**ML #3: Describing Data through Measures of Center & Spread (Unit 8-Math 7 PLUS)**

There are two ways to describe a set of data: graphically & numerically

- Today we will focus on the numerical descriptions.

***MEASURES OF CENTER*** (average)

**Mean:** add up numbers, ÷ by how many

**Median:** put numbers in order, middle number

***MEASURES OF SPREAD*** describe variability of data

- **Range:** difference b/w largest and smallest number
- **Inter-quartile Range** diff. b/w UQ and LQ
- Mean Absolute Deviation (MAD): 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"
  - A high mean absolute deviation indicates that the data points are spread out over a large range of values.

ex: 1, 2, 4, 8, 10

| MEAN ABSOLUTE DEVIATION | EXAMPLE |
|---|---|
| **STEP 1:** Find the mean | **STEP 1:** 25/5 = Mean: 5 |
| **STEP 2:** Subtract mean from each data point. | |
| **STEP 3:** Find absolute value of diff. | |
| **STEP 4:** Find the mean of the abs. value | **STEP 4:** MAD: $\frac{16}{5} = 3.2$ |

| DATA | STEP 2: DIFFERENCE Data minus Mean | STEP 3: ABSOLUTE VALUE |
|---|---|---|
| 1 | 1-5 = -4 | 4 |
| 2 | 2-5 = -3 | 3 |
| 4 | 4-5 = -1 | 1 |
| 8 | 8-5 = 3 | 3 |
| 10 | 10-5 = 5 | 5 |
| | TOTAL of VALUES: | |

**Li - 65, 82, 93, 100**

**MEAN:** 85

| DATA | DIFFERENCE Data minus Mean | ABSOLUTE VALUE |
|---|---|---|
| 65 | 65-85 | 20 |
| 82 | 82-85 | 3 |
| 93 | 93-85 | 8 |
| 100 | 100-85 | 15 |

**MAD:** $\frac{46}{4} = 11.5$

**Bessie – 82, 86, 89, 83**

**MEAN: 85**

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

**MAD:** $\frac{10}{4} = 2.5$

**Jamal – 80, 99, 73, 88**

**MEAN: 85**

| DATA | DIFFERENCE Data minus Mean | ABSOLUTE VALUE |
|---|---|---|
| 80 | 80-85 | 5 |
| 99 | 99-85 | 14 |
| 73 | 85-73 | 12 |
| 88 | 88-85 | 3 |

**MAD:** $\frac{34}{4} = 8.5$

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

**Data Set:** 30, 38, 40, 42, 48 **Find the mean:** $\bar{x} = \frac{198}{5} = 39.6$

| DATA | DIFFERENCE Data minus Mean | ABSOLUTE VALUE |
|---|---|---|
| 30 | 30 - 39.6 | 9.6 |
| 38 | 38 - 39.6 | 1.6 |
| 40 | 40 - 39.6 | 0.4 |
| 42 | 42 - 39.6 | 2.4 |
| 48 | 48 - 39.6 | 8.4 |

SUM of Values:

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

4.5