How do you perform a nested ANOVA in Excel step-by-step?

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Nested ANOVA (Analysis of Variance) is a statistical method used to analyze the differences between multiple groups or categories. In Excel, nested ANOVA can be performed in a step-by-step manner using the following process:

Step 1: Organize the data into a table with the dependent variable in one column and the independent variables in separate columns. Make sure to label the columns and rows appropriately.

Step 2: Select the data and go to the "Data" tab in the Excel ribbon. Then, click on the "Data Analysis" option.

Step 3: In the "Data Analysis" dialog box, select "Anova: Two-Factor With Replication" from the list of options and click "OK."

Step 4: In the "Input Range" field, select the range of data including the labels. Then, in the "Grouped By" field, select the column containing the independent variables.

Step 5: Check the box next to "Labels in First Row" if your data has column labels. If not, leave this box unchecked.

Step 6: Click on the "Output Range" option and select a location for the results to be displayed.

Step 7: Check the boxes next to "Residual Plots" and "Summary Statistics" if you want these to be included in the output.

Step 8: Click "OK" to run the analysis. The results will be displayed in the designated output location.

Step 9: Interpret the results. The ANOVA table will show the significance of the main effects and the interaction effect between the independent variables. The residual plots can also provide insights into the validity of the assumptions of the analysis.

By following these steps, you can easily perform a nested ANOVA in Excel to analyze the differences between multiple groups or categories.

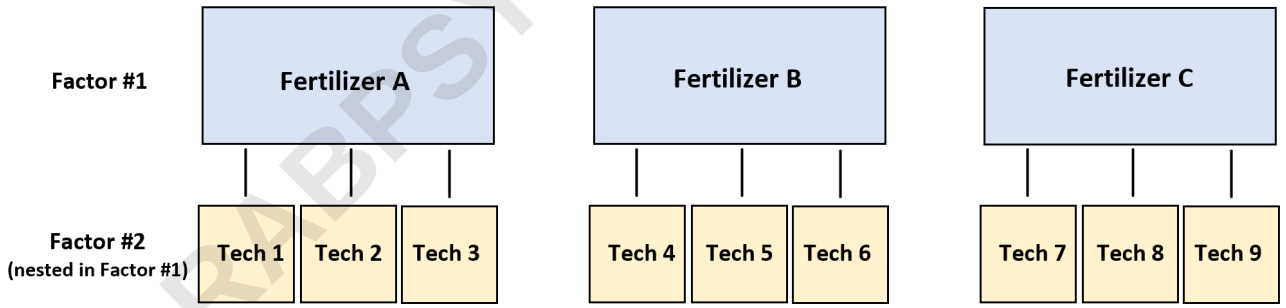
Perform a Nested ANOVA in Excel (Step-by-Step)

A is a type of ANOVA ("analysis of variance") in which at least one factor is *nested* inside another factor.

For example, suppose a researcher wants to know if three different fertilizers produce different levels of plant growth.

To test this, he has three different technicians sprinkle fertilizer A on four plants each, another three technicians sprinkle fertilizer B on four plants each, and another three technicians sprinkle fertilizer C on four plants each.

In this scenario, the is plant growth and the two factors are technician and fertilizer. It turns out that technician is *nested* within fertilizer:



The following step-by-step example shows how to perform this nested ANOVA in Excel.

Step 1: Enter the Data

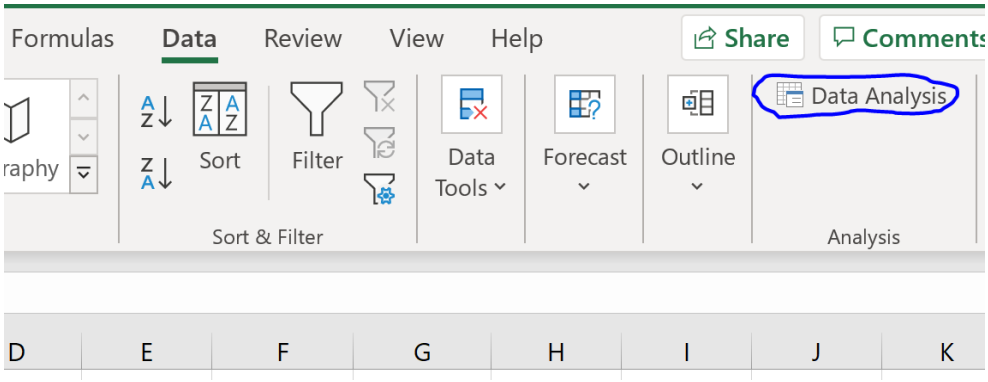
First, let's enter the data in the following format:

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

Step 2: Fit the Nested ANOVA

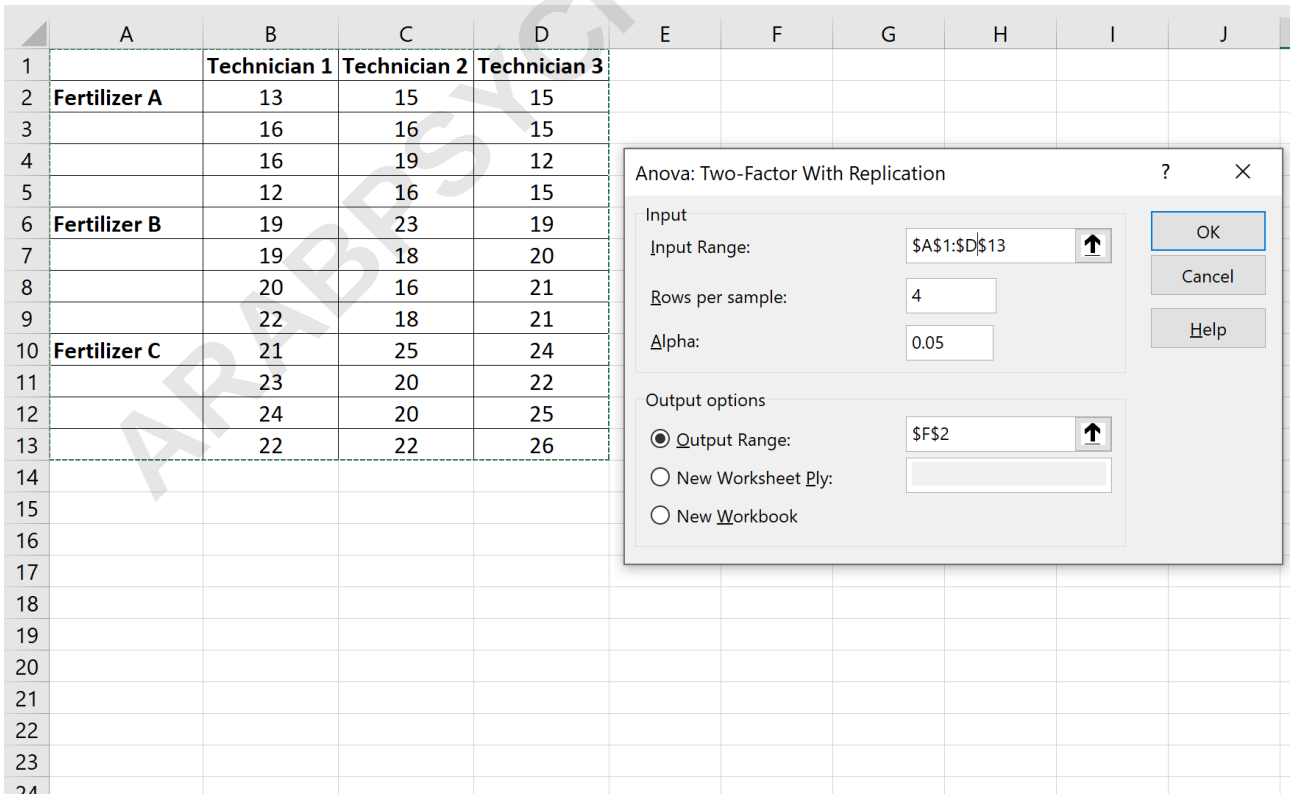
There is no built-in Nested ANOVA function in Excel, but we can use the Anova: Two-Factor With Replication option from the Data Analysis ToolPak to perform a nested ANOVA with some tweaks.

To do so, click the Data tab along the top ribbon. Then click the Data Analysis button within the Analyze group:



If you don't see this option, you need to first .

In the window that appears, click Anova: Two-Factor With Replication and then click OK. In the new window that appears, enter the following information:



	A	B	C	D
1		Technician 1	Technician 2	Technician 3
2	Fertilizer A	13	15	15
3		16	16	15
4		16	19	12
5		12	16	15
6	Fertilizer B	19	23	19
7		19	18	20
8		20	16	21
9		22	18	21
10	Fertilizer C	21	25	24
11		23	20	22
12		24	20	25
13		22	22	26

Once you click OK, the following output will appear:

F	G	H	I	J	K	L
Anova: Two-Factor With Replication						
SUMMARY	Technician	Technician	Technician	Total		
Fertilizer A						
Count	4	4	4	12		
Sum	57	66	57	180		
Average	14.25	16.5	14.25	15		
Variance	4.25	3	2.25	3.818182		
Fertilizer B						
Count	4	4	4	12		
Sum	80	75	81	236		
Average	20	18.75	20.25	19.66667		
Variance	2	8.916667	0.916667	3.69697		
Fertilizer C						
Count	4	4	4	12		
Sum	90	87	97	274		
Average	22.5	21.75	24.25	22.83333		
Variance	1.666667	5.583333	2.916667	3.969697		
Total						
Count	12	12	12			
Sum	227	228	235			
Average	18.91667	19	19.58333			
Variance	15.17424	9.818182	20.08333			
ANOVA						
Source of Variatior	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample	372.6667	2	186.3333	53.2381	4.27031E-10	3.354130829
Columns	3.166667	2	1.583333	0.452381	0.640845706	3.354130829
Interaction	28.66667	4	7.166667	2.047619	0.115848461	2.727765306
Within	94.5	27	3.5			

Step 3: Interpret the Output

The ANOVA table shown at the bottom of the output is the one table that we will focus on.

The row labeled Sample shows the results for fertilizer. The p-value in this row (4.27031E-10) is less than .05, so

we can conclude that fertilizer is statistically significant.

To determine if the nested factor "technician" is statistically significant, we must perform the following manual calculations:

ANOVA					
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*
Sample	372.6666667	2	186.3333333	53.23809524	4.27031E-10
Columns	3.166666667	2	1.583333333	0.452380952	0.640845706
Interaction	28.66666667	4	7.166666667	2.047619048	0.115848461
Within	94.5	27	3.5		
Total	499	35			
Source of Variation	SS	df	MS	F	P-value
Technician	31.83333333	6	5.305555556	1.515873016	0.211
Formulas Used	=G34+G33	=H34+H33	=G40/H40	=I40/I35	=F.DIST.RT(J40, H40, H35)

The p-value turns out to be 0.211. Since this is not less than .05, we conclude that technician is not a statistically significant predictor of plant growth.

These results tell us that if we'd like to increase plant growth, we should focus on the fertilizer being used rather than the individual technician who is sprinkling the fertilizer.