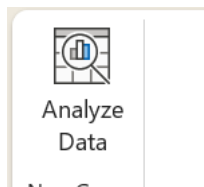
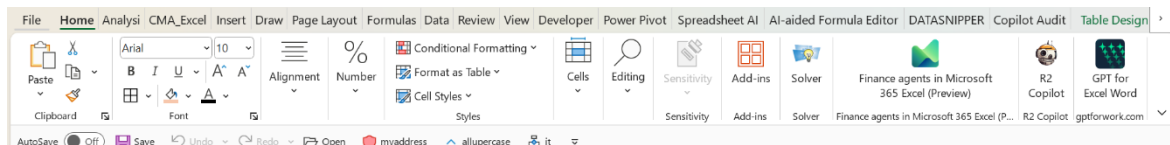


# Data Analysis in Excel 365

## Introduction to Data Analysis

Data analysis is the process of inspecting, cleaning, transforming, and modeling data to discover useful information, suggest conclusions, and support decision-making. Excel 365 provides powerful built-in tools for performing data analysis.



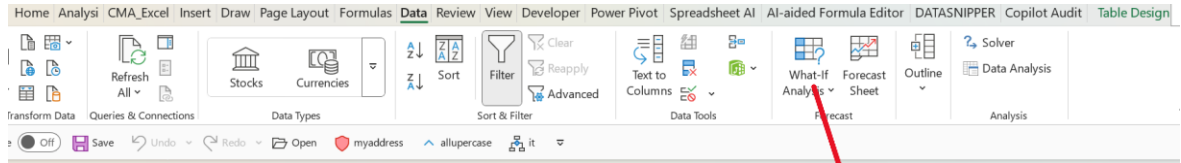
## Types of Data Analysis

1. Descriptive Analysis – Summarizing data (average sales, totals). Tools: SUM, AVERAGE, Charts, PivotTables. 2. Diagnostic Analysis – Understanding why something happened. Tools: Filters, PivotTables, Conditional Formatting. 3. Predictive Analysis – Forecasting future outcomes. Tools: Forecast Sheet, Regression. 4. Prescriptive Analysis – Suggesting actions for optimization. Tools: Solver, Goal Seek. ■ Screenshot: Example tables and charts for each type.

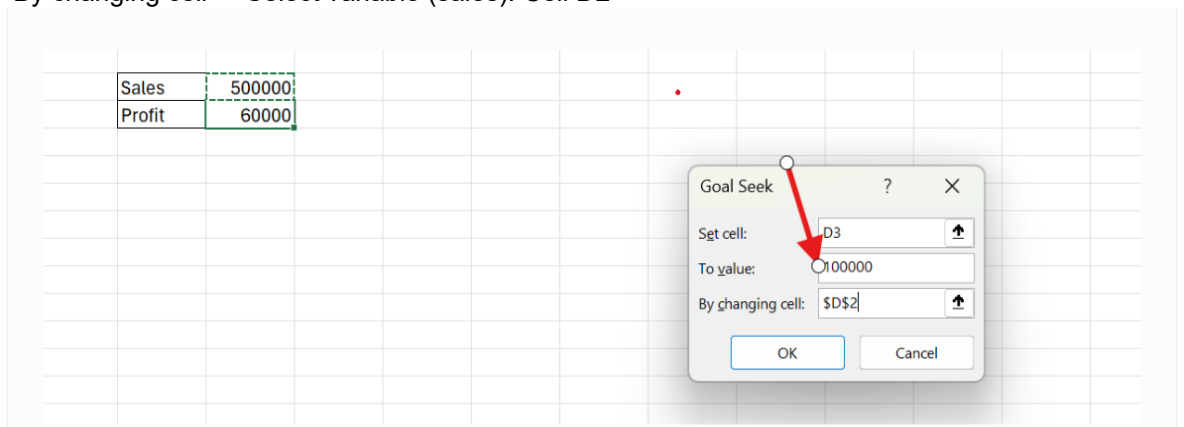
## What-If Analysis Tools

- Excel provides three key What-If tools: • Goal Seek – Find input value for desired output. Example: Calculate required sales to reach target profit. Steps:

1. Go to Data > What-If Analysis >



- Goal Seek.
- Example : In a sheet ,Enter the Sales value in Cell D2
- Enter the formula in e2 that is  $d2*10\%$
- Set cell → Select result cell (profit). D3 To value → Enter target value (e.g., 100000).
- By changing cell → Select variable (sales). Cell D2



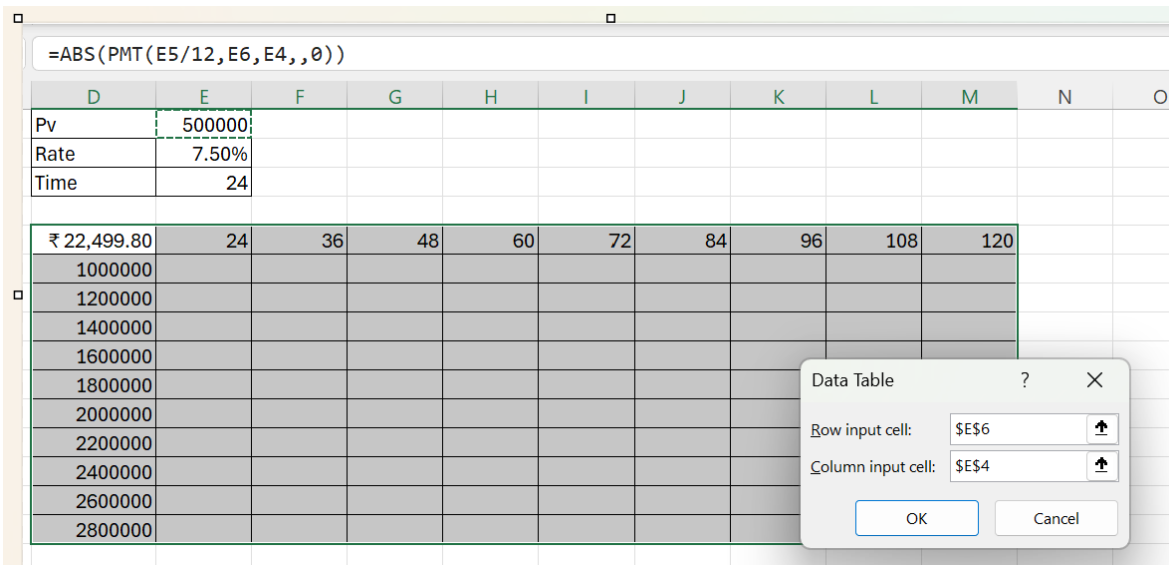
f.

• Data Table – Sensitivity analysis with one or two variables.

fx		=ABS(PMT(E5/12,E6,E4,,0))									
C	D	E	F	G	H	I	J	K	L	M	
	Pv	500000									
	Rate	7.50%									
	Time	24									
		=ABS(PMT(E5/12,E6,E4,,0))		48	60	72	84	96	108	120	
		1000000									
		1200000									
		1400000									
		1600000									
		1800000									
		2000000									
		2200000									
		2400000									
		2600000									
		2800000									

2.

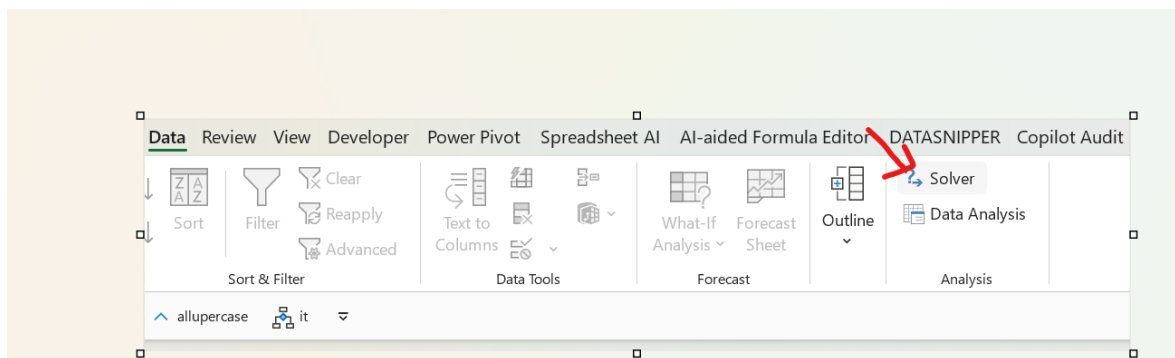
Example: Loan EMI for varying interest rates and tenure.



Press Ok

## Solver Add-in

Solver is used for optimization (maximize profit, minimize cost). Example: Optimize product mix to maximize profit under resource constraints.



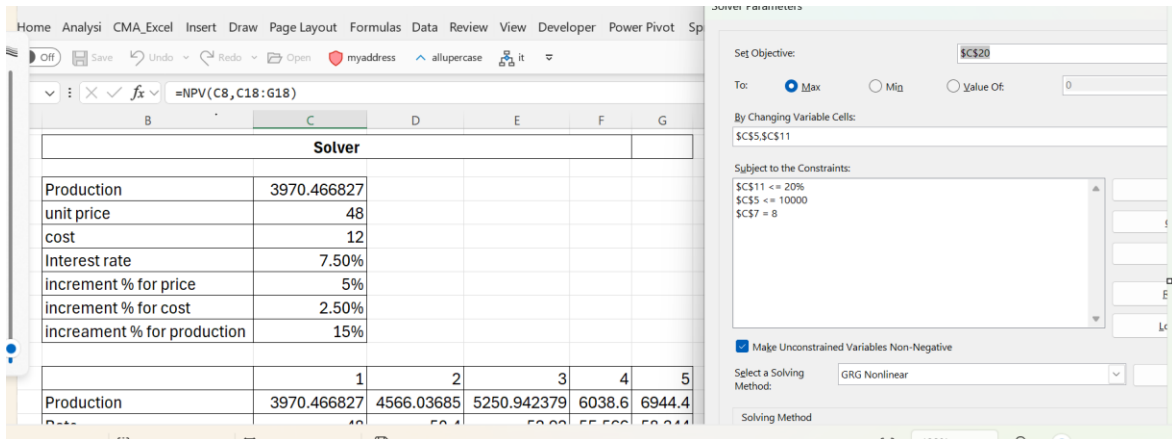
Steps: 1. Enable Solver from Options > Add-ins.

2. Define objective cell (e.g., total profit).

3. Select decision variables (units to produce). 4

. Add constraints (resource limits).

5. Click Solve.



.also creates scenarios for scenarios analysis

## Data Analysis ToolPak

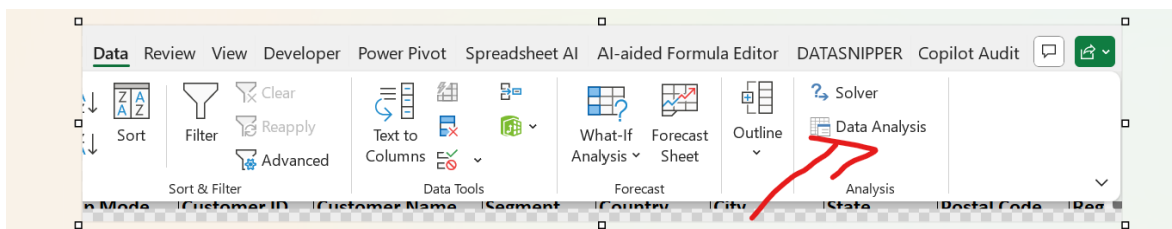
ToolPak provides advanced statistical tools. Example: Descriptive Statistics.

Steps: 1. Enable

ToolPak (File > Options > Add-ins > Analysis ToolPak).

2. Data > Data Analysis > Descriptive Statistics.

3. Select input range and summary statistics.



## Practice Exercises

1. Use Goal Seek to calculate required sales for ■1,00,000 profit. 2. Create a two-variable Data Table for EMI (Interest Rate vs Tenure). 3. Use Solver to optimize product mix with constraints. 4. Build a PivotTable showing sales by region and category. 5. Generate a Forecast Sheet for sales data. ■ Screenshot: Exercise datasets and results.

# Summary & Key Takeaways

- Excel 365 provides multiple tools for data analysis.
- Use What-If Analysis and Solver for predictive & prescriptive tasks.
- Use PivotTables and ToolPak for descriptive & diagnostic analysis.
- Forecast Sheet helps in future predictions. Mastering these tools improves decision-making and analytical skills.

## PivotTables and PivotCharts

PivotTables are used to summarize and analyze data interactively. Example: Analyze regional sales by product category.

Pivot Tables in Excel

Pivot tables are one of Excel's most powerful features. A pivot table allows you to extract the significance from a large, detailed data set.

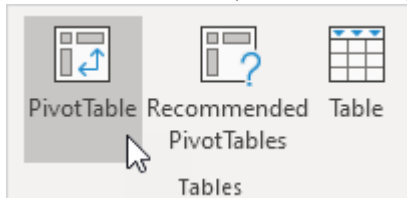
Our data set consists of 213 records and 6 fields. Order ID, Product, Category, Amount, Date and Country.

	A	B	C	D	E	F	G	H
1	Order ID	Product	Category	Amount	Date	Country		
2	1	Carrots	Vegetables	\$4,270	1/6/2024	United States		
3	2	Broccoli	Vegetables	\$8,239	1/7/2024	United Kingdom		
4	3	Banana	Fruit	\$617	1/8/2024	United States		
5	4	Banana	Fruit	\$8,384	1/10/2024	Canada		
6	5	Beans	Vegetables	\$2,626	1/10/2024	Germany		
7	6	Orange	Fruit	\$3,610	1/11/2024	United States		
8	7	Broccoli	Vegetables	\$9,062	1/11/2024	Australia		
9	8	Banana	Fruit	\$6,906	1/16/2024	New Zealand		
10	9	Apple	Fruit	\$2,417	1/16/2024	France		
11	10	Apple	Fruit	\$7,431	1/16/2024	Canada		

Insert a Pivot Table

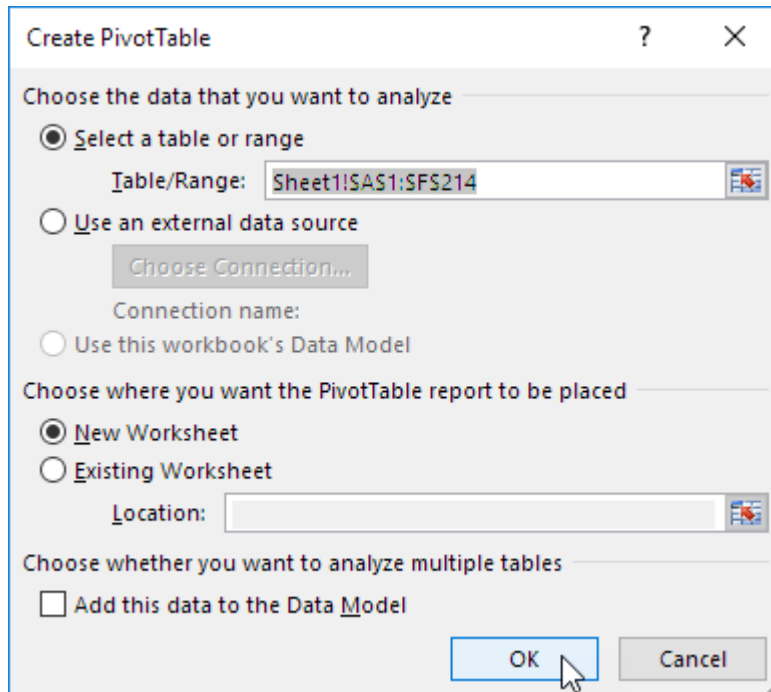
To insert a pivot table, execute the following steps.

1. Click any single cell inside the data set.
2. On the Insert tab, in the Tables group, click PivotTable.



The following dialog box appears. Excel automatically selects the data for you. The default location for a new pivot table is New Worksheet.

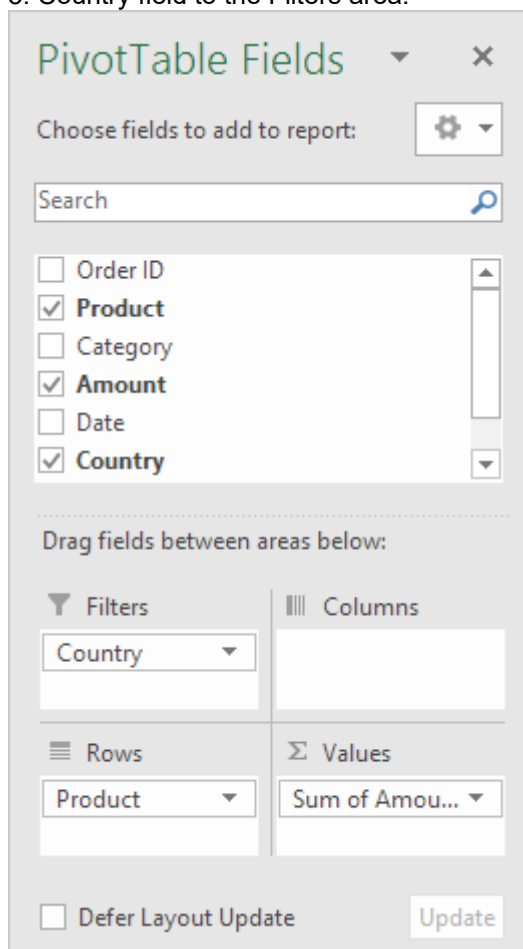
3. Click OK.



Drag fields

The PivotTable Fields pane appears. To get the total amount exported of each product, drag the following fields to the different areas.

1. Product field to the Rows area.
2. Amount field to the Values area.
3. Country field to the Filters area.



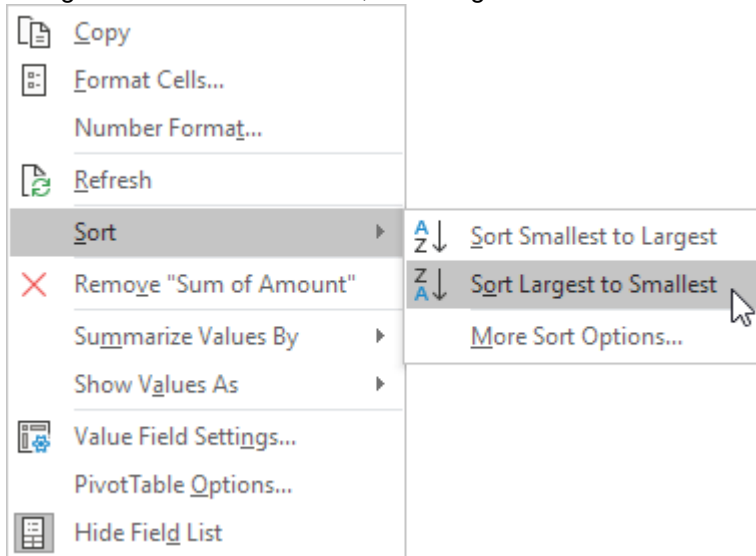
Below you can find the pivot table. Bananas are our main export product. That's how easy pivot tables can be!

	A	B	C
1	Country	(All) ▾	
2			
3	Row Labels ▾	Sum of Amount	
4	Apple	191257	
5	Banana	340295	
6	Beans	57281	
7	Broccoli	142439	
8	Carrots	136945	
9	Mango	57079	
10	Orange	104438	
11	<b>Grand Total</b>	<b>1029734</b>	
12			

### Sort a Pivot Table

To get Banana at the top of the list, sort the pivot table.

1. Click any cell inside the Sum of Amount column.
2. Right click and click on Sort, Sort Largest to Smallest.



Result:

	A	B	C
1	Country	(All)	
2			
3	Row Labels	Sum of Amount	
4	Banana	340295	
5	Apple	191257	
6	Broccoli	142439	
7	Carrots	136945	
8	Orange	104438	
9	Beans	57281	
10	Mango	57079	
11	Grand Total	1029734	
12			

### Filter a Pivot Table

Because we added the Country field to the Filters area, we can filter this pivot table by Country. For example, which products do we export the most to France?

1. Click the filter drop-down and select France.

Result: Apples are our main export product to France.

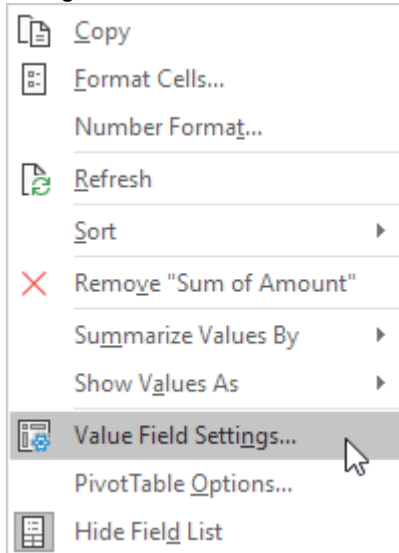
	A	B	C
1	Country	France	
2			
3	Row Labels	Sum of Amount	
4	Apple	80193	
5	Banana	36094	
6	Carrots	9104	
7	Mango	7388	
8	Broccoli	5341	
9	Orange	2256	
10	Beans	680	
11	Grand Total	141056	
12			

Note: you can use the standard filter (triangle next to Row Labels) to only show the amounts of specific products.

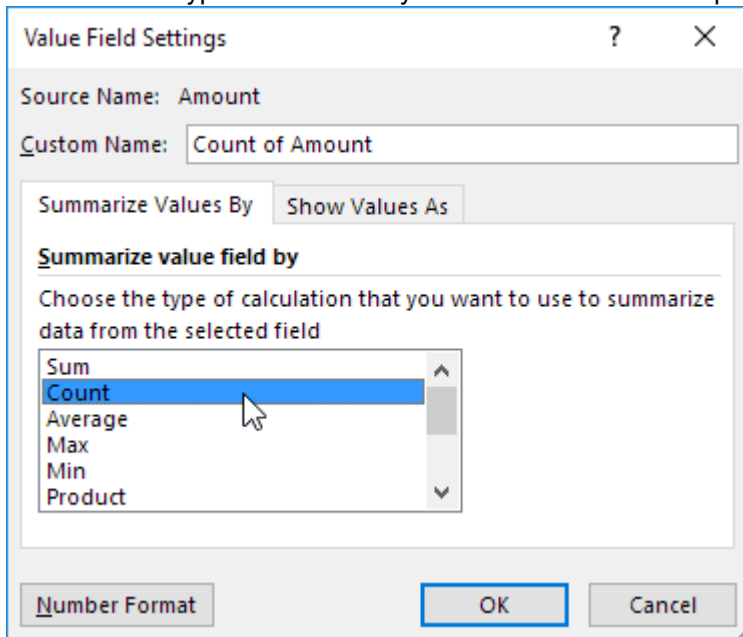
### Change Summary Calculation

By default, Excel summarizes your data by either summing or counting the items. To change the type of calculation that you want to use, execute the following steps.

1. Click any cell inside the Sum of Amount column.
2. Right click and click on Value Field Settings.



3. Choose the type of calculation you want to use. For example, click Count.



4. Click OK.

Result: 16 out of the 28 orders to France were 'Apple' orders.

	A	B	C
1	Country	France	
2			
3	Row Labels	Count of Amount	
4	Apple	16	
5	Banana	7	
6	Carrots	1	
7	Mango	1	
8	Orange	1	
9	Beans	1	
10	Broccoli	1	
11	Grand Total	28	
12			

### Two-dimensional Pivot Table

If you drag a field to the Rows area and Columns area, you can create a two-dimensional pivot table. First, [insert a pivot table](#). Next, to get the total amount exported to each country, of each product, drag the following fields to the different areas.

1. Country field to the Rows area.
2. Product field to the Columns area.
3. Amount field to the Values area.
4. Category field to the Filters area.

The screenshot shows the 'PivotTable Fields' task pane with the following configuration:

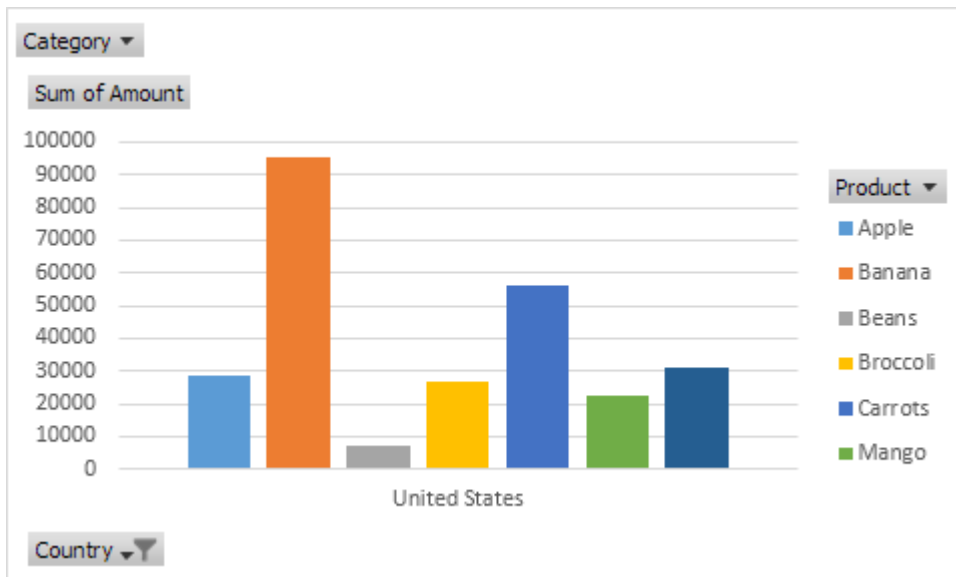
- Choose fields to add to report:** Order ID,  Product,  Category,  Amount, Date,  Country.
- Filters:** Category
- Columns:** Product
- Rows:** Country
- Values:** Sum of Amou...
- Defer Layout Update
- Update

Below you can find the two-dimensional pivot table.

	A	B	C	D	E	F	G	H	I	J
1	Category	(All)								
2										
3	Sum of Amount	Column								
4	Row Labels	Apple	Banana	Beans	Broccoli	Carrots	Mango	Orange	Grand Total	
5	Australia	20634	52721	14433	17953	8106	9186	8680	131713	
6	Canada	24867	33775		12407		3767	19929	94745	
7	France	80193	36094	680	5341	9104	7388	2256	141056	
8	Germany	9082	39686	29905	37197	21636	8775	8887	155168	
9	New Zealand	10332	40050		4390			12010	66782	
10	United Kingdom	17534	42908	5100	38436	41815	5600	21744	173137	
11	United States	28615	95061	7163	26715	56284	22363	30932	267133	
12	Grand Total	191257	340295	57281	142439	136945	57079	104438	1029734	
13										

### Pivot Chart

To easily compare these numbers, create a [pivot chart](#) and apply a filter. Maybe this is one step too far for you at this stage, but it shows you one of the many other powerful pivot table features Excel has to offer.



## Group Pivot Table Items in Excel

This example teaches you how to group pivot table items. Learn how to group products and how to group dates by quarters.

Below you can find a pivot table. Go back to [Pivot Tables](#) to learn how to create this pivot table.

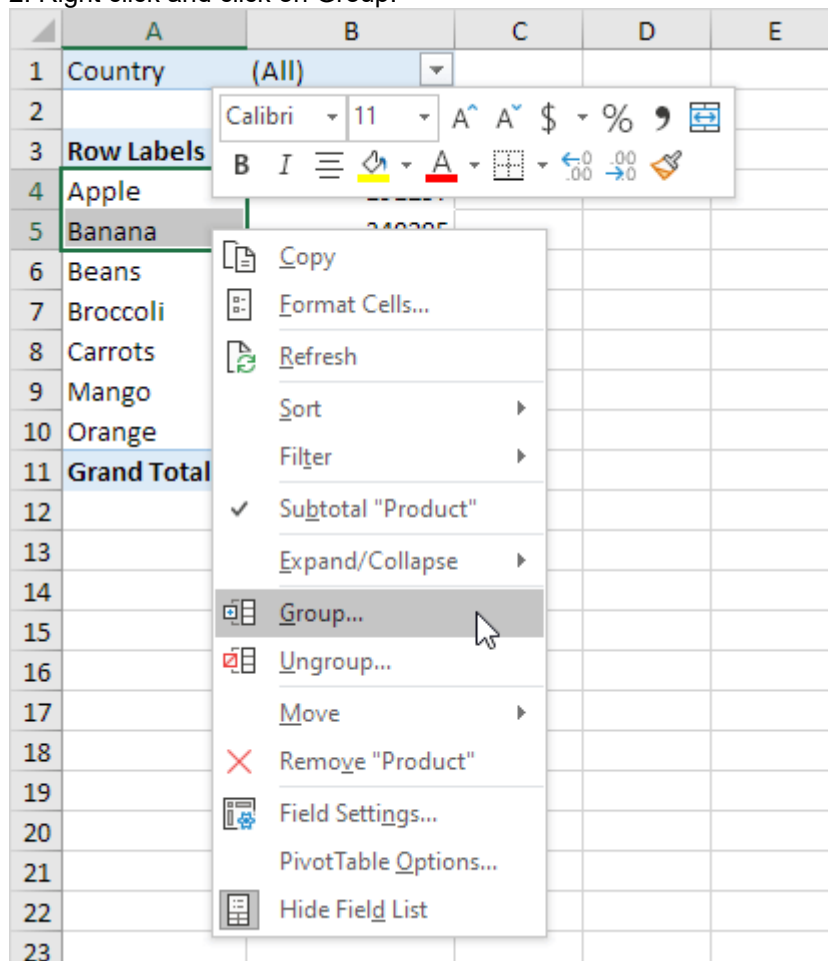
	A	B	C
1	Country	(All)	
2			
3	Row Labels	Sum of Amount	
4	Apple	191257	
5	Banana	340295	
6	Beans	57281	
7	Broccoli	142439	
8	Carrots	136945	
9	Mango	57079	
10	Orange	104438	
11	Grand Total	1029734	
12			

### Group Products

The Product field contains 7 items. Apple, Banana, Beans, Broccoli, Carrots, Mango and Orange.

To create two groups, execute the following steps.

1. In the pivot table, select Apple and Banana.
2. Right click and click on Group.



The screenshot shows the same pivot table as above, but with a right-click context menu open over the 'Apple' and 'Banana' rows. The menu includes options like Copy, Format Cells, Refresh, Sort, Filter, Subtotal, Expand/Collapse, Group, Ungroup, Move, Remove, Field Settings, PivotTable Options, and Hide Field List. The 'Group' option is highlighted by the mouse cursor.

	A	B	C	D	E
1	Country	(All)			
2					
3	Row Labels	Sum of Amount			
4	Apple	191257			
5	Banana	340295			
6	Beans	57281			
7	Broccoli	142439			
8	Carrots	136945			
9	Mango	57079			
10	Orange	104438			
11	Grand Total	1029734			
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					

3. In the pivot table, select Beans, Broccoli, Carrots, Mango and Orange.
4. Right click and click on Group.

	A	B	C	D	E
1	Country	(All) ▾			
2					
3	Row Labels ▾	Sum of Amount			
4	⊕ Group1	531552			
5	⊕ Beans	57281			
6	⊕ Broccoli				
7	⊕ Carrots				
8	⊕ Mango	57079			
9	⊕ Orange				
10	Grand Total				
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					

Result:

	A	B	C
1	Country	(All) ▾	
2			
3	Row Labels ▾	Sum of Amount	
4	⊖ Group1	531552	
5	Apple	191257	
6	Banana	340295	
7	⊖ Group2	498182	
8	Beans	57281	
9	Broccoli	142439	
10	Carrots	136945	
11	Mango	57079	
12	Orange	104438	
13	Grand Total	1029734	
14			

Note: to change the name of a group (Group1 or Group2), select the name, and edit the name in the formula bar. To ungroup, select the group, right click and click on Ungroup.  
5. To collapse the groups, click the minus signs.

	A	B	C
1	Country	(All)	
2			
3	Row Labels	Sum of Amount	
4	Group1	531552	
5	Group2	498182	
6	Grand Total	1029734	
7			

Conclusion: Apple and Banana (Group1) have a higher total than all the other products (Group2) together.

#### Group Dates

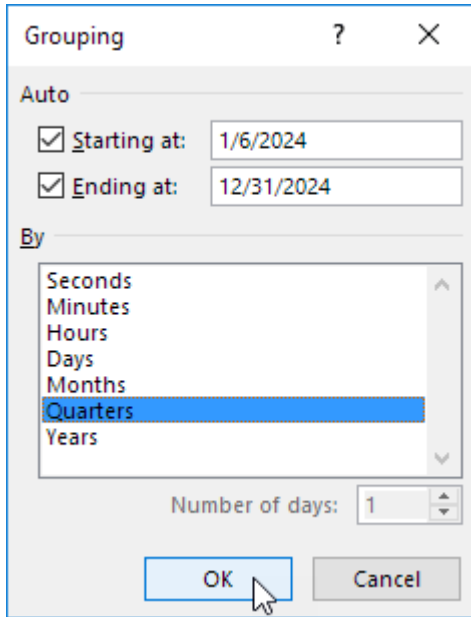
To create the pivot table below, instead of the Product field, add the Date field to the Rows area. The Date field contains many items. 6-Jan, 7-Jan, 8-Jan, 10-Jan, 11-Jan, etc.

To group these dates by quarters, execute the following steps.

1. Click any cell inside the column with dates.
2. Right click and click on Group.

	A	B	C	D	E
1	Country	(All)			
2					
3	Row Labels	Sum of Amount			
4	6-Jan	4270			
5	7-Jan				
6	8-Jan				
7	10-Jan				
8	11-Jan	12672			
9	16-Jan				
10	18-Jan				
11	20-Jan				
12	22-Jan				
13	24-Jan				
14	27-Jan				
15	28-Jan				
16	30-Jan				
17	2-Feb				
18	4-Feb				
19	11-Feb				
20	14-Feb				
21	17-Feb				
22	18-Feb				
23	20-Feb				
24	21-Feb				
25	22-Feb				
26	23-Feb	8892			

3. Select Quarters and click OK.



Note: also see the options to group by seconds, minutes, hours, etc.

Result:

	A	B	C
1	Country	(All)	
2			
3	Row Labels	Sum of Amount	
4	Qtr1	256991	
5	Qtr2	304413	
6	Qtr3	252162	
7	Qtr4	216168	
8	<b>Grand Total</b>	<b>1029734</b>	
9			

Conclusion: Quarter 2 is the best quarter.

Multi-level Pivot Table in Excel

You can drag more than one field to an area in a pivot table. We'll look at an example of multiple row fields, multiple value fields and multiple report filter fields.

Remember, our data set consists of 213 records and 6 fields. Order ID, Product, Category, Amount, Date and Country.



	A	B	C	D	E	F	G	H
1	<b>Order ID</b>	<b>Product</b>	<b>Category</b>	<b>Amount</b>	<b>Date</b>	<b>Country</b>		
2	1	Carrots	Vegetables	\$4,270	1/6/2024	United States		
3	2	Broccoli	Vegetables	\$8,239	1/7/2024	United Kingdom		
4	3	Banana	Fruit	\$617	1/8/2024	United States		
5	4	Banana	Fruit	\$8,384	1/10/2024	Canada		
6	5	Beans	Vegetables	\$2,626	1/10/2024	Germany		
7	6	Orange	Fruit	\$3,610	1/11/2024	United States		
8	7	Broccoli	Vegetables	\$9,062	1/11/2024	Australia		
9	8	Banana	Fruit	\$6,906	1/16/2024	New Zealand		
10	9	Apple	Fruit	\$2,417	1/16/2024	France		
11	10	Apple	Fruit	\$7,431	1/16/2024	Canada		


Multiple Row Fields

First, [insert a pivot table](#). Next, drag the following fields to the different areas.

1. Category field and Country field to the Rows area.
2. Amount field to the Values area.








### PivotTable Fields


Choose fields to add to report:  

Search 

- Order ID
- Product
- Category**
- Amount**
- Date
- Country**

Drag fields between areas below:

 <b>Filters</b>	 <b>Columns</b>
 <b>Rows</b>	 <b>Values</b>
Category 	Sum of Amou... 
Country 	

Defer Layout Update 

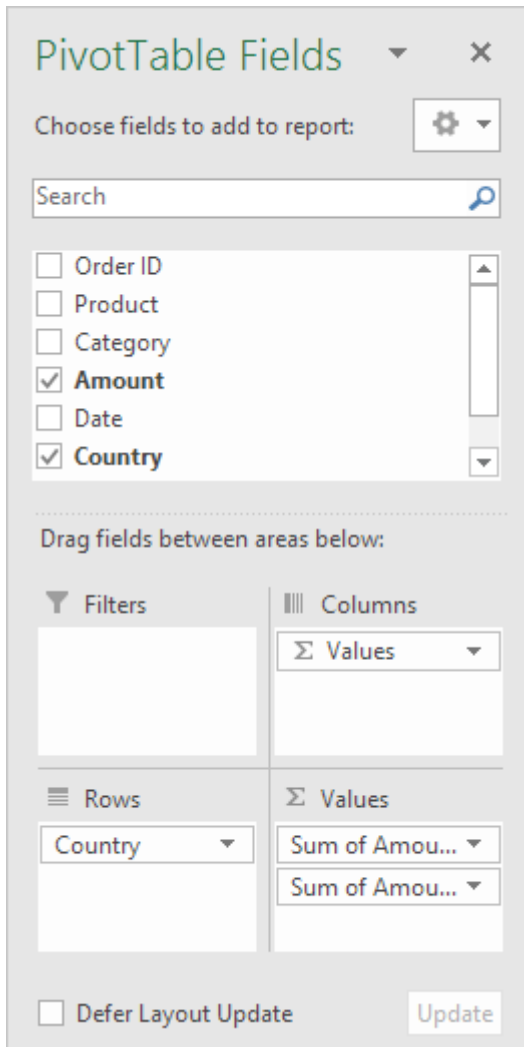
Below you can find the multi-level pivot table.

	A	B	C
1			
2			
3	<b>Row Labels</b>	<b>Sum of Amount</b>	
4	<b>Fruit</b>	<b>693069</b>	
5	Australia	91221	
6	Canada	82338	
7	France	125931	
8	Germany	66430	
9	New Zealand	62392	
10	United Kingdom	87786	
11	United States	176971	
12	<b>Vegetables</b>	<b>336665</b>	
13	Australia	40492	
14	Canada	12407	
15	France	15125	
16	Germany	88738	
17	New Zealand	4390	
18	United Kingdom	85351	
19	United States	90162	
20	<b>Grand Total</b>	<b>1029734</b>	
21			

#### Multiple Value Fields

First, [insert a pivot table](#). Next, drag the following fields to the different areas.

1. Country field to the Rows area.
2. Amount field to the Values area (2x).



Note: if you drag the Amount field to the Values area for the second time, Excel also populates the Columns area.

Pivot table:

	A	B	C	D
1				
2				
3	<b>Row Labels</b>	<b>Sum of Amount</b>	<b>Sum of Amount2</b>	
4	Australia	131713	131713	
5	Canada	94745	94745	
6	France	141056	141056	
7	Germany	155168	155168	
8	New Zealand	66782	66782	
9	United Kingdom	173137	173137	
10	United States	267133	267133	
11	<b>Grand Total</b>	<b>1029734</b>	<b>1029734</b>	
12				

3. Next, click any cell inside the Sum of Amount2 column.

4. Right click and click on Value Field Settings.

	A	B	C	D	E	F
1						
2						
3	<b>Row Labels</b>	<b>Sum of Amount</b>	<b>Sum</b>			
4	Australia	131713				
5	Canada	94745				
6	France	141056				
7	Germany	155168				
8	New Zealand	66782				
9	United Kingdom	173137				
10	United States	267133				
11	<b>Grand Total</b>	<b>1029734</b>				
12						
13						
14						
15						
16						
17						
18						
19						

- Enter Percentage for Custom Name.
- On the Show Values As tab, select % of Grand Total.

Value Field Settings

Source Name: Amount

Custom Name: Percentage

Summarize Values By Show Values As

Show values as

- No Calculation
- No Calculation
- % of Grand Total**
- % of Column Total
- % of Row Total
- % Of
- % of Parent Row Total

Date

Country

Number Format OK Cancel

- Click OK.

Result:

	A	B	C	D
1				
2				
3	<b>Row Labels</b>	<b>Sum of Amount</b>	<b>Percentage</b>	
4	Australia	131713	12.79%	
5	Canada	94745	9.20%	
6	France	141056	13.70%	
7	Germany	155168	15.07%	
8	New Zealand	66782	6.49%	
9	United Kingdom	173137	16.81%	
10	United States	267133	25.94%	
11	<b>Grand Total</b>	<b>1029734</b>	<b>100.00%</b>	
12				

### Multiple Report Filter Fields

First, [insert a pivot table](#). Next, drag the following fields to the different areas.

1. Order ID to the Rows area.
2. Amount field to the Values area.
3. Country field and Product field to the Filters area.

The screenshot shows the 'PivotTable Fields' task pane. At the top, it says 'Choose fields to add to report:' with a search box and a settings icon. Below the search box is a list of fields with checkboxes: Order ID (checked), Product (checked), Category (unchecked), Amount (checked), Date (unchecked), and Country (checked). Below this list is the instruction 'Drag fields between areas below:'. There are four areas: 'Filters' (containing Country and Product), 'Columns' (empty), 'Rows' (containing Order ID), and 'Values' (containing Sum of Amou...). At the bottom, there is a 'Defer Layout Update' checkbox and an 'Update' button.

4. Next, select United Kingdom from the first filter drop-down and Broccoli from the second filter drop-down.

The pivot table shows all the 'Broccoli' orders to the United Kingdom.

	A	B	C
1	Country	United Kingdom	
2	Product	Broccoli	
3			
4	Row Labels	Sum of Amount	
5	2	8239	
6	19	3595	
7	86	2054	
8	92	2011	
9	112	7231	
10	121	6343	
11	126	3027	
12	163	5936	
13	<b>Grand Total</b>	<b>38436</b>	
14			

### Frequency Distribution in Excel

Did you know that you can use pivot tables to easily create a frequency distribution in Excel? You can also use the Analysis Toolpak to create a [histogram](#).

Remember, our data set consists of 213 records and 6 fields. Order ID, Product, Category, Amount, Date and Country.

	A	B	C	D	E	F	G	H
1	<b>Order ID</b>	<b>Product</b>	<b>Category</b>	<b>Amount</b>	<b>Date</b>	<b>Country</b>		
2	1	Carrots	Vegetables	\$4,270	1/6/2024	United States		
3	2	Broccoli	Vegetables	\$8,239	1/7/2024	United Kingdom		
4	3	Banana	Fruit	\$617	1/8/2024	United States		
5	4	Banana	Fruit	\$8,384	1/10/2024	Canada		
6	5	Beans	Vegetables	\$2,626	1/10/2024	Germany		
7	6	Orange	Fruit	\$3,610	1/11/2024	United States		
8	7	Broccoli	Vegetables	\$9,062	1/11/2024	Australia		
9	8	Banana	Fruit	\$6,906	1/16/2024	New Zealand		
10	9	Apple	Fruit	\$2,417	1/16/2024	France		
11	10	Apple	Fruit	\$7,431	1/16/2024	Canada		

First, [insert a pivot table](#). Next, drag the following fields to the different areas.

1. Amount field to the Rows area.
2. Amount field (or any other field) to the Values area.

**PivotTable Fields** [dropdown] [close]

Choose fields to add to report: [gear icon] [dropdown]

Search [input] [magnifying glass icon]

- Order ID
- Product
- Category
- Amount**
- Date
- Country

---

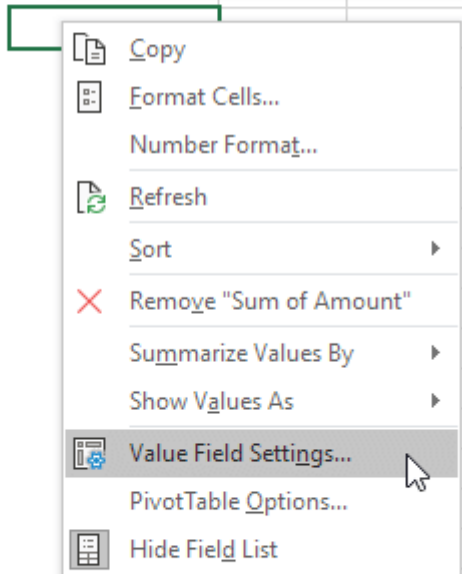
Drag fields between areas below:

<b>Filters</b> [empty box]	<b>Columns</b> [empty box]
<b>Rows</b> Amount [dropdown]	<b>Values</b> Sum of Amou... [dropdown]

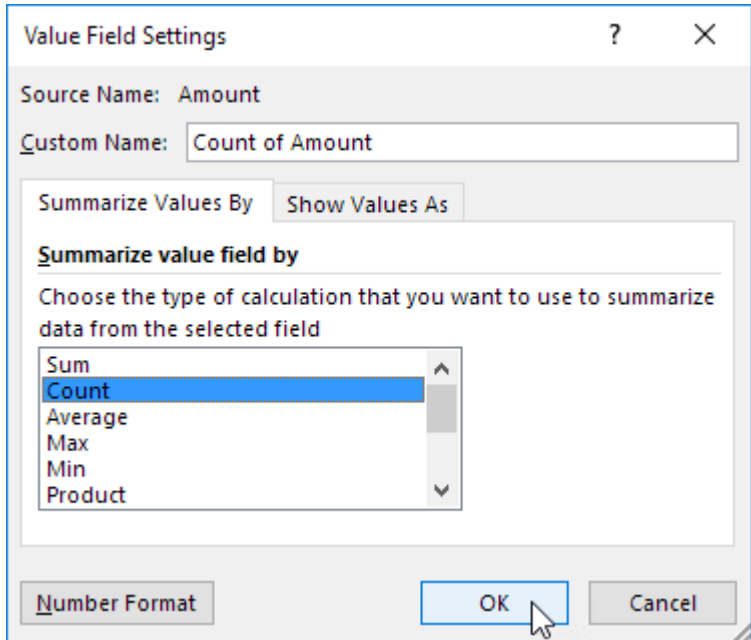
Defer Layout Update [Update]

3. Click any cell inside the Sum of Amount column.
4. Right click and click on Value Field Settings.

	A	B	C	D	E
1					
2					
3	Row Labels	Sum of Amount			
4	\$107	107			
5	\$135	135			
6	\$136	136			
7	\$220	220			
8	\$235	235			
9	\$277				
10	\$284				
11	\$330				
12	\$339				
13	\$352				
14	\$424				
15	\$474				
16	\$521				
17	\$592				
18	\$607				
19	\$617				
20	\$680				
21	\$682				
22	\$793				
23	\$850				
24	\$852				
25	\$859				
26	\$958	958			
27	\$1,002	1002			
28	\$1,004	1004			
29	\$1,054	1054			
30	\$1,113	1113			



5. Choose Count and click OK.



6. Next, click any cell inside the column with Row Labels.

7. Right click and click on Group.

The screenshot shows an Excel spreadsheet with a PivotTable. The PivotTable has 'Row Labels' in column A and 'Count of Amount' in column B. The data rows are numbered 4 through 31. A context menu is open over the 'Group...' option, which is highlighted. The menu includes options like Copy, Format Cells, Refresh, Sort, Filter, Subtotal, Expand/Collapse, Group, Ungroup, Move, Remove, Field Settings, PivotTable Options, and Hide Field List. A ribbon with various formatting options is also visible above the menu.

	A	B	C	D	E
1					
2					
3	Row Labels	Count of Amount			
4	\$107	1			
5	\$135	1			
6	\$136	1			
7	\$220	1			
8	\$235	1			
9	\$277				
10	\$284				
11	\$330				
12	\$339				
13	\$352				
14	\$424				
15	\$474				
16	\$521				
17	\$592				
18	\$607				
19	\$617				
20	\$680				
21	\$682				
22	\$793				
23	\$850				
24	\$852				
25	\$859				
26	\$958				
27	\$1,002				
28	\$1,004				
29	\$1,054				
30	\$1,113	1			
31	\$1,128	1			

8. Enter 1 for Starting at, 10000 for Ending at, and 1000 for By.

9. Click OK.

The screenshot shows the 'Grouping' dialog box in Excel. It has a title bar with a question mark and a close button. Under the 'Auto' section, there are three input fields: 'Starting at' with the value '1', 'Ending at' with the value '10000', and 'By' with the value '1000'. There are 'OK' and 'Cancel' buttons at the bottom.

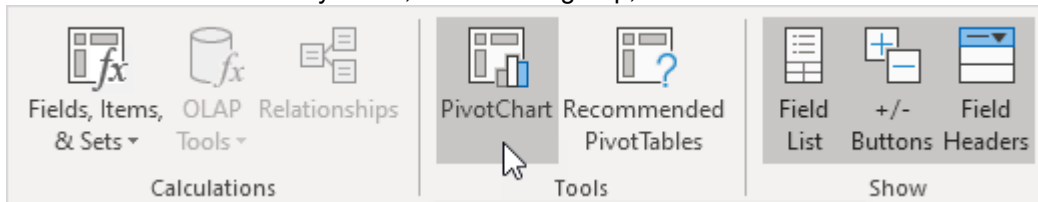
Result:

	A	B	C
1			
2			
3	Row Labels	Count of Amount	
4	1-1000	23	
5	1001-2000	19	
6	2001-3000	22	
7	3001-4000	19	
8	4001-5000	27	
9	5001-6000	25	
10	6001-7000	17	
11	7001-8000	26	
12	8001-9000	23	
13	9001-10000	12	
14	<b>Grand Total</b>	<b>213</b>	
15			

To easily compare these numbers, create a pivot chart.

10. Click any cell inside the pivot table.

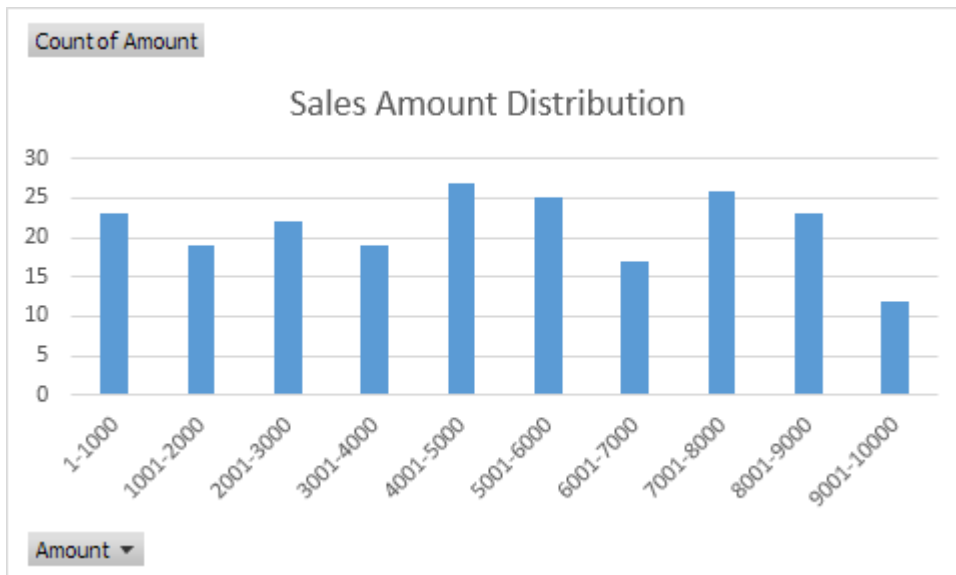
11. On the PivotTable Analyze tab, in the Tools group, click PivotChart.



The Insert Chart dialog box appears.

12. Click OK.

Result:



Pivot Chart in Excel

A pivot chart is the visual representation of a pivot table in Excel. Pivot charts and pivot tables are connected with each other.

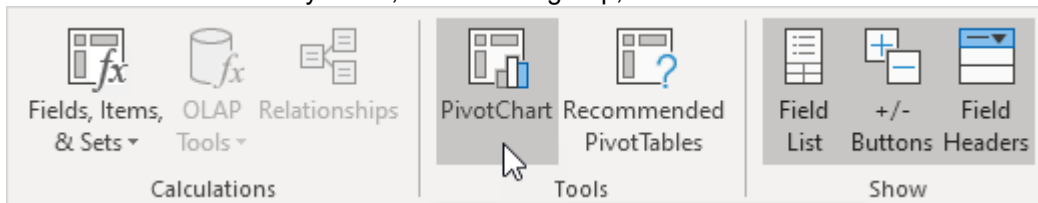
Below you can find a two-dimensional pivot table. Go back to [Pivot Tables](#) to learn how to create this pivot table.

	A	B	C	D	E	F	G	H	I	J
1	Category	(All)								
2										
3	Sum of Amount	Column								
4	Row Labels	Apple	Banana	Beans	Broccoli	Carrots	Mango	Orange	Grand Total	
5	Australia	20634	52721	14433	17953	8106	9186	8680	131713	
6	Canada	24867	33775		12407		3767	19929	94745	
7	France	80193	36094	680	5341	9104	7388	2256	141056	
8	Germany	9082	39686	29905	37197	21636	8775	8887	155168	
9	New Zealand	10332	40050		4390			12010	66782	
10	United Kingdom	17534	42908	5100	38436	41815	5600	21744	173137	
11	United States	28615	95061	7163	26715	56284	22363	30932	267133	
12	Grand Total	191257	340295	57281	142439	136945	57079	104438	1029734	
13										

### Insert Pivot Chart

To insert a pivot chart, execute the following steps.

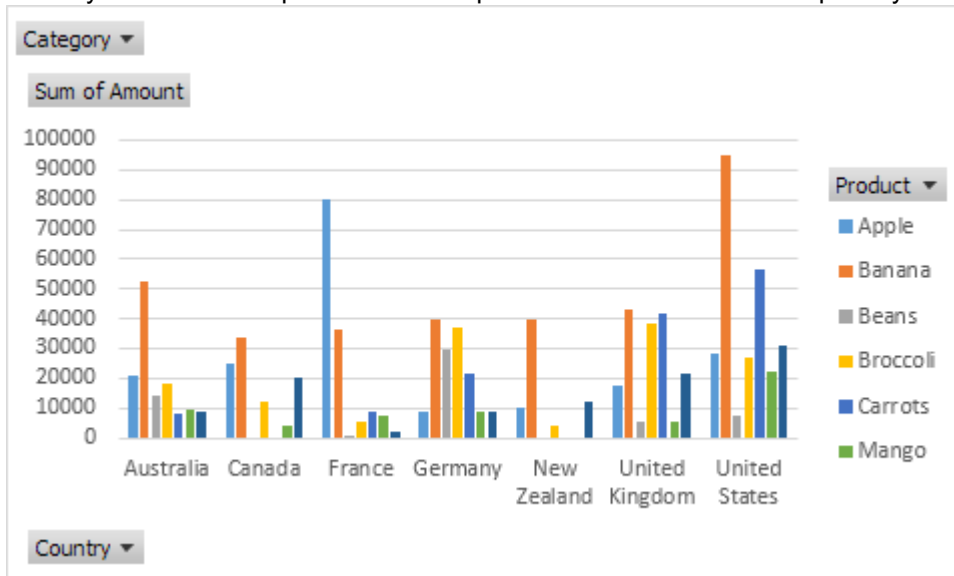
1. Click any cell inside the pivot table.
2. On the PivotTable Analyze tab, in the Tools group, click PivotChart.



The Insert Chart dialog box appears.

3. Click OK.

Below you can find the pivot chart. This pivot chart will amaze and impress your boss.

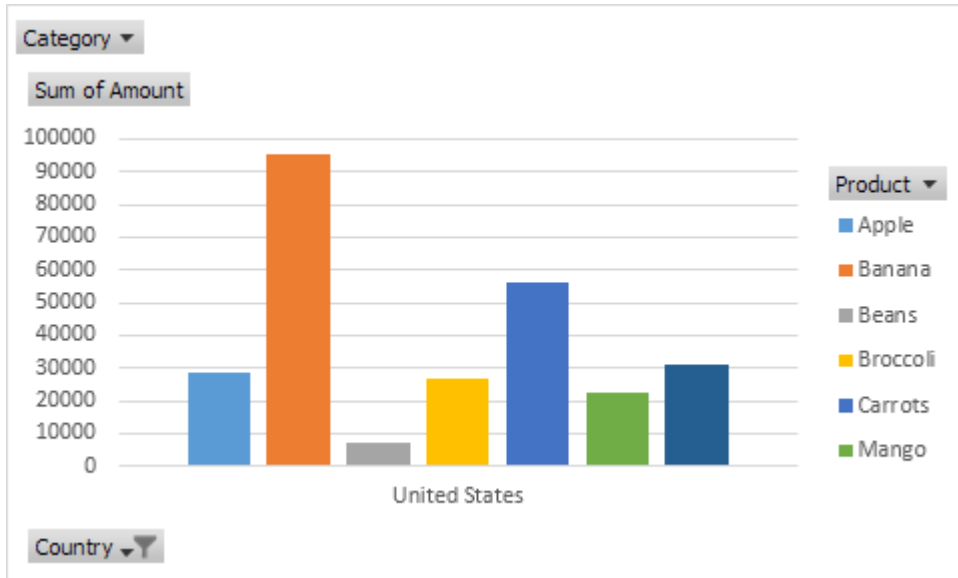


Note: any changes you make to the pivot chart are immediately reflected in the pivot table and vice versa.

### Filter Pivot Chart

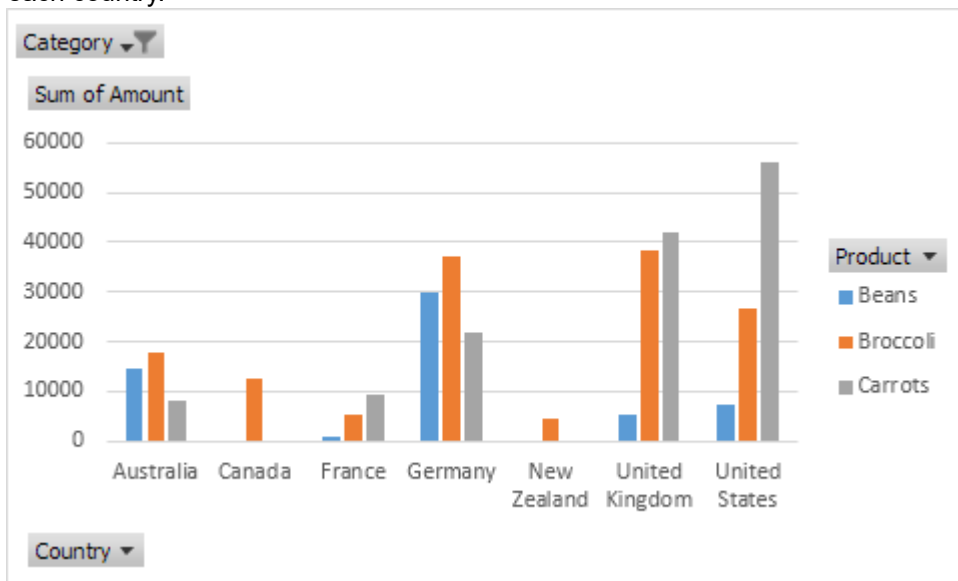
To filter this pivot chart, execute the following steps.

1. Use the standard filters (triangles next to Product and Country). For example, use the Country filter to only show the total amount of each product exported to the United States.



2. Remove the Country filter.

3. Because we added the Category field to the Filters area, we can filter this pivot chart (and pivot table) by Category. For example, use the Category filter to only show the vegetables exported to each country.

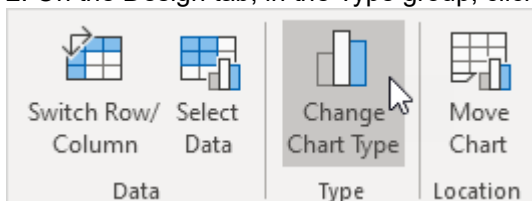


### Change Pivot Chart Type

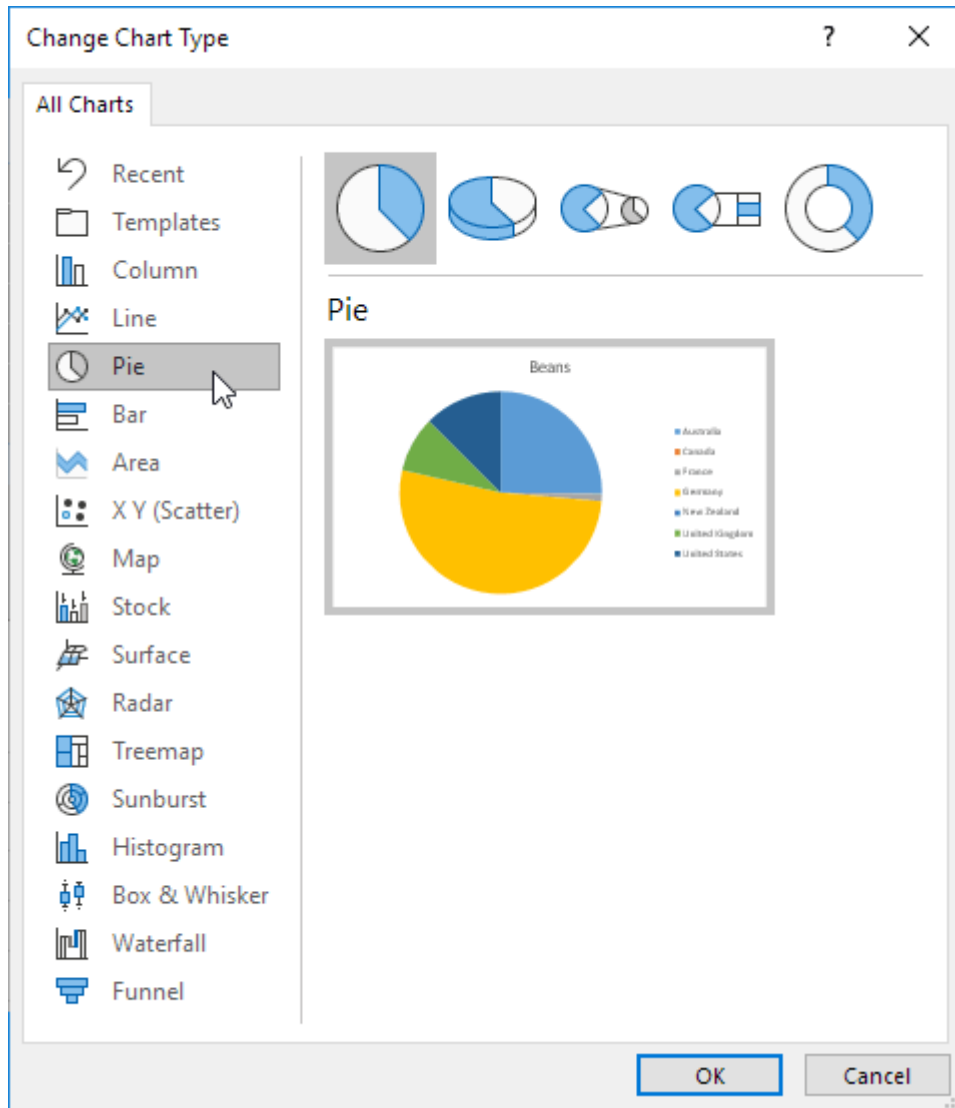
You can change to a different type of pivot chart at any time.

1. Select the chart.

2. On the Design tab, in the Type group, click Change Chart Type.

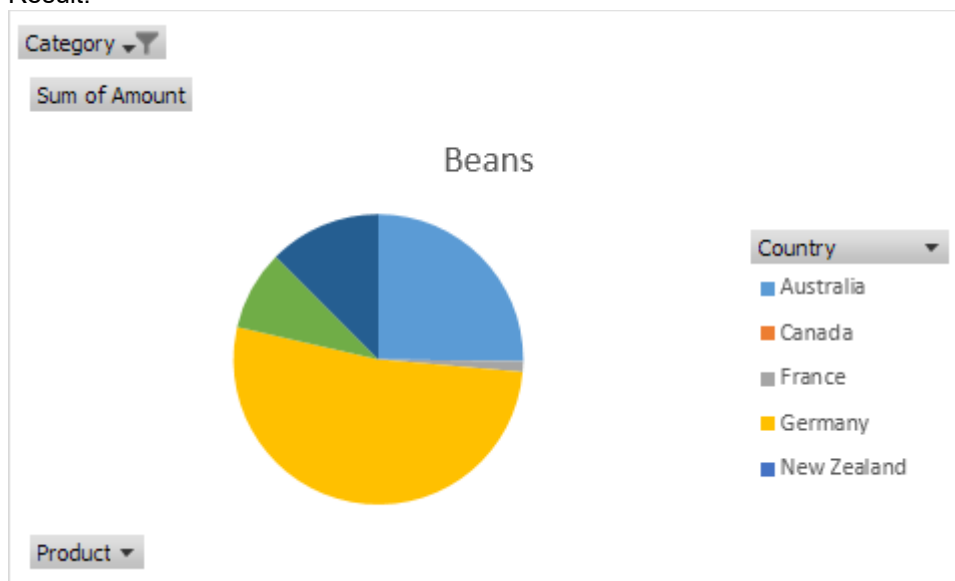


3. Choose Pie.



4. Click OK.

Result:



Note: pie charts always use one data series (in this case, Beans). To get a pivot chart of a country, swap the data over the axis. First, select the chart. Next, on the Design tab, in the Data group, click Switch Row/Column.

Slicers in Excel

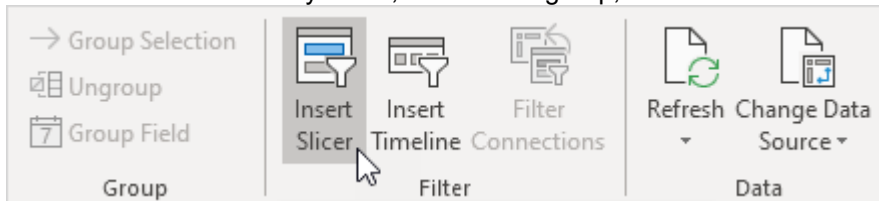
Use slicers in Excel to quickly and easily filter pivot tables. Connect multiple slicers to multiple pivot tables to create awesome reports.

Below you can find a pivot table. Go back to [Pivot Tables](#) to learn how to create this pivot table.

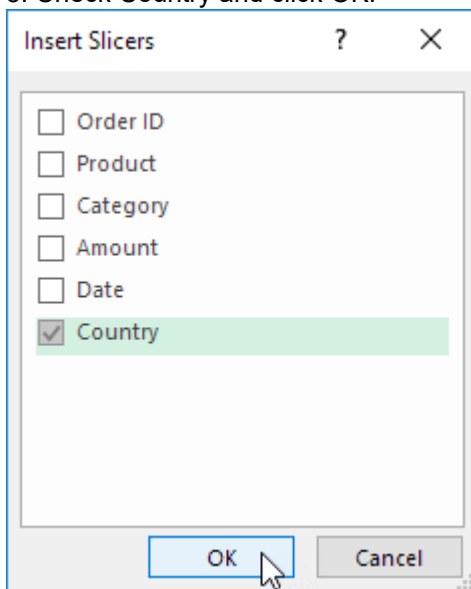
	A	B	C
1	Country	(All)	
2			
3	Row Labels	Sum of Amount	
4	Apple	191257	
5	Banana	340295	
6	Beans	57281	
7	Broccoli	142439	
8	Carrots	136945	
9	Mango	57079	
10	Orange	104438	
11	Grand Total	1029734	
12			

To insert a slicer, execute the following steps.

1. Click any cell inside the pivot table.
2. On the PivotTable Analyze tab, in the Filter group, click Insert Slicer.

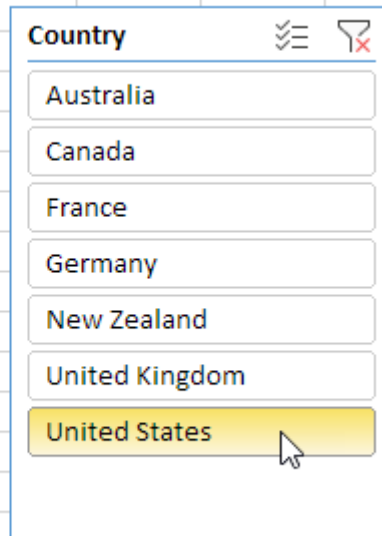


3. Check Country and click OK.



4. Click United States to find out which products we export the most to the United States.

	A	B	C	D	E	F
1	Country	United States				
2						
3	Row Labels	Sum of Amount				
4	Apple	28615				
5	Banana	95061				
6	Beans	7163				
7	Broccoli	26715				
8	Carrots	56284				
9	Mango	22363				
10	Orange	30932				
11	Grand Total	267133				
12						
13						
14						
15						

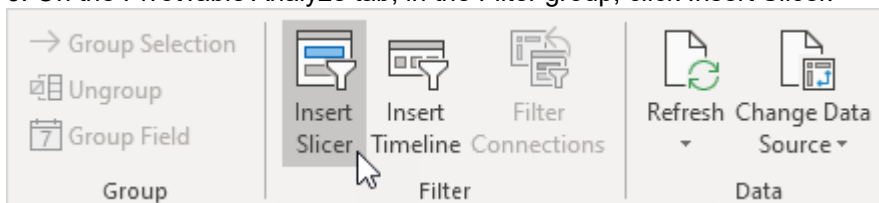


Conclusion: bananas are our main export product to the United States. The report filter (cell B1) changes to United States.

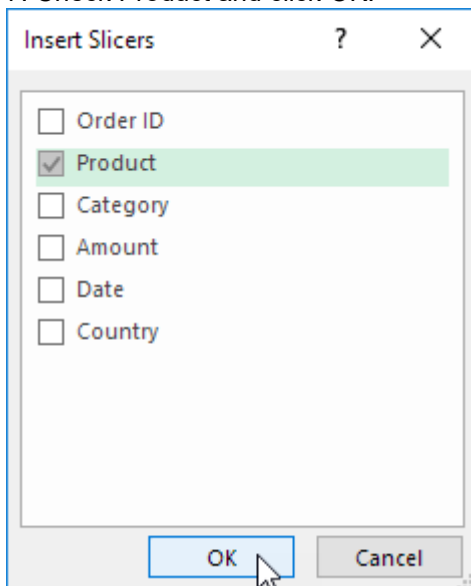
OK, that was pretty easy. Let's insert a second slicer.

5. Click any cell inside the pivot table.

6. On the PivotTable Analyze tab, in the Filter group, click Insert Slicer.

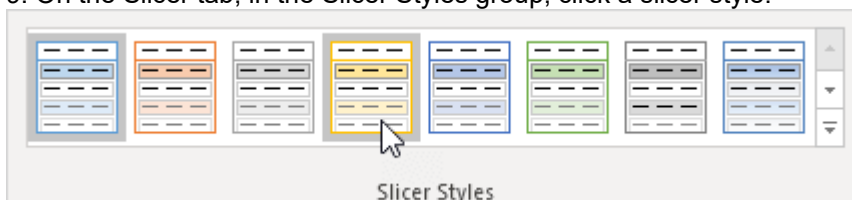


7. Check Product and click OK.



8. Select the slicer.

9. On the Slicer tab, in the Slicer Styles group, click a slicer style.



10. Use the second slicer. Click the Multi-Select button to select multiple products.

	A	B	C	D	E	F
1	Country	United States				
2						
3	Row Labels	Sum of Amount				
4	Banana	95061				
5	Beans	7163				
6	Broccoli	26715				
7	Grand Total	128939				
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						

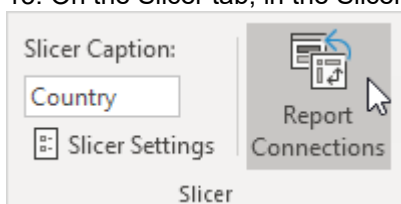
Note: instead of using the Multi-Select button, hold down CTRL to select multiple items. To really impress your boss, execute the following steps.

11. Insert a second pivot table.

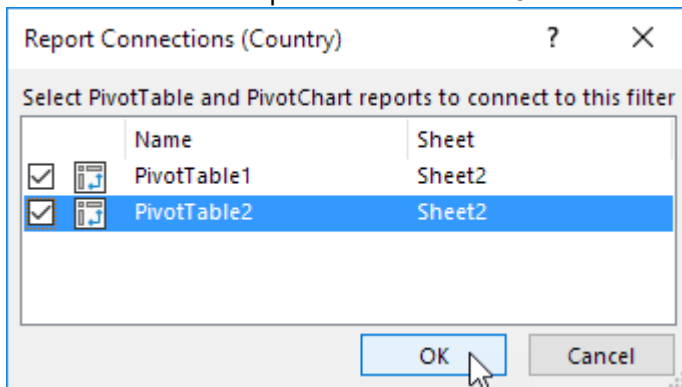
To connect both slicers to this pivot table, execute the following steps.

12. Select the first slicer.

13. On the Slicer tab, in the Slicer group, click Report Connections.



14. Select the second pivot table and click OK.



15. Repeat steps 12-14 for the second slicer.

16. Use both slicers.

	A	B	C	D	E	F
1	Country	Canada		Country	Canada	
2						
3	Row Labels	Sum of Amount		Row Labels	Count of Amount	
4	Apple	24867		Apple	6	
5	Orange	19929		Orange	3	
6	Grand Total	44796		Grand Total	9	
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

**Country** ☰ ✖

- Australia
- Canada
- France
- Germany
- New Zealand
- United Kingdom
- United States

**Product** ☰ ✖

- Apple
- Banana
- Broccoli
- Mango
- Orange
- Beans
- Carrots

Conclusion: the total amount of apples exported to Canada equals \$24,867 (6 orders) and the total amount of oranges exported to Canada equals \$19,929 (3 orders).  
 17. Click the icon in the upper-right corner of a slicer to clear the filter.

	A	B	C	D	E	F
1	Country	Canada		Country	Canada	
2						
3	Row Labels	Sum of Amount		Row Labels	Count of Amount	
4	Apple	24867		Apple	6	
5	Banana	33775		Banana	7	
6	Broccoli	12407		Broccoli	3	
7	Mango	3767		Mango	1	
8	Orange	19929		Orange	3	
9	Grand Total	94745		Grand Total	20	
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						

Note: we didn't export any beans or carrots to Canada. Try it yourself, download the Excel file and use slicers to create awesome reports.

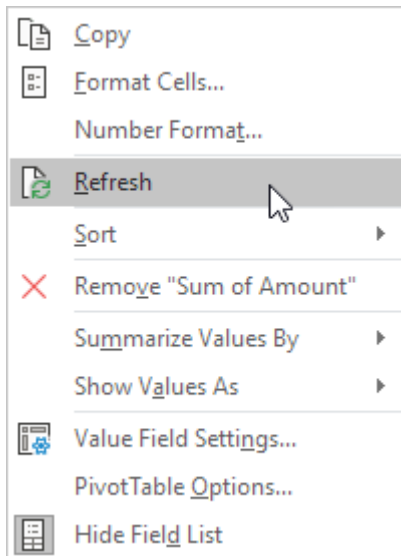
Update a Pivot Table in Excel

Any changes you make to the data set are not automatically picked up by the pivot table. Refresh the pivot table or change the data source to update the pivot table with the applied changes.

Refresh

If you change any of the text or numbers in your data set, you need to refresh the pivot table.

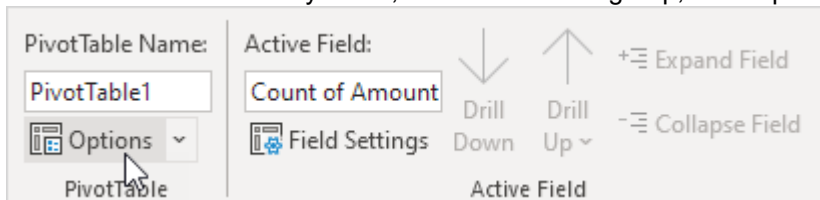
1. Click any cell inside the pivot table.
2. Right click and click on Refresh.



To refresh a pivot table automatically when opening an Excel file, execute the following steps.

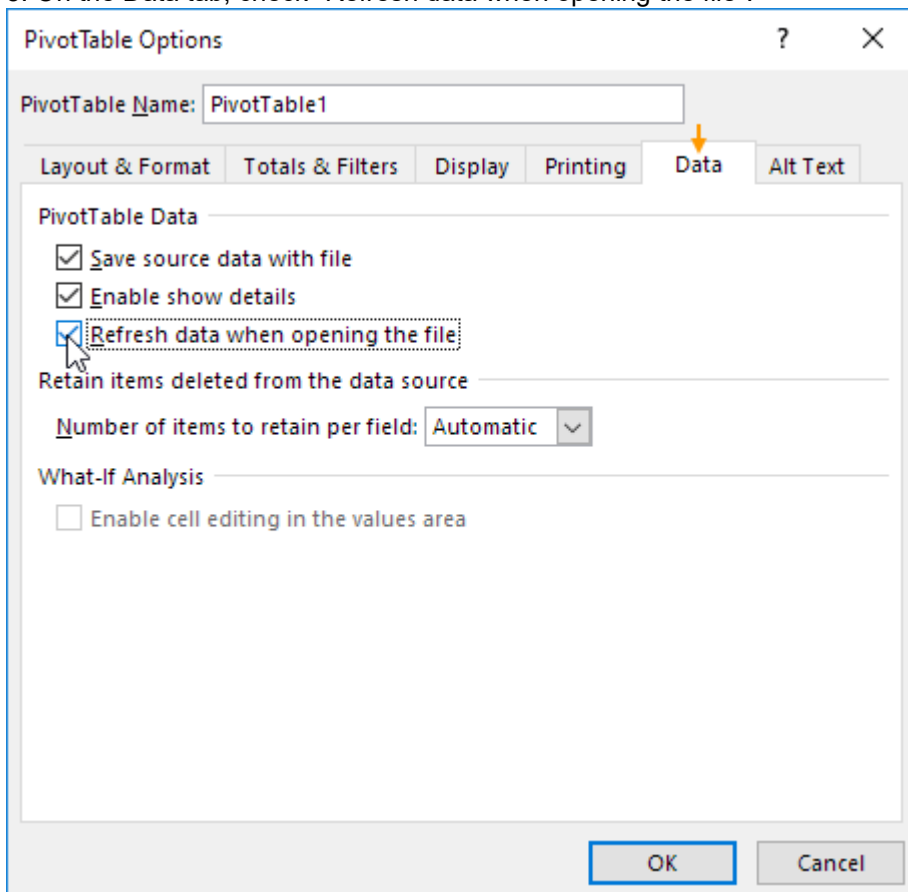
3. Click any cell inside the pivot table.

4. On the PivotTable Analyze tab, in the PivotTable group, click Options.



Excel shows the PivotTable Options dialog box.

5. On the Data tab, check "Refresh data when opening the file".



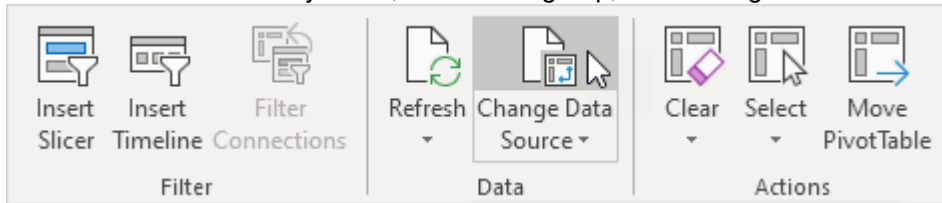
6. Click OK.

From now on, whenever you open this Excel file, Excel will automatically refresh this pivot table (and all other pivot tables with this source data in this Excel file).

### Change Data Source

If you change the size of your data set by adding or deleting rows/columns, you need to update the source data for the pivot table.

1. Click any cell inside the pivot table.
2. On the PivotTable Analyze tab, in the Data group, click Change Data Source.



Tip: change your data set to a [table](#) before you insert a pivot table. This way your data source will be updated automatically when you add or delete rows/columns. This can save time. You still have to refresh though.

### Calculated Field/Item in Excel

This example teaches you how to insert a calculated field or calculated item in a pivot table.

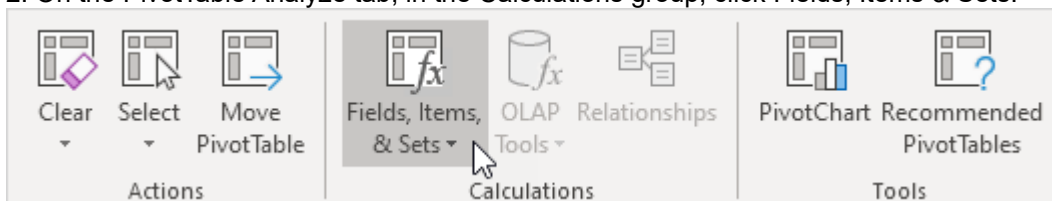
Below you can find a pivot table. Go back to [Pivot Tables](#) to learn how to create this pivot table.

	A	B	C
1			
2			
3	Row Labels	Sum of Amount	
4	Australia	131713	
5	Canada	94745	
6	France	141056	
7	Germany	155168	
8	New Zealand	66782	
9	United Kingdom	173137	
10	United States	267133	
11	Grand Total	1029734	
12			

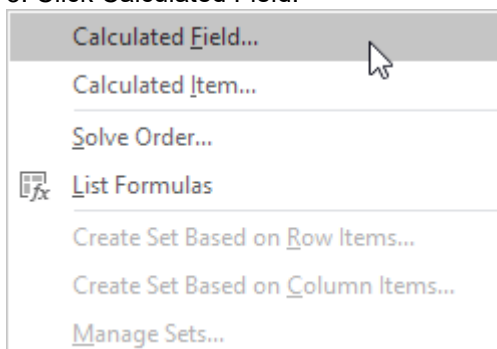
### Calculated Field

A calculated field uses the values from another field. To insert a calculated field, execute the following steps.

1. Click any cell inside the pivot table.
2. On the PivotTable Analyze tab, in the Calculations group, click Fields, Items & Sets.



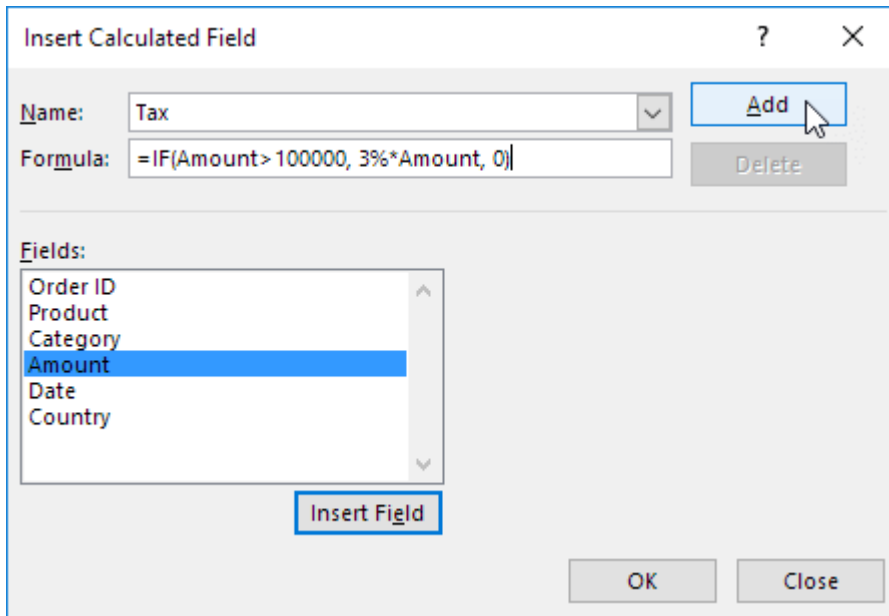
3. Click Calculated Field.



The Insert Calculated Field dialog box appears.

4. Enter Tax for Name.

- Type the formula =IF(Amount>100000, 3%\*Amount, 0)
- Click Add.



Note: use the Insert Field button to quickly insert fields when you type a formula. To delete a calculated field, select the field and click Delete (under Add).

- Click OK.

Excel automatically adds the Tax field to the Values area.

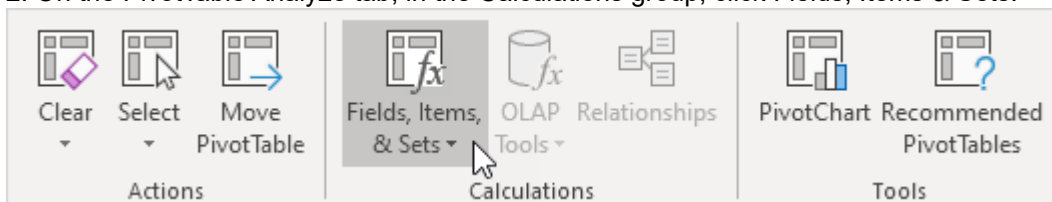
Result:

	A	B	C	D
1				
2				
3	Row Labels	Sum of Amount	Sum of Tax	
4	Australia	131713	\$3,951	
5	Canada	94745	\$0	
6	France	141056	\$4,232	
7	Germany	155168	\$4,655	
8	New Zealand	66782	\$0	
9	United Kingdom	173137	\$5,194	
10	United States	267133	\$8,014	
11	<b>Grand Total</b>	<b>1029734</b>	<b>\$30,892</b>	
12				

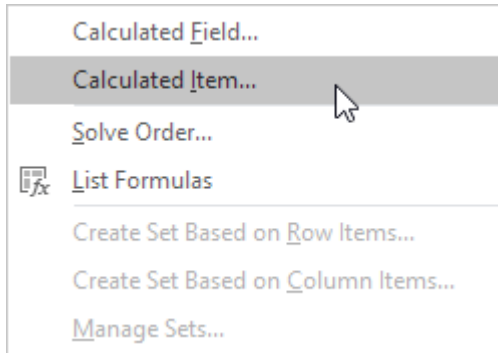
Calculated Item

A calculated item uses the values from other items. To insert a calculated item, execute the following steps.

- Click any Country in the pivot table.
- On the PivotTable Analyze tab, in the Calculations group, click Fields, Items & Sets.

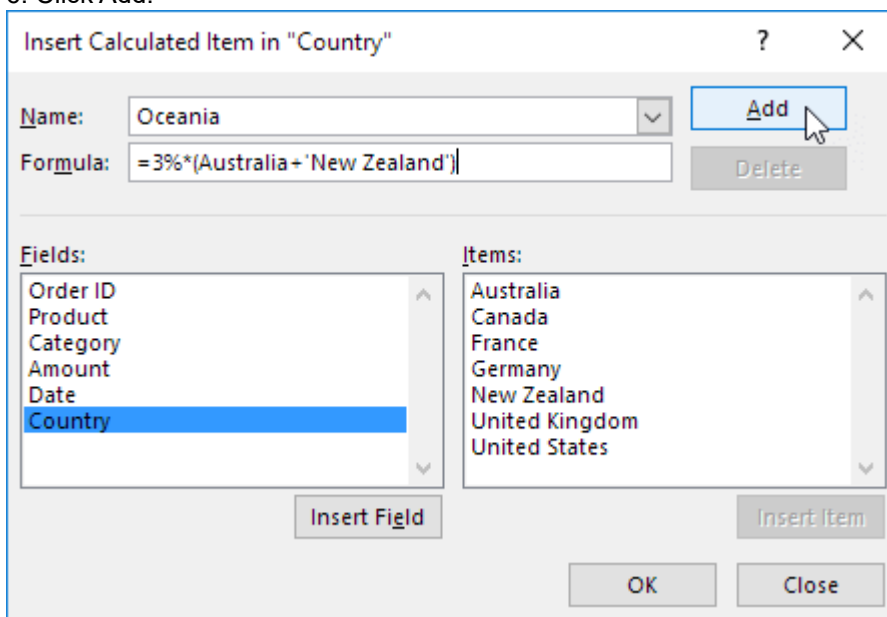


- Click Calculated Item.



The Insert Calculated Item dialog box appears.

4. Enter Oceania for Name.
5. Type the formula  $=3%*(Australia+'New Zealand')$
6. Click Add.



Note: use the Insert Item button to quickly insert items when you type a formula. To delete a calculated item, select the item and click Delete (under Add).

7. Repeat steps 4 to 6 for North America (Canada and United States) and Europe (France, Germany and United Kingdom) with a 4% and 5% tax rate respectively.
8. Click OK.

Result:

	A	B	C
1			
2			
3	Row Labels	Sum of Amount	
4	[-] Sales	1029734	
5	Australia	131713	
6	Canada	94745	
7	France	141056	
8	Germany	155168	
9	New Zealand	66782	
10	United Kingdom	173137	
11	United States	267133	
12	[-] Taxes	43898	
13	Oceania	5955	
14	North America	14475	
15	Europe	23468	
16	Grand Total	1073632	
17			

Note: we created two [groups](#) (Sales and Taxes).

## Forecasting Tools

Excel 365 offers Forecast Sheet for time-series prediction. Example: Forecast monthly sales for next 12 months. Steps: 1. Select historical data. 2. Go to Data > Forecast Sheet. 3. Choose line/column chart, forecast end date. 4. Excel generates forecast with confidence intervals. Forecast Sheet dialog and output chart.

## Other Tools

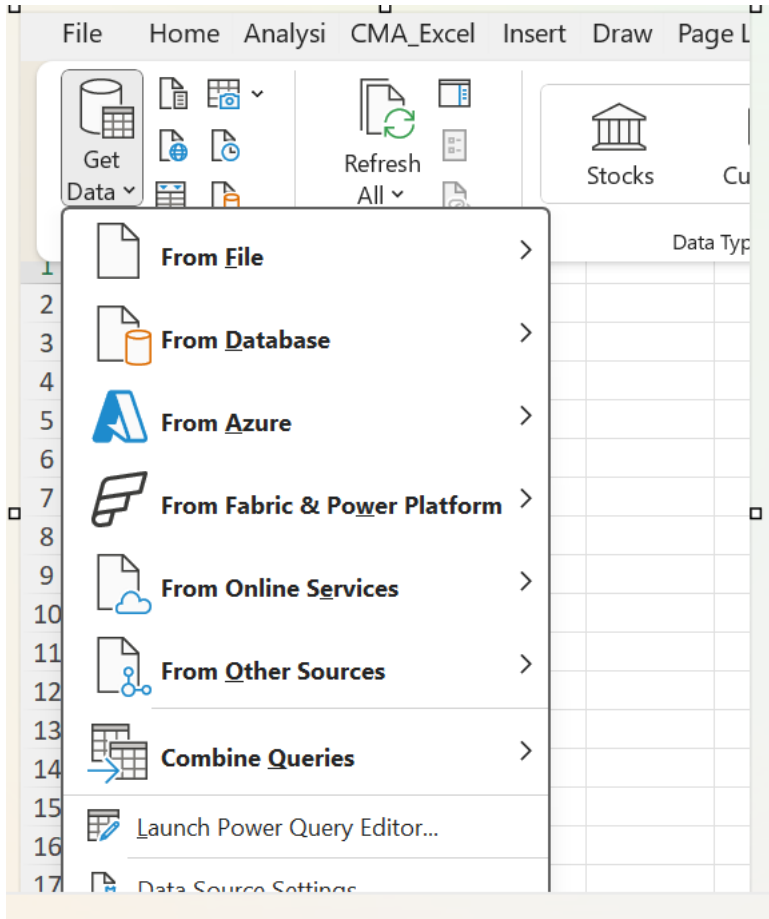
- Conditional Formatting – Highlight trends (e.g., top 10 sales).

Formatting options. • Sparklines – Mini charts inside cells to show trends.

Sparklines in worksheet.

- Power Query editor(ETL) – Import, clean, and transform data.

## Power Query Editor in Excel 365



This screenshot shows the Power Query Editor interface. The main area displays a table with the following columns: Row ID, Order ID, Order Date, Ship Date, and Ship Mode. The table contains 20 rows of data. The formula bar shows the query name and type: `Table.TransformColumnTypes(#"Promoted Headers",({"Row ID", Int64.Type}, {"Order ID", type text}, {"Order Date", Int64.Type}, {"Ship Date", Int64.Type}, {"Ship Mode", type text}))`. The right-hand pane shows the 'Query Settings' for the 'Orders' query, with the 'Applied Steps' list containing 'Source', 'Navigation', 'Promoted Headers', and 'Changed Type'.

Row ID	Order ID	Order Date	Ship Date	Ship Mode
1	CA-2016-152156	08-11-2016	11-11-2016	Second Class
2	CA-2016-152156	08-11-2016	11-11-2016	Second Class
3	CA-2016-138688	12-06-2016	16-06-2016	Second Class
4	US-2015-108966	11-10-2015	18-10-2015	Standard Class
5	US-2015-108966	11-10-2015	18-10-2015	Standard Class
6	CA-2014-115812	09-06-2014	14-06-2014	Standard Class
7	CA-2014-115812	09-06-2014	14-06-2014	Standard Class
8	CA-2014-115812	09-06-2014	14-06-2014	Standard Class
9	CA-2014-115812	09-06-2014	14-06-2014	Standard Class
10	CA-2014-115812	09-06-2014	14-06-2014	Standard Class
11	CA-2014-115812	09-06-2014	14-06-2014	Standard Class
12	CA-2014-115812	09-06-2014	14-06-2014	Standard Class
13	CA-2017-114412	15-04-2017	20-04-2017	Standard Class
14	CA-2016-161389	05-12-2016	10-12-2016	Standard Class
15	US-2015-118983	22-11-2015	26-11-2015	Standard Class
16	US-2015-118983	22-11-2015	26-11-2015	Standard Class
17	CA-2014-105893	11-11-2014	18-11-2014	Standard Class
18	CA-2014-167164	13-05-2014	15-05-2014	Second Class
19	CA-2014-143336	27-08-2014	01-09-2014	Second Class
20	CA-2014-143336	27-08-2014	01-09-2014	Second Class

## Introduction to Power Query

Power Query is a data connection technology in Excel that allows you to import, clean, transform, and combine data from multiple sources.

It automates the process of data preparation without coding.

Location: Data tab → Get & Transform Data group.

### Power Query Workflow (ETL Process)

1. Extract – Import data (Excel, CSV, Web, SQL, etc.).
2. Transform – Clean and reshape data (remove blanks, split columns, filter rows).
3. Load – Send the cleaned data back to Excel or Power BI.
4. Automate – Refresh the query anytime the source data changes.

### Key Features of Power Query Editor

- Import Data – From Excel, CSV, Text, Web, Databases, SharePoint.
- Transform Data – Remove rows/columns, split columns, filter rows, change data type, merge/append queries.
- Group By – Summarize (e.g., total sales by region).
- Pivot/Unpivot – Reshape data.
- Custom/Conditional Columns – Add logic & calculations.

### Applied Steps & Query Settings

- Each transformation is recorded as a step in the right-hand panel.
- Steps can be renamed, reordered, or deleted.
- Queries are repeatable and refreshable.

## Load Data

- Load cleaned data back into: Excel Table, Pivot Table Report, or Data Model (Power Pivot).
- Choose “Load To...” for options.

## Practical Examples

1. Cleaning Sales Data – Import CSV, remove blanks, split Full Name, load cleaned table.
2. Merging Queries – Merge Sales and Customer tables using Customer ID.
3. Unpivoting Data – Convert month columns into rows.
4. Group By – Summarize sales by region.

## Advantages of Power Query

- No manual repetition – Refresh updates automatically.
- Handles large datasets efficiently.
- Works across multiple data sources.
- Integrates with Power BI.

## Summary & Key Takeaways

- Power Query is an ETL tool inside Excel.
- All steps are recorded → Queries are reusable.
- Saves time, effort, and reduces human error.
- Essential for data cleaning, combining, and reshaping tasks.