

How to Calculate Relative Frequency on a TI-84 Calculator

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Calculating the Relative Frequency of a data set using a TI-84 calculator requires a systematic approach involving list manipulation and formula input. This powerful graphing tool allows users to quickly convert raw frequency counts into proportions, which are essential for statistical analysis. The fundamental principle involves dividing the individual event frequency by the total number of observations in the set. Mastering this technique is crucial for anyone studying basic statistics or probability, as it streamlines the data processing required to obtain accurate proportional statistics.

The Concept of Relative Frequency in Statistics

Relative frequencies are a cornerstone of descriptive statistics, providing insight into how often specific outcomes or classes occur compared to the total population size. Unlike absolute frequencies, which merely count occurrences, relative frequencies normalize the counts, making it possible to compare distributions across different sample sizes or contexts. This normalization is achieved by expressing the frequency of an event as a fraction, decimal, or percentage of the total number of events recorded. Understanding this conceptual foundation is the first step before performing calculations on the TI-84 platform, ensuring that the results obtained are interpreted correctly within a statistical context.

To illustrate this concept, consider a scenario where a retail shop tracks item sales based on price brackets over a week. If we simply look at the raw counts (frequencies), we know how many items fall into each bracket. However, to understand the distribution profile--for instance, what proportion of total sales came from the '\$1-\$10' bracket--we must calculate the relative frequency. This metric is indispensable for probability assessments, quality control, and general business analytics where proportional representation matters more than raw counts, allowing for weighted comparisons across different classes.

For example, the following table summarizes the sales data. Note that the sum of all individual frequencies equals the total number of sales, which is the necessary denominator for calculating the relative frequency for each category. We aim to replicate this calculation efficiently using the statistical functions of the TI-84 calculator, eliminating the need for manual, element-by-element division.

Item Price	Frequency	Relative Frequency
\$1 - \$10	20	0.303
\$11 - \$20	21	0.318
\$21 - \$30	13	0.197
\$31 - \$40	8	0.121
\$41 - \$50	4	0.061

Manual Verification of Relative Frequency Calculation

In this specific sales example, the total number of items sold across all price brackets was 66 ($20 + 21 + 13 + 8 + 4$). The calculation of relative frequency for each class involves taking the class frequency and dividing it by this total count of 66. This manual verification reinforces the logic we will automate on the TI-84 calculator. It is paramount that the sum of all relative frequencies always equals 1 (or 100% when expressed as a percentage), serving as a crucial verification step for the entire process and indicating that all observations have been accounted for.

For instance, analyzing the first class (\$1 - \$10), which had a frequency of 20 items sold. To find its relative contribution to the total sales volume, we perform the division: 20 divided by 66. This yields approximately **0.303**. This result means that roughly 30.3% of all sales recorded during that week were attributed to the lowest price bracket, providing actionable insight into sales distribution.

Moving to the second class (\$11 - \$20), the recorded frequency was 21 items. The corresponding relative frequency is calculated as 21 divided by 66, resulting in approximately **0.318**. This confirms that this price range was the most popular, accounting for nearly 31.8% of the weekly sales. Subsequent calculations follow the same arithmetic pattern, ensuring every class is appropriately weighted relative to the overall dataset size, a critical requirement for accurate statistical reporting.

Prerequisites: Preparing the TI-84 for Statistical Input

Before attempting to input any statistical data, ensure your TI-84 calculator is in the standard operating mode and that any existing lists you plan to use are clear. Using the built-in list editor is the most efficient way to handle large frequency distributions. To access the list editor, press the dedicated STAT button, which opens the main statistics menu. From there, select the EDIT option (typically option 1) to view the L1, L2, L3, and subsequent lists available for data storage and manipulation.

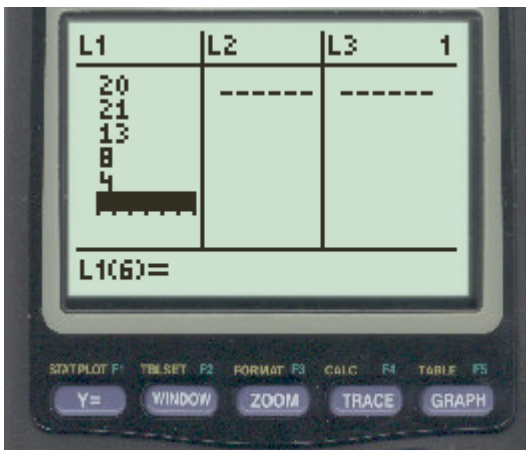
If you are working with a previously used calculator, it is highly recommended to clear the lists to avoid mixing new data with old entries, which can lead to calculation errors. To clear a list effectively, highlight the list name (e.g., L1) at the very top of the column, press CLEAR, and then press ENTER. This action removes all numerical entries from the list while keeping the list structure intact. This preparatory step ensures accuracy as you move into the vital data entry phase, particularly when defining L1 solely for frequency counts.

Step 1: Entering the Frequency Data into List L1

The first crucial step in automating the relative frequency calculation is accurately entering the raw frequency counts into a designated list. We will use List L1 for this purpose, as it is the default list for most single-variable statistical calculations and is easily referenced in formulas. Navigate to the

list editor (by pressing STAT followed by EDIT), ensure the cursor is positioned on the first entry of L1, and input the frequencies one by one, pressing ENTER after each value to move to the next row.

Using the sales example from above, we are entering the counts: 20, 21, 13, 8, and 4 in sequential order down List L1. It is imperative that the order of entry matches the order of the corresponding classes, maintaining consistency for accurate interpretation. Once all values are entered, your calculator screen should resemble the visual depiction below, confirming the raw frequency distribution is ready for processing.



The TI-84 uses these lists as vectors for calculations. Although you could also enter the corresponding variable values (like the midpoints of the price ranges) into L2, for relative frequency calculation, only the raw counts (frequencies) in L1 are strictly necessary, as they determine the numerator for each proportion and collectively determine the denominator (the total count). List L1 now holds all the necessary numerator values for the upcoming calculation.

Step 2: Calculating the Total Frequency (Conceptual Check)

While we will ultimately use an automated formula, knowing how to find the total number of observations (N or Σx) is an excellent validation step. This total frequency represents the denominator in our relative frequency calculation. To quickly find this total, press STAT, scroll over to the CALC menu, and select 1-Var Stats (Option 1).

Ensure the List is set to L1 (which holds the frequencies) and the FreqList is left blank. Execute the calculation by pressing ENTER. The resulting output screen provides numerous summary statistics. Scroll down until you find the value labeled 'n'. This 'n' represents the total count of all entries in L1, which corresponds to the total sample size (66 in our example). This total is the divisor required for calculating the relative frequency for every data point, confirming the integrity of the data entry process before moving forward.

The 1-Var Stats function is a powerful diagnostic tool, but we will utilize a more direct method for the final relative frequency calculation. The TI-84 features a dedicated command, the `sum()` function, which allows us to calculate the total count of L1 directly within the formula for L2. This automated approach is faster and more efficient than relying on a separate calculation step.

Step 3: Setting Up the Relative Frequency Formula in List L2

To calculate the relative frequencies for all entries simultaneously, we must utilize the list manipulation features of the TI-84 calculator by defining List L2 as a calculated result based on List L1. Navigate back to the list editor (`STAT -> EDIT`). It is critical that the cursor is placed directly on the list name **L2** at the top of the column, not on the first numerical cell. Highlighting the name allows you to enter a formula that applies element-wise to the entire list.

The formula required is the frequency count (L1) divided by the total sum of all frequency counts (sum of L1). When entered at the L2 header, the calculator performs the division $L2(i) = L1(i) / \text{sum}(L1)$ for every row 'i'. The complete formula to be entered is: **L1 / sum(L1)**. This elegant solution ensures that every individual frequency in L1 is instantaneously divided by the consistent total frequency, which is dynamically calculated by the machine itself.



Entering this formula correctly is the most technical aspect of the process. If the formula is incorrectly entered into the first cell of L2 instead of the list name, it will only calculate the relative frequency for that single data point, $L1(1)$, and not apply the calculation across the entire dataset. Always ensure the entire list header (L2) is highlighted before typing the expression and pressing enter to confirm the list definition.

Step 4: Executing the Formula with Precise Key Presses

Executing the formula $L1 / \text{sum}(L1)$ requires specific, sequenced keystrokes to access the required list names and the summing function. Follow this precise sequence while the L2 header is

highlighted, confirming each input appears correctly on the display:

To input "L1": Press 2nd, then press the number 1. This retrieves the list name L1, which is printed above the '1' key.

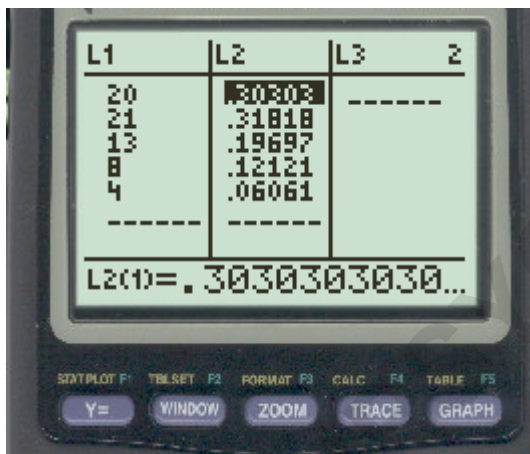
To input the division symbol "/": Press the dedicated division key, \div .

To input the summing function "sum(": This critical function is accessed through the statistical operations menu. First, press 2nd, then press STAT (which accesses the LIST menu). Scroll right using the arrow keys to select the "MATH" submenu. Finally, press the number 5, which corresponds to the sum(command.

To input the list name "L1" inside the sum function: Press 2nd, then press 1 again.

To close the sum function: Press the closing parenthesis key,).

After verifying the formula $L1/\text{sum}(L1)$ is correctly displayed at the bottom of the screen (or next to $L2=$), press ENTER. The calculator will immediately execute the command, populating List L2 with the calculated relative frequency values derived from the raw frequency counts in L1.



Step 5: Interpreting the Relative Frequency Output

Once the calculation is complete, List L2 now holds the relative frequencies corresponding to the original frequencies listed in L1. These values are typically displayed in decimal format, often showing high precision. The interpretation of these outputs is straightforward: each entry represents the proportion of the total sample size accounted for by the corresponding frequency class, providing the statistical probability of selecting an item from that class if sampling randomly.

Based on the data input in Step 1 (20, 21, 13, 8, 4), the output in L2 should match the proportions calculated earlier, reflecting the calculator's high level of accuracy:

The relative frequency of the first class (20/66) is approximately **0.30303**.

The relative frequency of the second class (21/66) is approximately **0.31818**.

The relative frequency of the third class (13/66) is approximately **0.19697**.

The relative frequency of the fourth class (8/66) is approximately **0.12121**.

The relative frequency of the fifth class (4/66) is approximately **0.06061**.

The precision provided by the calculator, showing multiple decimal places, is crucial for minimizing cumulative rounding errors in subsequent statistical operations. When reporting results in formal contexts, standard statistical practice generally requires rounding these values to 3 or 4 significant decimal places, or converting them into percentages by multiplying by 100.

Verification of Results and Conclusion

A fundamental statistical rule dictates that the sum of all relative frequencies derived from a complete dataset must always equal 1 (or 100%). This property makes verification an extremely easy and essential final step. While the individual values in L2 might contain minor floating-point discrepancies due to the calculator's internal processing, the sum should be exceptionally close to 1. To confirm this, you can apply the `sum(` function to L2, or simply run 1-Var Stats on L2 and check the 'n' or Σx value, which should be 1.

In our example, summing the values in L2 (0.30303 + 0.31818 + 0.19697 + 0.12121 + 0.06061) yields a total of exactly 1.00000. This confirmation assures the user that both the data entry in L1 and the formula application in L2 were executed correctly, providing highly accurate relative frequencies for the dataset. The TI-84 method, using efficient list operations and the built-in sum function, is a powerful technique for quickly handling distributional analysis and generating publication-ready statistics.

Mastering this procedure not only streamlines calculation but also enhances understanding of statistical distributions, preparing the user for more complex tasks involving cumulative relative frequency or advanced probability mass functions that rely heavily on proportional representation.