



Algebra 2 - Year 2

Lesson 11.6 - Standard Deviation Notes & Examples (Day 2)

Name: _____

Date: _____ Hour: _____

In a data list, every value falls within some number of standard deviations of the mean.
For example, if the mean is 50 and the standard deviation is 10, then a value x with $40 \leq x \leq 60$ is within one standard deviation of the mean. \uparrow range

Example 1- If the mean is 24 and the standard deviation is 6, what would the range of the data values be that are within 2 standard deviations of the mean?

$$\begin{aligned}
 24 - 6 &= 18 & 1 \text{ standard deviation: } & 18 \leq x \leq 30 \\
 24 + 6 &= 30 \\
 18 - 6 &= 12 & 2 \text{ standard deviations: } & 12 \leq x \leq 36 \\
 30 + 6 &= 36
 \end{aligned}$$

Got It? 2. Meteorology The table displays the number of hurricanes in the Atlantic Ocean from 1992 to 2006. What are the mean and standard deviation?

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Number	4	4	3	11	10	3	10	8	8	9	4	7	9	14	5

Source: National Hurricane Center

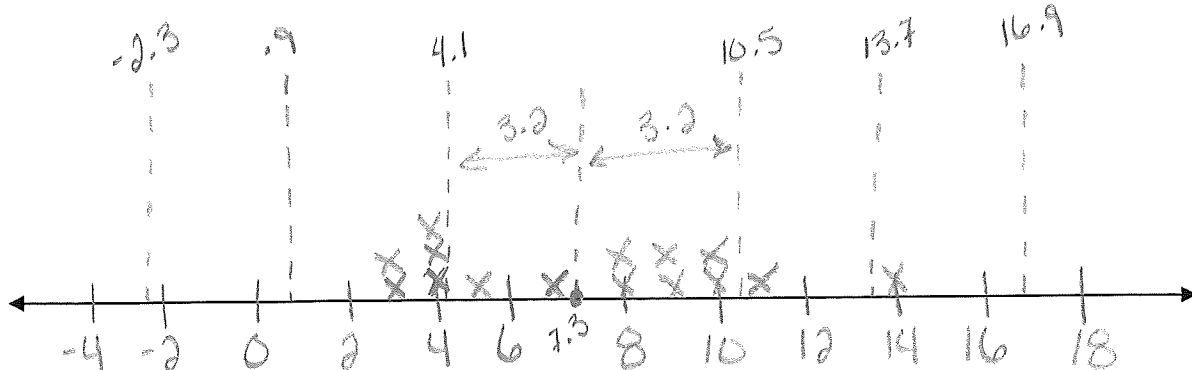
a. Use a graphing calculator to find the mean and standard deviation.

Mean = \bar{x} = 7.3

Standard deviation = σ = 3.2

$$\begin{aligned}
 7.3 - 3.2 &= 4.1 & 0.9 - 3.2 &= -2.3 \\
 7.3 + 3.2 &= 10.5 & 13.7 + 3.2 &= 16.9 \\
 4.1 - 3.2 &= 0.9 \\
 10.5 + 3.2 &= 13.7
 \end{aligned}$$

b. Create a number line by plotting all of the data values, showing the mean in the center. Add and subtract standard deviations in each direction until all data values would be included.



c. Within how many standard deviations of the mean do all of the values fall?

3 standard deviations



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Name: _____

Assignment: Lesson 11.6 worksheet

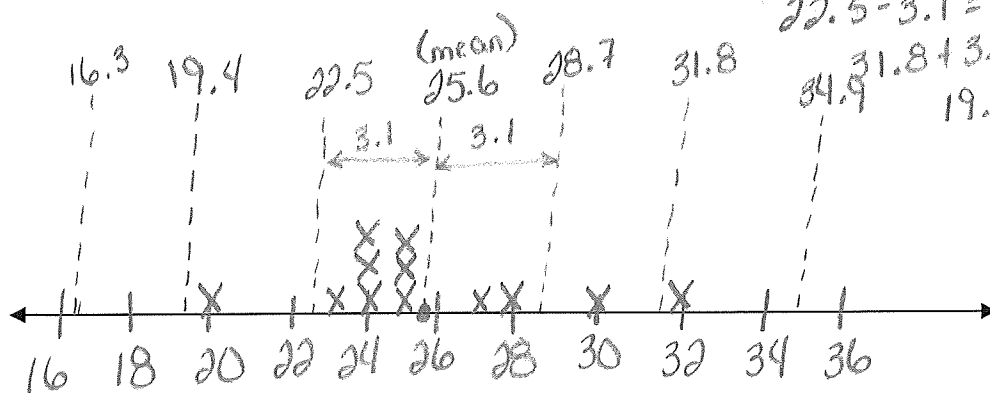
Date: _____ Hour: _____

Create a number line by plotting all of the data values, then determine the whole number of standard deviations from the mean that include all the data values.

1. The mean price of the nonfiction books on the best-sellers list is 25.6; the standard deviation is 3.1

27 23 24 25 30 20 25 24 28 25 32 24

$$\begin{aligned}
 25.6 + 3.1 &= 28.7 \\
 25.6 - 3.1 &= 22.5 \\
 28.7 + 3.1 &= 31.8 \\
 22.5 - 3.1 &= 19.4 \\
 31.8 + 3.1 &= 34.9 \\
 19.4 - 3.1 &= 16.3
 \end{aligned}$$

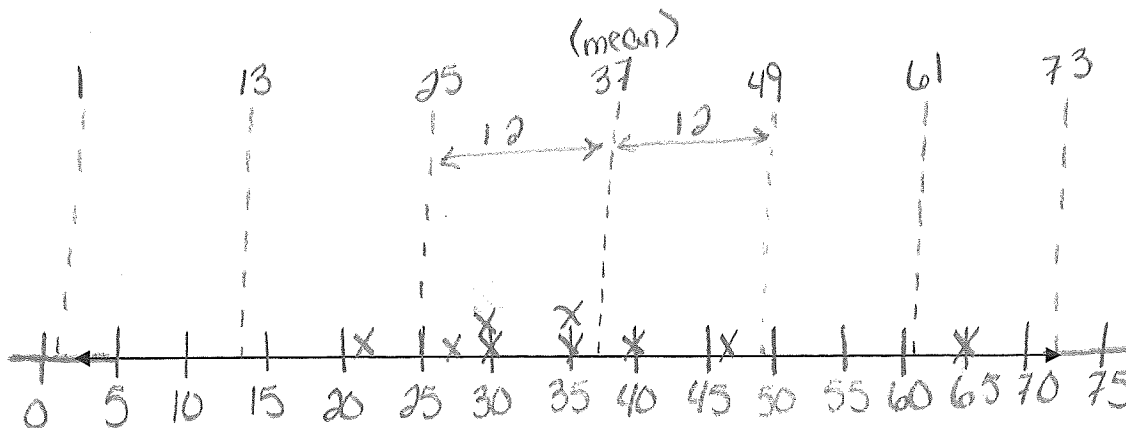


3 deviations to include all values

2. The mean length of Beethoven's nine symphonies is 37 minutes; the standard deviation is 12 minutes.

27 30 47 35 30 40 35 22 65

$$\begin{aligned}
 37 + 12 &= 49 & 61 + 12 &= 73 \\
 37 - 12 &= 25 & 13 - 12 &= 1 \\
 49 + 12 &= 61 & & \\
 25 - 12 &= 13 & &
 \end{aligned}$$



3 deviations to include all values

3. The data for the daily energy usage of a small town during ten days in January is shown.

83.8 87.1 92.5 80.6 82.4 77.6 78.9 78.2 81.8 80.1

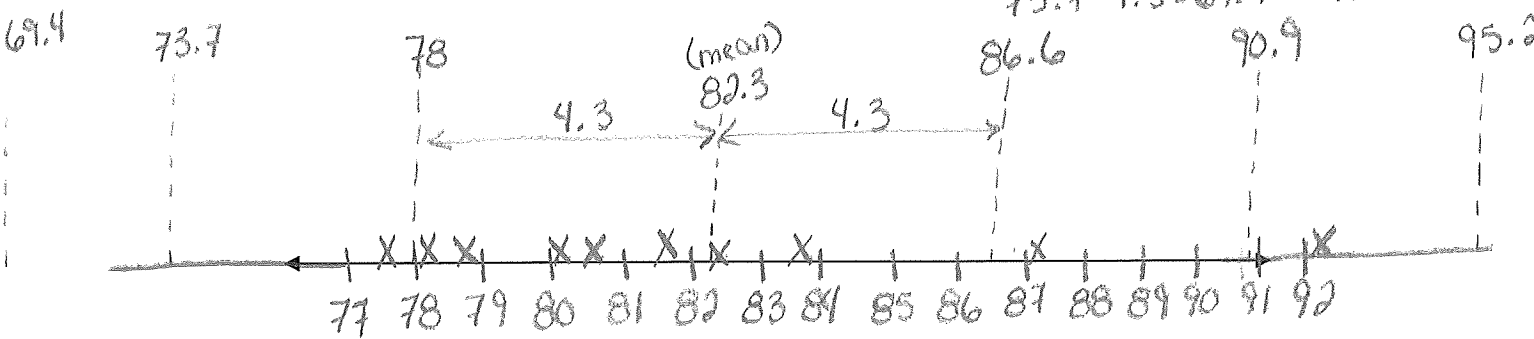
a. Find the mean and standard deviation of the data, rounded to the nearest tenth.

$\bar{x} = \underline{82.3}$ $\sigma_x = \underline{4.3}$

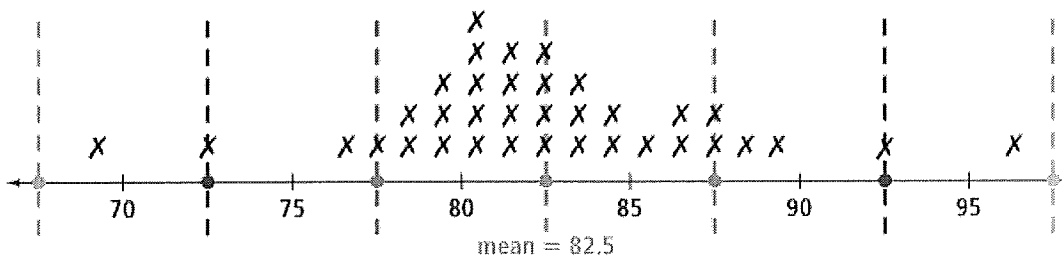
b. How many values in the data set fall within one standard deviation from the mean? *7 values*

Within two standard deviations? *9 values* $82.3 + 4.3 = 86.6 + 4.3 = 90.9$

Within three standard deviations? *10 values* $82.3 - 4.3 = 78 - 4.3 = 73.7$
 $73.7 - 4.3 = 69.4$ $90.9 + 4.3 = 95.2$



21. Error Analysis One of your friends says that the data below fall within three standard deviations from the mean. Your other friend disagrees, saying that the data fall within six standard deviations from the mean. With whom do you agree? Explain.



The data falls within 3 standard deviations because one standard deviation includes all values within one standard deviation above and below the mean.



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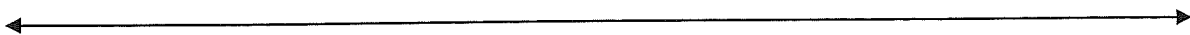
Source: National Hurricane Center

- a. Use a graphing calculator to find the mean and standard deviation.

Mean = \bar{x} = _____

Standard deviation = σ = _____

- b. Create a number line by plotting all of the data values, showing the mean in the center. Add and subtract standard deviations in each direction until all data values would be included.



- c. Within how many standard deviations of the mean do all of the values fall?



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Assignment: Lesson 11.6 worksheet

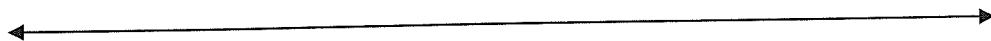
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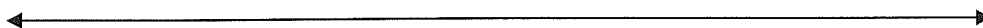
a. Find the mean and standard deviation of the data, rounded to the nearest tenth.

$\bar{X} =$ _____ $\sigma_x =$ _____

b. How many values in the data set fall within one standard deviation from the mean?

Within two standard deviations?

Within three standard deviations?



21. **Error Analysis** One of your friends says that the data below fall within three standard deviations from the mean. Your other friend disagrees, saying that the data fall within six standard deviations from the mean. With whom do you agree? Explain.

