

How to perform a Chi-Square Goodness of Fit Test in Google Sheets (Step-by-Step)

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December 10, 2025

RECOMMENDED CITATION

stats writer (2025). *How to perform a Chi-Square Goodness of Fit Test in Google Sheets (Step-by-Step)*. PSYCHOLOGICAL SCALES. Retrieved from <https://scales.arabpsychology.com/?p=106905>

A Chi-Square Goodness of Fit Test is a statistical test used to compare observed counts of data with expected counts. To perform a Chi-Square Goodness of Fit Test in Google Sheets, first enter the observed counts of the data into a table, then enter the expected counts into the table. Next, use the CHITEST function to calculate the Chi-Square statistic and the associated p-value. Finally, interpret the results of the test based on the p-value to determine if the observed and expected counts differ significantly.

A is used to determine whether or not a categorical variable follows a hypothesized distribution.

For example, suppose a shop owner claims that an equal number of customers come into his shop each weekday.

To test this hypothesis, an independent researcher records the number of customers that come into the shop on a given week and finds the following:

Monday: 50 customers

Tuesday: 60 customers

Wednesday: 40 customers

Thursday: 47 customers

Friday: 53 customers

We can perform a Chi-Square Goodness of Fit Test to determine if the data is consistent with the shop owner's claim.

This following step-by-step example shows how to perform a Chi-Square Goodness of Fit Test in Google Sheets.

Step 1: Create the Data

First, let's input the data into Google Sheets in the following format:

	A	B	C	D	E
1	Day	Observed	Expected		
2	Monday	50	50		
3	Tuesday	60	50		
4	Wednesday	40	50		
5	Thursday	47	50		
6	Friday	53	50		
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Note: There were 250 customers total. If the shop owner expects an equal number to come into the shop each day then he would expect 50 customers per day.

Step 2: Calculate the Difference Between Observed and Expected Values

The Chi-Square test statistic for the Goodness of Fit test is $\chi^2 = \sum(O-E)^2 / E$

where:

Σ : is a fancy symbol that means "sum"

O: observed value

E: expected value

The following formula shows how to calculate $(O-E)^2 / E$ for each row:

	A	B	C	D	E
1	Day	Observed	Expected	(O-E)²/E	
2	Monday	50	50		$=(B2-C2)^2/C2$
3	Tuesday	60	50	2	
4	Wednesday	40	50	2	
5	Thursday	47	50	0.18	
6	Friday	53	50	0.18	
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Step 3: Calculate the P-Value

	A	B	C	D	E	F	G
1	Day	Observed	Expected	(O-E)²/E			
2	Monday	50	50	0			
3	Tuesday	60	50	2			
4	Wednesday	40	50	2			
5	Thursday	47	50	0.18			
6	Friday	53	50	0.18			
7			X²	4.36	=SUM(D2:D6)		
8			p-value	0.3595	=CHISQ.DIST.RT(D7, COUNT(D2:D6)-1)		
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Note: The function **CHISQ.DIST.RT(x, deg_freedom)** returns the right-tailed probability of the Chi-Square distribution associated with a test statistic **x** and a certain degrees of freedom. The degrees of freedom is calculated as $n-1$. In this case, $\text{deg_freedom} = 5 - 1 = 4$.

The X² test statistic for the test is **4.36** and the corresponding p-value is **0.3595**.

Since this p-value is not less than 0.05, we fail to reject the null hypothesis. This means we do not have sufficient evidence to say that the true distribution of customers is different from the distribution that the shop owner claimed.