

## Pivot Table

Pivot tables are the fastest and easiest way to quickly analyze data in Excel. This article is an introduction to Pivot Tables and their benefits, and a step-by-step guide with sample data.

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Pivot tables are one of the most powerful and useful features in Excel. With very little effort, you can use a pivot table to build good-looking reports for large data sets.

### What is a pivot table?

You can think of a pivot table as a report. However, unlike a static report, a pivot table provides an [interactive view of your data](#). With very little effort (and no formulas) you can look at the *same data from many different perspectives*. You can group data into categories, break down data into years and months, filter data to include or exclude categories, and even build charts.

*The beauty of pivot tables is they allow you to interactively explore your data in different ways.*

### Step-by-step tutorial

To understand pivot tables, you need to work with them yourself. In this section, we'll build several pivot tables step-by-step from a set of sample data. With experience, the pivot tables below can be built in about 5 minutes.

### Sample data

The [sample data](#) contains 452 records with 5 fields of information: Date, Color, Units, Sales, and Region. This data is perfect for a pivot table.

B5										
	A	B	C	D	E	F	G	H	I	J
1										
2		<b>Sample sales data</b>								
3										
4		Date	Color	Region	Units	Sales				
5		3-Jan-16	Red	West	1	\$11.00				
6		13-Jan-16	Blue	South	8	\$96.00				
7		21-Jan-16	Green	West	2	\$26.00				
8		30-Jan-16	Blue	North	7	\$84.00				
9		7-Feb-16	Green	North	8	\$104.00				
10		13-Feb-16	Red	South	2	\$22.00				
11		21-Feb-16	Blue	East	5	\$60.00				
12		1-Mar-16	Green	West	2	\$26.00				
13		13-Mar-16	Blue	East	8	\$96.00				
14		23-Mar-16	Blue	North	7	\$84.00				
15		28-Mar-16	Green	West	2	\$26.00				
16		3-Apr-16	Blue	South	8	\$96.00				

Sample sales data  
in an Excel Table  
named "Table1"

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Data in a proper [Excel Table](#) named "Table1". Excel Tables are a [great way to build pivot tables](#), because they automatically adjust as data is added or removed.

*Note: I know this data is very generic. But generic data is good for understanding pivot tables – you don't want to get tripped up on a detail when learning the fun parts.*

## Insert Pivot Table

1. To start off, select *any cell in the data* and click Pivot Table on the Insert tab of the ribbon:

File	Home	Insert	Page Layout	Formulas	Data	Review	View	Help	Table Design
		PivotTable	Recommended PivotTables	Illustrations	Get Add-ins	My Add-ins	Recommended Charts	Maps	Pivot
		Tables			Add-ins		Charts		
2		<b>Sample sales data</b>							
3									
4		Date	Color	Region	Units	Sales			
5		3-Jan-16	Red	West	1	\$11.00			
6		13-Jan-16	Blue	South	8	\$96.00			
7		21-Jan-16	Green	West	2	\$26.00			
8		30-Jan-16	Blue	North	7	\$84.00			
9		7-Feb-16	Green	North	8	\$104.00			
10		13-Feb-16	Red	South	2	\$22.00			
11		21-Feb-16	Blue	East	5	\$60.00			
12		1-Mar-16	Green	West	2	\$26.00			
13		13-Mar-16	Blue	East	8	\$96.00			
14		23-Mar-16	Blue	North	7	\$84.00			

Click PivotTable on the  
Insert tab of the ribbon

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Excel will display the Create Pivot Table window. Notice the data range is already filled in. The default location for a new pivot table is New Worksheet.

2. Override the default location and enter H4 to place the pivot table on the current worksheet:

Create PivotTable

Choose the data that you want to analyze

☒ Select a table or range

Table/Range: Table1

☐ Use an external data source

Choose Connection...

Connection name:

☐ Use this workbook's Data Model

Choose where you want the PivotTable report to be placed

☐ New Worksheet

☒ Existing Worksheet

Location: H4

Choose whether you want to analyze multiple tables

☐ Add this data to the Data Model

OK Cancel

3. Click OK, and Excel builds an empty pivot table starting in cell H4.

H4

Sample sales data

Date	Color	Region	Units	Sales
3-Jan-16	Red	West	1	\$11.00
13-Jan-16	Blue	South	8	\$96.00
21-Jan-16	Green	West	2	\$26.00
30-Jan-16	Blue	North	7	\$84.00
7-Feb-16	Green	North	8	\$104.00
13-Feb-16	Red	South	2	\$22.00
21-Feb-16	Blue	East	5	\$60.00
1-Mar-16	Green	West	2	\$26.00
13-Mar-16	Blue	East	8	\$96.00
23-Mar-16	Blue	North	7	\$84.00
28-Mar-16	Green	West	2	\$26.00
3-Apr-16	Blue	South	8	\$96.00
12-Apr-16	Green	South	1	\$13.00
16-Apr-16	Red	East	8	\$88.00

New empty Pivot Table

PivotTable2

To build a report, choose fields from the PivotTable Field List

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*Note: there are good reasons to place a pivot table on a different worksheet. However, when learning pivot tables, it's helpful to see both the source data and the pivot table at the same time.*

Excel also displays the PivotTable Fields pane, which is empty at this point. Note all five fields are listed, but unused:

PivotTable Fields

Choose fields to add to report:

Search

☐ Date

☐ Color

☐ Region

☐ Units

☐ Sales

Drag fields between areas below:

Filters

Columns

Rows

Σ Values

☐ Defer Layout Update

Update

To build a pivot table, drag fields into one of the Columns, Rows, or Values area. The Filters area is used to apply global filters to a pivot table.

*Note: the pivot table fields pane shows how fields were used to create a pivot table. Learning to "read" the fields pane takes a bit of practice. See below and [also here](#) for more examples.*


### Add fields


1. Drag the Sales field to the Values area.

Excel calculates a grand total of 26356. This is the sum of all sales values in the entire data set:









**PivotTable Fields** ▼ ✕

Choose fields to add to report:  ▼

Search 

☐ Date  
☒ **Color**  
☐ Region  
☐ Units  
☒ **Sales**

Drag fields between areas below:

 Filters	 Columns
 Rows	 Values
Color 	Sum of Sales 

☐ Defer Layout Update Update

### Number formatting

Pivot Tables can apply and maintain number formatting automatically to numeric fields. This is a big time-saver when data changes frequently.

1. Right-click any Sales number and choose Number Format:

Color	Sum of Sales
Blue	7464
Green	6414
Red	55
Silver	65
Grand Total	263

Right-click,  
select Number  
Format

- Copy
- Format Cells...
- Number Format...
- Refresh
- Sort >
- Remove "Sum of Sales"
- Summarize Values By >
- Show Values As >
- Value Field Settings...
- PivotTable Options...
- Hide Field List

2. Apply Currency formatting with zero decimal places, then click OK:

**Format Cells**

**Number**

**Category:**

- General
- Number
- Currency**
- Accounting
- Date
- Time
- Percentage
- Fraction
- Scientific
- Text
- Special
- Custom

**Sample**

\$6,414

**Decimal places:** 0

**Symbol:** \$

**Negative numbers:**

- \$1,234
- \$1,234
- (\$1,234)
- (\$1,234)

Currency formats are used for general monetary values. Use Accounting formats to align decimal points in a column.

OK Cancel

In the resulting pivot table, all sales values have Currency format applied:

	A	B	C	D	E	F	G	H	I	J
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										

Sample sales data					
Date	Color	Region	Units	Sales	
3-Jan-16	Red	West	1	\$11.00	
13-Jan-16	Blue	South	8	\$96.00	
21-Jan-16	Green	West	2	\$26.00	
30-Jan-16	Blue	North	7	\$84.00	
7-Feb-16	Green	North	8	\$104.00	
13-Feb-16	Red	South	2	\$22.00	
21-Feb-16	Blue	East	5	\$60.00	
1-Mar-16	Green	West	2	\$26.00	
13-Mar-16	Blue	East	8	\$96.00	
23-Mar-16	Blue	North	7	\$84.00	
28-Mar-16	Green	West	2	\$26.00	
3-Apr-16	Blue	South	8	\$96.00	

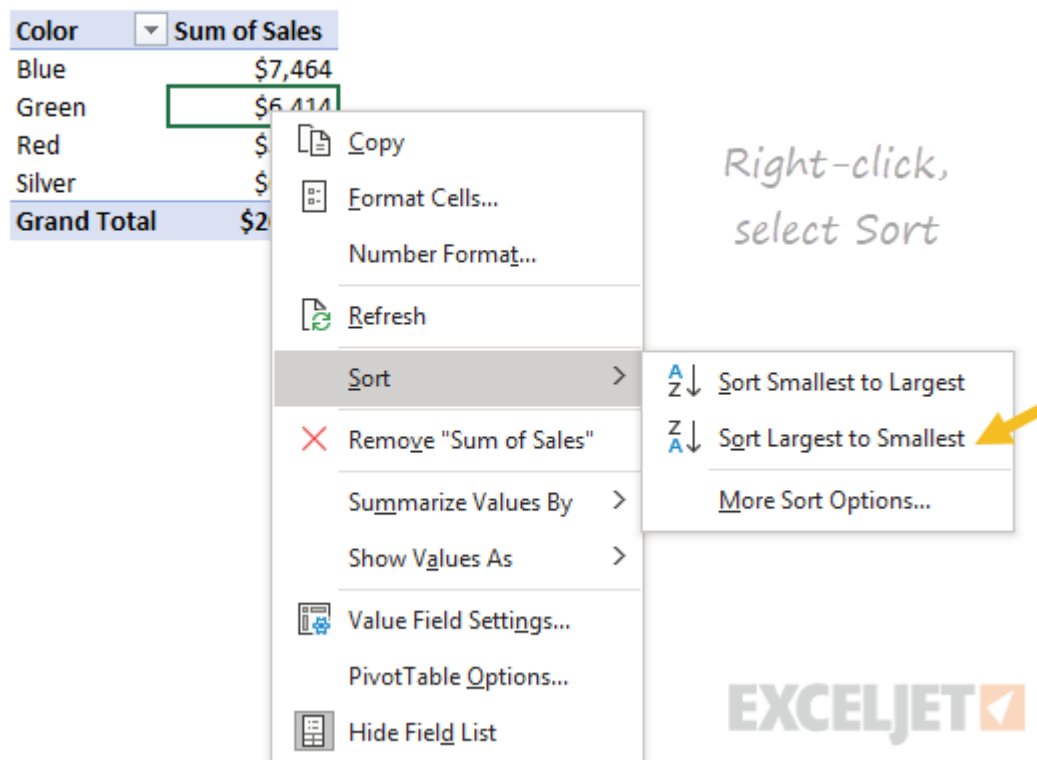
Color	Sum of Sales
Blue	\$7,464
Green	\$6,414
Red	\$5,508
Silver	\$6,970
<b>Grand Total</b>	<b>\$26,356</b>

Currency format will continue to be applied to Sales values, even when the pivot table is reconfigured, or new data is added.



## Sorting by value

1. Right-click any Sales value and choose Sort > Largest to Smallest.



Excel now lists top-selling colors first. This sort order will be maintained when data changes, or when the pivot table is reconfigured.

Sample sales data		Sorted largest to smallest			
Date	Color	Region	Units	Sales	
3-Jan-16	Red	West	1	\$11.00	Blue \$7,464
13-Jan-16	Blue	South	8	\$96.00	Silver \$6,970
21-Jan-16	Green	West	2	\$26.00	Green \$6,414
30-Jan-16	Blue	North	7	\$84.00	Red \$5,508
7-Feb-16	Green	North	8	\$104.00	Grand Total \$26,356
13-Feb-16	Red	South	2	\$22.00	
21-Feb-16	Blue	East	5	\$60.00	
1-Mar-16	Green	West	2	\$26.00	
13-Mar-16	Blue	East	8	\$96.00	
23-Mar-16	Blue	North	7	\$84.00	
28-Mar-16	Green	West	2	\$26.00	
3-Apr-16	Blue	South	8	\$96.00	

Refresh data

Pivot table data needs to be "refreshed" in order to bring in updates. To reinforce how this works, we'll make a big change to the source data and watch it flow into the pivot table.

1. Select cell F5 and change \$11.00 to \$2000.
2. Right-click anywhere in the pivot table and select "Refresh".

	A	B	C	D	E	F	G	H	I	J
1										
2		Sample sales data						Right-click, select "Refresh"		
3										
4		Date	Color	Region	Units	Sales		Color	Sum of Sales	
5		3-Jan-16	Red	West	1	\$2,000.00		Blue	\$7,464	
6		13-Jan-16	Blue	South	8	\$96.00		Silver	\$6,970	
7		21-Jan-16	Green	West	2	\$26.00		Green		
8		30-Jan-16	Blue	North	7	\$84.00		Red		
9		7-Feb-16	Green	North	8	\$104.00		Grand Total		
10		13-Feb-16	Red	South	2	\$22.00				
11		21-Feb-16	Blue	East	5	\$60.00				
12		1-Mar-16	Green	West	2	\$26.00				
13		13-Mar-16	Blue	East	8	\$96.00				
14		23-Mar-16	Blue	North	7	\$84.00				
15		28-Mar-16	Green	West	2	\$26.00				
16		3-Apr-16	Blue	South	8	\$96.00				
17		12-Apr-16	Green	South	1	\$13.00				
18		16-Apr-16	Red	East	8	\$88.00				
19		23-Apr-16	Red	West	6	\$66.00				
20		30-Apr-16	Green	South	5	\$65.00				

Notice "Red" is now the top-selling color, and automatically moves to the top:

H5										
1										
2		Sample sales data								
3										
4		Date	Color	Region	Units	Sales		Color	Sum of Sales	
5		3-Jan-16	Red	West	1	\$2,000.00		Red	\$7,497	
6		13-Jan-16	Blue	South	8	\$96.00		Blue	\$7,464	
7		21-Jan-16	Green	West	2	\$26.00		Silver	\$6,970	
8		30-Jan-16	Blue	North	7	\$84.00		Green	\$6,414	
9		7-Feb-16	Green	North	8	\$104.00		Grand Total	\$28,345	
10		13-Feb-16	Red	South	2	\$22.00				
11		21-Feb-16	Blue	East	5	\$60.00				
12		1-Mar-16	Green	West	2	\$26.00				
13		13-Mar-16	Blue	East	8	\$96.00				
14		23-Mar-16	Blue	North	7	\$84.00				
15		28-Mar-16	Green	West	2	\$26.00				
16		3-Apr-16	Blue	South	8	\$96.00				
17		12-Apr-16	Green	South	1	\$13.00				
18		16-Apr-16	Red	East	8	\$88.00				

3. Change F5 back to \$11.00 and refresh the pivot again.

*Note: changing F5 to \$2000 is not realistic, but it's a good way to force a change you can easily see in the pivot table. Try changing an existing color to something new, like "Gold" or "Black". When you refresh, you'll see the new color appear. You can use undo to go back to the original data and pivot.*

## Second value field

You can add more than one field as a Value field.

1. Drag Units to the Value area to see Sales and Units together:

The screenshot shows an Excel PivotTable titled "Sample sales data". The PivotTable is structured with "Color" as the filter field, and "Sum of Sales" and "Sum of Units" as the value fields. The data is summarized by color. The formula bar at the top shows the value 7464 for cell I5, which corresponds to the "Sum of Sales" for the "Blue" category.

Date	Color	Region	Units	Sales
3-Jan-16	Red	West	1	\$11.00
13-Jan-16	Blue	South	8	\$96.00
21-Jan-16	Green	West	2	\$26.00
30-Jan-16	Blue	North	7	\$84.00
7-Feb-16	Green	North	8	\$104.00
13-Feb-16	Red	South	2	\$22.00
21-Feb-16	Blue	East	5	\$60.00
1-Mar-16	Green	West	2	\$26.00
13-Mar-16	Blue	East	8	\$96.00
23-Mar-16	Blue	North	7	\$84.00
28-Mar-16	Green	West	2	\$26.00
3-Apr-16	Blue	South	8	\$96.00
12-Apr-16	Green	South	1	\$13.00
16-Apr-16	Red	East	8	\$88.00

Color	Sum of Sales	Sum of Units
Blue	\$7,464	608
Silver	\$6,970	473
Green	\$6,414	481
Red	\$5,508	486
<b>Grand Total</b>	<b>\$26,356</b>	<b>2048</b>

*Units added as a Value field*

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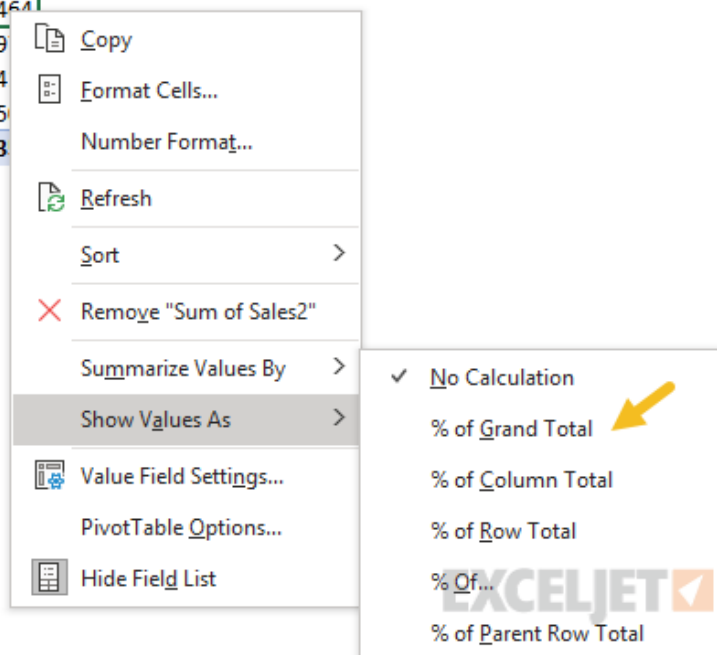
## Percent of total

There are different ways to display values. One option is to show values as a percent of the total. If you want to display the same field in different ways, add the field twice.

1. Remove the Units from the Values area
2. Add the Sales field (again) to the Values area.
3. Right-click the second instance and choose "% of grand total":

Color	Sum of Sales	Sum of Sales2
Blue	\$7,464	74,644
Silver	\$6,970	69,700
Green	\$6,414	64,140
Red	\$5,508	55,080
<b>Grand Total</b>	<b>\$26,356</b>	<b>263,564</b>

*Changing calculation to show percent of total*



The result is a breakdown by color along with a percent of the total:

J5    28.3199271513128%										
	A	B	C	D	E	F	G	H	I	J
1										
2	Sample sales data									
3										
4		Date	Color	Region	Units	Sales		Color	Sum of Sales	Sum of Sales2
5		3-Jan-16	Red	West	1	\$11.00		Blue	\$7,464	28.3%
6		13-Jan-16	Blue	South	8	\$96.00		Silver	\$6,970	26.4%
7		21-Jan-16	Green	West	2	\$26.00		Green	\$6,414	24.3%
8		30-Jan-16	Blue	North	7	\$84.00		Red	\$5,508	20.9%
9		7-Feb-16	Green	North	8	\$104.00		<b>Grand Total</b>	<b>\$26,356</b>	<b>100.0%</b>
10		13-Feb-16	Red	South	2	\$22.00				
11		21-Feb-16	Blue	East	5	\$60.00				
12		1-Mar-16	Green	West	2	\$26.00				
13		13-Mar-16	Blue	East	8	\$96.00				
14		23-Mar-16	Blue	North	7	\$84.00				
15		28-Mar-16	Green	West	2	\$26.00				
16		3-Apr-16	Blue	South	8	\$96.00				
17		12-Apr-16	Green	South	1	\$13.00				
18		16-Apr-16	Red	East	8	\$88.00				

*Second Sales field displays % of total*

*Note: the number format for percentage has also been adjusted to show 1 decimal.*

Here is the Fields pane at this point:

PivotTable Fields

Choose fields to add to report:

☐ Date  
☒ Color  
☐ Region  
☐ Units  
☒ Sales

Drag fields between areas below:

Filters

Columns

Σ Values

Rows

Color

Σ Values

Sum of Sales  
Sum of Sales2

☐ Defer Layout Update

Update

### Group by date

Pivot tables have a special feature to group dates into units like years, months, and quarters. This grouping can be customized.

1. Remove the second Sales field (Sales2).
2. Drag the Date field to the Columns area.
3. Right-click a date in the header area and choose "Group":

Sum of Sales	Years	Quarters	Date	Grand Total
	2016	2017	2018	2019
Color				
Blue	\$1,764	\$2,703	\$7,464	
Silver			\$5,970	
Green	\$1,001	\$2,414	\$6,414	
Red	\$682	\$2,508	\$5,508	
Grand Total	\$3,447	\$6,025	\$26,356	

Right-click a date, select Group

4. When the Group window appears, group by Years only (deselect Months and Quarters):

Grouping

Auto

☒ Starting at: 1/3/2016

☒ Ending at: 8/4/2019

By

Seconds  
Minutes  
Hours  
Days  
Months  
Quarters  
Years

Number of days: 1

OK Cancel

We now have a pivot table that groups sales by color and year:

G	H	I	J	K	L	M	N
---	---	---	---	---	---	---	---

*Date grouped by Years only*

Sum of Sales	Date ▾					
Color ▾	2016	2017	2018	2019	Grand Total	
Blue	\$1,764	\$2,136	\$2,147	\$1,417	\$7,464	
Silver			\$3,565	\$3,405	\$6,970	
Green	\$1,001	\$2,431	\$1,330	\$1,652	\$6,414	
Red	\$682	\$2,024	\$1,986	\$816	\$5,508	
<b>Grand Total</b>	<b>\$3,447</b>	<b>\$6,591</b>	<b>\$9,028</b>	<b>\$7,290</b>	<b>\$26,356</b>	

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Notice there are no sales of Silver in 2016 and 2017. We can guess that Silver was introduced as a new color in 2018. Pivot tables often reveal patterns in data that are difficult to see otherwise.

Here is the Fields pane at this point:

PivotTable Fields

Choose fields to add to report:

Search

☒ Date
 ☒ Color
 ☐ Region
 ☐ Units
 ☒ Sales

Drag fields between areas below:

Filters

Columns

Date ▾

Rows

Color ▾

Values

Sum of Sales ▾

☐ Defer Layout Update
 

Update

## Two-way Pivot

Pivot tables can plot data in various two-dimensional arrangements.

1. Drag the Date field out of the columns area
2. Drag Region into the Columns area.

Excel builds a two-way pivot table that breaks down sales by color and region:

G	H	I	J	K	L	M	N
---	---	---	---	---	---	---	---

*Two-way Pivot table, Color by Region*

Sum of Sales Region						
Color		East	North	South	West	Grand Total
Blue		\$1,121	\$2,358	\$1,710	\$2,275	\$7,464
Silver		\$697	\$2,645	\$1,149	\$2,479	\$6,970
Green		\$1,198	\$1,678	\$1,059	\$2,479	\$6,414
Red		\$714	\$2,028	\$1,126	\$1,640	\$5,508
Grand Total		\$3,730	\$8,709	\$5,044	\$8,873	\$26,356



3. Swap Region and Color (i.e. drag Region to the Rows area and Color to the Columns area).

Excel builds another two-dimensional pivot table:

G	H	I	J	K	L	M	N
---	---	---	---	---	---	---	---

*Two-way Pivot table, Region by Color*

Sum of Sales Color						
Region		Blue	Silver	Green	Red	Grand Total
East		\$1,121	\$697	\$1,198	\$714	\$3,730
North		\$2,358	\$2,645	\$1,678	\$2,028	\$8,709
South		\$1,710	\$1,149	\$1,059	\$1,126	\$5,044
West		\$2,275	\$2,479	\$2,479	\$1,640	\$8,873
Grand Total		\$7,464	\$6,970	\$6,414	\$5,508	\$26,356



Again notice that total sales (\$26,356) is the same in *all pivot tables above*. Each table presents a different view of the *same data*, so they all sum to the *same total*.



The above example shows how quickly you can build different pivot tables from the same data. You can create [many other kinds of pivot tables](#), using all kinds of data.

### **Key Pivot Table benefits**

**Simplicity.** Basic pivot tables are very simple to set up and customize. There is no need to learn complicated formulas.

**Speed.** You can create a good-looking, useful report with a pivot table in minutes. Even if you are very good with formulas, [pivot tables are faster to set up and require much less effort](#).

**Flexibility.** Unlike formulas, pivot tables don't lock you into a particular view of your data. You can quickly rearrange the pivot table to suit your needs. You can even [clone a pivot table](#) and build a separate view.

**Accuracy.** As long as a pivot table is set up correctly, you can rest assured results are accurate. In fact, a pivot table will often highlight problems in the data faster than any other tool.

**Formatting.** A Pivot table can apply automatically apply consistent number and style formatting, even as data changes.

**Updates.** Pivot tables are designed for ongoing updates. If you base a pivot table on an Excel Table, the table resizes as needed with new data. [All you need to do is click Refresh](#), and your pivot table will show you the latest.

**Filtering.** Pivot tables contain several tools for filtering data. Need to look at North America and Asia, but exclude Europe? A pivot table makes it simple.

**Charts.** Once you have a pivot table, you can easily [create a pivot chart](#).