

# Create a Bell Curve in Google Sheets (Step-by-Step)

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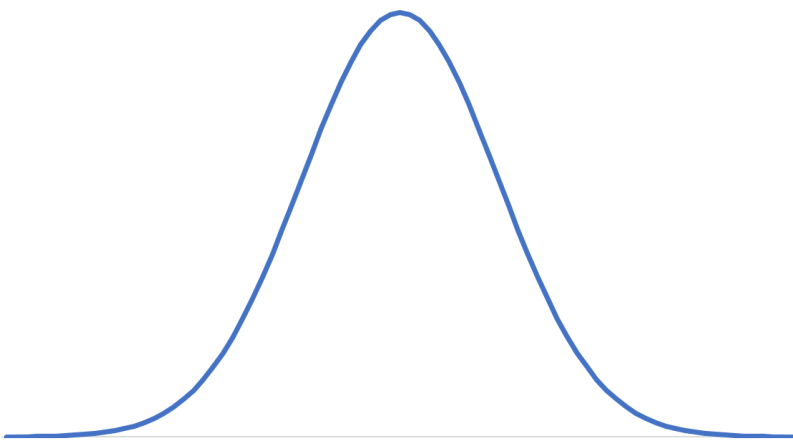
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## RECOMMENDED CITATION

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The term "**bell curve**" is universally recognized, representing the graphical depiction of the most foundational statistical concept: the [normal distribution](#). This pervasive shape is perfectly symmetrical, defined by the characteristic bell structure where data points concentrate tightly around the central average and gradually decrease in frequency toward the extremes. Understanding and visualizing this distribution is paramount for accurate data analysis across disciplines, from determining risk in finance to evaluating performance in educational testing.

Creating this visualization manually can be complex, but modern spreadsheet tools simplify the process significantly. This detailed, expert guide provides a precise, step-by-step methodology necessary to construct a dynamic and statistically accurate bell curve visualization using **Google Sheets**. By defining just two core parameters--the mean and the standard deviation--you can generate a reusable model that instantly adapts to new data inputs.



## Step 1: Define the Essential Statistical Parameters (Mean and Standard Deviation)

Every normal distribution is uniquely defined by two fundamental statistical parameters: the [mean](#) ( $\mu$ ) and the [standard deviation](#) ( $\sigma$ ). The **mean** dictates the exact center point (the highest peak) of the bell curve, while the **standard deviation** governs the spread or variability of the data--a smaller standard deviation results in a taller, narrower curve, and vice versa.

The initial and most critical action is to clearly establish these values within dedicated cells in your Google Sheet. It is strongly recommended practice to label these cells unambiguously (e.g., "Mean" and "Standard Deviation") to ensure formula readability and easy adjustment later on. These cells will act as the dynamic inputs for all subsequent calculations.

For the purpose of this demonstration, we will set up the sheet with a sample **mean** of 50 and a **standard deviation** of 5. These values should be placed at the top of your sheet, as illustrated

below, typically in cells B2 and B3, respectively:

	A	B	C	D
1	<b>Mean</b>	0		
2	<b>Standard Dev</b>	1		
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				

## Step 2: Establish the Range of Standardized Scores (Z-Scores)

To produce a smooth, visually accurate curve, we must calculate a sufficient number of data points that span the entire relevant range of the distribution. Statisticians commonly use [percentiles](#) or Z-scores for this, as they measure the distance of any point from the mean in units of standard deviation, standardizing the scale.

A standard practice for plotting a comprehensive normal curve is to define the range from negative four standard deviations (**-4.0**) to positive four standard deviations (**+4.0**). This range captures over 99.99% of the distribution area, making the resulting curve highly representative. To ensure the plotted line is continuous and detailed, we must use small, consistent increments.

In the first column (Column A), beginning in cell A5, meticulously list the Z-scores ranging from **-4.0 to 4.0**, utilizing increments of 0.1. This precise increment size yields 81 distinct points, which is ample resolution for creating a smooth graphic representation of the probability density function:

	A	B	C	D
1	<b>Mean</b>	0		
2	<b>Standard Dev</b>	1		
3				
4	<b>Percentiles</b>			
5	-4			
6	-3.9			
7	-3.8			
8	-3.7			
9	-3.6			
10	-3.5			
11	-3.4			
12	-3.3			
13	-3.2			
14	-3.1			
15	-3			
16	-2.9			
17	-2.8			
18	-2.7			
19	-2.6			
20	-2.5			
21	-2.4			

### Step 3: Calculate the Corresponding Data Values (X-Axis Coordinates)

The standardized percentile values established in Step 2 represent distances from the mean, but they must be converted back into the actual scale of our data (the X-axis coordinates) using the previously defined mean and standard deviation. This conversion transforms the abstract Z-scores into tangible data points relevant to our specific dataset (e.g., test scores, height measurements, etc.).

In Column B, starting in cell B5, input the formula that executes this transformation. The formula takes the Z-score (A5), multiplies it by the [standard deviation](#) (\$B\$3), and then adds the [mean](#) (\$B\$2). The formula is structured as follows:

```
=A5*$B$3+$B$2
```

It is absolutely essential that you use absolute references (indicated by the dollar signs, e.g., \$B\$3 and \$B\$2) for the mean and standard deviation cells. This ensures that when you drag the formula down to calculate the remaining 80 points, the reference to the input parameters remains fixed,

guaranteeing accurate calculation across the entire range.

B5		fx = \$B\$1 + A5 * \$B\$2			
	A	B	C	D	
1	<b>Mean</b>	0			
2	<b>Standard Dev</b>	1			
3					
4	<b>Percentiles</b>	<b>Data</b>			
5	-4	-4			
6	-3.9	-3.9			
7	-3.8	-3.8			
8	-3.7	-3.7			
9	-3.6	-3.6			
10	-3.5	-3.5			
11	-3.4	-3.4			
12	-3.3	-3.3			
13	-3.2	-3.2			
14	-3.1	-3.1			
15	-3	-3			
16	-2.9	-2.9			
17	-2.8	-2.8			
18	-2.7	-2.7			
19	-2.6	-2.6			
20	-2.5	-2.5			
21	-2.4	-2.4			

#### Step 4: Determine the Probability Density Function (Y-Axis Coordinates)

The height of the bell curve at each X-value is determined by the [Probability Density Function](#) (PDF), which mathematically describes the likelihood of a continuous random variable falling within a specified range. Fortunately, Google Sheets simplifies this complex calculation using the powerful built-in `NORMDIST` function, which computes the required density value for any specified point.

In Column C, beginning in cell C5, enter the following function. The function requires four arguments: the calculated data value (B5), the mean (\$B\$2), the standard deviation (\$B\$3), and a logical value. Crucially, we use `FALSE` as the final argument to specify that we want the density value (PDF) rather than the cumulative probability (CDF).

```
=NORMDIST(B5,$B$2,$B$3,FALSE)
```

Once entered, drag this function down through all corresponding rows. The resulting values in Column C represent the precise Y-axis coordinates--the heights--that, when paired with the X-values from Column B, perfectly define the shape of our normal distribution curve.

	A	B	C	D
1	<b>Mean</b>	0		
2	<b>Standard Dev</b>	1		
3				
4	<b>Percentiles</b>	<b>Data</b>	<b>PDF</b>	
5	-4	-4	0.000133830225	
6	-3.9	-3.9	0.000198655471	
7	-3.8	-3.8	0.000291946925	
8	-3.7	-3.7	0.000424780270	
9	-3.6	-3.6	0.000611901930	
10	-3.5	-3.5	0.000872682695	
11	-3.4	-3.4	0.001232219168	
12	-3.3	-3.3	0.001722568939	
13	-3.2	-3.2	0.002384088201	
14	-3.1	-3.1	0.003266819056	
15	-3	-3	0.004431848412	
16	-2.9	-2.9	0.00595253242	
17	-2.8	-2.8	0.007915451583	
18	-2.7	-2.7	0.01042093481	
19	-2.6	-2.6	0.01358296923	
20	-2.5	-2.5	0.01752830049	
21	-2.4	-2.4	0.02239453029	

## Step 5: Visualize the Normal Distribution Using a Line Chart

With all necessary coordinates calculated--the X-values (data points) in Column B and the corresponding Y-values (PDF density) in Column C--the final step involves translating this data into the visual representation we seek. This charting process is straightforward and relies entirely on the data structure we have meticulously established.

To generate the visualization, execute the following instructions:

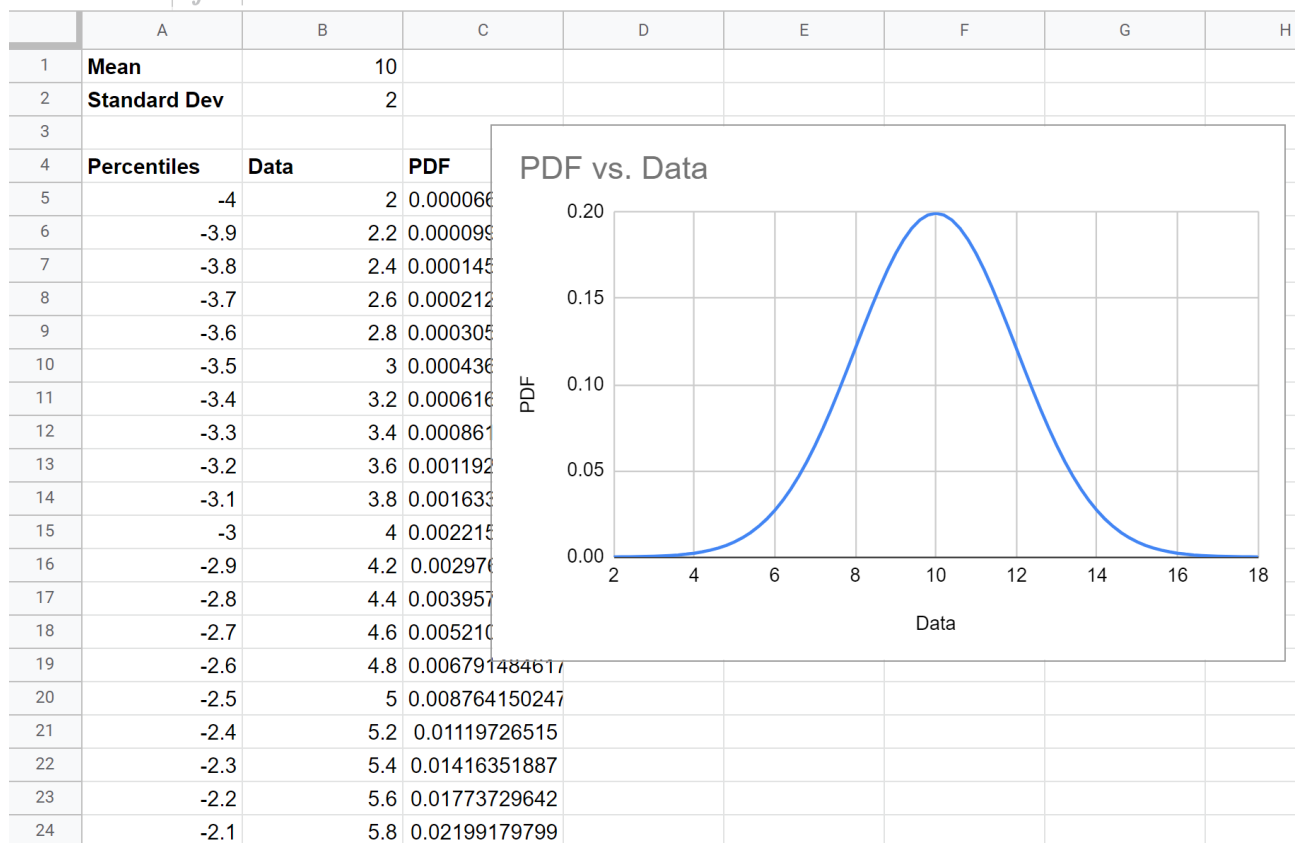
Highlight the entire data range containing both the X-values and the PDF values (for example, the range **B5:C85**).

Navigate to the **Insert** menu tab in the Google Sheets interface.

Select **Chart** from the subsequent dropdown options.



clearly demonstrates two fundamental effects: the entire curve shifts its center (location) and becomes significantly taller and narrower (reduced spread), illustrating the sensitivity of the normal distribution to its defining parameters:



We highly recommend utilizing the extensive customization tools available in the Google Sheets Chart Editor. Beyond the core visualization, you can significantly enhance the aesthetic appeal and interpretability of your chart by adding clear, explicit axis labels, modifying the chart title, adjusting line thickness, and optimizing color schemes for presentations or reports.

### Further Statistical Resources and Learning

For individuals seeking to deepen their understanding of the theoretical underpinnings and advanced applications related to the [normal distribution](#), the following tutorials and resources provide valuable supplementary information and complex calculation methods:

[An Introduction to the Normal Distribution](#)

[Normal CDF Calculator](#)