

# How do I perform a Correlation Test in Excel step-by-step?

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A correlation test in Excel is a statistical method used to measure the relationship between two variables. It can help identify patterns and determine the strength and direction of the relationship between the two variables. To perform a correlation test in Excel, follow these steps:

1. Open Microsoft Excel and enter the data for the two variables in separate columns. Make sure the data is organized in a tabular format with a clear heading for each column.
2. Select the entire data set by clicking and dragging over the cells.
3. Go to the "Data" tab and click on "Data Analysis" in the "Analyze" group.
4. In the "Data Analysis" dialog box, select "Correlation" from the list of tools and click "OK".
5. In the "Input Y Range" field, enter the range of cells containing the first variable's data. In the "Input X Range" field, enter the range of cells containing the second variable's data. Check the box next to "Labels in First Row" if your data has column headers.
6. Click "OK" to generate the correlation analysis.
7. The results will appear in a new worksheet. The correlation coefficient ( $r$ ) will be displayed in the cell next to "Correlation Coefficient". The closer the value of  $r$  is to 1 or -1, the stronger the relationship between the two variables. The positive or negative sign indicates the direction of the relationship.
8. To create a scatter plot of the data, select the cells containing the correlation analysis results and click on the "Insert" tab. Then, click on "Scatter" in the "Charts" group and select a scatter plot type.
9. You can also use the "Trendline" feature in Excel to generate a line of best fit for the data points. Right-click on a data point in the scatter plot and select "Add Trendline". Choose the type of trendline and the equation will be displayed on the chart.
10. Finally, you can interpret the results of the correlation test by analyzing the  $r$  value and the scatter plot. A strong positive correlation ( $r$  close to 1) indicates a positive relationship, while a strong negative correlation ( $r$  close to -1) indicates a negative relationship. A value of  $r$  close to 0 suggests no relationship between the two variables.

By following these steps, you can easily perform a correlation test in Excel and gain valuable insights into the relationship between two variables.

## Perform a Correlation Test in Excel (Step-by-Step)

One way to quantify the relationship between two variables is to use the Pearson correlation coefficient which is a measure of the linear association between two variables.

It always takes on a value between -1 and 1 where:

-1 indicates a perfectly negative linear correlation between two variables  
0 indicates no linear correlation between two variables  
1 indicates a perfectly positive linear correlation between two variables

To determine if a correlation coefficient is statistically significant you can perform a correlation test, which involves calculating a t-score and a corresponding p-value.

The formula to calculate the t-score is:

$$t = r\sqrt{(n-2) / (1-r^2)}$$

where:

**r:** Correlation coefficient  
**n:** The sample size

The p-value is calculated as the corresponding two-sided p-value for the t-distribution with  $n-2$  degrees of freedom.

The following step-by-step example shows how to perform a correlation test in Excel.

### Step 1: Enter the Data

First, let's enter some data values for two variables in Excel:

	A	B	C	D	E	F	G
1	x	y					
2	2	23					
3	3	24					
4	3	24					
5	5	23					
6	6	17					
7	9	14					
8	14	30					
9	15	31					
10	19	26					
11	21	39					
12	22	41					
13	23	43					
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							

## Step 2: Calculate the Correlation Coefficient

Next, we can use the **CORREL()** function to calculate the correlation coefficient between the two variables:

	A	B	C	D	E	F	G	H
1	x	y		r	0.803702	=CORREL(A2:A13, B2:B13)		
2	2	23						
3	3	24						
4	3	24						
5	5	23						
6	6	17						
7	9	14						
8	14	30						
9	15	31						
10	19	26						
11	21	39						
12	22	41						
13	23	43						
14								
15								
16								
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23								

The correlation coefficient between the two variables turns out to be **0.803702**.

## Step 3: Calculate the Test Statistic and P-Value

Next, we can use the following formulas to calculate the test statistic and the corresponding p-value:

	A	B	C	D	E	F	G	H	I
1	<b>x</b>	<b>y</b>		<b>r</b>	0.803702				
2	2	23		<b>n</b>	12	=COUNT(B2:B13)			
3	3	24		<b>t-score</b>	4.27124	=E1*SQRT((E2-2)/(1-E1^2))			
4	3	24		<b>p-value</b>	0.001634	=T.DIST.2T(E3, E2-2)			
5	5	23							
6	6	17							
7	9	14							
8	14	30							
9	15	31							
10	19	26							
11	21	39							
12	22	41							
13	23	43							
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The test statistic turns out to be 4.27124 and the corresponding p-value is 0.001634.

Since this p-value is less than .05, we have sufficient evidence to say that the correlation between the two variables is statistically significant.