completion times for fourth graders from around the United States?"
21. The fourth grade times had an outlier at 122 seconds. Delete this point from the list/column of the fourth grade times and recalculate the mean and standard deviation. What effect did the outlier have on the mean and standard deviation?