

How do I create a Frequency Distribution in Excel?

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December 23, 2025

RECOMMENDED CITATION

stats writer (2025). *How do I create a Frequency Distribution in Excel?*. PSYCHOLOGICAL SCALES. Retrieved from <https://scales.arabpsychology.com/?p=108569>

Creating a Frequency Distribution in Excel is a fundamental task for statisticians and data analysts. While the powerful built-in function is often preferred, the Data Analysis ToolPak provides a simple, wizard-driven approach. To utilize this feature, you must first ensure your raw data is properly entered into the spreadsheet columns.

Once your data is prepared, navigate to the "Data" tab on the ribbon and select the "Data Analysis" option. From the list of statistical tools, choose the "Histogram" option (which generates the necessary frequency table) and click "OK". Within the subsequent dialog box, you will define the input range (your data) and the bin range (your class limits). Upon execution, Excel automatically generates a frequency distribution table detailing the number of occurrences for values falling within each defined class interval, providing an immediate overview of the dataset's dispersion.

Understanding the Frequency Distribution Concept

A **frequency distribution** is a tabular or graphical representation that illustrates how often different numerical values or scores occur within a given dataset. It serves as a foundational tool in descriptive statistics, providing immediate insight into the central tendency, spread, and shape of the data. By organizing raw data into meaningful classes or categories and counting the occurrences, we can significantly simplify large amounts of information.

Understanding this distribution is paramount for subsequent statistical analysis, allowing researchers to spot trends, identify outliers, and make informed decisions about appropriate analytical methods. Whether you are analyzing sales figures, test scores, or scientific measurements, visualizing the distribution is the first critical step in data exploration.

While the Data Analysis ToolPak offers a quick method, the most robust and flexible technique for generating these tables in Excel involves using the specialized FREQUENCY function, which is designed specifically for calculating occurrence counts within predefined class intervals (known as bins).

Leveraging the FREQUENCY Function for Precision

The FREQUENCY function is unique because it is an array formula, meaning it returns multiple values based on a single formula entry. This makes it highly efficient for calculating frequency counts across multiple bins simultaneously. It is essential to understand the structure of the function before implementation:

The core syntax requires two primary arguments: the data set itself and the array defining the upper limits of your frequency categories.

=FREQUENCY(data_array, bins_array)

Where:

data_array: This argument refers to the range containing the raw numerical values you wish to analyze. This is the source data set.

bins_array: This argument must be a range of cells containing the upper boundary values (or class limits) that define the intervals for your frequency count. Excel automatically calculates the count of values less than or equal to each limit.

When using this function, remember that because it is an array formula, it must be entered correctly by selecting the entire output range first, typing the formula, and then confirming the entry using Ctrl+Shift+Enter (or Cmd+Shift+Enter on Mac).

Setting Up Data and Defining Bin Ranges

To demonstrate the practical application of the FREQUENCY function, consider a hypothetical dataset consisting of 20 numerical values. These values, organized in Column A of the Excel worksheet, represent our raw data that we need to analyze for distribution patterns.

	A	B	C	D	E	F	G
1	data						
2	2						
3	3						
4	3						
5	5						
6	6						
7	10						
8	12						
9	14						
10	14						
11	15						
12	16						
13	17						
14	19						
15	22						
16	23						
17	24						
18	29						
19	30						
20	32						
21	34						
22							
23							
24							
25							
26							

The crucial next step involves defining the upper limits for the classification intervals, also known as bins. The choices for these limits dictate how the data will be grouped and visualized. In this specific scenario, we have chosen 10, 20, and 30 as our upper limits. These limits define four distinct categories, or bins, for which we will calculate the corresponding frequencies:

Bin 1 (Upper Limit 10): Includes all values greater than 0 up to and including 10.

Bin 2 (Upper Limit 20): Includes all values greater than 10 up to and including 20.

Bin 3 (Upper Limit 30): Includes all values greater than 20 up to and including 30.

Bin 4 (Overflow): Excel automatically creates an additional bin for all values that are strictly greater than the highest limit defined (in this case, values > 30).

It is important to input these limits (10, 20, 30) into a separate column (Column C) adjacent to where the frequencies will be outputted. This arrangement, as shown below, prepares the necessary inputs for the array formula.

	A	B	C	D	E
1	data		bins		
2	2		10		
3	3		20		
4	3		30		
5	5				
6	6				
7	10				
8	12				
9	14				
10	14				
11	15				
12	16				
13	17				
14	19				
15	22				
16	23				
17	24				
18	29				
19	30				
20	32				
21	34				
22					
23					
24					
25					

Executing the FREQUENCY Array Formula

Since the FREQUENCY function returns an array of results, the input procedure is critical. First, you must select the output range where the frequency counts will appear. Since we defined three bins (10, 20, 30), we need to select four cells for output (D2:D5) to account for the three defined bins and the required overflow bin.

With the range D2:D5 selected, input the following formula into the formula bar:

```
=FREQUENCY(A2:A21, C2:C4)
```

Remember to confirm the formula using Ctrl+Shift+Enter. Upon correct entry, Excel surrounds the formula with curly braces

{ }

, indicating that it is being processed as an array formula, and the frequency counts will automatically populate the selected cells, as demonstrated in the resulting table below:

D2		fx		=FREQUENCY(A2:A21, C2:C4)			
	A	B	C	D	E	F	G
1	data		bins	frequency			
2	2		10	6			
3	3		20	7			
4	3		30	5			
5	5			2			
6	6						
7	10						
8	12						
9	14						
10	14						
11	15						
12	16						
13	17						
14	19						
15	22						
16	23						
17	24						
18	29						
19	30						
20	32						
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26							

Interpreting the Generated Frequency Counts

The resulting frequency table provides a clear, quantitative summary of the data distribution. Each count corresponds precisely to the range defined by the upper limit in the adjacent cell, except for the final cell, which captures the remainder.

Analyzing the counts shown in the output range D2:D5 reveals the following critical insights into the dataset:

Bin (0-10): A total of **6** values from the dataset fall within this initial range (less than or equal to 10).

Bin (11-20): This interval contains the highest frequency, with **7** values being greater than 10 but less than or equal to 20.

Bin (21-30): The third class interval contains **5** values, indicating a slight drop-off compared to the previous bin.

Overflow Bin (>30): Finally, 2 values in the dataset are strictly greater than the highest defined limit of 30.

This structured frequency count is the essential precursor to visualization, as it transforms raw data into easily digestible statistical metrics.

Visualizing the Distribution: Creating a Column Chart

While the frequency table is informative, a graphical representation, typically a histogram or column chart, offers the quickest way to understand the shape of the distribution. Visualizing the data makes it easier to communicate findings and identify patterns like skewness or modality.

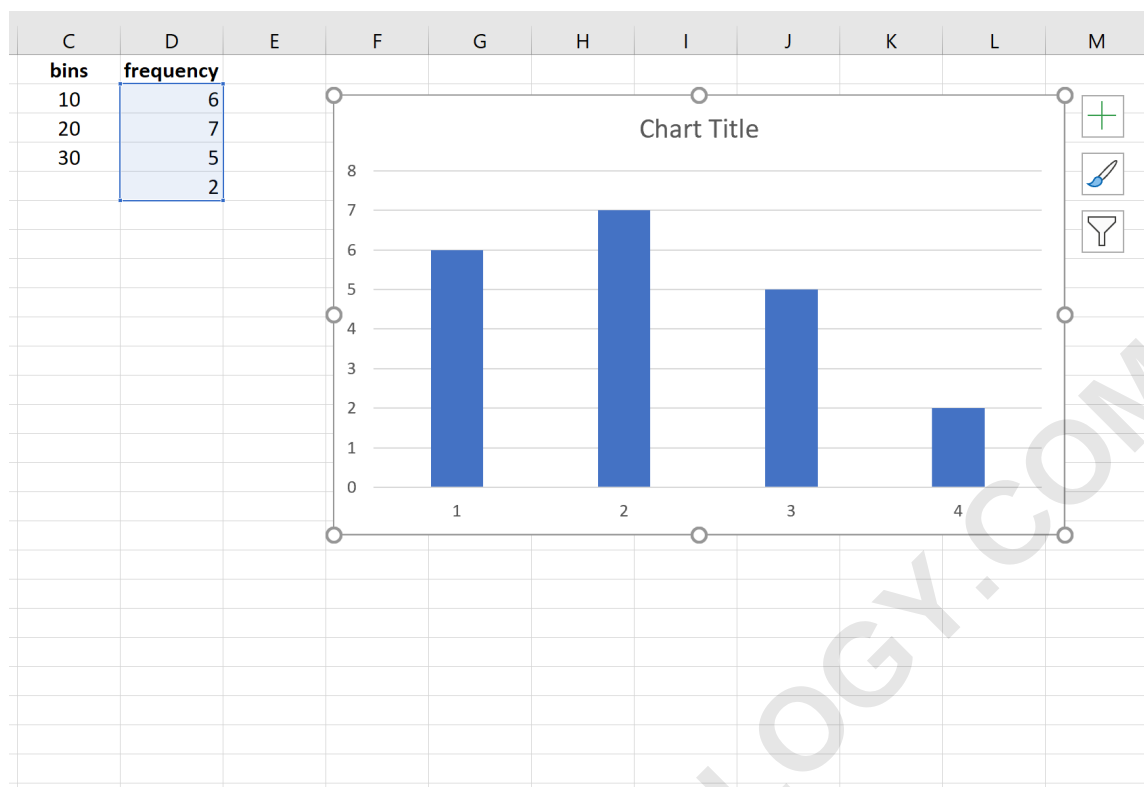
To create a visual representation of the calculated frequencies in Excel, follow these steps precisely:

Select Data: Highlight only the numerical frequency counts generated by the array formula, corresponding to the range **D2:D5** in our example. Do not include the bin limits in this initial selection.

Insert Chart: Navigate to the **Insert** tab on the Excel ribbon.

Choose Chart Type: Within the **Charts** group, click on the icon for Column or Bar charts and select the standard **2-D Column** option.

Excel will immediately generate a preliminary bar chart, where the height of each column corresponds directly to the frequency count in that bin. The resulting visualization clearly displays the distribution across the defined intervals:

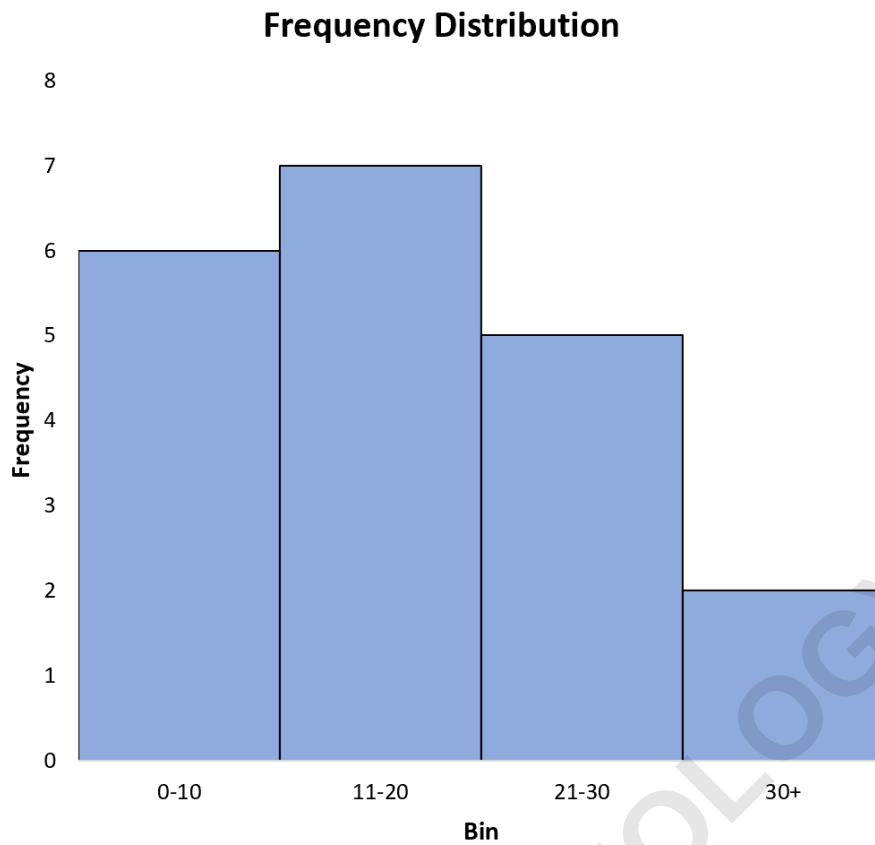


Refining and Customizing the Chart Presentation

The initial column chart provides the required data visualization, but often requires formatting to meet presentation standards. Effective data visualization relies on clear axis labels and appropriate bar representation, especially when the chart is meant to function as a formal histogram.

Key modifications often include: setting custom axis labels to reflect the true bin intervals (e.g., "0-10," "11-20"), adjusting the gap width between bars to zero (standard for histograms), and ensuring the chart title accurately reflects the data being displayed (e.g., "Distribution of Dataset Values"). These refinements enhance clarity and analytical value.

After applying these aesthetic and structural modifications, the chart becomes a polished and highly informative graphical summary, ready for inclusion in reports or presentations:



For additional guides and tutorials on statistical analysis and data handling within Excel, please explore our comprehensive collection of resources [here](#).