Mean Absolute Deviation:

“It is the average distance of all of the elements in a data set from the mean of the same data set.”

Mean Absolute Deviation, referred to as MAD, is a better measure of dispersion than the standard deviation when there are outliers in the data. An outlier is a data point which is far removed in value from the others in the data set. It is an unusually large or an unusually small value compared to the others.

**The mean absolute deviation formula is:**

**MAD =**

**Or**

**MAD =**

**Where mean is represented by µ and *n* is the total number of items and is the individual sample.**

**Mean Absolute Deviation is Often Preferred because it is less effected by Outliers.**

1. We start with an [average, or measurement of the center](https://www.thoughtco.com/the-mean-median-and-mode-2312604), of a data set, which we will denote by *m.*
2. Next we find how much each of the data values deviate from *m.* This means that we take the difference between each of the data values and *m.*
3. After this, we take the [absolute value](https://www.thoughtco.com/definition-of-absolute-value-2312371) of each of the difference from the previous step. In other words, we drop any negative signs for any of the differences. The reason for doing this is that there are positive and negative deviations from *m.*If we do not figure out a way to eliminate the negative signs, all of the deviations will cancel one another out if we add them together.
4. Now we add together all of these absolute values.
5. Finally we divide this sum by *n*, which is the total number of data values. The result is the mean absolute deviation.

**Variations**

There are several variations for the above process. Note that we did not specify exactly what *m* is. The reason for this is that we could use a variety of statistics for *m.* Typically this is the center of our data set, and so any of the measurements of central tendency can be used.

The most common statistical measurements of the center of a data set are the mean, [median](https://www.thoughtco.com/what-is-the-median-3126370) and the mode.

 Thus any of these could be used as *m*in the calculation of the mean absolute deviation. This is why it is common to refer to the mean absolute deviation about the mean or the mean absolute deviation about the median. We will see several examples of this.

**Example: Mean Absolute Deviation About the Mean**

Suppose that we start with the following data set:

1, 2, 2, 3, 5, 7, 7, 7, 7, 9.

The mean of this data set is 5. The following table will organize our work in calculating the mean absolute deviation about the mean.

|  |  |  |
| --- | --- | --- |
| Data Value | Deviation from mean | Absolute Value of Deviation |
| 1 | 1 - 5 = -4 | |-4| = 4 |
| 2 | 2 - 5 = -3 | |-3| = 3 |
| 2 | 2 - 5 = -3 | |-3| = 3 |
| 3 | 3 - 5 = -2 | |-2| = 2 |
| 5 | 5 - 5 = 0 | |0| = 0 |
| 7 | 7 - 5 = 2 | |2| = 2 |
| 7 | 7 - 5 = 2 | |2| = 2 |
| 7 | 7 - 5 = 2 | |2| = 2 |
| 7 | 7 - 5 = 2 | |2| = 2 |
| 9 | 9 - 5 = 4 | |4| = 4 |
|  | **Total of Absolute Deviations:** | **24** |

We now divide this sum by 10, since there are a total of ten data values. The mean absolute deviation about the mean is 24/10 = 2.4.