**MAD NOTES:**

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Period:\_\_\_\_\_\_

**Describing Data through Measures of Center & Spread**

There are two ways to describe a set of data:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Today we will focus on the numerical descriptions.

***MEASURES OF CENTER***

**Mean:** A **numerical measure** of center that is the arithmetic average of the data. Affected by outliers.

Symbols to represent the mean. The large “E” type symbol indicates a “sum”. So the top is the sum of the data numbers and the bottom is the sum of how many pieces of data there are.

 Mean: $\overbar{x}= \frac{the sum of values}{number of data}= \frac{\sum\_{x}^{}}{\sum\_{n}^{}}$

**Median:** A **numerical measure** of center that describes the middle value of a data set. The median is not affected by outliers. Note that the median does not have to be one of the values in the data set, but a value that divides the data set in half so that 50% of the data values lie above the median and 50% of the data set lie below the median.

***MEASURES OF SPREAD*** describe\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:**

|  |  |
| --- | --- |
| **MEAN ABSOLUTE DEVIATION** | **EXAMPLE** |
| **STEP 1:****STEP 2:****STEP 3:****STEP 4:** | **STEP 1:****STEP 3****STEP 2**

|  |  |  |
| --- | --- | --- |
| **DATA** | **DIFFERENCE****Data minus Mean** | **ABSOLUTE VALUE** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

 **TOTAL of VALUES:****STEP 4:** |

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:** A **numerical measure** of spread that shows how much data values vary from the mean. A low mean absolute deviation indicates that the data points tend to be very close to the mean and not spread out very far so the mean is an accurate description of “typical”, and a high mean absolute deviation indicates that the data points are spread out over a large range of values.

BACK TO PPT SLIDE 9…..

**Jamal**

**MEAN:**

|  |  |  |
| --- | --- | --- |
| **DATA** | **DIFFERENCE****Data minus Mean** | **ABSOLUTE VALUE** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**MAD:**

**Bessie**

**MEAN:**

|  |  |  |
| --- | --- | --- |
| **DATA** | **DIFFERENCE****Data minus Mean** | **ABSOLUTE VALUE** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**MAD:**

**Li**

**MEAN:**

|  |  |  |
| --- | --- | --- |
| **DATA** | **DIFFERENCE****Data minus Mean** | **ABSOLUTE VALUE** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**MAD:**

BEST STUDENT? Explain.

**CLASSWORK**

**Now Try This: MEAN ABSOLUTE DEVIATION:**

 **Data Set: 30, 38, 40, 42, 48 Find the mean:** $\overbar{x}=$ \_\_\_\_\_\_\_\_\_

|  |  |  |
| --- | --- | --- |
| **DATA** | **DIFFERENCE****Data minus Mean** | **ABSOLUTE VALUE** |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

SUM of Values:

 *Mean Absolute Deviation (MAD) =*

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Period:\_\_\_\_\_\_

**Describing Data through Measures of Center & Spread**

There are two ways to describe a set of data:\_**graphically**\_\_ & \_\_\_**numerical**\_\_

Today we will focus on the numerical descriptions.

*MEASURES OF CENTER*

**Mean:** A **numerical measure** of center that is the arithmetic average of the data. Affected by outliers.

Symbols to represent the mean. The large “E” type symbol indicates a “sum”. So the top is the sum of the data numbers and the bottom is the sum of how many pieces of data there are.

 Mean: $\overbar{x}= \frac{the sum of values}{number of data}= \frac{\sum\_{x}^{}}{\sum\_{n}^{}}$

**Median:** A **numerical measure** of center that describes the middle value of a data set. The median is not affected by outliers. Note that the median does not have to be one of the values in the data set, but a value that divides the data set in half so that 50% of the data values lie above the median and 50% of the data set lie below the median.

*MEASURES OF SPREAD* describe\_**how much values typically vary from the center** \_

**\_\_RANGE\_\_\_:a description of how far apart the distance from the highest to lowest data pieces; found using highest minus lowest data**

**\_\_INTERQUARTILE RANGE: (IQR) a description of the middle 50% of the data; found using Q3 – Q1**

|  |  |
| --- | --- |
| **MEAN ABSOLUTE DEVIATION** | **EXAMPLE** |
| **STEP 1: Find the mean****STEP 2: Subtract the mean from each piece of data** **STEP 3: Find the absolute value of each difference** **STEP 4: Find the mean of the new**  **differences (deviations)** | **STEP 1: 25/5 = 5****STEP 3****STEP 2**

|  |  |  |
| --- | --- | --- |
| **DATA** | **DIFFERENCE****Data minus Mean** | **ABSOLUTE VALUE** |
| **1** | **1 – 5 = – 4**  | **І-4І = 4** |
| **2** | **2 – 5 = – 3**  | **І-3І = 3** |
| **4** | **4 – 5 = – 1**  | **І-1І = 1** |
| **8** |  **8 – 5 = 3** | **І 3І = 3** |
| **10** | **10 – 5 = 5** | **І 5І = 5** |

 **TOTAL of VALUES: 16****STEP 4: 16/5 = 3.2** |

**\_MEAN ABSOLUTE DEVIATION:** A **numerical measure** of spread that shows how much data values vary from the mean. A low mean absolute deviation indicates that the data points tend to be very close to the mean and not spread out very far so the mean is an accurate description of “typical”, and a high mean absolute deviation indicates that the data points are spread out over a large range of values.

**BACK TO PPT SLIDE 9…..**

**Bessie**

**MEAN: 85**

|  |  |  |
| --- | --- | --- |
| **DATA** | **DIFFERENCE****Data minus Mean** | **ABSOLUTE VALUE** |
| **82** | **82 – 85 = -3** | **І-3І = 3** |
| **86** | **86 – 85 = 1** | **І 1І = 1** |
| **89** | **89 – 85 = 4** | **І 4І = 4** |
| **83** | **83 – 85 = -2** | **І-2І = 2** |

**MAD:  = 2.5**

**Li**

**MEAN: 85**

|  |  |  |
| --- | --- | --- |
| **DATA** | **DIFFERENCE****Data minus Mean** | **ABSOLUTE VALUE** |
| **65** | **65 – 85 = -20** | **І-20І=20** |
| **82** | **65 – 82 = -17** | **І-17І=17** |
| **93** | **65 – 93 = -28** | **І-28І=28** |
| **100** | **65 – 100 = -35** | **І-35І=35** |

**MAD:=25**

**Jamal**

**MEAN: 85**

|  |  |  |
| --- | --- | --- |
| **DATA** | **DIFFERENCE****Data minus Mean** | **ABSOLUTE VALUE** |
| **80** | **80 – 85 = -5** | **І-5І = 5** |
| **99** | **99 – 85 = 14** | **І14І = 14** |
| **73** | **73 – 85 = -12** | **І-12І = 12** |
| **88** | **88 – 85 = 3** | **І 3 І = 3** |

**MAD:  = 8.5**

***Answers to “best” vary…allow them to defend thoughts-with all means equal, the lowest MAD score should help determine the student who is most consistent and has the least deviation from that mean. (BESSIE)***

**CLASSWORK**

**Now Try This:**

**MEAN ABSOLUTE DEVIATION:**

 **Data Set: 30, 38, 40, 42, 48 Find the mean:** $\overbar{x}=$ \_**39.6**\_

|  |  |  |
| --- | --- | --- |
| **DATA** | **DIFFERENCE****Data minus Mean** | **ABSOLUTE VALUE** |
| **30** | **30 – 39.6 = -9.6** | **І-9.6І = 9.6** |
| **38** | **38 – 39.6 = -1.6** | **І-1.6І = 1.6** |
| **40** | **40 – 39.6 = 0.4** | **І0.4І = 0.4** |
| **42** | **42 – 39.6 = 2.4** | **І2.4І = 2.4** |
| **48** | **48 – 39.6 = 8.4** | **І8.4І = 8.4** |

SUM of Values: **22.4**

 *Mean Absolute Deviation (MAD) =* **22.4/5 = 4.48**