

Business Research and Data Analytics

Lecture 4: Data visualization in MS Excel

Igor Vyshnevskyi
Woosong University
March 27, 2024

Agenda

1. Basic Data Visualization in MS Excel
2. Intro to Pivot Tables
 1. Grouping and Visualization With Pivot Tables
3. In-class Assignment

1. Basic data visualization in MS Excel

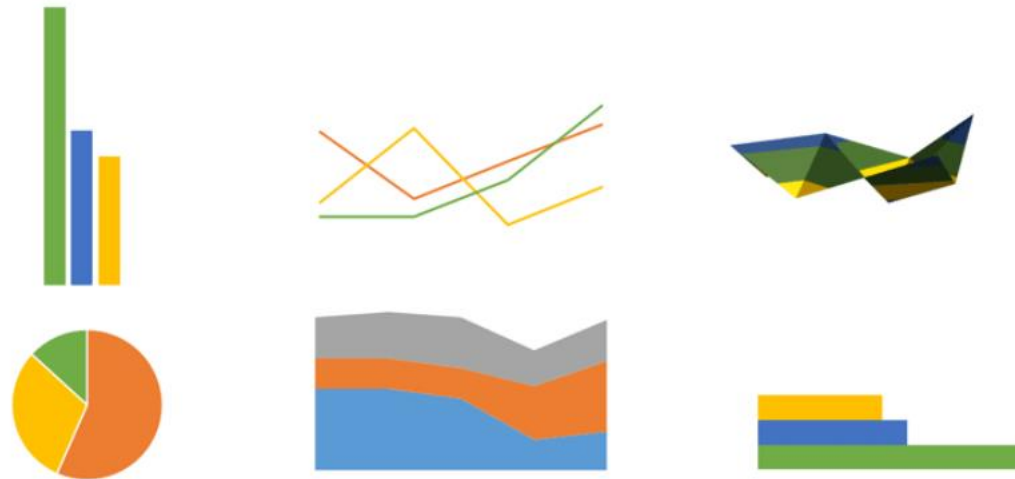
Creating basic data visualizations in Microsoft Excel is a *straightforward* process that can help you understand and present your data more effectively.

You just need to have *clean* data!

Major Chart

Excel offers the following major chart types:

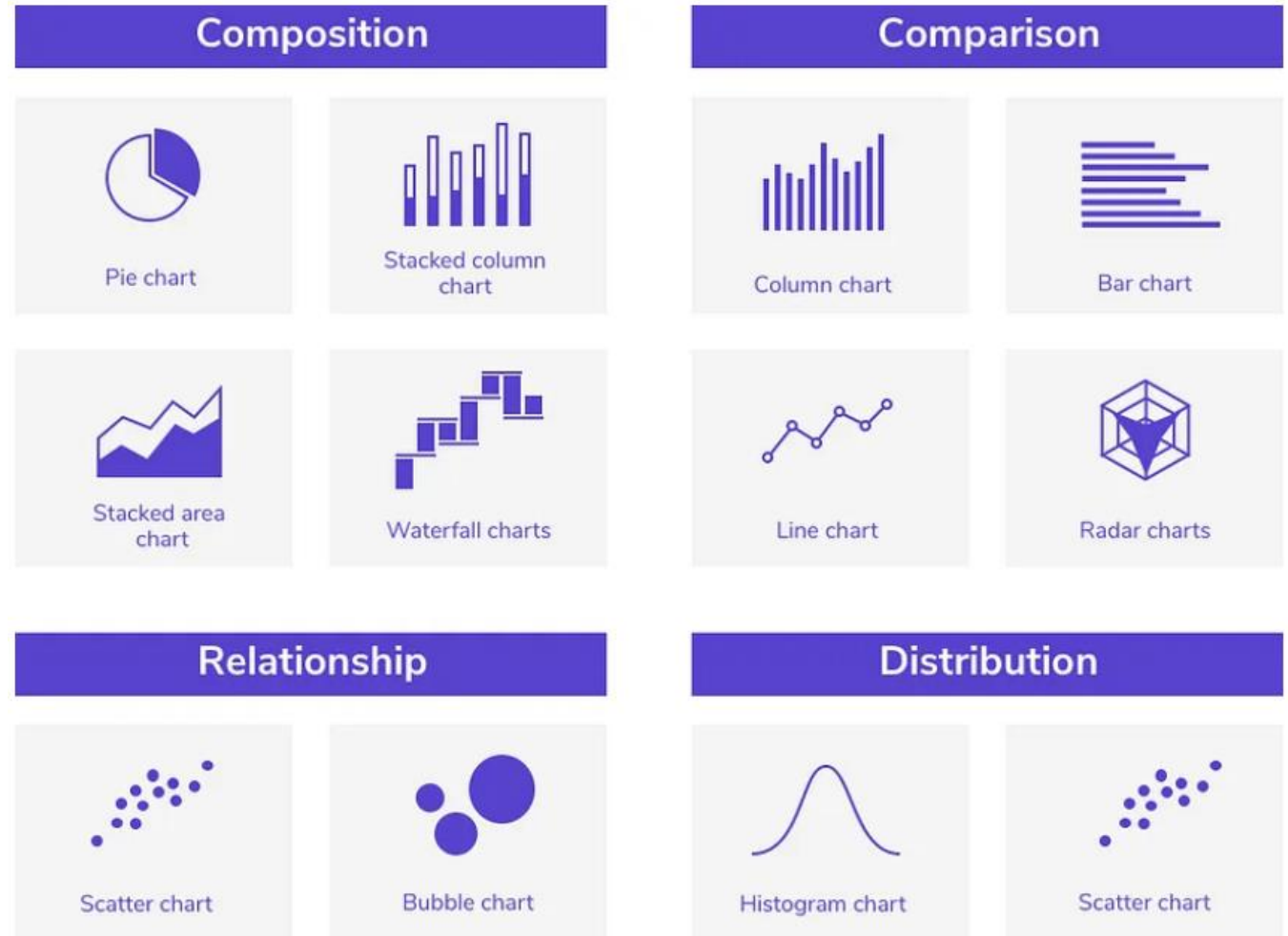
- Column Chart
- Line Chart
- Pie Chart
- Doughnut Chart
- Bar Chart
- Area Chart
- XY (Scatter) Chart
- Bubble Chart
- Stock Chart
- Surface Chart
- Radar Chart
- Combo Chart



The Most Common Chart Types

- Different types of visualization are better suited to different types of data and communication goals
- Choosing the right visualization can help you communicate your insights more effectively and support decision-making.

The example of detail interactive decision tree to make decisions based on key questions that you can ask yourself I highly recommend:
<https://www.data-to-viz.com/>



Source: <https://uxplanet.org/data-heavy-applications-how-to-design-perfect-charts-c0c893fef6de>

File to be used: *Excel Charts Tutorial File.xlsx*

Our Data

Let's:

1. Observe our data;
2. Think on what show/want to show.

[illegible]

Data Selection

Select data you want to visualize and then select chart type from below.

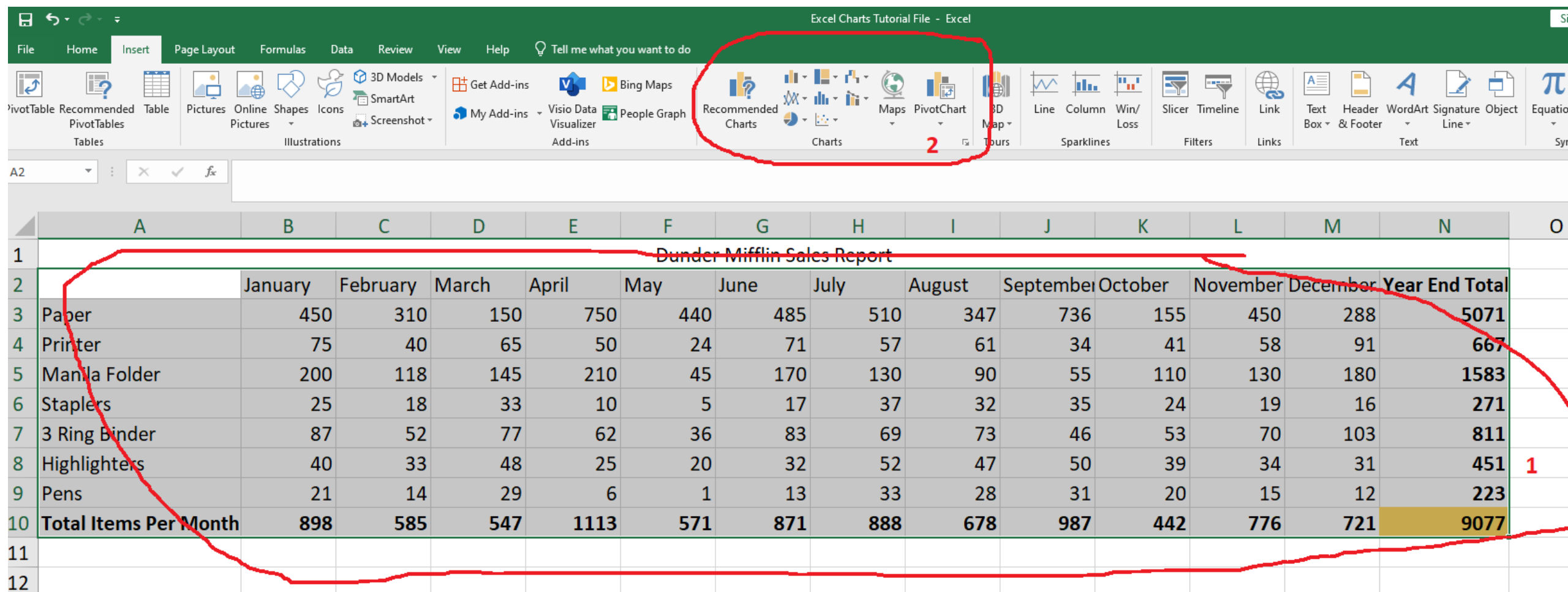


Chart Selection

Select the chart type you want to build.

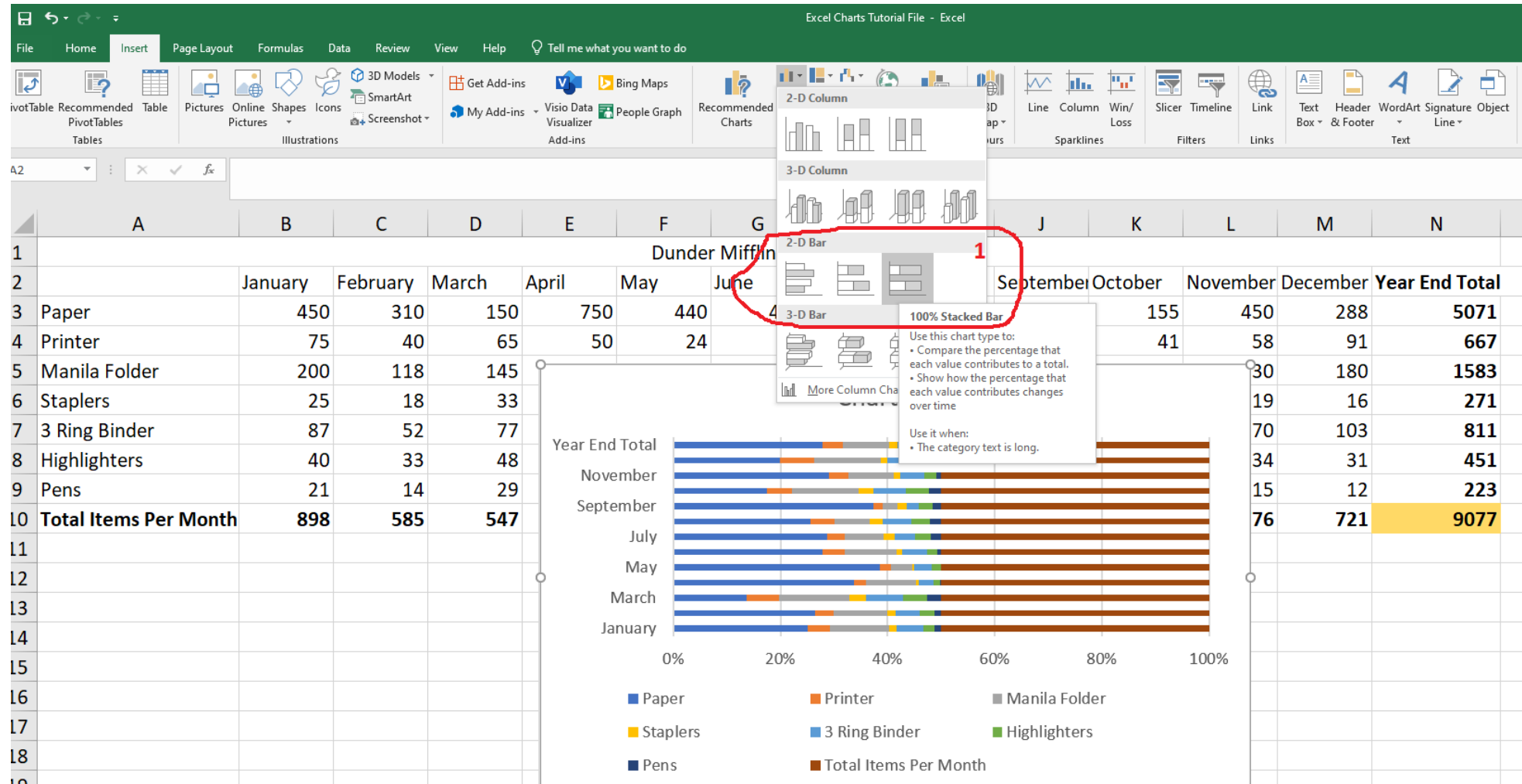


Chart Customization (1)

Once you have created your chart you can customize it.

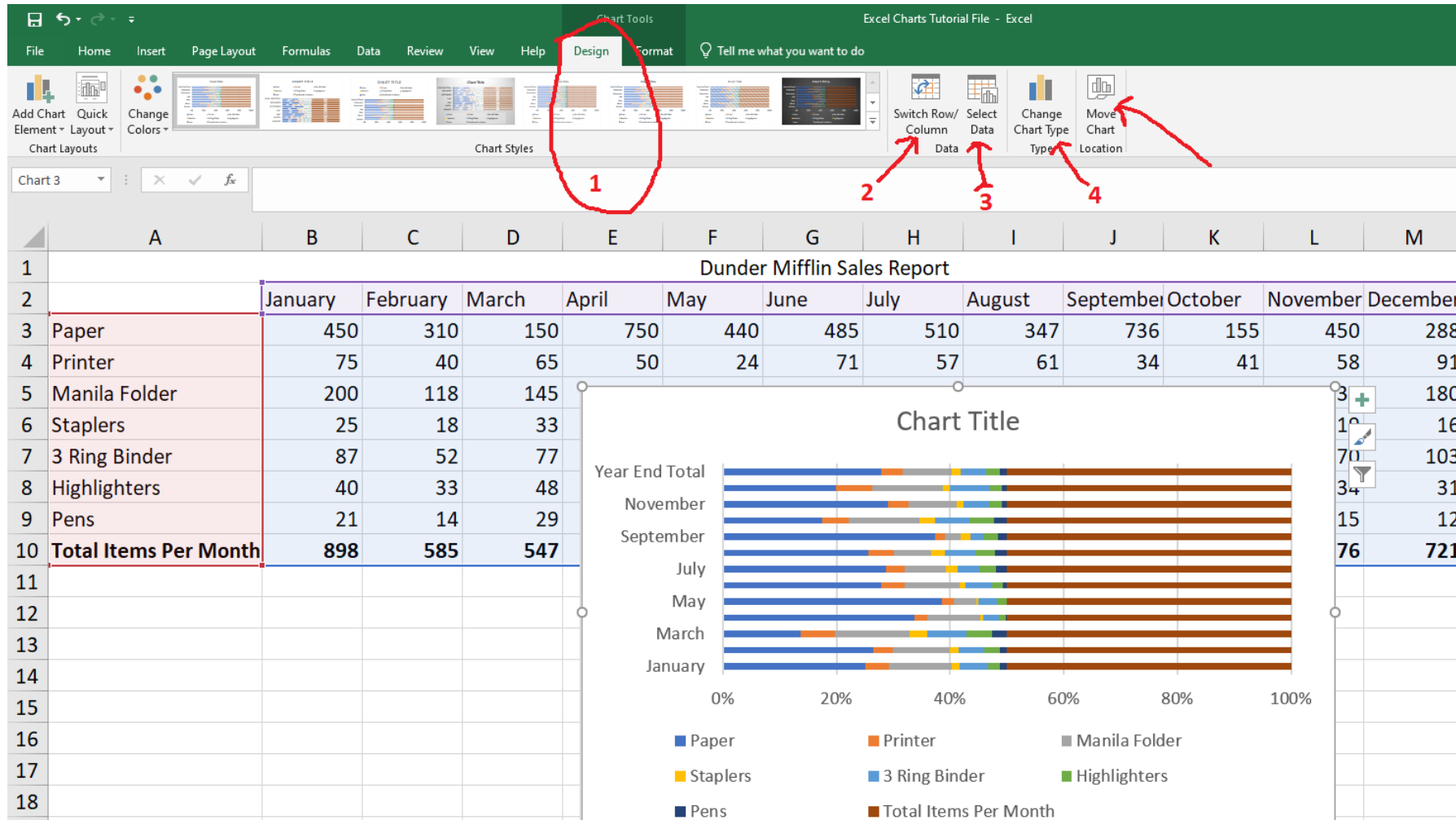
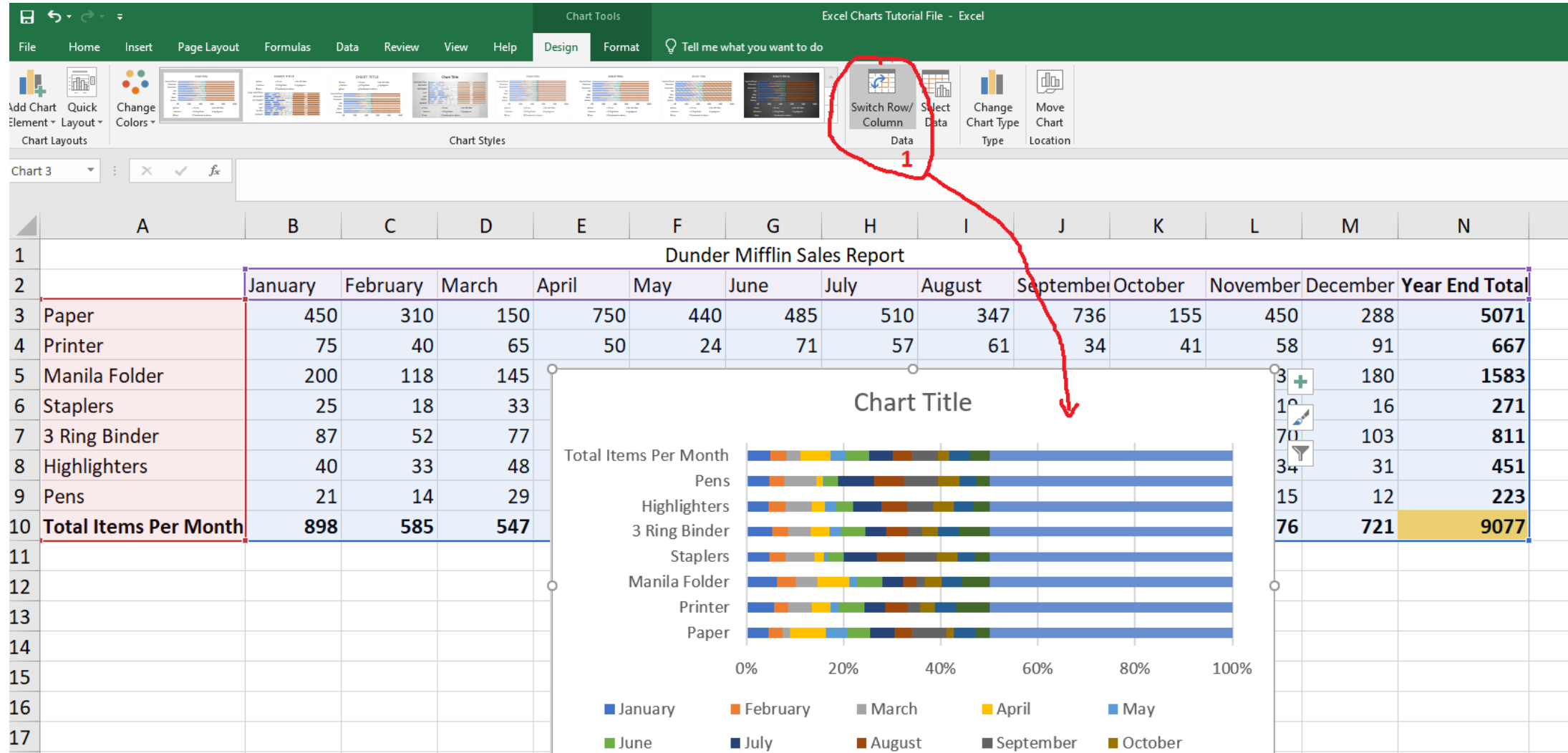


Chart Customization (2)

You can switch row/column.



You can choose which data to visualize.

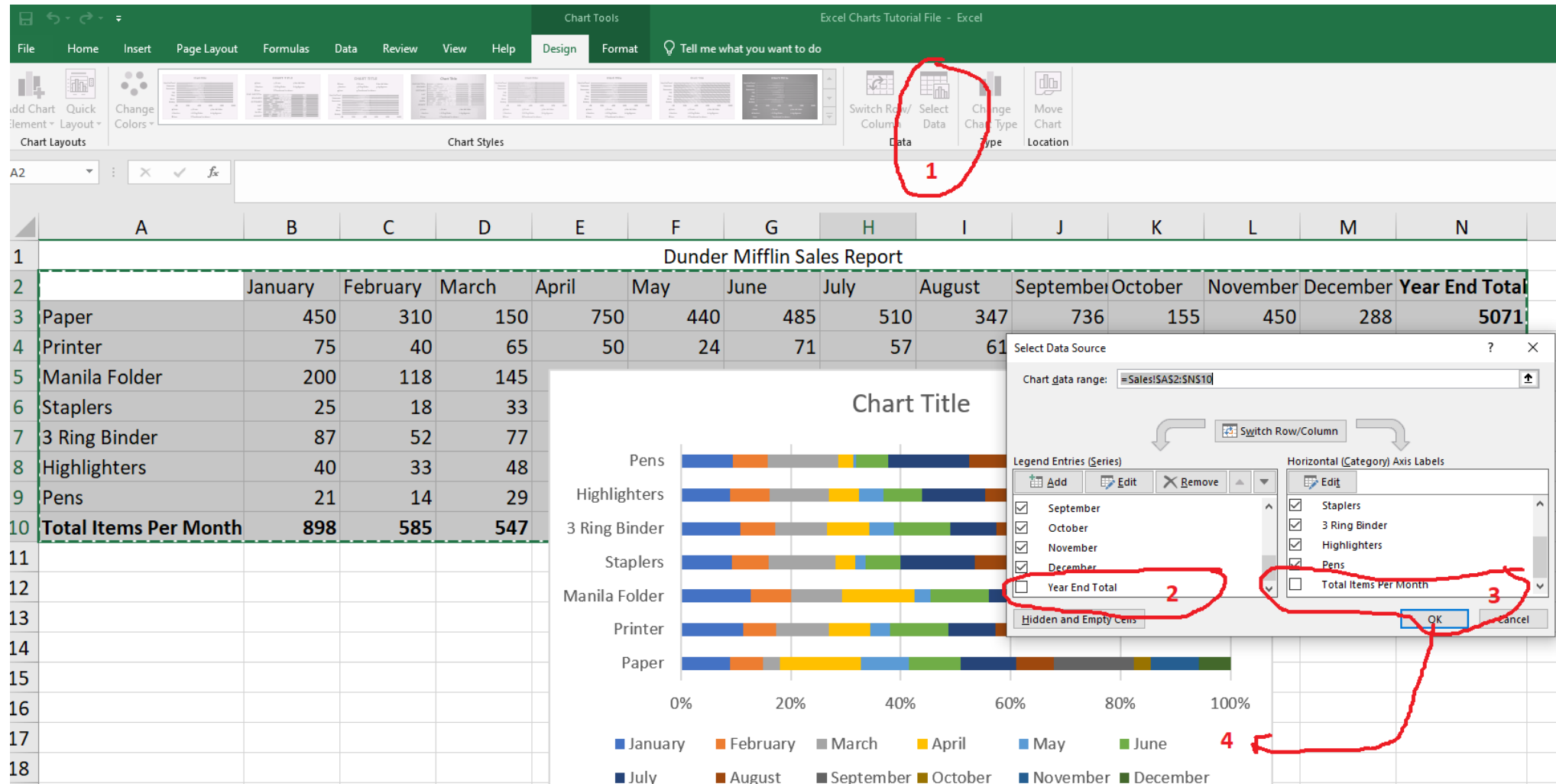
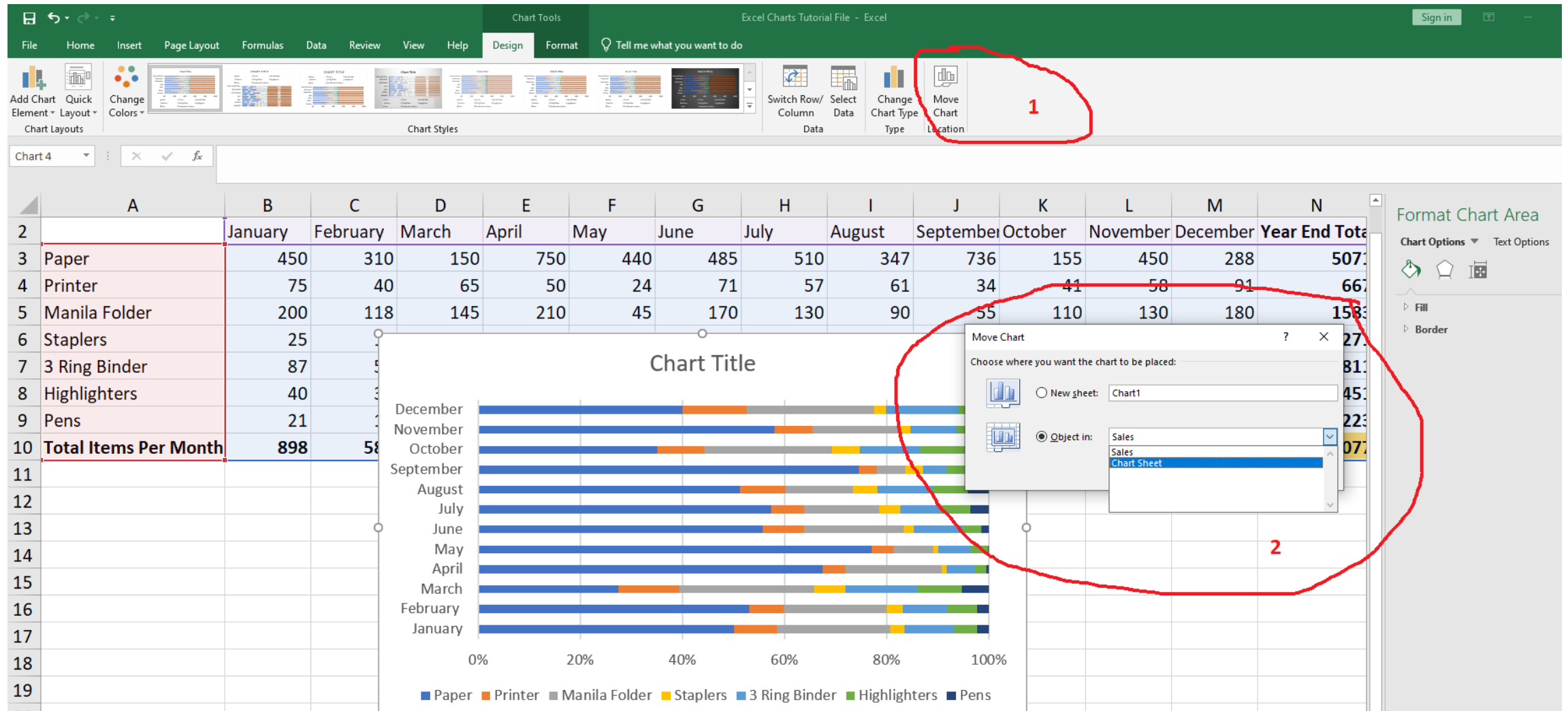


Chart Customization (4)

Finally, you can move ready charts to other excel sheets.



2. Intro to Pivot Tables

Basics

A **PivotTable** is an interactive way to quickly summarize large amounts of data. You can use a PivotTable to analyze numerical data in detail, and answer unanticipated questions about your data.

A PivotTable is especially designed for:

1. Querying large amounts of data in many user-friendly ways.
2. Subtotaling and aggregating numeric data, summarizing data by categories and subcategories, and creating custom calculations and formulas.
3. Expanding and collapsing levels of data to focus your results, and drilling down to details from the summary data for areas of interest to you.
4. Moving rows to columns or columns to rows (or "pivoting") to see different summaries of the source data.
5. Filtering, sorting, grouping, and conditionally formatting the most useful and interesting subset of data enabling you to focus on just the information you want.
6. Presenting concise, attractive, and annotated online or printed reports.

PivotTable Example

For example, here's a simple list of household expenses on the left, and a PivotTable based on the list to the right:

Sales data

Year	Category	Product	Sales	Rating
2017	Components	Chains	\$20,000	75%
2015	Clothing	Socks	\$3,700	22%
2017	Clothing	Bib-Shorts	\$4,000	22%
2015	Clothing	Shorts	\$13,300	56%
2017	Clothing	Tights	\$36,000	100%
2015	Components	Handlebars	\$2,300	35%
2016	Clothing	Socks	\$2,300	28%
2016	Components	Brakes	\$3,100	36%
2016	Bikes	Mountain Bikes	\$6,300	40%
2017	Components	Brakes	\$5,100	38%
2016	Accessories	Helmets	\$17,000	90%
2016	Accessories	Lights	\$21,600	90%
2016	Accessories	Locks	\$29,800	90%
2016	Components	Bottom Brackets	\$1,000	23%
2015	Clothing	Jerseys	\$6,700	5%
2017	Components	Bottom Brackets	\$600	27%

Corresponding PivotTable

Row Labels	Sum of Sales
Accessories	68400
Helmets	17000
Lights	21600
Locks	29800
Bikes	6300
Clothing	66000
Components	32100
Bottom Brackets	1600
Brakes	8200
Chains	20000
Handlebars	2300
Grand Total	172800

Source: 'Overview of PivotTables and PivotCharts' Microsoft.

Ways to work with a PivotTable

Working with PivotTables in Excel can help you **summarize** and **analyze** large datasets more efficiently.

Here are various tasks you can perform using PivotTables:

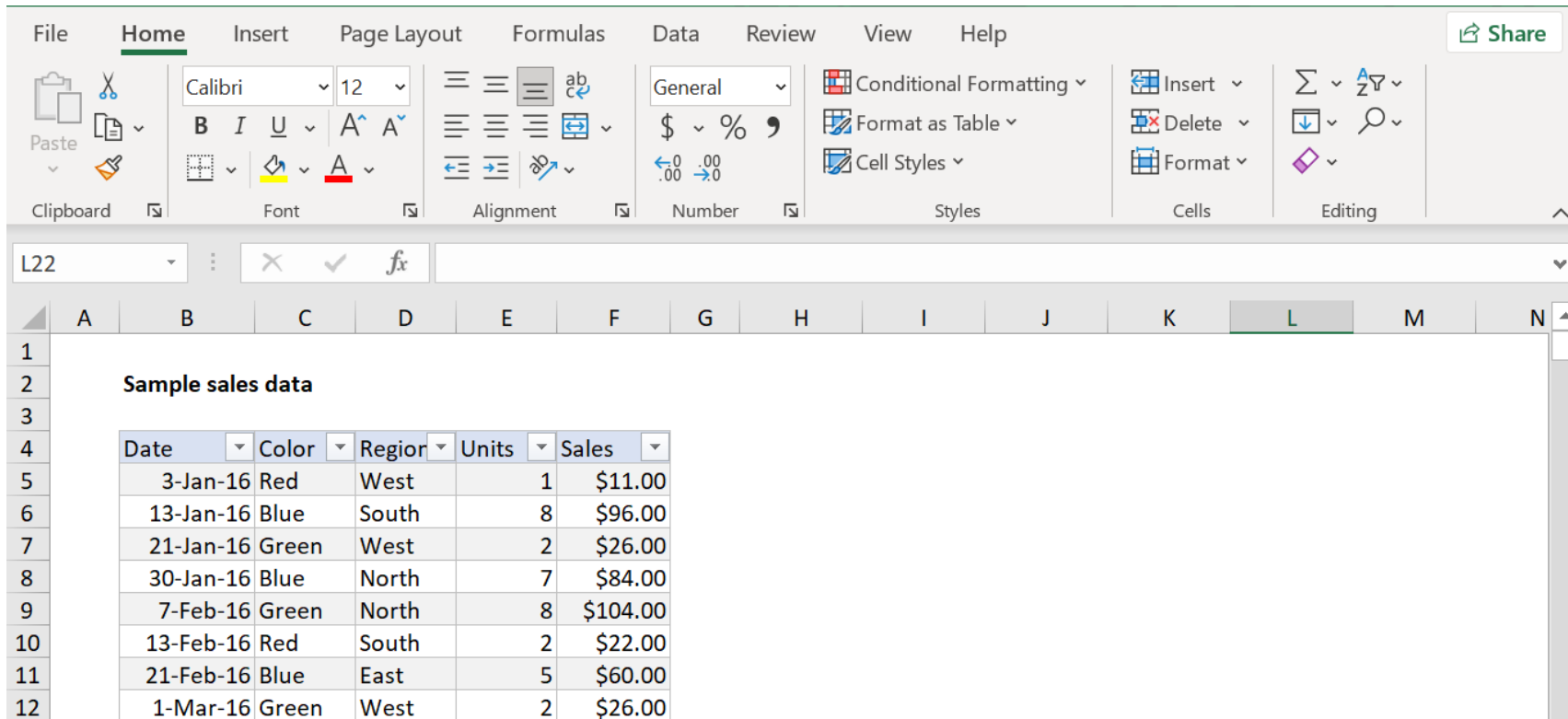
1. Creating a PivotTable;
2. Arranging PivotTable Fields;
3. Summarizing Data;
4. Grouping Data;
5. Filtering Data;
6. Drilling Down;
7. Sorting Data;
8. Formatting PivotTable;
9. Refreshing Data;
10. Calculations and Custom Fields;
11. Changing PivotTable Source Dat.

File to be used: *Sample data for pivot table.xlsx*

Our Data

Let's:

1. Observe our data;
2. Think on what to can/want to show.



The screenshot shows the Microsoft Excel interface with the 'Home' tab selected. The ribbon includes options for Clipboard, Font, Alignment, Number, Styles, Cells, and Editing. A PivotTable titled 'Sample sales data' is displayed in the worksheet. The PivotTable has five columns: Date, Color, Region, Units, and Sales. The data is organized by Date, with rows showing individual sales transactions. The 'Sales' column is formatted with currency (\$).

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

Source: 'Excel Pivot Tables' ExcelJet.

Creating a PivotTable

General instructions:

1. To start off, select any cell in the data and click Pivot Table on the Insert tab of the ribbon (for some tables you may have to select the entire dataset).
 - i. 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

File Home **Insert** Page Layout Formulas Data Review View Help Table Design

PivotTable Recommended PivotTables

Tables

J4

A B

1

2 **Sample sales**

3

4 Date

5 3-Jan-16

6 13-Jan-16

7 **21-Jan-16**

8 30-Jan-16

9 7-Feb-16

10 13-Feb-16

11 21-Feb-16

12 1-Mar-16

13 13-Mar-16

14 23-Mar-16

15 28-Mar-16 Green West 2 \$26.00

16 3-Apr-16 Blue South 8 \$96.00

Shapes SmartArt Screenshot Get Add-ins Visio Data Visualizer Bing Maps People Graph Add-ins

Table

Pictures

Icons

Get Add-ins

Visio Data Visualizer

Bing Maps

People Graph

Add-ins

J K

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: Sheet1!\$J\$4

Choose whether you want to analyze multiple tables

☐ Add this data to the Data Model

OK Cancel

Key Elements of PivotTable work panel

File Home Insert Page Layout Formulas Data Review View Help **PivotTable Analyze** Design

PivotTable Name: PivotTable1

Active Field: [Field Settings]

Drill Down Drill Up

Expand Field Collapse Field

Group Selection Ungroup Group Field

Insert Slicer Insert Timeline Filter Connections

Refresh

J4

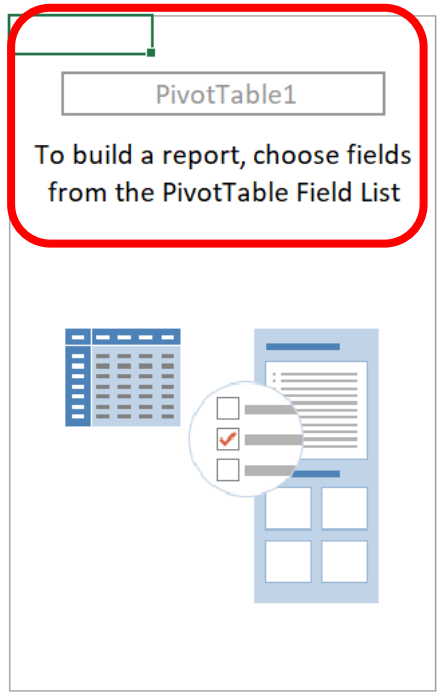
	A	B	C	D	E	F	G	H	I	J	K	L
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												

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
23-Apr-16	Red	West	6	\$66.00
30-Apr-16	Green	South	5	\$65.00
9-May-16	Blue	South	7	\$84.00

PivotTable1

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



Share

Delete Format

AutoSum Fill Clear

Sort & Filter Find & Select

Cells Editing

PivotTable Fields

Choose fields to add to report:

Search

☐ Date
☐ Color
☐ Region
☐ Units
☐ Sales

More Tables...

Drag fields between areas below:

Filters Columns

Rows Values

☐ Defer Layout Update Update

Adding Fields: define rows and columns

General instructions:

1. Drag the Sales field to the Values area.
2. Drag the Color field to the Rows area.

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

Sum of Sales
26356

PivotTable Fields

Choose fields to add to report:

Search

☐ Date

☐ Color

☐ Region

☐ Units

☒ Sales

More Tables...

Drag fields between areas below:

Filters

Columns

Rows

Σ Values

Sum of Sales

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

Row Labels	Sum of Sales
Blue	7464
Green	6414
Red	5508
Silver	6970
Grand Total	26356

PivotTable Fields

Choose fields to add to report:

Search

☐ Date

☒ Color

☐ Region

☐ Units

☒ Sales

More Tables...

Drag fields between areas below:

Filters

Columns

Rows

Color

Σ Values

Sum of Sales

Number Formatting

General instructions:

1. Right-click any Sales number and choose Number Format.
2. Apply Currency formatting with zero decimal places, then click OK.

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
23-Apr-16	Red	West	6	\$66.00
30-Apr-16	Green	South	5	\$65.00
9-May-16	Blue	South	7	\$84.00
16-May-16	Red	South	5	\$55.00
25-May-16	Blue	South	1	\$12.00
30-May-16	Blue	North	4	\$48.00
4-Jun-16	Blue	North	7	\$84.00

Row Labels	Sum of Sales
Blue	746.4
Green	641.0
Red	550.0
Silver	697.0
Grand Total	2635.0

Calibri 12 A A \$ % ,

B I

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

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
23-Apr-16	Red	West	6	\$66.00
30-Apr-16	Green	South	5	\$65.00
9-May-16	Blue	South	7	\$84.00
16-May-16	Red	South	5	\$55.00
25-May-16	Blue	South	1	\$12.00
30-May-16	Blue	North	4	\$48.00
4-Jun-16	Blue	North	7	\$84.00
13-Jun-16	Red	East	3	\$33.00
21-Jun-16	Blue	South	2	\$24.00
26-Jun-16	Blue	South	6	\$72.00
2-Jul-16	Red	East	6	\$66.00
8-Jul-16	Green	West	2	\$26.00

Row Labels	Sum of Sales
Blue	7464
Green	6414
Red	5508
Silver	6970
Grand Total	26356

Format Cells

Number

Category:

General

Number

Currency

Accounting

Date

Time

Percentage

Fraction

Scientific

Text

Special

Custom

Sample

\$7,464

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

Sample sales data

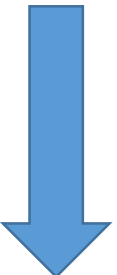
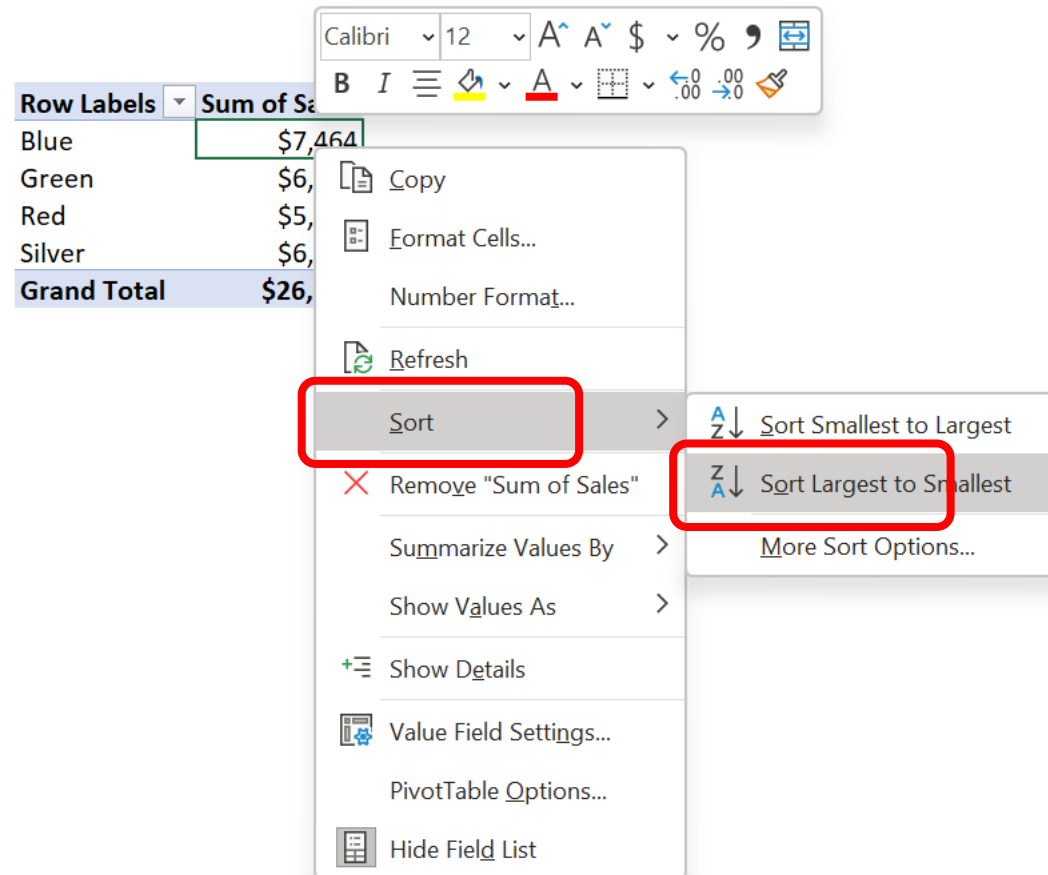
Date	Color	Region	Units	Sales
3-Jan-16	Red	West	1	\$11.00
13-Jan-16	Blue	South	8	\$96.00
21-Jan-16	Green	West	2	\$26.00
30-Jan-16	Blue	North	7	\$84.00
7-Feb-16	Green	North	8	\$104.00
13-Feb-16	Red	South	2	\$22.00
21-Feb-16	Blue	West	5	\$55.00

Row Labels	Sum of Sales
Blue	\$7,464
Green	\$6,414
Red	\$5,508
Silver	\$6,970
Grand Total	\$26,356

Sorting by Value

General instructions:

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



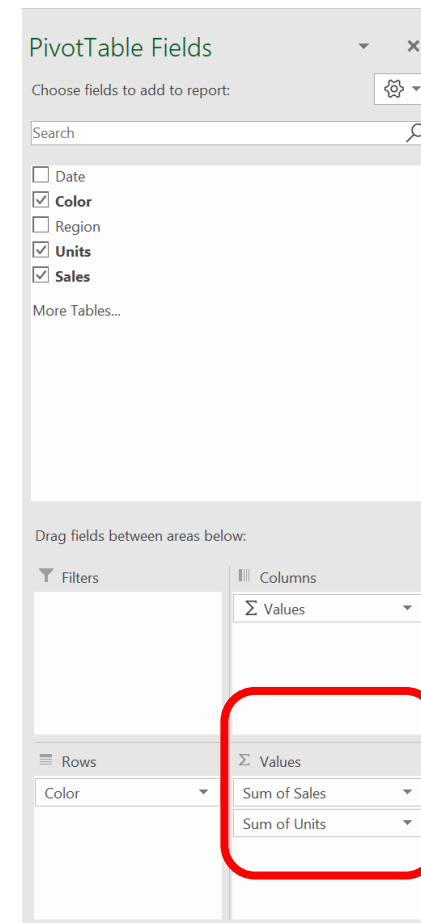
Row Labels	Sum of Sales
Blue	\$7,464
Silver	\$6,970
Green	\$6,414
Red	\$5,508
Grand Total	\$26,356

Second Value Field

General instructions:

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

Row Labels	Sum of Sales	Sum of Units
Blue	\$7,464	608
Silver	\$6,970	473
Green	\$6,414	481
Red	\$5,508	486
Grand Total	\$26,356	2048



Percent of Total

General instructions:

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".

Calibri 12 A A \$ % ,

B *I* ≡ ↔ A □ ↔ .00 →0

Row Labels	Sum of Sales	Sum of Sales2
Blue	\$7,464	
Silver	\$6,970	
Green	\$6,414	
Red	\$5,508	
Grand Total	\$26,356	2

- Copy
- Format Cells...
- Number Format...
- Refresh
- Sort >
- Remove "Sum of Sales2"
- Summarize Values By >
- Show Values As >
- Show Details

- ☒ No Calculation
- ☐ % of Grand Total

PivotTable Fields

Choose fields to add to report:

Search

- ☐ Date
- ☒ Color
- ☐ Region
- ☐ Units
- ☒ Sales

More Tables...

Drag fields between areas below:

Filters

Columns

Rows

Values

Sum of Sales

Sum of Sales2

Row Labels	Sum of Sales	Sum of Sales2
Blue	\$7,464	28.32%
Silver	\$6,970	26.45%
Green	\$6,414	24.34%
Red	\$5,508	20.90%
Grand Total	\$26,356	100.00%


Group by Date


General instructions:

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

Sum of Sales	Column Labels				
	+ 2016	+ 2017	+ 2018	+ 2019	Grand Total
Row Labels					
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
Grand Total	\$3,447	\$6,591	\$9,028	\$7,290	\$26,356

PivotTable Fields


Choose fields to add to report: 


Search 


- ☒ Date
- ☒ Color
- ☐ Region
- ☐ Units
- ☒ Sales
- ☒ Quarters
- ☒ Years


More Tables...


Drag fields between areas below:


 Filters


 Columns


Years 


Quarters 

Date 

 Rows

Color 

 Values

Sum of Sales 

Calibri 12 A[^] A^v \$ % ,

B *I*

Sum of Sales **Column Labels**

2016 2017 2018 2019 **Grand Total**

Row Labels

Blue \$1,764 \$2,146 464

Silver \$1,001 \$2,431 970

Green \$682 \$2,024 414

Red \$3,447 \$6,591 508

Grand Total \$3,447 \$6,591 356

Copy

Format Cells...

Refresh

Sort >

Filter >

✓ Subtotal "Years"

Expand/Collapse >

Group...

Grouping ? X

Auto

☒ Starting at: 1/3/2016

☒ Ending at: 8/4/2019

By

Seconds

Minutes

Hours

Days

Months

Quarters

Years

Number of days: 1

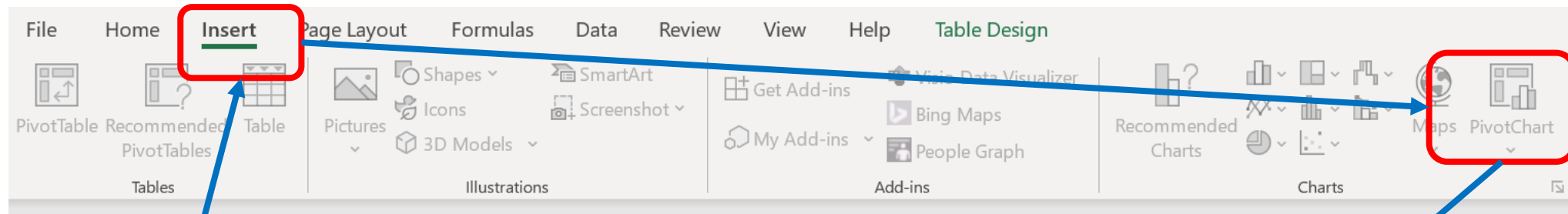
OK Cancel

Sum of Sales	Column Labels				
Row Labels	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
Grand Total	\$3,447	\$6,591	\$9,028	\$7,290	\$26,356

Creating a PivotChart

General instructions:

1. To start off, select any cell in the data and click Pivot Chart on the Insert tab of the ribbon.
 - i. Excel will display the Create Pivot Chart 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 H20 to place the pivot table on the current worksheet



B7

1/21/2016

	A	Date	Color	Region	Units	Sales	G	H	I	J	K	L	M	N	O	P	Q
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											
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											
21		9-May-16	Blue	South	7	\$84.00											
22		16-May-16	Red	South	5	\$55.00											
23		25-May-16	Blue	South	1	\$12.00											
24		30-May-16	Blue	North	4	\$48.00											

Create PivotChart

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 PivotChart to be placed

☐ New Worksheet

☒ Existing Worksheet

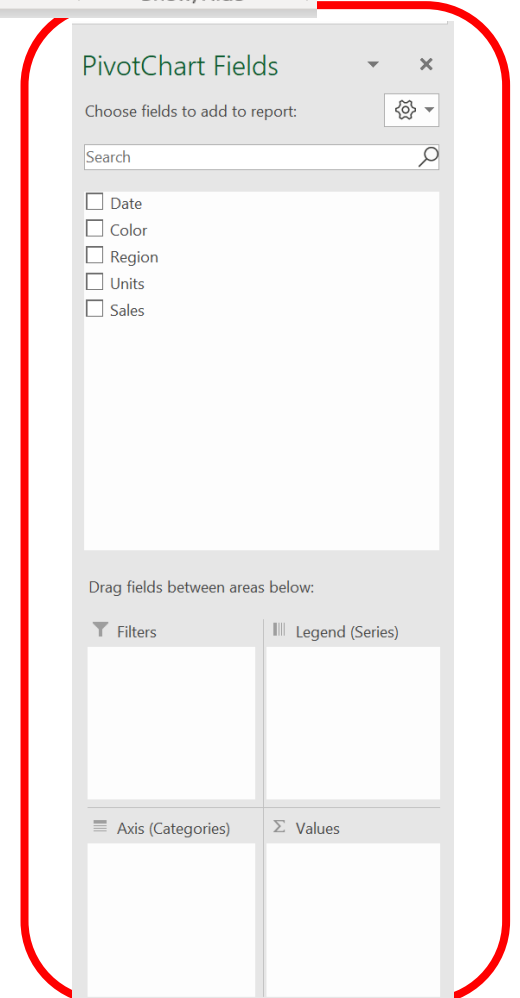
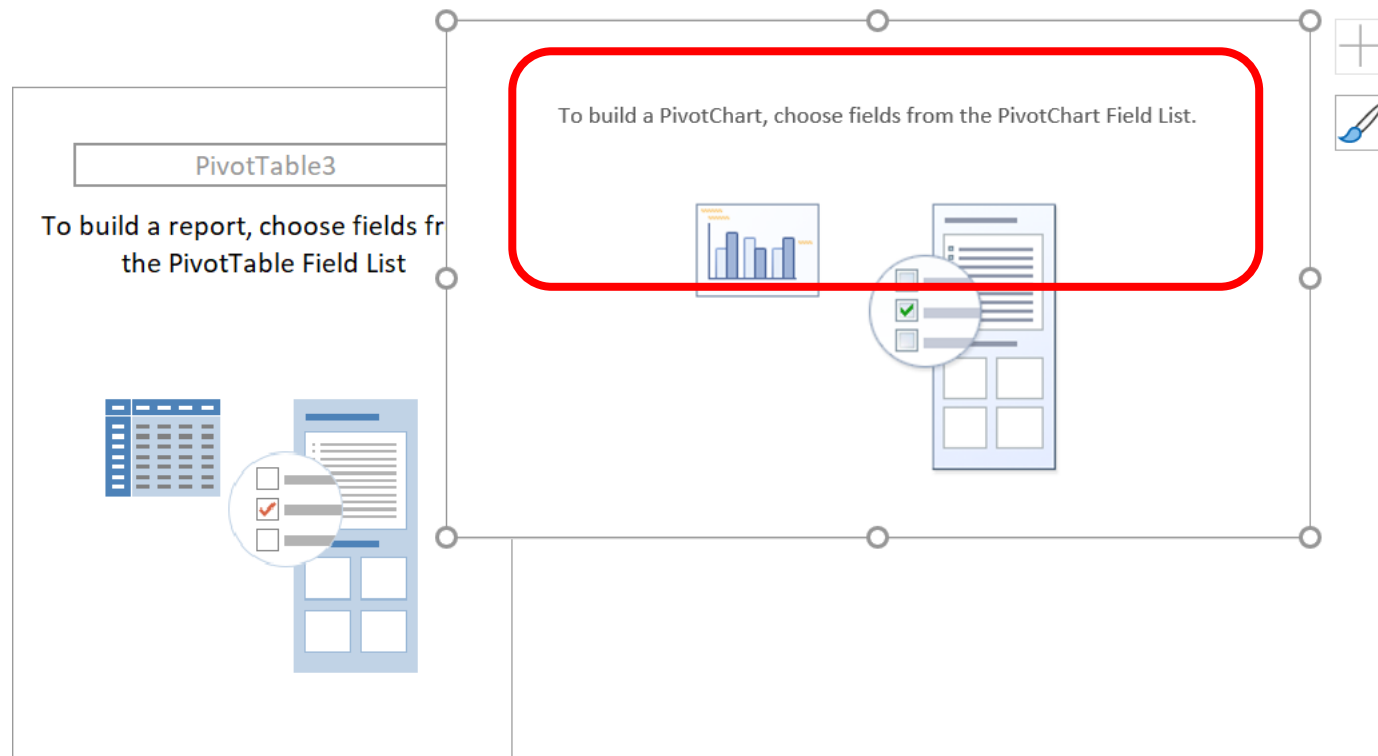
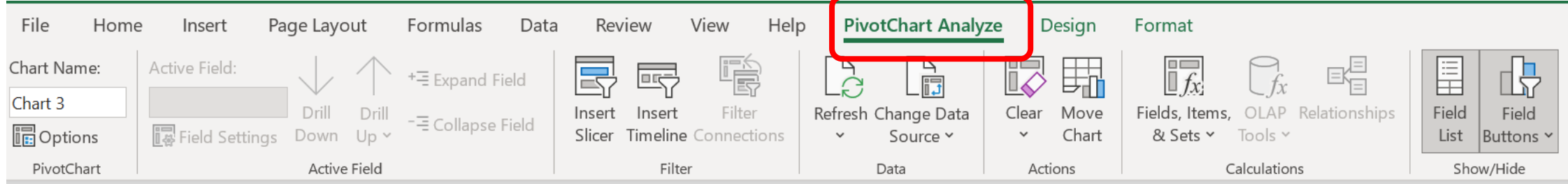
Location: h20

Choose whether you want to analyze multiple tables

☐ Add this data to the Data Model

OK Cancel

Key Elements of PivotChart work panel

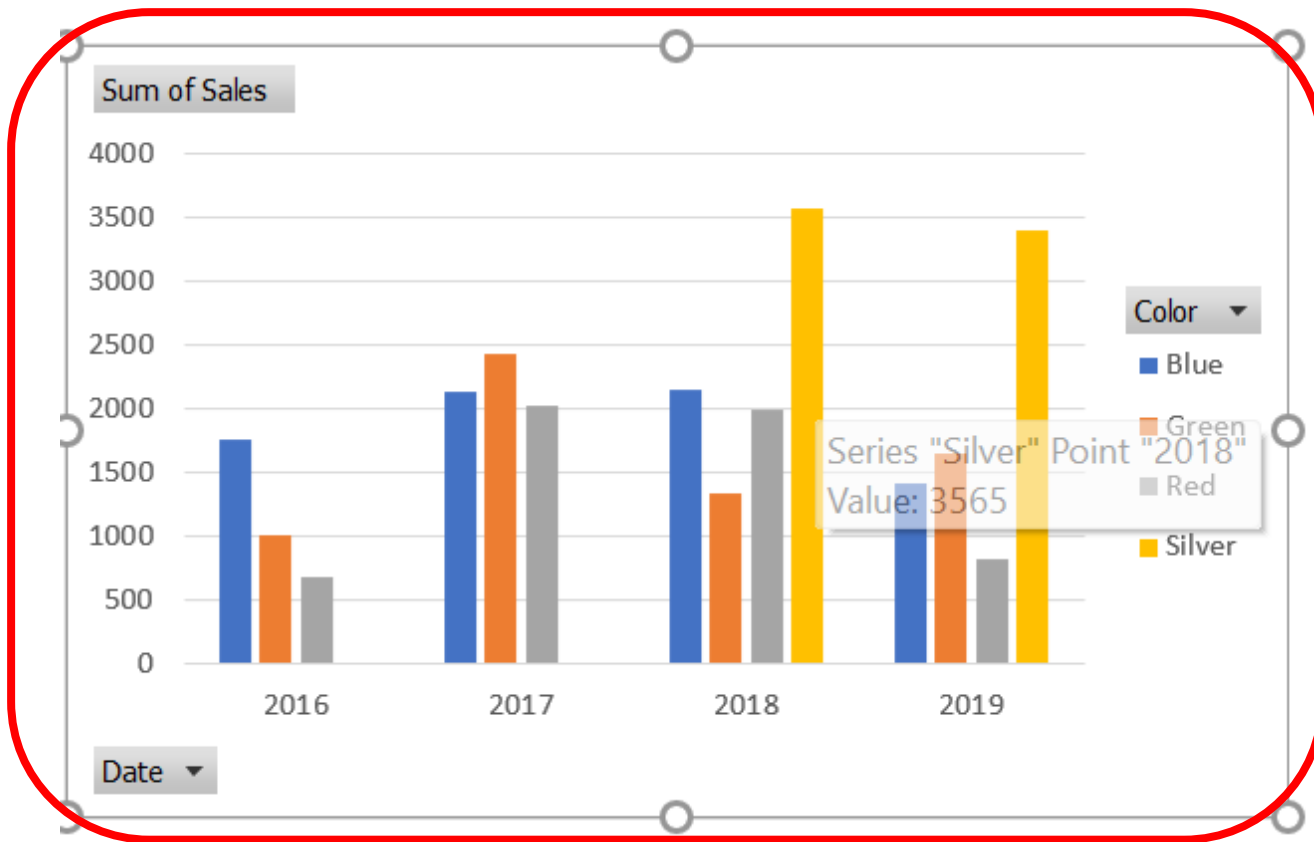


Adding Fields

General instructions:

1. Drag the Sales field to the Values area.
2. Drag the Date field to the Axis area.
3. Drag the Color field to the Legend area.

Sum of Sales	Column Labels				
Row Labels	Blue	Green	Red	Silver	Grand Total
2016	1764	1001	682		3447
2017	2136	2431	2024		6591
2018	2147	1330	1986	3565	9028
2019	1417	1652	816	3405	7290
Grand Total	7464	6414	5508	6970	26356



PivotChart Fields

Choose fields to add to report: ⚙️

Search 🔍

- ☒ Date
- ☒ Color
- ☐ Region
- ☐ Units
- ☒ Sales

Drag fields between areas below:

Filters	Legend (Series)
	Color

Axis (Categories)	Values
Date	Sum of Sales

3. In-class Assignment

Instructions

Please open the DataCamp Group and do the following:

- Complete *at least either* Chapters 1 of the Data Visualization in Excel course or Chapters 1 of the Data Analysis in Excel.
- Please don't use the DataCamp in-build AI helper (you lose XP then).
- Submit the screenshot showing the completion of these chapters.

It's an individual assignment.

Max score: 10 points – for 2 Chapters; 7 points for 1 Chapter.