

How to Calculate Interquartile Range on a TI-84 Calculator: A Step-by-Step Guide

Authored by
stats writer

December 5, 2025

RECOMMENDED CITATION

stats writer (2025). *How to Calculate Interquartile Range on a TI-84 Calculator: A Step-by-Step Guide*. PSYCHOLOGICAL SCALES. Retrieved from <https://scales.arabpsychology.com/?p=105914>

The ability to calculate measures of dispersion is fundamental to statistical analysis, allowing researchers and students to quantify how spread out a set of data is. Among these measures, the interquartile range (IQR) stands out as a robust metric. This comprehensive guide details the precise, step-by-step process for determining the IQR using the powerful statistical capabilities built into the popular TI-84 calculator, a staple tool in mathematics and science classrooms globally. Successfully performing this operation requires accurately inputting the raw data and utilizing the calculator's dedicated one-variable statistics function, known as 1-Var Stats, which automatically computes the necessary quartile boundaries, Q1 (lower quartile) and Q3 (upper quartile).

Understanding the Interquartile Range (IQR)

The interquartile range, commonly abbreviated as IQR, is a statistical measure designed to describe the spread of the central portion of a data set. Unlike the standard range, which simply measures the distance between the maximum and minimum values, the IQR focuses exclusively on the middle 50% of the observations. This metric is derived from the difference between the third quartile (Q3) and the first quartile (Q1). Understanding the nature of quartiles is crucial here; these are specific data points that divide a probability distribution, or a sample of data, into four segments, each containing 25% of the total observations. Q1 marks the 25th percentile, the median (Q2) marks the 50th percentile, and Q3 marks the 75th percentile. By isolating this central span, the IQR provides a focused view of data variability, offering insights into the typical deviation within the dataset.

The calculation itself is elegantly simple: $IQR = Q3 - Q1$. For instance, if Q3 is 23 and Q1 is 7, the IQR is 16. This value of 16 signifies that the middle half of the data spans 16 units. The interquartile range is exceptionally valuable because it bypasses the extremes, providing a truer picture of central tendency variability than metrics susceptible to skewness or outlying data points. Consequently, when analyzing complex or potentially corrupted datasets, the IQR often provides a more reliable measure of dispersion compared to the overall range or even the standard deviation, particularly in exploratory data analysis and inferential statistics.

Why Use the Interquartile Range? Robustness to Outliers

A primary statistical advantage of the IQR over other measures of spread, such as the overall range, is its inherent resistance to outliers. Outliers are observations that lie an abnormal distance from other values in a random sample from a population. If a dataset contains unusually small or unusually large values, these extremes disproportionately inflate the standard range (Max - Min), potentially giving a misleading impression of the data's general spread. Since the IQR only concerns itself with the values falling between the 25th and 75th percentiles, it is fundamentally

unaffected by these extreme observations. This statistical property, known as robustness, makes the IQR an invaluable tool for analysts working with real-world data, which frequently contains errors or unexpected extreme events.

To illustrate this point, consider a scenario where you are analyzing housing prices. If one house in a neighborhood sells for ten times the average price, that single outlier would drastically skew the overall range of prices. However, the IQR remains stable because it excludes the lowest 25% and the highest 25% of the sales data. By focusing only on the distribution of the middle half of the data, the IQR provides a normalized measure of dispersion that truly reflects the variability experienced by the bulk of the observations. This reliability is why the interquartile range is frequently used in conjunction with the box plot, providing the visual boundaries for the central box that represents this robust range.

Prerequisites: Preparing Your TI-84 Calculator

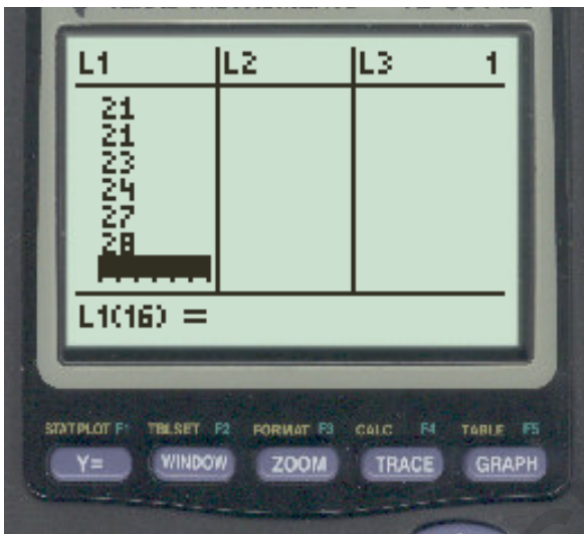
Before beginning the calculation, ensure your TI-84 calculator is powered on and ready to accept input. The procedure relies on the calculator's built-in list editor and statistical functions. It is good practice to clear any previous data residing in the list column you intend to use (usually L1) to prevent accidental contamination of your current calculation. To clear a list, press the STAT button, select option 4: ClrList, and then specify the list you wish to clear (e.g., 2nd followed by 1 for L1). Press ENTER to execute the command, confirming that the list is now empty and ready for new input. Adhering to this preliminary step ensures accuracy and streamlines the data entry process, which is the foundation of any statistical computation on the device.

For demonstration purposes, we will use the following specific dataset throughout this guide to illustrate how the IQR is found on the TI-84. This concrete example will make it easier to follow the subsequent steps and verify your calculator's output. The dataset we will analyze is composed of fifteen numerical observations: **4, 6, 6, 7, 8, 12, 15, 17, 20, 21, 21, 23, 24, 27, 28**. This specific sequence of numbers represents a standard input that will yield easily identifiable quartile values for instructional purposes, allowing you to clearly see where Q1 and Q3 are located once the calculator processes the list.

Step 1: Inputting Your Data Set

The first crucial step in calculating the IQR involves entering all of your data values into a designated list within the TI-84 calculator's memory. To access the list editor, press the dedicated STAT button, which opens the main statistical menu. From the options provided, select 1: EDIT, which will display the list editor screen, typically showing columns L1, L2, and L3. If you have not cleared L1 previously, ensure you navigate to the top of the L1 column, press CLEAR, and then ENTER to wipe the column clean, preparing it for the new data set.

Now, systematically input each value from the dataset into the L1 column. Start with the first value (4) and press ENTER after each entry to move to the next row. Continue this process until all fifteen values (4, 6, 6, 7, 8, 12, 15, 17, 20, 21, 21, 23, 24, 27, 28) have been correctly entered into the list L1. Precision here is paramount; even a single transcription error can result in inaccurate quartiles and, consequently, an incorrect IQR. Take a moment to verify that the final entry (28) is correctly placed at the end of the list and that the total count of entered values matches the expected size of the dataset ($n=15$ in this example). The visual representation of the correctly entered data set should resemble the following display on your TI-84 screen:

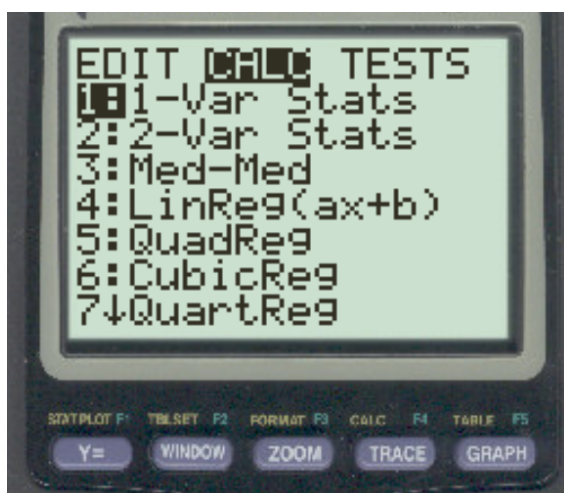


Step 2: Accessing the 1-Var Stats Command

Once all data points are securely stored in list L1, the next phase involves instructing the TI-84 calculator to perform the necessary statistical analysis. This is achieved through the use of the 1-Var Stats command, which is specifically designed for analyzing a single column of numerical data. Begin by pressing the STAT button again. Instead of staying on the EDIT menu, you must now scroll one position to the right using the arrow keys until the CALC menu is highlighted. This menu houses all of the calculator's computational statistical functions, allowing it to quickly compute summary statistics that would be laborious to calculate manually.

Within the CALC menu, the first option, 1: 1-Var Stats, is the required command. Select this option by either pressing the number 1 or highlighting it and pressing ENTER. The calculator will then prompt you to specify which list contains the data. On modern TI-84 models (like the CE or Plus Silver Edition), a screen will appear asking for "List:" and "FreqList:". Ensure that "List:" is set to L1 (which is the default, accessed by pressing 2nd followed by 1) and that "FreqList:" is left blank or set to LONE, as we are dealing with raw, ungrouped data. After confirming these parameters, navigate down to Calculate and press ENTER.

If you are using an older TI-84 model, selecting 1-Var Stats will immediately bring you back to the home screen where the command "1-Var Stats" appears. You must then manually specify the list name, typically resulting in the command line reading: 1-Var Stats L1. Regardless of the model, pressing ENTER after specifying the list initiates the computation, leading the calculator to process all 15 data points and generate a comprehensive set of summary statistics. The screen displaying the prompt for list specification looks similar to the image below, confirming the correct function has been selected:



Step 3: Interpreting the Statistical Output

Upon execution of the 1-Var Stats command, the TI-84 calculator displays an extensive list of statistical measures, including the mean ($\bar{x}$), the sum of x (Σx), the standard deviation (Sx), and the sample size (n). Although these values are often useful, our focus for calculating the IQR lies further down the output screen. You must scroll down using the down arrow key to reveal the "Five-Number Summary," which is the critical section containing the required quartiles.

The Five-Number Summary provides the minimum value ($\min X$), the first quartile ($Q1$), the median (Med or $Q2$), the third quartile ($Q3$), and the maximum value ($\max X$). For our specific dataset (4, 6, 6, 7, 8, 12, 15, 17, 20, 21, 21, 23, 24, 27, 28), the output screen, once scrolled down, should clearly display the following quartile values calculated by the TI-84's internal algorithm:

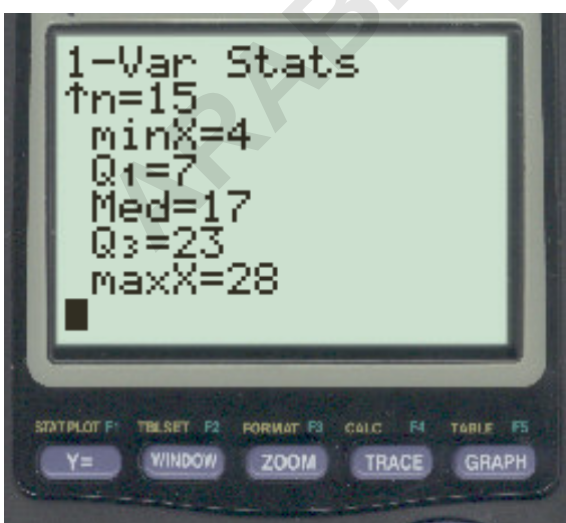


Continuing to scroll will display the final part of the summary, which is often crucial for visual confirmation and for identifying the boundaries of the data spread. It is imperative to accurately extract the Q1 and Q3 values from this displayed summary, as they are the only necessary components for the IQR calculation. For our example dataset, based on the statistical output provided by the calculator:

First quartile (Q1): **7**

Third quartile (Q3): **23**

This process demonstrates the efficiency of the 1-Var Stats function, which performs all the sorting and location calculations for the quartiles automatically, saving significant manual labor, especially when dealing with large datasets. The final screen confirming these values looks like this:



Step 4: Calculating the Final IQR Value

The final step in determining the interquartile range involves a simple arithmetic calculation performed outside of the 1-Var Stats menu, using the two critical values extracted in the previous step. Recall the definition: the IQR is the difference between the third quartile (Q3) and the first quartile (Q1). Using the values derived from our sample dataset, $Q3 = 23$ and $Q1 = 7$, we substitute them into the formula: $IQR = Q3 - Q1$.

The calculation is $23 - 7$, which yields a result of **16**. This resulting number, 16, is the interquartile range for the provided dataset. This numerical value signifies that the distance spanned by the central 50% of our data--the range that encompasses the most typical observations--is 16 units. This measure is highly informative because it immediately suggests the level of concentration or dispersion in the mid-range of the data, unaffected by the potential presence of extreme values or outliers.

Furthermore, the IQR is not just a measure of spread; it is a critical component in the formal method for identifying outliers. An observation is generally considered an outlier if it falls below $Q1 - 1.5 \times IQR$ or above $Q3 + 1.5 \times IQR$. In our case, this outlier detection range would be based on $1.5 \times 16 = 24$. Thus, any value below $7 - 24 = -17$ or above $23 + 24 = 47$ would be flagged as an outlier. Since our dataset spans from 4 to 28, we can confidently conclude that there are no statistical outliers present based on the conventional IQR method, reinforcing the integrity and central focus of the calculated IQR value.

Beyond the IQR: Using Quartiles for Box Plots

While the immediate goal of using the 1-Var Stats function might be to calculate the IQR, the derived Q1 and Q3 values, along with the other three numbers in the Five-Number Summary (Min, Median, Max), form the foundational elements for constructing a box plot, also known as a box-and-whisker plot. A box plot is a standardized way of displaying the distribution of data based on these five summary values. It offers a concise visual representation that highlights central tendency, spread, and symmetry, and provides an immediate graphical indication of potential outliers.

The central box in the plot spans exactly from Q1 to Q3, with a line inside marking the median (Q2). The length of this box is precisely the IQR. The whiskers extend from the edges of the box to the minimum and maximum values that are not considered outliers. Learning to generate this visual representation on the TI-84 calculator enhances your statistical analysis capabilities beyond simple calculation. To do this, after running 1-Var Stats, you would typically navigate to the STAT PLOT menu (2nd followed by Y=), select a plot, choose the box plot icon, and set L1 as the XList. Pressing ZOOM, then 9: ZoomStat, will display the graphical representation of the data distribution, visually confirming the spread measured by the IQR.

Troubleshooting Common TI-84 Issues

While the process for finding the IQR on the TI-84 is generally straightforward, users occasionally encounter common pitfalls that lead to incorrect or missing results. One frequent issue is forgetting to specify the list (L1) after selecting 1-Var Stats on older operating systems, resulting in an "ERR: ARGUMENT" message. Always ensure the command reads 1-Var Stats L1 if prompted. Another common error arises from data entry mistakes. If your calculated IQR seems wildly off, immediately return to the STAT EDIT menu and verify that all data points were entered correctly and that you have the proper count (n value) displayed in the summary statistics.

If the calculator displays "ERR: DIM MISMATCH," this usually indicates that you attempted to run a calculation using lists of unequal lengths. Although less common when finding IQR for a single dataset, it can occur if you accidentally input a frequency list (FreqList) that has a different number of entries than your data list (L1). To resolve this, ensure FreqList is either blank or set to LONE. Finally, if your calculator is set to an incorrect statistical plot mode, you might see errors when trying to view the data graphically. Always turn off any residual plots (2nd, Y=, and ensure plots are set to OFF) before running standard numerical calculations to avoid display conflicts, ensuring a clean and reliable computation of the interquartile range.