

# How to Find the Five-Number Summary on a TI-84 Calculator: A Step-by-Step Guide

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December 5, 2025

## RECOMMENDED CITATION

stats writer (2025). *How to Find the Five-Number Summary on a TI-84 Calculator: A Step-by-Step Guide*. PSYCHOLOGICAL SCALES. Retrieved from <https://scales.arabpsychology.com/?p=105920>

The TI-84 calculator is an essential tool for students and professionals required to perform advanced statistical analysis. While this graphing calculator offers a multitude of complex functions, one of its most fundamental and useful capabilities is calculating the five number summary for a given data set. This summary is pivotal in descriptive statistics as it provides a robust, standardized overview of the distribution and spread of values within your data. By simply following a few straightforward steps--entering the data, selecting the appropriate statistical command, and executing the calculation--the device instantly outputs the minimum, the first quartile (Q1), the median, the third quartile (Q3), and the maximum values. These five crucial metrics form the foundation for visual tools like box plots and offer immediate insights into the central tendency and variability of the distribution, far surpassing the utility of just observing the raw data. Furthermore, the TI-84's **1-Var Stats** function generates a wealth of additional statistical measures, empowering the user to conduct truly in-depth analysis beyond the basic summary.

## Mastering Statistical Analysis with the TI-84

In the realm of quantitative analysis, descriptive statistics serve as the initial phase of data exploration, helping researchers characterize the main features of a collection of information. The TI-84 calculator streamlines this process significantly. Understanding how to leverage its built-in functions, particularly for finding the five number summary, is critical for accurately summarizing large groups of raw numbers. This functionality is not merely about finding five points; it is about establishing parameters that define the distribution's boundaries and internal divisions, which is key to identifying potential skewness or outliers before moving on to inferential testing.

The calculation of the five number summary is particularly valued because it is non-parametric, meaning it relies on the position of the data points rather than their specific numerical magnitude, making it resilient to extreme values. This robustness ensures that the summary remains a reliable indicator of data spread even when dealing with distributions that are highly skewed or contain significant errors. Before we dive into the specific steps for the calculator, it is essential to establish a strong conceptual foundation regarding what each of these five statistics represents in the context of a data set.

## Understanding the Five Number Summary Components

A **five number summary** is a cornerstone concept in exploratory data analysis (EDA), offering a concise and powerful method to summarize a dataset using just five strategic values. These values effectively divide the entire data range into four equal sections, each containing 25% of the total observations:

The **Minimum**: The smallest observation found within the data set.

The **First Quartile (Q1)**: Marks the 25th percentile, separating the lowest 25% of the data from the

upper 75%.

The **Median**: The central value of the data set, marking the 50th percentile.

The **Third Quartile (Q3)**: Marks the 75th percentile, separating the highest 25% of the data from the lower 75%.

The **Maximum**: The largest observation found within the data set.

By simply knowing these five values, we can deduce a great deal about the characteristics, distribution, and overall spread of a dataset, making it invaluable for comparison across different samples.

The primary benefit of this summary lies in its ability to quickly visualize the data's central tendency and dispersion, especially when translating these numbers into a box-and-whisker plot. The box itself spans from Q1 to Q3, representing the middle 50% of the data, while the whiskers extend to the minimum and maximum values. This visual representation is immediate and highly effective for comparative analysis across multiple groups, providing quick diagnostics about data symmetry and potential outliers.

## Applying the Method: A Detailed Example

To fully illustrate the procedure for generating the five number summary, we will use a clearly defined dataset and walk through the exact keystrokes required on the TI-84 calculator. This step-by-step example ensures that every user can replicate the procedure accurately and obtain the correct statistical output.

We begin with the following raw data, which represents 15 hypothetical observations:

**Dataset:** 4, 6, 6, 7, 8, 12, 15, 17, 20, 21, 21, 23, 24, 27, 28

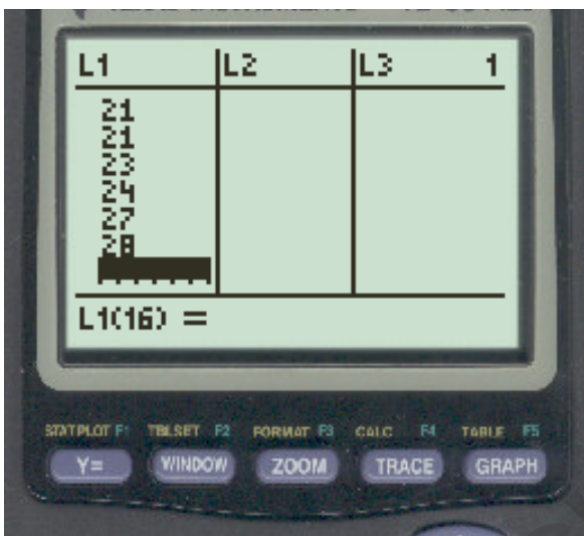
It is important to note that for the TI-84 to perform the calculation correctly, the data must be entered sequentially into one of the designated statistical lists (typically L1). While the calculator does not strictly require the data to be sorted beforehand, manually checking the dataset for completeness and order ensures accuracy during the input phase. This initial data handling is the most crucial part of avoiding calculation errors.

## Step 1: Inputting Data into the Statistical List

The first critical step involves accurately inputting all data values into a statistical list on the TI-84 calculator. This list is the source material for all subsequent calculations. To initiate the data entry screen, press the Stat button, which opens the main statistical menu. From there, select the **EDIT** option (usually choice 1). This action navigates you to the List Editor interface, where you will see columns labeled L1, L2, L3, and so forth.

We will enter the values of the dataset precisely as listed above into column L1. Use the number pad to type each value, pressing Enter after each entry to move to the next row. It is highly recommended to double-check the entered values against the original dataset to prevent transposition errors, which can drastically affect the resulting summary statistics. Ensure that the total count of entered values ( $n=15$  in this case) matches the number of rows occupied in L1.

The screen should visually confirm the successful entry of all data points, looking similar to the graphic below:



If there are any pre-existing values in L1, you must first clear the list. To do this, arrow up to highlight the list name (L1), press Clear, and then press Enter. Do not press Delete, as this removes the list entirely instead of just clearing the contents.

## Step 2: Calculating One-Variable Statistics

Once the data is securely stored in L1, the next phase is to execute the statistical calculation. Begin by pressing the Stat button again. This time, instead of staying on the EDIT tab, you will scroll over to the right using the arrow keys to highlight the **CALC** menu. This menu contains all the primary calculation functions.

Within the CALC menu, select the option labeled 1-Var Stats (One-Variable Statistics), typically option 1. This function is specifically designed to analyze a single list of numerical data and provide a comprehensive set of descriptive statistics, including means, standard deviations, and the crucial five number summary.

Upon selecting 1-Var Stats, the calculator will prompt you to specify the list where your data

resides (List:) and, if applicable, the frequency list (FreqList:). Ensure List is set to L1 (usually by pressing 2nd followed by 1). The frequency list should be left blank or set to 1 if you are using raw, non-grouped data. Finally, scroll down and select **Calculate** to run the analysis.



If you are using an older TI-84 model that does not display the menu shown above, selecting 1-Var Stats will automatically display this command on the main screen. In that case, you must manually specify the list, resulting in the command line looking like: 1-Var Stats L1. In either scenario, once the command is confirmed, simply press Enter to execute the calculation.



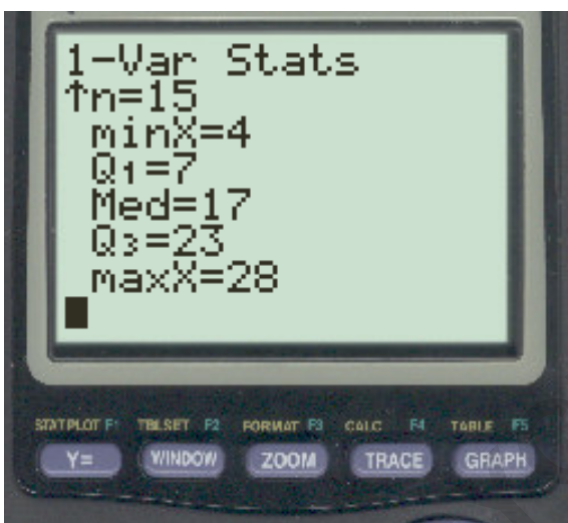
## Interpreting the Results: Locating the Summary Values

Once the calculation is complete, the TI-84 calculator generates a scrolling list of summary statistics. The initial screen typically displays measures of central tendency (the mean,  $\bar{x}$ ) and variability (standard deviation,  $s_x$  and  $\sigma_x$ ), as well as the sample size ( $n$ ). To

locate the specific components of the five number summary, you must scroll down to the very bottom of the generated list using the down arrow key.

The statistical output is structured hierarchically, ensuring that the most frequently used descriptive statistics appear first. The five final values listed are precisely the summary components we seek, clearly labeled for easy identification. Reviewing this output provides immediate confirmation of the data's lowest and highest points, along with the quartiles that define the distribution of the middle 50% of observations.

After scrolling down, the screen should look like the following image, clearly presenting the final five values:



From this comprehensive screen, we can definitively observe the calculated five number summary for our dataset:

The **Minimum** (minX): **4**. This is the smallest value in the sample.

The **First Quartile** (Q1): **7**. This marks the boundary below which 25% of the data falls.

The **Median** (Med): **17**. This is the central value (50th percentile) of the entire distribution.

The **Third Quartile** (Q3): **23**. This marks the boundary below which 75% of the data falls.

The **Maximum** (maxX): **28**. This is the largest value recorded in the sample.

## Deriving Measures of Dispersion: Range and IQR

While the five number summary defines the boundaries and internal divisions of the data set, these values are foundational inputs for calculating other critical measures of dispersion, specifically the Range and the Interquartile Range (IQR). These derived metrics provide quantified measures of data spread, which are crucial for comparing the variability between different samples.

The **Range** gives the simplest measure of overall spread, defining the distance from the smallest value to the largest. The **Interquartile Range (IQR)**, conversely, measures the spread of the central 50% of the data, offering a robust measure of variability that is significantly less affected by extreme outliers than the total range.

We can easily calculate these two secondary metrics using the output obtained from the TI-84:

**Range:** Calculated as the Maximum value minus the Minimum value. Using our example:  $28 - 4 = 24$ .

**Interquartile Range (IQR):** Calculated as the Third Quartile (Q3) minus the First Quartile (Q1). Using our example:  $23 - 7 = 16$ .

These two metrics provide us with a quantitative idea of how dispersed the values are in the dataset. A larger range indicates a wider span of observations, whereas a smaller Interquartile Range suggests that the bulk of the data points are tightly clustered around the median.

## Interpreting Distribution and Skewness

The relationship between the median and the quartiles provides immediate insight into the distribution's symmetry. In our example, the median is 17. The distance between Q1 (7) and the median (17) is 10 units, while the distance between the median (17) and Q3 (23) is 6 units. Since the lower half of the distribution (Min to Median) spans a greater distance than the upper half (Median to Max), this indicates that the data is slightly skewed toward the lower values, meaning the data points are more spread out below the central point than above it.

Furthermore, the IQR value of 16 is essential for robust statistical testing. Because the IQR is resistant to outliers, it is often utilized to define fences for identifying extreme values in a data set. Any observation falling outside 1.5 times the IQR above Q3 or below Q1 is statistically considered an outlier. This process is automatic when the TI-84 generates a box plot, but understanding the calculation manually reinforces the statistical meaning of the summary.

## Conclusion: The Efficiency of the TI-84 for Descriptive Statistics

The ability of the TI-84 calculator to swiftly generate the five number summary is a testament to its efficiency as a statistical tool. By following the clear sequence of keystrokes--entering data via STAT EDIT and executing the command via STAT CALC 1-Var Stats--users can obtain foundational descriptive metrics with high reliability. This summary provides the essential information needed to create visualizations like box plots and to calculate crucial measures of spread such as the Interquartile Range (IQR) and the total Range.

Mastering this function is crucial for anyone involved in statistical coursework or basic data

analysis, as the five number summary provides a non-parametric, robust view of data distribution. It simplifies the initial assessment of any data set, guiding the user toward more complex analyses or visualizations. Always ensure that the data input step is performed accurately, as the integrity of the resulting statistical summary depends entirely on the correct initial entry.

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