

Calculating Standard Deviation by hand ws  
due Monday! #2-3

## **Essential Question**

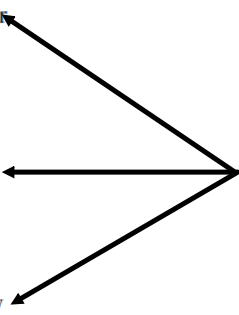
How can you describe the variation of a data set?

### Core Concept

**Mean**  
The **mean** of a numerical data set is the sum of the data divided by the number of data values. The symbol  $\bar{x}$  represents the mean. It is read as "x-bar."

**Median**  
The **median** of a numerical data set is the middle number when the values are written in numerical order. When a data set has an even number of values, the median is the mean of the two middle values.

**Mode**  
The **mode** of a data set is the value or values that occur most often. There may be one mode, no mode, or more than one mode.



Measures of Center  
Measures of Variation

Range: *max-min*

Standard Deviation:

*How much data typically varies from the mean*



How do you decide which measure of center best represents the data?

Mean  
If no outliers

Median  
outlier

Mode  
almost all data is same

6, 6.5, 6.7, 7, 7, 8, 8.5, 10, 15, 17

The following represent number of likes on your last 8 Instagram posts...

210, 185, 186, 221, 228, 176, 197, 203

176, 185, 186, 197, | 203, 210, 221, 228

Mean:  $\bar{x} = 200.75$

Median: 200

Mode: none

Range:  $228 - 176 = 52$

Std Dev: 17.086

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An amusement park hires students for the summer. The students' hourly wages are shown in the table.

Measures of Center

Mean:  $\bar{x} = 9.65$

Median: 8.70

Mode: 8.25

Students' Hourly Wages	
\$16.50	<u>\$8.25</u>
\$8.75	\$8.45
\$8.65	<u>\$8.25</u>
\$9.10	\$9.25

Which measure of center best represents the data?  
 Explain. Median  $\rightarrow$  outlier

Identify the outlier in the data.

Students' Hourly Wages	
\$16.50	\$8.25
\$8.75	\$8.45
\$8.65	\$8.25
\$9.10	\$9.25

16.50

How does the outlier affect the mean, median, and mode?

mean: pulled it up! made higher  
 med: 9.65 pulled up a tiny bit  
 mode: 8.25 no affect

Describe one possible explanation for the outlier.

Manager

w/ outlier  
 $\bar{x}$  9.65  
 med 8.70  
 mode 8.25

Ran

The table shows the annual salaries of the employees of an auto repair service.

Annual Salaries	
\$32,000	\$42,000
\$41,000	<del>\$38,000</del> + 1,000
<del>\$38,000</del>	\$45,000
\$72,000	\$35,000

Mean:

Median:

Mode:

Identify the outlier.

How does the outlier affect the mean, median, and mode?

$$72,000 - 32,000$$

$$R = 40,000$$

$$144,000 - 64,000 = 80,000$$



What happens to the mean, median, mode, range and standard deviation if you add \$1000 to each persons salary?

mean: + 1,000  
med: + 1,000  
mode: + 1,000

range.: same  
sd: same

What if you double each persons salary? (x, ÷)

mean: doubles  
med: doubles  
mode: doubles

range: doubles  
sd: doubles

## Core Concept

### **Data Transformations Using Addition**

When a real number  $k$  is added to each value in a numerical data set

- the measures of center of the new data set can be found by adding  $k$  to the original measures of center.
- the measures of variation of the new data set are the *same* as the original measures of variation.

### **Data Transformations Using Multiplication**

When each value in a numerical data set is multiplied by a real number  $k$ , where  $k > 0$ , the measures of center and variation can be found by multiplying the original measures by  $k$ .

Two reality cooking shows select 12 contestants each. The ages of the contestants are shown in the tables. Find the range and standard deviation of the ages for each show. Compare your results.

Show A	
Ages	
20	29
19	22
25	27
27	29
30	20
21	31

Show B	
Ages	
25	19
20	27
22	25
27	22
48	21
32	24

Show A

Show B

Range:

Range:

Std Dev:

Std Dev:

On your 5 math tests thus far you've scored 79, 91, 88, 90 and 84. What must you score on the sixth test if your goal is to have an average score of 90 on all tests?

$$\frac{79 + 91 + 88 + 90 + 84 + X}{6} = 90$$

$$\begin{array}{r} 432 + X = 540 \\ -432 \quad \quad -432 \\ \hline X = 108 \end{array}$$

hw 7.1 pg 336-338 #s 1-4, 5-21 odd, 27, 29, 32, 34  
due Tuesday

