

Learning Guide: Calculating Interquartile Range (IQR) with a TI-84 Calculator

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The **interquartile range** (IQR) is a fundamental metric in the field of **descriptive statistics**, offering a robust measurement of the variability or spread within the central 50% of a data distribution. Unlike the standard range, the IQR focuses exclusively on the core data concentration, making it a highly reliable summary statistic for analyzing data variability.

Mathematically, the IQR is calculated by finding the difference between the third quartile (Q3) and the first quartile (Q1) of the ordered dataset ($IQR = Q3 - Q1$). This straightforward calculation yields a single value that immediately illuminates the concentration of data points around the median. Grasping this core definition is essential before leveraging the advanced calculation features of the **TI-84 calculator**.

It is crucial to recall that **quartiles** are specific values that divide an ordered dataset into four equal segments, with each segment containing precisely 25% of the observations. Specifically, Q1 marks the 25th percentile, Q2 (the median) marks the 50th percentile, and Q3 marks the 75th percentile.

The IQR is widely preferred over simpler measures of spread, such as the standard range, primarily because it is highly **resistant to outliers**. Since the calculation relies solely on the values of Q1 and Q3, the extreme upper and lower 25% of the data--which are most likely to contain unusually small or large values--do not influence the final IQR figure. This inherent resilience makes the IQR a foundational tool in rigorous exploratory data analysis.

This stability makes the IQR a preferable way to measure **dispersion** compared to metrics like the standard range, which is defined by the difference between the maximum and minimum values. A single extreme observation can drastically skew the range, whereas the IQR provides a far more stable and representative measure of typical data variability.

The following comprehensive, step-by-step guide demonstrates the efficient procedure for calculating the Interquartile Range using the specialized statistical functions available on a **TI-84 calculator**. We will use the following data set throughout the tutorial:

Sample Dataset for Calculation: 4, 6, 6, 7, 8, 12, 15, 17, 20, 21, 21, 23, 24, 27, 28 (N = 15 observations)

Preparing and Organizing Data on the TI-84

Before initiating any statistical computation on the **TI-84 calculator**, the raw data must be accurately transcribed and organized within the calculator's list editor. When calculating single-variable statistics like the IQR, List 1 (L1) is the standard register utilized for input. It is imperative to ensure that any previous data is cleared from the list before entering new observations.

The TI-84 system demands precision during data entry. For this procedure, where we are analyzing a simple set of observations without associated frequencies, only the L1 column is

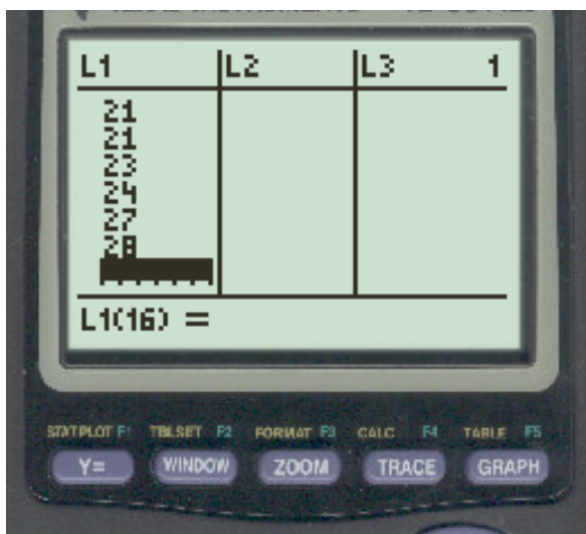
necessary. If residual data remains in L1 from previous calculations, use the clear function accessible through the STAT EDIT menu to reset the column entirely before starting the input process.

Step 1: Inputting Data into List L1

The procedure begins by accessing the statistical editor menu. First, locate and press the STAT button, which is typically found near the middle of the keypad. Once the STAT menu is displayed, select the EDIT option (usually Option 1) to open the list editor screen, which presents columns L1, L2, and L3.

Carefully enter each numerical value from the sample dataset (4, 6, 6, 7, 8, 12, 15, 17, 20, 21, 21, 23, 24, 27, 28) into column L1. Ensure you press the ENTER key after each entry to move the cursor to the subsequent row. Take a moment to verify that all 15 observations have been entered sequentially and without transposition errors.

Upon completion, the calculator screen should accurately reflect the complete dataset, confirming that the data entry phase is both precise and complete, matching the visual representation below:



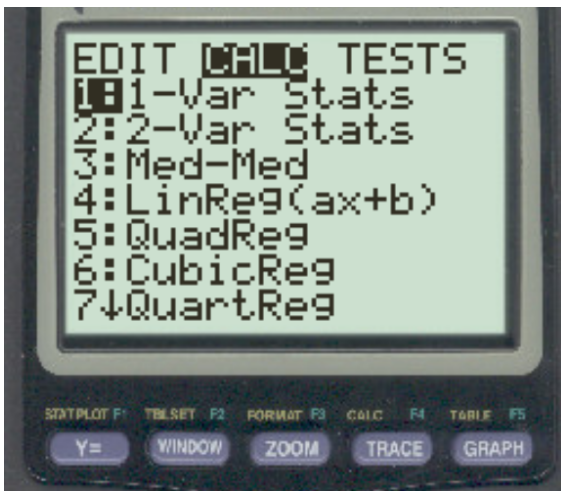
Step 2: Accessing One-Variable Statistics and Calculation

With the dataset securely stored in L1, the next step is to instruct the calculator to perform the necessary statistical analysis. Press the STAT button once more to access the main statistical menu.

Instead of remaining in the EDIT column, use the right arrow key to scroll over until the CALC menu is highlighted. This menu contains all the essential computational statistical functions

available on the **TI-84 calculator**.

From the CALC menu, select 1-Var Stats (typically Option 1). This specialized function is designed to calculate a comprehensive suite of metrics for a single list of data, including measures of central tendency, standard deviation, and, critically for finding the IQR, the required [five-number summary](#) components.



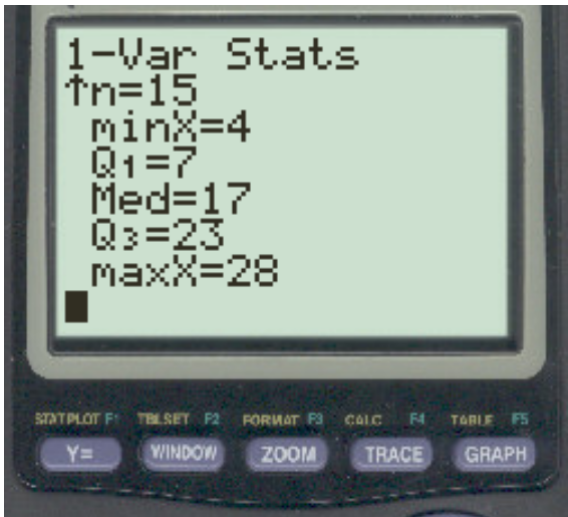
On newer TI-84 models, a configuration screen will appear, prompting you to verify the list parameters. Ensure that the **List** parameter is accurately set to L1 (achieved by pressing 2nd then 1). The **FreqList** parameter must be left empty or set to 1, as this example does not involve a frequency distribution. Once these settings are confirmed, navigate down to the Calculate command and press ENTER.

Interpreting the Output for Quartiles (Q1 and Q3)

The calculator will swiftly process the data within L1 and display the resulting statistics screen. While this screen provides numerous metrics, such as the mean (\bar{x}) and standard deviation (σ_x), our focus is on locating the **quartiles**.

To find the necessary quartile values, use the down arrow key to scroll through the output. Continue scrolling until you locate the [five-number summary](#), which is presented in the order: MinX, Q1, Med (Q2), Q3, and MaxX.

The values Q1 and Q3 are the critical components required for determining the [interquartile range](#). The **TI-84 calculator** provides these figures directly, bypassing the need for manual data sorting or complex interpolation methods typically required when calculating quartiles by hand.



From this detailed output screen, we can clearly identify the necessary components--the first quartile (Q1) and the third quartile (Q3)--derived from our sample dataset:

First Quartile (Q1): The value marking the 25th percentile is calculated by the TI-84 as **7**.

Third Quartile (Q3): The value marking the 75th percentile is calculated by the TI-84 as **23**.

Calculating the Final IQR and Conclusion

The final stage involves performing the simple subtraction required to define the [interquartile range](#) (IQR). As established earlier, the IQR is formally defined as the difference between Q3 and Q1. Using the precise values obtained directly from the 1-Var Stats output, we complete the calculation.

The formula is: $IQR = Q3 - Q1$. Substituting the calculated values: $23 - 7 = 16$.

The resulting value, 16, quantifies the spread of the middle 50% of values in the dataset. This concise figure confirms that the majority of the data points are clustered within a 16-unit range, providing a reliable measure of central variability that remains unaffected by potential [outliers](#) present at the extreme ends of the distribution.

Expanding the Use of the Interquartile Range

Beyond simply measuring [dispersion](#), the interquartile range is frequently used as a preliminary step in identifying potential [outliers](#) within a dataset. Data points are statistically considered extreme values if they fall more than 1.5 times the IQR below Q1 or above Q3. This calculation highlights the IQR's utility not just as a stable measure of spread, but also as a critical metric in data cleaning and quality assessment.

For students or professionals seeking a deeper mastery of statistical methods using graphing technology, exploring resources focused on the [five-number summary](#) and the construction of box-and-whisker plots is highly recommended. Mastering these concepts ensures a truly comprehensive grasp of robust data analysis using the **TI-84 calculator**.