

How to Calculate Relative Standard Deviation in Google Sheets

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Calculating the Relative Standard Deviation (RSD) in Google Sheets is a necessary process in statistical analysis, allowing you to measure the variability of a data set precisely in relation to its central tendency, or Mean. To initiate this calculation, you first enter your raw data into the spreadsheet. The core calculation utilizes the formula `=STDEV.S(range)/AVERAGE(range)`. This operation yields a decimal value, which is then converted into a percentage by multiplying by 100. The resulting percentage represents the relative standard deviation of your data set, providing critical insights into data consistency and overall variability.

Calculate Relative Standard Deviation in Google Sheets

Understanding Relative Standard Deviation (RSD)

The **relative standard deviation** is a statistical metric, also known as the Coefficient of Variation (CV), that serves as a measure of the sample Standard Deviation relative to the sample Mean for any given dataset. This normalization process removes the dependency on the units of measure, making RSD a powerful tool for comparative analysis across disparate datasets.

The fundamental calculation for this key metric is defined by the following ratio:

$$\text{Relative Standard Deviation} = s / \bar{x} * 100\%$$

In this formula, the variables correspond to the following statistical properties of your sample data:

s: Represents the sample Standard Deviation (the absolute measure of data dispersion).

\bar{x} : Represents the sample Mean (the average value of the data points).

This calculation yields a dimensionless value, typically expressed as a percentage, which provides immediate insight into how closely data points are clustered around the central tendency. A lower RSD signifies higher precision and consistency in the measurements.

Interpreting Relative Standard Deviation Through Examples

The true utility of the Relative Standard Deviation becomes clear when evaluating data consistency. It allows us to compare the relative Variability even when datasets possess drastically different scales.

For instance, consider a scenario where the Standard Deviation of a dataset is 4. If the corresponding Mean is 400, the RSD is calculated as $4/400$ multiplied by 100%, resulting in 1%. This small percentage indicates that the observations exhibit high precision and are tightly clustered around the mean value.

Conversely, examine a dataset that has a standard deviation of 40, but maintains the same mean of 400. This second dataset will yield a relative standard deviation of $40/400$ multiplied by 100%, resulting in 10%. This tenfold increase in RSD demonstrates that the observations are significantly more spread out around the mean relative to the previous dataset, indicating much lower measurement precision or higher inherent Variability.

Constructing the RSD Formula in Google Sheets

To calculate the Relative Standard Deviation of a dataset effectively within Google Sheets, we combine the statistical functions `STDEV.S()` for sample standard deviation and `AVERAGE()` for the mean. The syntax must correctly reference the data range for both functions.

The generalized formula syntax needed to achieve this calculation is as follows:

`=STDEV.S(range)/AVERAGE(range)`

Using a specific data range, such as **A2:A21**, the actual implemented formula will look like this. This syntax calculates the relative standard deviation for the entire dataset contained within that designated range:

`=STDEV.S(A2:A21)/AVERAGE(A2:A21)`

The subsequent section provides a fully worked example demonstrating how to input and utilize this calculation in a live spreadsheet environment.

Example: Calculating Relative Standard Deviation in Google Sheets

To demonstrate the practical application of the RSD formula, let us use a sample dataset that has been entered into Google Sheets. Assume the twenty data points are housed in column A, specifically in the range A2 through A21.

The dataset we are analyzing is structured as shown below:

	A	B	C	D
1	Values			
2	7			
3	8			
4	8			
5	8			
6	9			
7	12			
8	13			
9	14			
10	17			
11	19			
12	22			
13	24			
14	25			
15	26			
16	28			
17	31			
18	36			
19	40			
20	47			
21	49			
22				
..				

Our goal is to accurately calculate the relative standard deviation for this entire collection of measurements.

We proceed by typing the complete calculation formula into a convenient empty cell, such as cell **D1**:

=STDEV.S(A2:A21)/AVERAGE(A2:A21)

The resulting output confirms the successful execution of the formula, as illustrated in the following screenshot:

D1 fx =STDEV.S(A2:A21) / AVERAGE(A2:A21)

	A	B	C	D
1	Values		RSD	0.5932295823
2	7			
3	8			
4	8			
5	8			
6	9			
7	12			
8	13			
9	14			
10	17			
11	19			
12	22			
13	24			
14	25			
15	26			
16	28			
17	31			
18	36			
19	40			
20	47			
21	49			
22				

The calculation yields a relative standard deviation of **0.5932**. When interpreted as a percentage, this translates to **59.32%**. This indicates that the Standard Deviation of the dataset is nearly 60% of the size of the mean. This number is exceptionally high, clearly signifying that the data values are significantly dispersed and possess low statistical consistency around the sample mean.

Comparing Data Consistency Using RSD

A primary advantage of the Relative Standard Deviation is its utility in comparing the precision or Variability across multiple, potentially non-homogenous datasets. Since RSD is normalized, it acts as a reliable benchmark for consistency.

If you are managing or analyzing multiple datasets--for example, comparing test results from different laboratory instruments or financial volatility across several stocks--you can apply the exact same `STDEV.S()` / `AVERAGE()` formula to calculate the RSD for each dataset independently.

By comparing the final RSD percentage values across the datasets, you can quickly identify which data collection method or sample group demonstrates the highest level of precision (the lowest RSD value) and which exhibits the greatest scatter. This comparative capability is vital for quality control and statistical validation processes.

The following tutorials explain how to perform other common tasks in Google Sheets:

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