



DATA ANALYSIS

MS OFFICE EXCEL –PART II

WEEK 9



Objectives

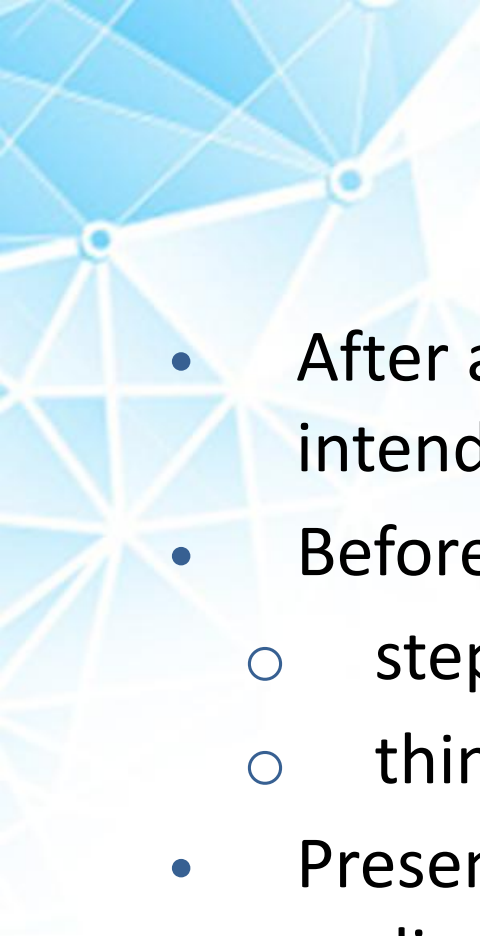
At the end of this chapter you will learn data analysis and Excel basics on how to:

- Represent results of an analysis visually
- Prepare a professional looking table and realize its importance
- Summarize data by using charts and graphs
- Interpreting the result of an analysis

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PRESENTING YOUR DATA

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 - i. Determine Your Message
 - ii. Identify your Data and Type of Comparison
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PRESENTATION

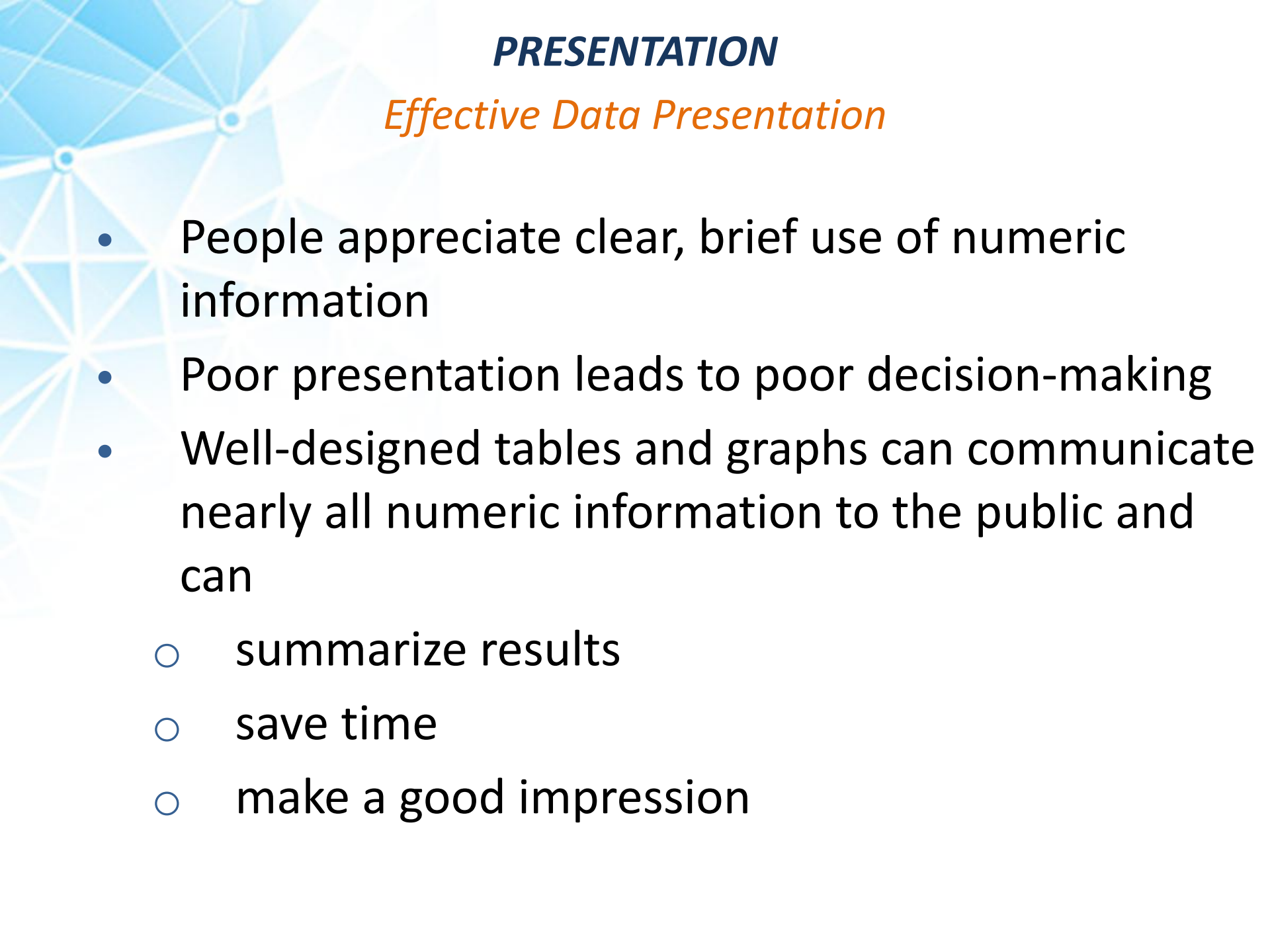
Effective Data Presentation

- After analyzing data, we present results to the intended audience
- Before you decide on how to present the data
 - step back for a moment
 - think carefully about what you want to say
- Present results in a way that is understandable to the audience
- Effective data presentation requires understanding:
 - the type of data to be utilized
 - who the intended audience is
 - how the information will be used

PRESENTATION

Effective Data Presentation

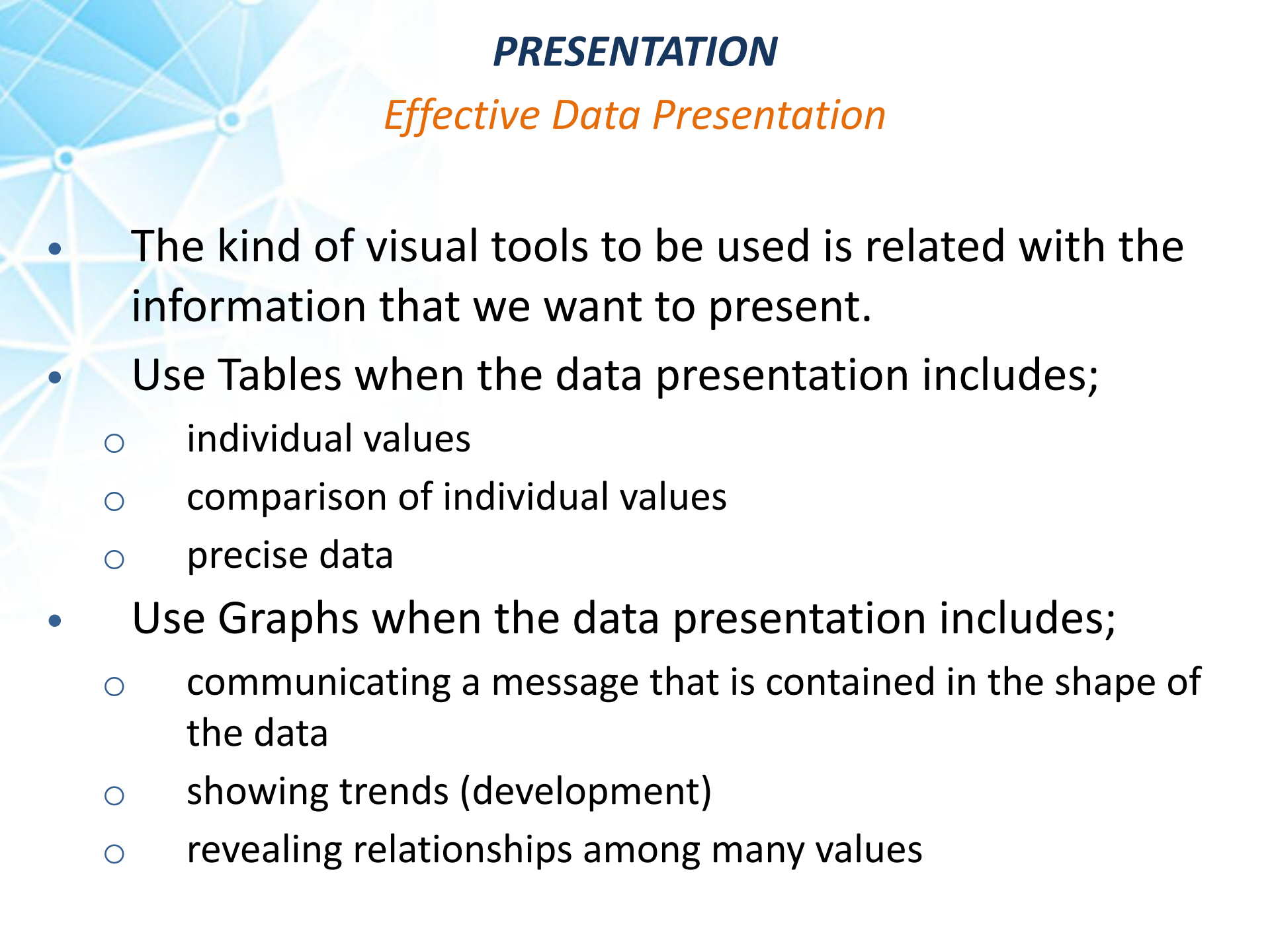
- Consider few key points before the presentation
- Ask yourself the followings:
 - Who is the audience?
 - What is the intended use of the data?
 - What is the basic message you want to convey?
 - What is the format of the presentation (report, brochure, oral presentation, etc.)?
 - What is the underlying nature of the data and assumptions?



PRESENTATION

Effective Data Presentation

- People appreciate clear, brief use of numeric information
- Poor presentation leads to poor decision-making
- Well-designed tables and graphs can communicate nearly all numeric information to the public and can
 - summarize results
 - save time
 - make a good impression



PRESENTATION

Effective Data Presentation

- The kind of visual tools to be used is related with the information that we want to present.
- Use Tables when the data presentation includes;
 - individual values
 - comparison of individual values
 - precise data
- Use Graphs when the data presentation includes;
 - communicating a message that is contained in the shape of the data
 - showing trends (development)
 - revealing relationships among many values

PRESENTATION

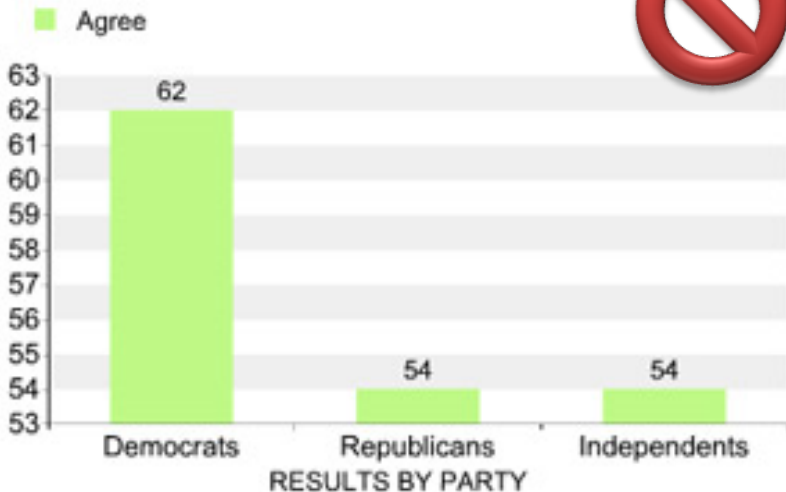
Common Mistakes in Data Presentation

- Mistakes in presentation may distort the results and mislead the audience;
 - Using unsuitable tools
 - Presenting data in a way that is not appropriate for the situation
- *The question is: “agreement with the court's decision on a case”*
- *Results: , " 62% of Democratic respondents agreed, compared to 54% of Republicans, and 54% of Independents*

PRESENTATION

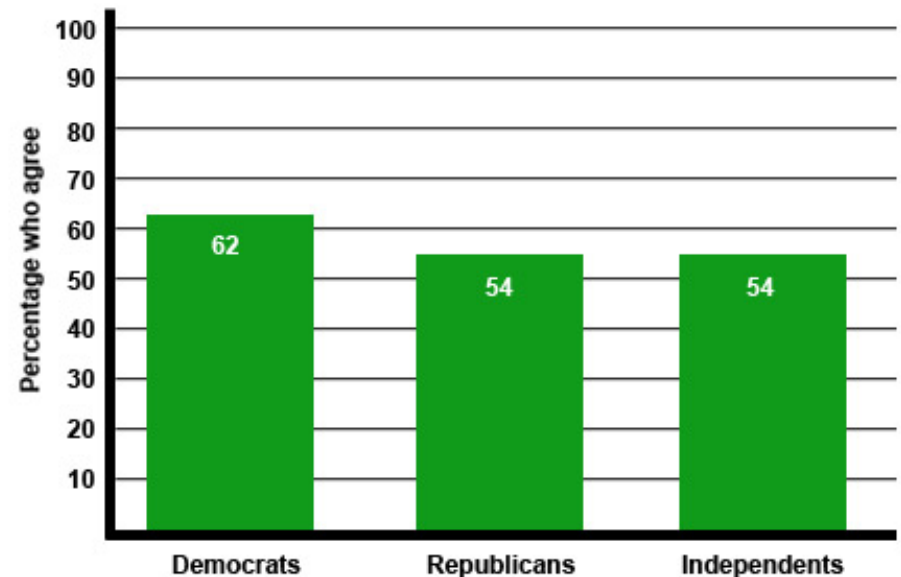
Effective Data Presentation

Results by party



Incorrect!!
Inappropriate scaling

Correct 😊



TABLES

- Tables list numbers in a systematic fashion.
- They **supplement, simplify, explain** and **condense** written material
- You can use tables
 - to show large amount of numbers
 - to show a wide range of numbers
 - to list precise numbers
 - to extract numbers easily

TABLES

Simplicity of Layout

- A **simple** and **uncluttered/organized** table will communicate the numbers **more successfully** than a decorated one.
- Grid lines may
 - clutter tables without adding information.
 - dominate the table.
- For instance, vertical lines stop the eye scanning across a row of numbers to make comparison.

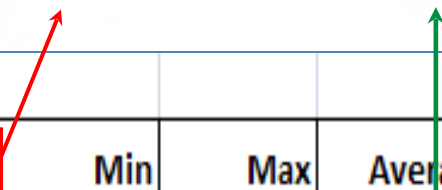
TABLES

Simplicity of Layout

- Look at the data in two tables. Which one is easy to scan?

Vertical Gridlines

Horizontal Gridlines



	Min	Max	Average	St. Dev.
x1	0.22	0.59	0.26	0.08
x2	20	28	23.52	2.55
x3	30	40	34.34	2.87
x4	12.17	13.68	12.64	0.31
x5	12.27	13.66	13.11	0.30

	Min	Max	Average	St. Dev.
x1	0.22	0.59	0.26	0.08
x2	20	28	23.52	2.55
x3	30	40	34.34	2.87
x4	12.17	13.68	12.64	0.31
x5	12.27	13.66	13.11	0.30

TABLES

Clarity of Wording

- Incomplete and inaccurate wording can make a table incomprehensible
- Wording consists of **titles**, column and row **headings**, and any other text on the table
- Titles should be definitive and comprehensive
- Readers need to know,
 - **What**- the subject of the table (e.g., patients, home electronics, etc.)
 - **Where**- Location
 - **When**- Dates or period covered
 - **Units**- Measurement used (e.g., thousands, barrels of oil, etc.)

TABLES

Clarity of Wording

- The labels on columns and headings need to be coherent for your readers
 - Avoid abbreviations unless they are well known such as TRT
 - If you need footnotes, mark them with asterisks rather than footnote numbers
 - Include sources on all tables
- Brief column headings help to organize the information
 - Transfer some information into the title

TABLES

Attention to Page Design

- Your table and explanatory text should complement one another.
- Tables need to be related to their explanation, preferably on the same page.
 - Put table in the center or aligned it to the left.
 - For best effect, place them at the top or bottom of a page.
 - Ensure that the size of table is proportioned with what the data demands

TABLES

Tables in Excel

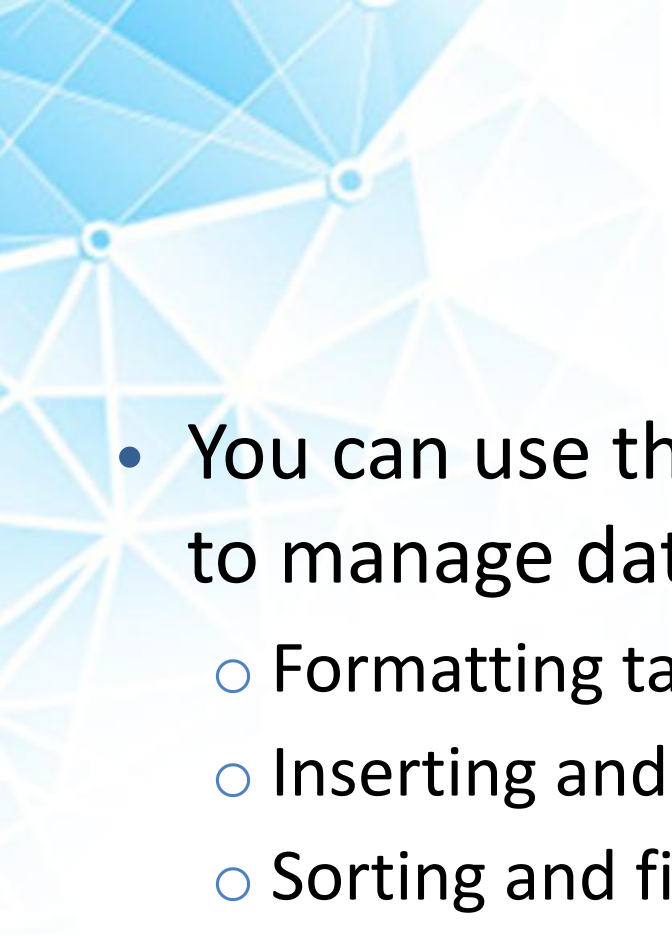
- In Excel, table refers to a block of data organized such that
 - Each row refers to an item (a person in an address list, a product in a product catalog, and so on)
 - Each column contains one piece of information about that item (the postal code of a contact, the catalog number of a product, and so on)

TABLES

Tables in Excel

- Typically, the worksheet range defined as a table should have the following characteristics:
 - The top row should consist labels, with each label describing the contents of the column beneath it.
 - Each label should be unique. (The labels row is not compulsory, but if you omit it, Excel will generate one for you using default column names.)
 - Each column should contain the same kind of information.
 - Each category of information that you want to be able to sort by, search on, or otherwise manipulate individually should occupy a separate column.

Student	ÖSS scores(/25)	GPA(/80)
Ali	12	41
Ahmet	21	76
Ayşe	9	29
Hasan	7	21
Fatma	13	43
Kemal	11	37
Suzan	7	14
Berke	18	63
Can	15	54
Mehmet	14	39



TABLES

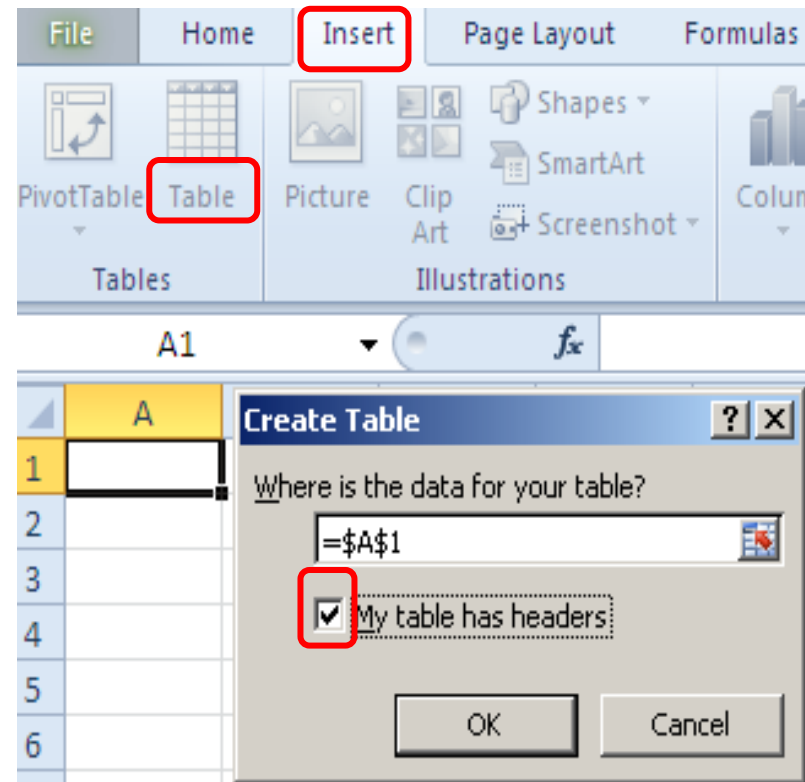
Tables in Excel

- You can use the following features of the Excel to manage data in a table;
 - Formatting table data
 - Inserting and deleting table rows and columns
 - Sorting and filtering

TABLES IN EXCEL

Create a Table

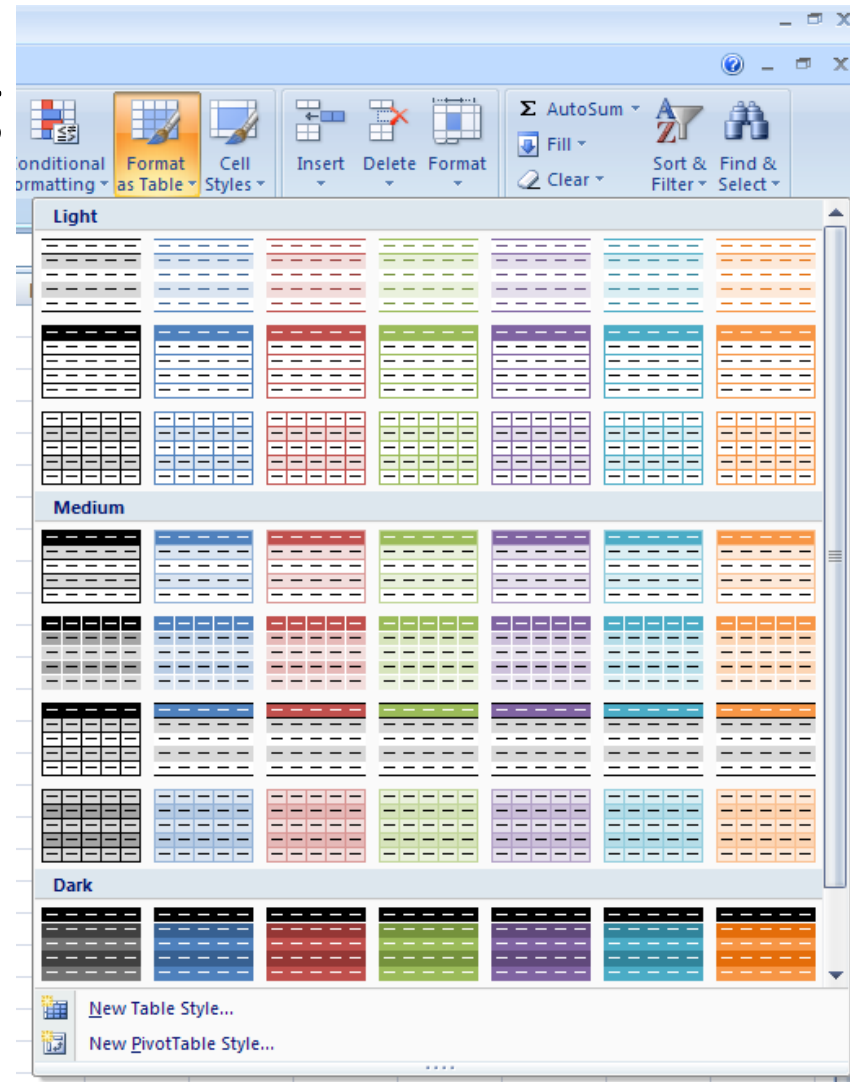
- After you have some data in a worksheet range, you can designate that range as a table by :
 - Insert tab
 - Select the range of cells that you want to include in the table.
 - On the **Insert** tab, in the **Table** group, click **Table**.
 - If the selected range contains column headers, select the **My table has headers** check box.



TABLES IN EXCEL

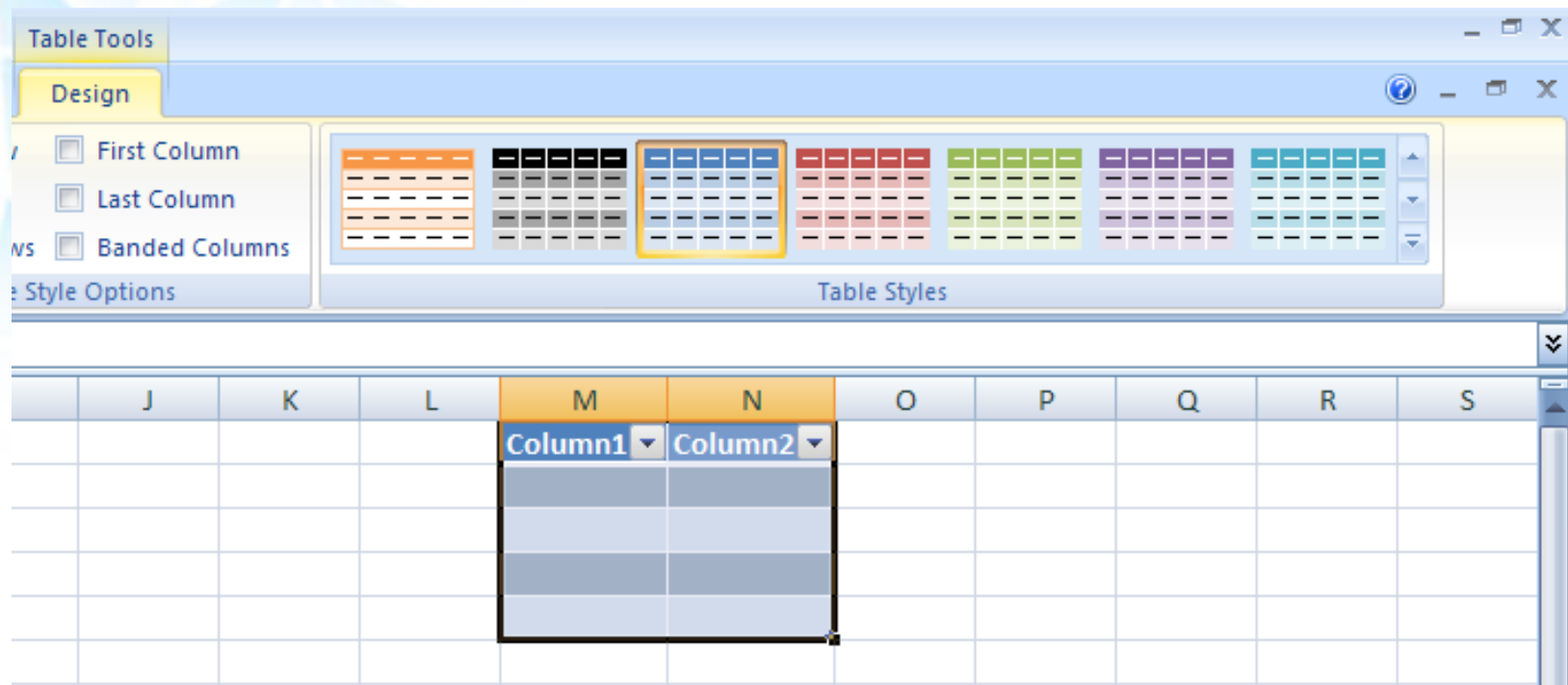
Create a Table

- Another way of creating table, from **Home** tab;
 - Select the headers and data
 - On the **Home** tab, in the **Styles** group, click **Format as Table**.
 - From the gallery shown, click the style you want to apply to the table.



TABLES IN EXCEL

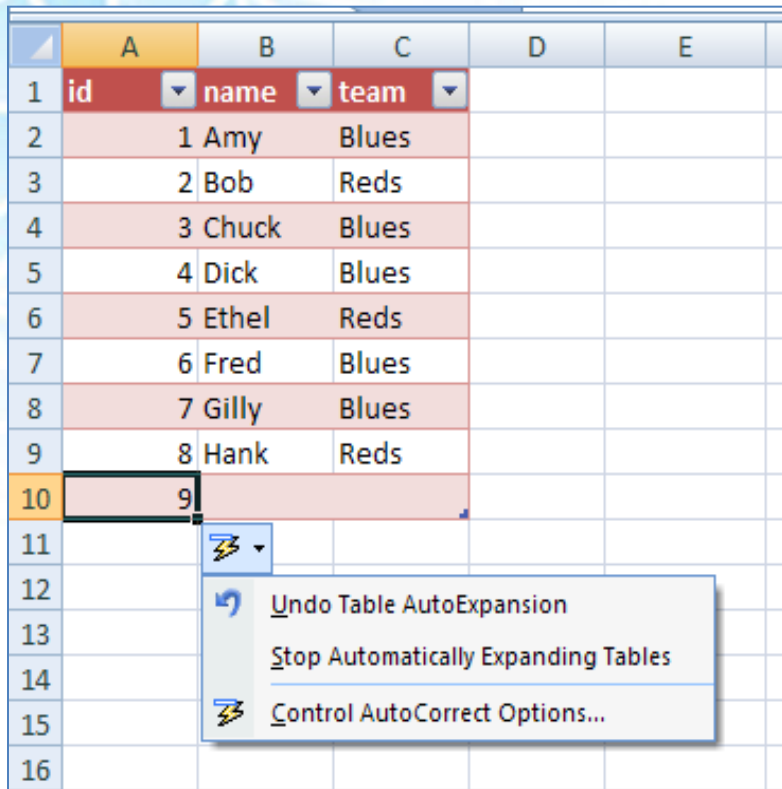
Create a Table



NOTE: After you create a table, the Table Tools become available, and a Design tab is displayed. You can use the tools on the Design tab to customize or edit the table.

TABLES IN EXCEL

Adding Data in a Table



	A	B	C	D	E
1	id	name	team		
2	1	Amy	Blues		
3	2	Bob	Reds		
4	3	Chuck	Blues		
5	4	Dick	Blues		
6	5	Ethel	Reds		
7	6	Fred	Blues		
8	7	Gilly	Blues		
9	8	Hank	Reds		
10	9				
11					
12					
13					
14					
15					
16					

- Select a cell in the row immediately below the last row of the table or a cell in the column on the right of the table
- Type a value into the cell.
- The table automatically expands for the new row or column
- If you didn't mean to include the data in the table, you can click Undo Table AutoExpansion to exclude the cells from the table.

TABLES IN EXCEL

Adding or Removing Rows and Columns

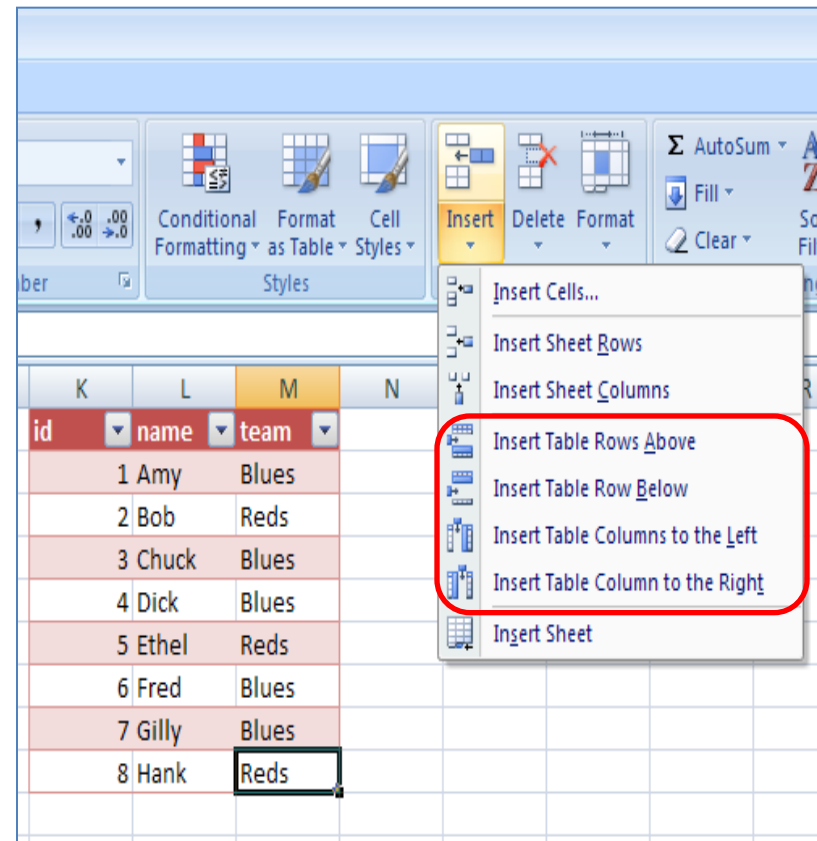
- You can add rows and columns to a table, or remove them from the table, by dragging the **resize handle** at the table's lower-right corner.

	A	B	C	D
1	id	name	team	Column
2	1	Amy	Blues	
3	2	Bob	Reds	
4	3	Chuck	Blues	
5	4	Dick	Blues	
6	5	Ethel	Reds	
7	6	Fred	Blues	
8	7	Gilly	Blues	
9	8	Hank	Reds	
10				

TABLES IN EXCEL

Inserting a Table Row or Column

- Select one or more table rows that you want to insert blank table rows above or below
- Or, select one or more table columns that you want to insert blank table columns to the left or right of them
- On the **Home** tab, in the **Cells** group, click the arrow under the **Insert**. Select the appropriate one from the list shown.



TABLES IN EXCEL

Data Cleaning

- Garbage In, Garbage Out (GIGO): The quality of output is determined by the quality of the input.

Common Data Issues



Duplicates

Same record entered multiple times skewing totals.



Extra Spaces

Leading/trailing spaces breaking VLOOKUPS and filters.



Missing Data

Null values or "N/A" strings in numeric columns.



Case Issues

Inconsistent casing: "Ankara", "ankara", "ANKARA".

TABLES IN EXCEL

Data Cleaning

Removing Duplicates

The Automated Way

Duplicate rows are common when merging datasets from different sources.

- Select your data range.
- Go to Data Tab > Remove Duplicates.
- Choose specific columns for comparison.

Standardizing Text with Functions

TRIM(): Removes all spaces from text except for single spaces between words.

PROPER(): Capitalizes the first letter in each word of a text string.

CLEAN(): Removes all non-printable characters from text.

Pro Tip: Combine them!

`=PROPER(TRIM(CLEAN(A2)))`

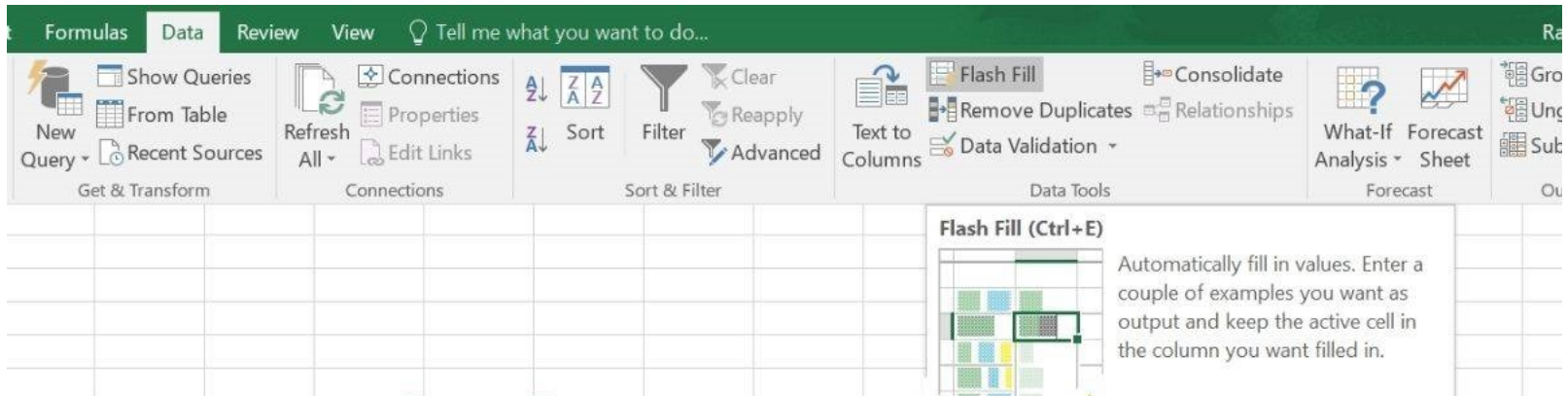
TABLES IN EXCEL

Data Cleaning

Flash Fill: Smart Patterns

Excel's built-in AI tool that senses patterns and cleans data automatically.

- Type 1-2 examples of how you want the data to look.
- Press Ctrl + E.



TABLES IN EXCEL

Data Cleaning

Splitting Data: Text to Columns

Breaking Down Strings

Use this when multiple data points are combined in a single cell (e.g., "ID-Date-Name").

- **Delimited:** Split based on characters like commas or tabs.
- **Fixed Width:** Split by character count.
- Found under the «Data Tab».

Handling Missing Values

Option 1: Delete: Remove the entire row if the missing value is critical and cannot be estimated.

Best for: Large datasets where a few missing points won't affect the overall trend.

Option 2: Fill/Impute: Replace blanks with a placeholder (e.g., "N/A" or "0") or the column average.

Best for: Avoiding gaps in calculations like averages or sums.

TABLES IN EXCEL

Data Cleaning

Mass Corrections

Standardize Terms: Find "USA", "U.S.", "United States" and replace all with "US".

Remove Junk: Quickly remove specific unwanted symbols or strings from the whole sheet.

Shortcut: Press Ctrl + H to open the Find and Replace dialog instantly.

Data Cleaning Best Practices

Save a Backup: Never clean data on your only copy of the raw dataset.

Use Excel Tables: (Ctrl+T) helps keep formatting and formulas consistent as data grows.

Filter First: Use the Filter tool to scan for outliers or anomalies before deleting.

Document Steps: Keep track of what you changed to ensure reproducibility.

GRAPHS

- Graphs are often excellent ways to display your results
- They surpass tables in demonstrating patterns and relationships that are difficult to see in tables or difficult to explain in words
- Images can communicate faster than words or lists of numbers (“A picture is worth thousand words.”)
- Knowledge of effective charting methods allows one to present numerical information in a visually-appealing way.

GRAPHS

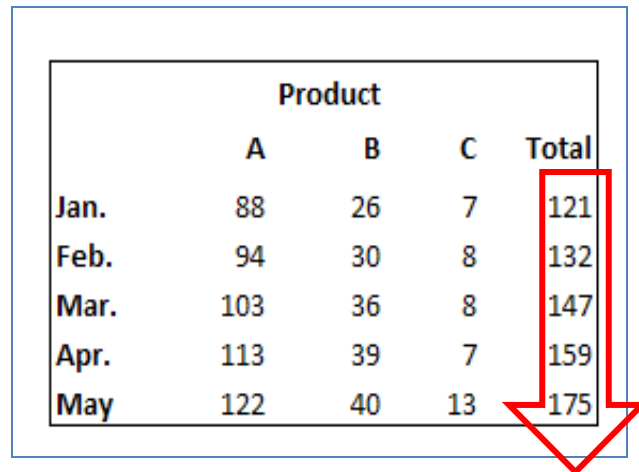
Types of Data

- In order to use graphs effectively, you should pay attention to four important points:
 - Know the nature of your numerical data(Quantitative vs. Categorical)
 - Be sure your graph has a specific message
 - Identify what you compare
 - Select the appropriate graph form
- There are two fundamental types of data
 - Qualitative (Categorical) data such as gender
 - Quantitative data such as weight, temperature

GRAPHS

Determine Your Message

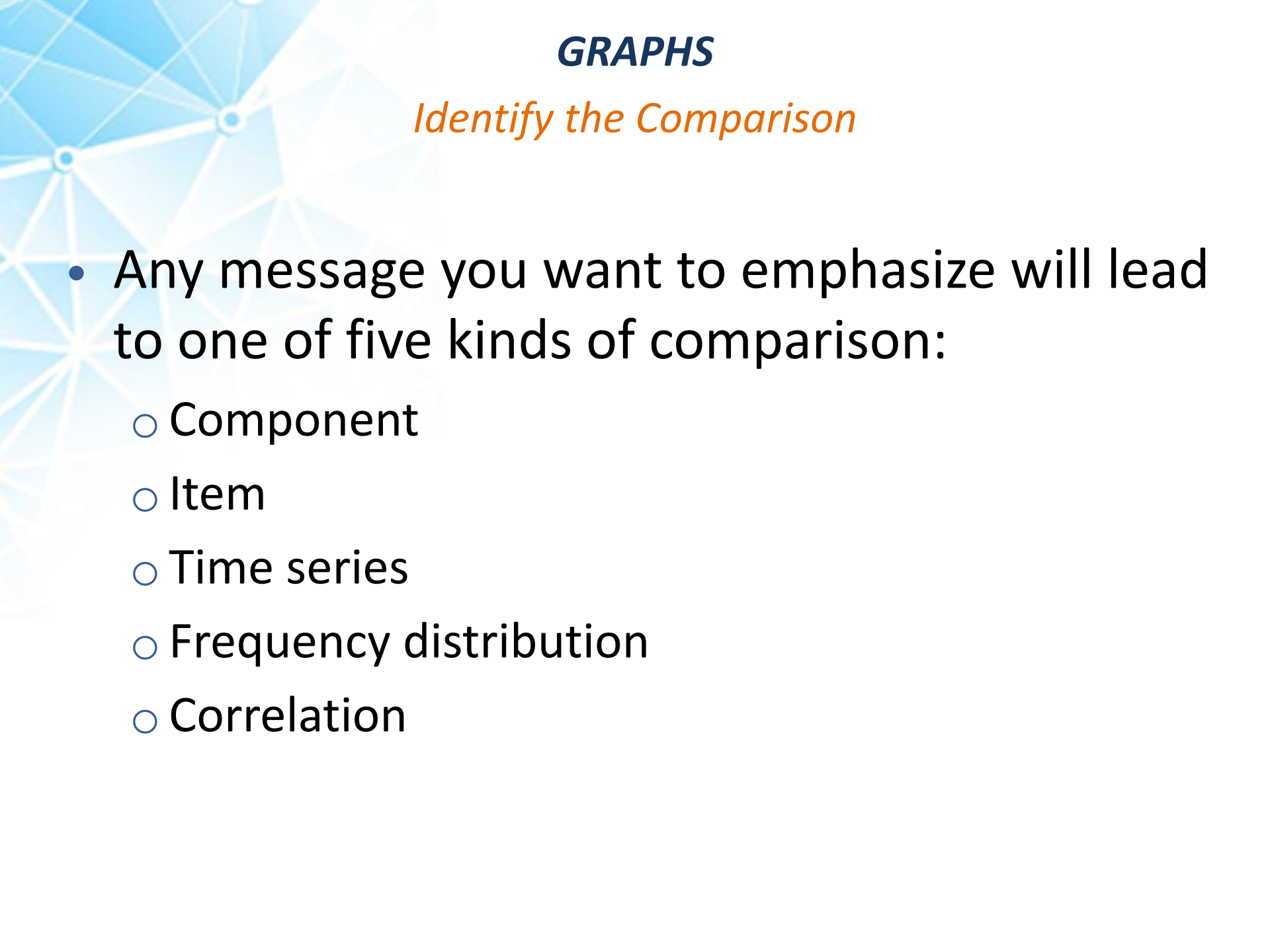
- Graphs are best when displaying a specific message rather than a vague one—**Clear your mind and focus on the message**
- If your story is cluttered, then your graph will be.
- When you determine your message you can create more convincing graphs with a single, obvious point such as “Coffee production has increased”.



	Product			Total
	A	B	C	
Jan.	88	26	7	121
Feb.	94	30	8	132
Mar.	103	36	8	147
Apr.	113	39	7	159
May	122	40	13	175

Overall Sales Trend from January through May

- Your attention might focus on the overall sales trend from January through May; how the sales has changed over time.
- In that case, your message would be: “Sales have risen steadily since January.”



GRAPHS

Identify the Comparison

- Any message you want to emphasize will lead to one of five kinds of comparison:
 - Component
 - Item
 - Time series
 - Frequency distribution
 - Correlation

GRAPHS

Identify the Comparison

1. **Component comparison** shows the size of each part as a percentage of the total. Keywords in your message can be:
 - share , percentage of total, accounted for X percent
2. **Item comparison** compares how things rank. Words indicating an item comparison:
 - large than, smaller than, equal to
3. **Time series comparison** shows how parts change over time, whether trend changes over weeks, months and quarters. Clues to look for in your message:
 - change, grow, increase, decrease, rise, decline, fluctuate

GRAPHS

Identify the Comparison

4. Frequency distribution comparison shows how many items fall into a series of progressive numerical range.

Terms to look for:

- **x to y range, concentration, frequency and distribution**

5. Correlation comparison shows whether the relationship between two variables follows or fails to follow. Clues in your messages:

- **related to, increases with, decreases with, changes with, varies with, or the converse such as doesn't increase with**

GRAPHS

Select the Appropriate Graph Form

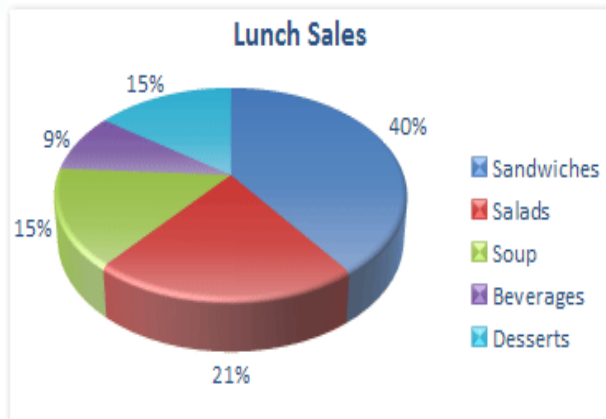
- Choosing the right graph is important because some types of graphs are appropriate for specific data
- According to comparison that you used, you will choose one of the five basic graph forms:
 - Pie Charts
 - Bar Charts
 - Column Charts
 - Line Charts
 - Scatter Diagrams

GRAPHS

Pie Charts

- A **component comparison** can best be demonstrated using a **pie chart**
- Because a circle gives an impression of being a total, a pie chart is ideally suited for showing the size of each part as a percentage of the whole.

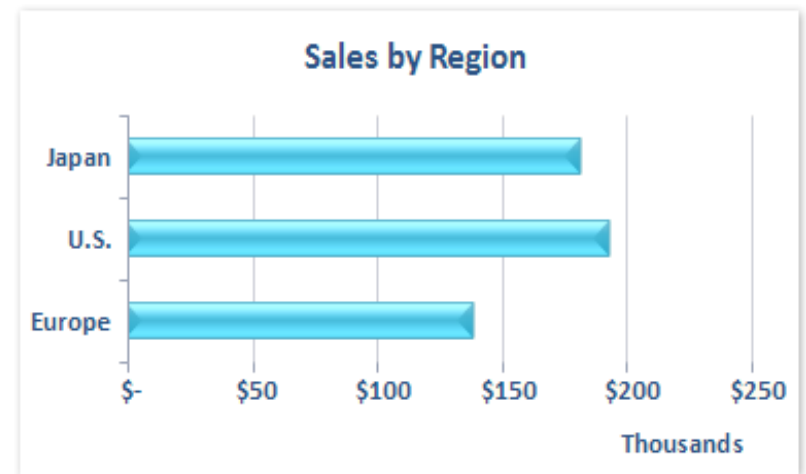
- When to use pie chart:
 - You only have one data series that you want to plot
 - None of the values that you want to plot are negative
 - Almost none of the values that you want to plot are zero values
 - You don't have more than seven categories



GRAPHS

Bar Charts

- **Comparisons among individual items** can be plotted in a **bar chart**.
- Consider using a bar chart when:
 - The axis labels are long
 - Some values represent period



GRAPHS

Column Charts

- In **column charts**, categories are typically organized along the horizontal axis and values along the vertical axis
- Use column chart when;
 - showing data changes over a period of time
 - illustrating comparisons among items if they have short labels (if long, use bar chart)
 - showing comparisons among time series if you have only few points in time to plot



GRAPHS

Line Charts

- **Line charts** can display **continuous data over time**
- Ideal for showing **trends** in data at equal intervals
 - The changing in the temperature over time, ratings of TV programs over months
- In a line chart, **categorical data** is distributed evenly along the horizontal axis, and all value data is distributed evenly along the vertical axis

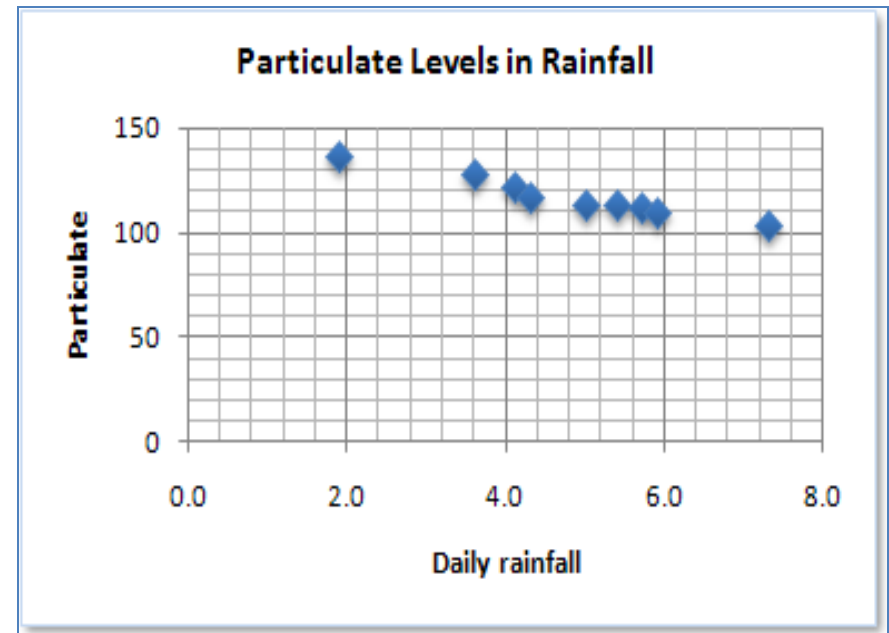


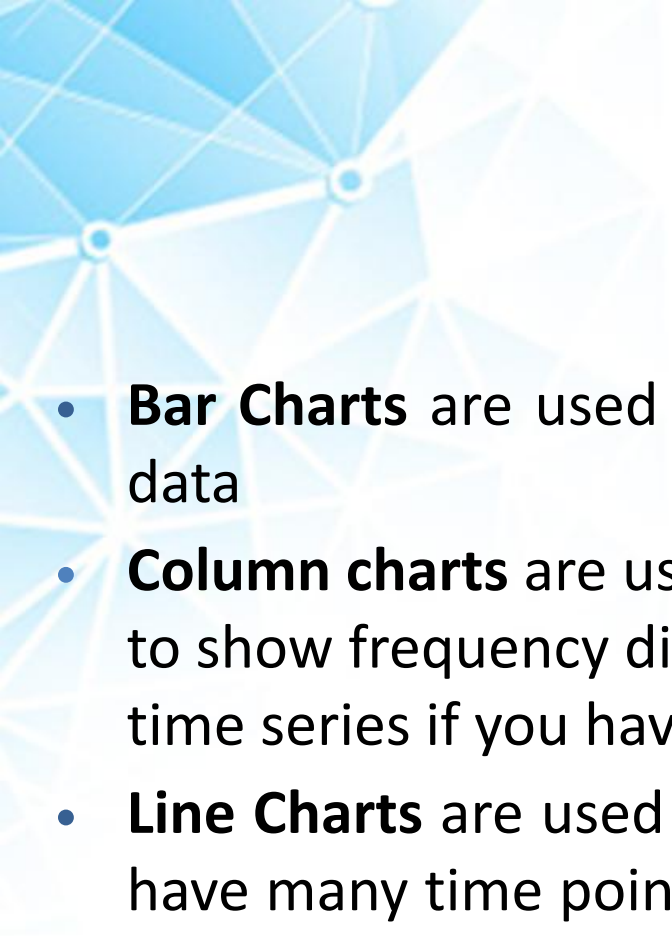
- You should use a line chart
 - if your category labels are text
 - if your category labels are representing evenly spaced values such as months, quarters, or fiscal years

GRAPHS

Scatter Diagrams

- **Scatter charts** show the **relationships among the numeric values** in several data series, or plots two groups of numbers as one series of xy coordinates.
- Scatter charts are commonly used for **displaying and comparing numeric values**, such as scientific, statistical, and engineering data.





GRAPHS

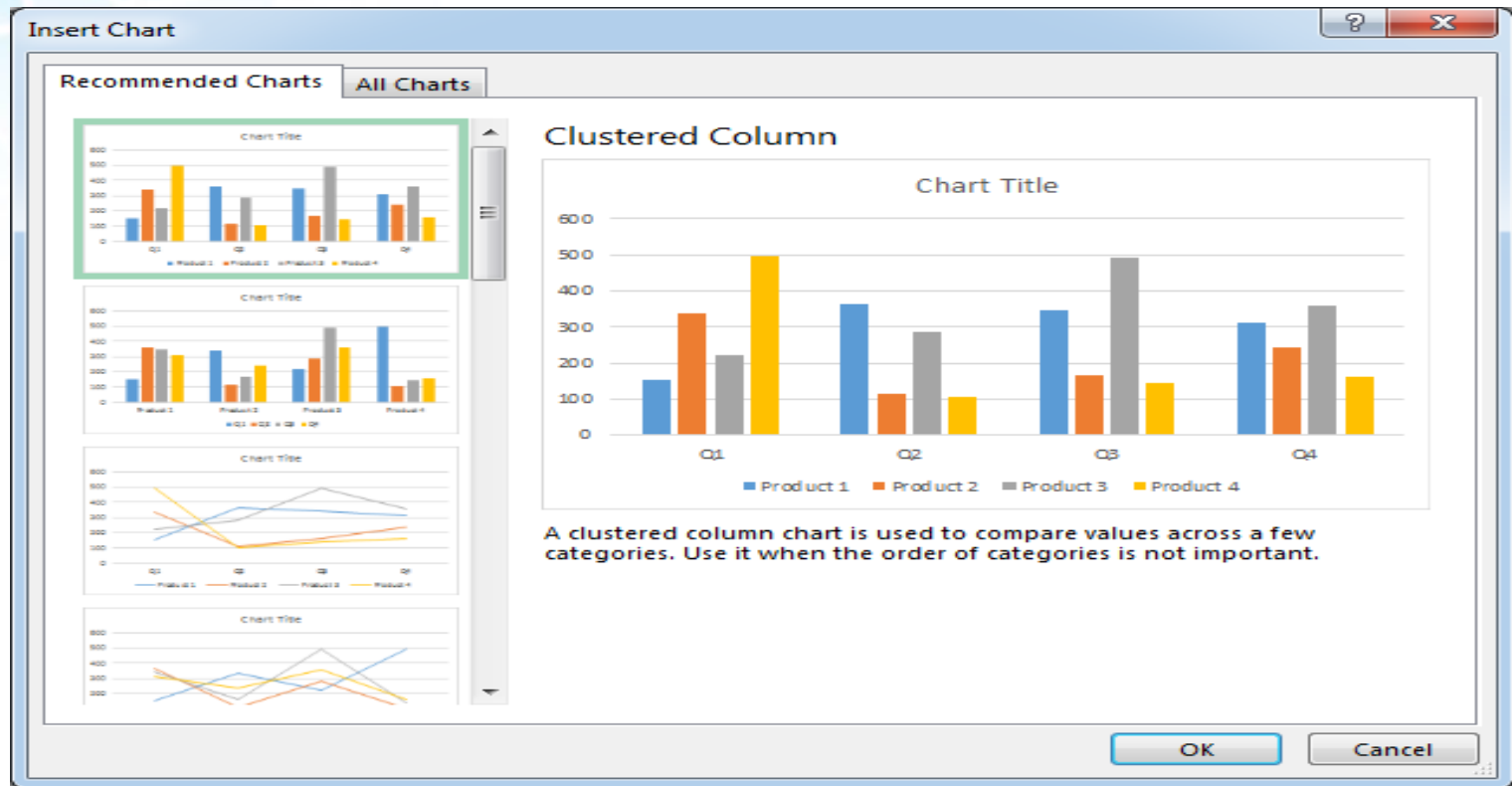
Summary

- **Bar Charts** are used for showing comparison among categorical data
- **Column charts** are used to illustrate comparisons among items , to show frequency distribution, to illustrate comparisons among time series if you have only a few points in time to plot .
- **Line Charts** are used to display continuous data over time. If you have many time points to plot, line charts are more suitable than column charts.
- **Pie charts** are used to show parts of a whole data usually expressed in percentages.
- **Scatter diagrams** are used for the relationship between two quantitative variables.

GRAPHS

Chart Types

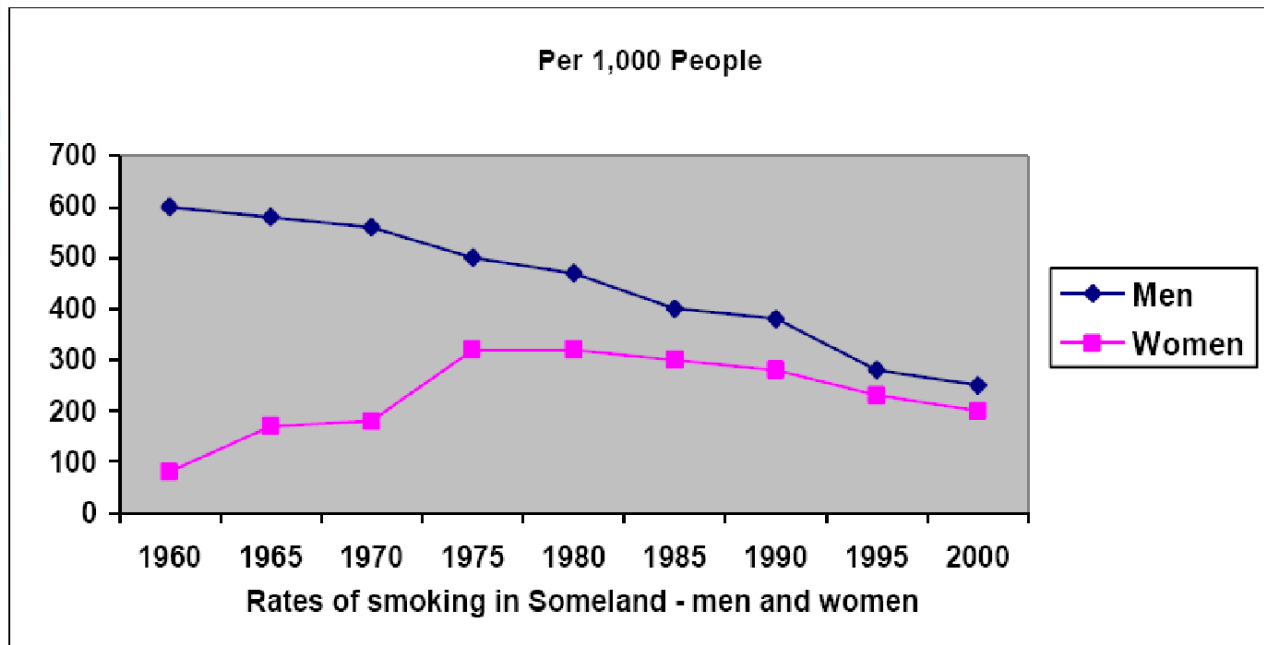
- You can analyze your data and recommend you the appropriate chart types.



Insert Chart Box

GRAPHS

Reading Graphs

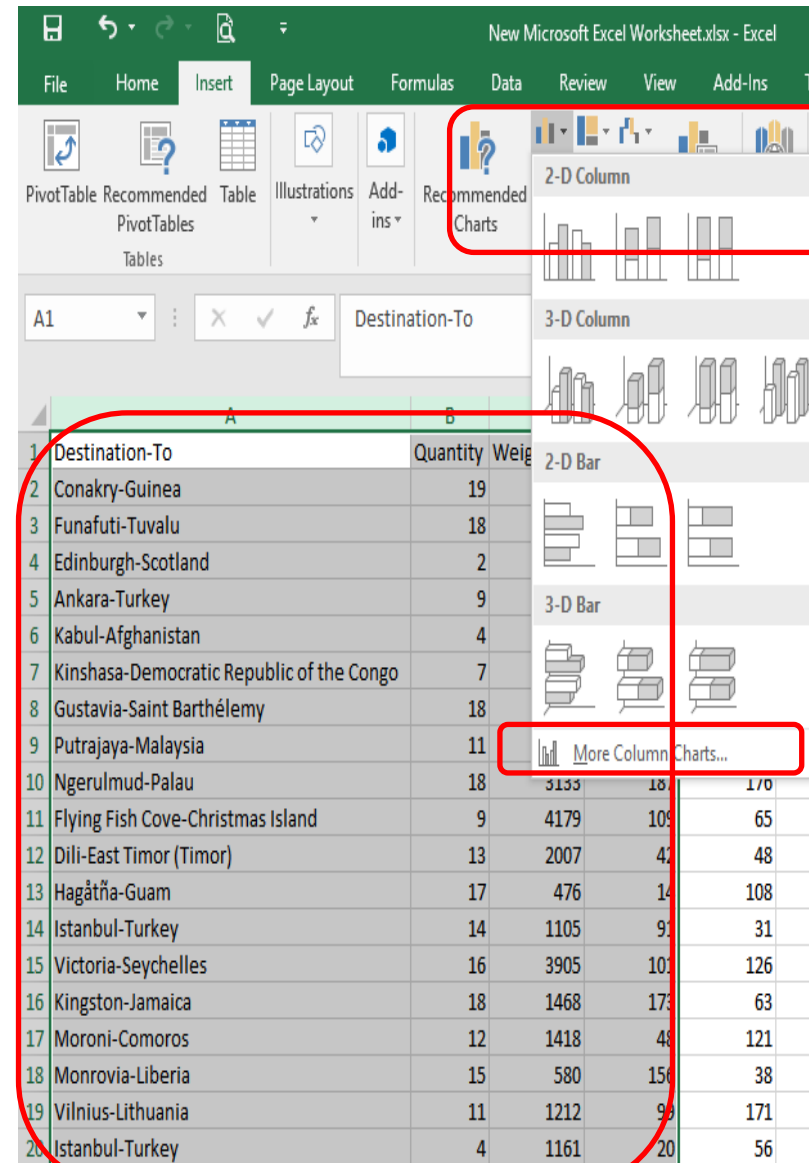


- Objectively describe the information given
- Compare and contrast men and women in terms of changes in their rates of smoking.

GRAPHS IN EXCEL

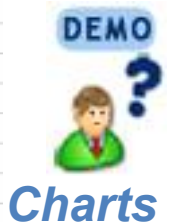
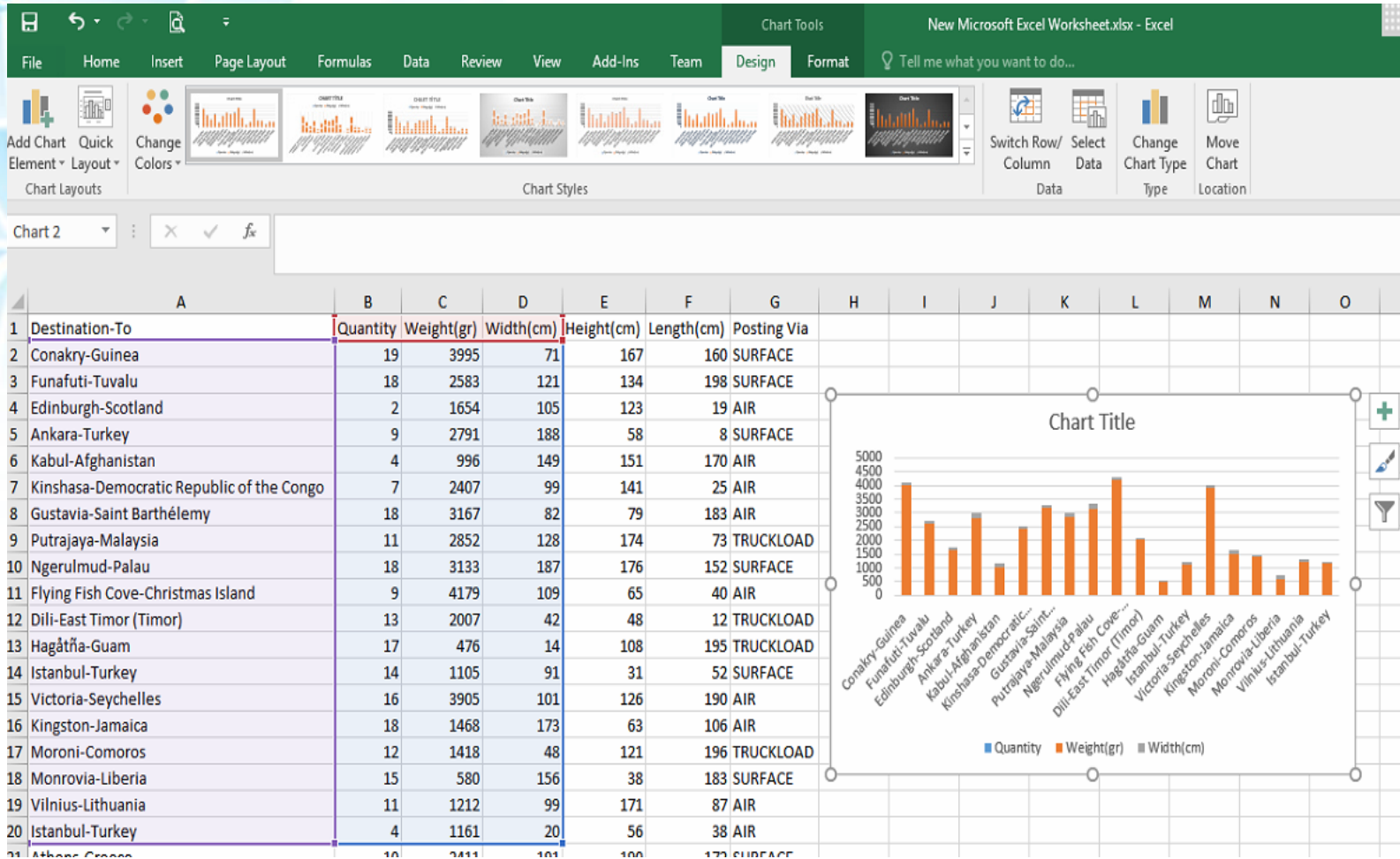
Create a Chart

- To create a chart, first, arrange the data that you want to plot in the chart
- Select the cells that contain the data to be displayed in the chart
- On the **Insert** tab, in the **Charts** group:
 - Click the chart type that you will use, and then click a chart subtype that you want to use
- To see all available chart types together, click “**More Column Types**” below the sub types.



GRAPHS IN EXCEL

Create a Chart



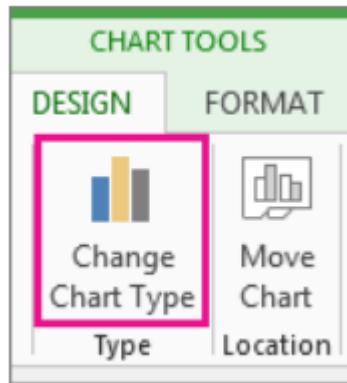
NOTE : The chart will be placed on the worksheet in embedded form.

GRAPHS IN EXCEL

Changing Chart Type

If you have already have a chart, but you just want to change its type

- a. Select the chart, click the Design tab, and click Change Chart Type.



- a. Choose a new chart type in the **Change Chart Type** box.



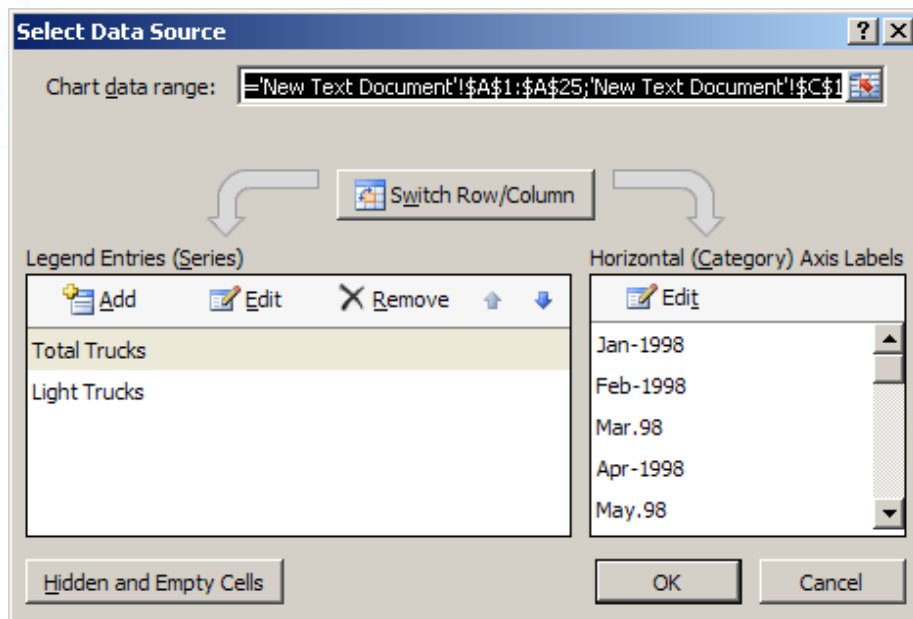
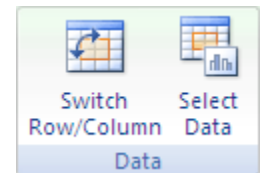
Available chart types in Office

GRAPHS IN EXCEL

Changing Data Sources

To add new data series to an existing chart:

- Click the chart that you want to add data series. This will display the **Chart Tools**, including **Design**, **Layout**, and **Format** tabs
- Under **Chart Tools**, on the **Design** tab, in the **Data** group, click **Select Data**

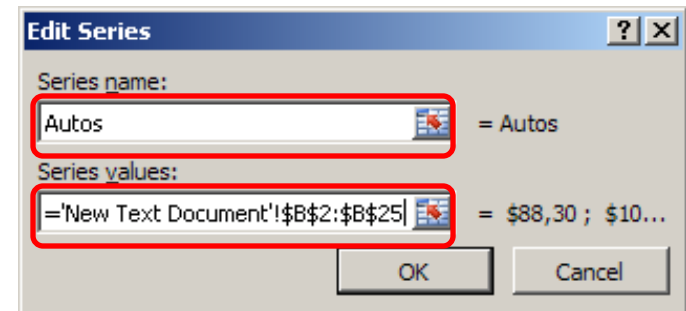


- This displays **Select Data Source** dialog box
- Under **Legend Entries (Series)**, click **Add**.

GRAPHS IN EXCEL

Changing Data Sources

- In the **Series Name** box, type the name that you want to use for the series, or select the name from the worksheet.
- In the **Series Values** box, type the reference of the data range to be included, or select the range from the worksheet.



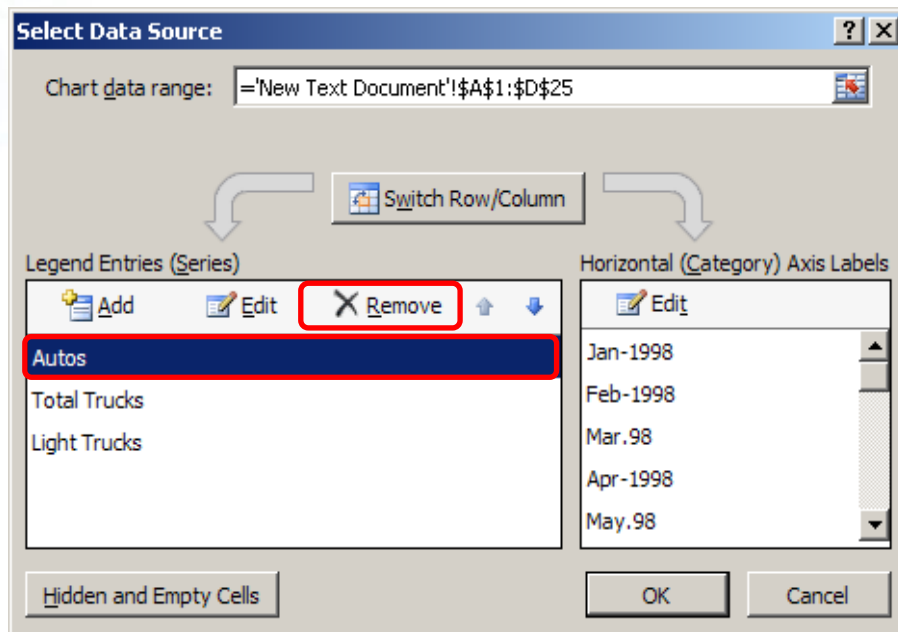
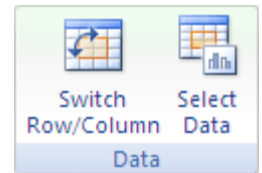
Edit Series Box

GRAPHS IN EXCEL

Changing Data Sources

You can also remove data series from an existing chart:

- Click the chart from which you want to remove data series. Chart Tools will appear.
- Under **Chart Tools**, On the **Design** tab, in the **Data** group, click **Select Data**.



- This displays **Select Data Sources** dialog box
- Under **Legend Entries (Series)**, select the series that you want to remove and then click **Remove**.

Quick Analysis

- **Quick Analysis** button appears as you select data.
- It allows you to instantly analyze your data by using Quick Analysis menu.
- Quick Analysis menu provides great convenience when preparing your data for presentation.

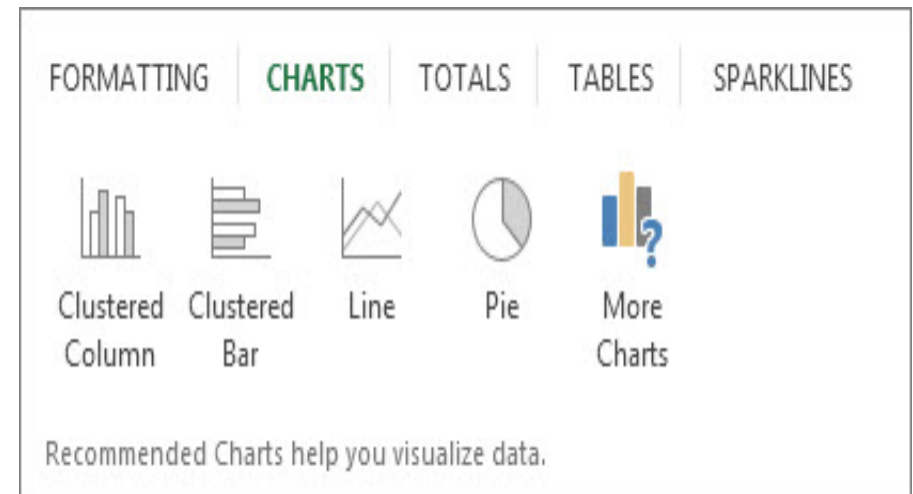
	Q1	Q2	Q3	Q4
Product 1	154	363	346	311
Product 2	337	113	167	242
Product 3	222	286	492	361
Product 4	496	105	143	162



Quick Analysis (Ctrl+Q)

Use the Quick Analysis tool to quickly and easily analyze your data with some of Excel's most useful tools, such as charts, color-coding, and formulas.

Quick Analysis Tool

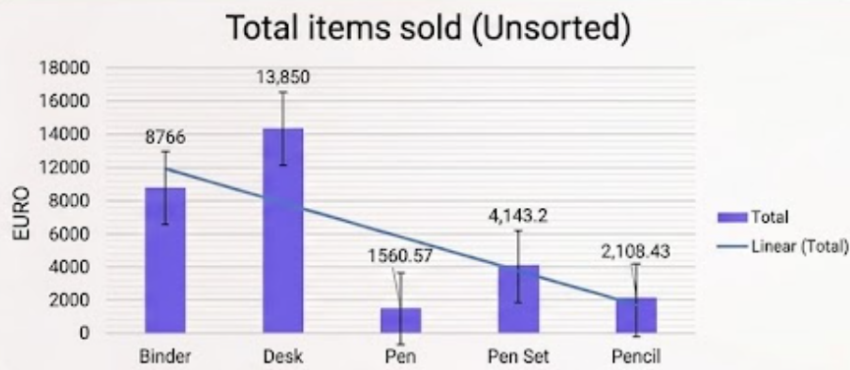


Quick Analysis Menu

- 1. Declutter the Canvas** Remove unnecessary elements like heavy gridlines, redundant legends, and excessive axes labels. A high "data-to-ink ratio" reduces cognitive load for your audience.
- 2. Use Color Strategically** Avoid default multi-color palettes. Use a neutral base color (like grey) for most data, and apply a strong, contrasting color (like blue or red) to highlight the specific data point you want the audience to focus on.
- 3. Define a Clear Message** Every chart should have a clear purpose. Instead of a generic title like "Sales 2025", use an active title that tells the story: "Q3 Sales Dropped 15% Due to Supply Chain Issues".

Applying basic storytelling principles can drastically change how your data is perceived.

- **The "Before" Chart:** Relies on Excel's default settings. It is loud, cluttered, and leaves the viewer guessing what is important.
- **The "After" Chart:** Stripped of noise. Gridlines are removed, axes are simplified, and **color is used exclusively** to draw the eye to the key takeaway.
- **The Result:** The audience instantly understands the business insight without needing to study the graphic



CRITIQUE:

- Unsorted categories make comparisons difficult.
- Excessive minor gridlines create "chart junk".
- Error bars add clutter (only use if essential).
- Redundant trendline obscures data points.

THE BEFORE: Cluttered Chart

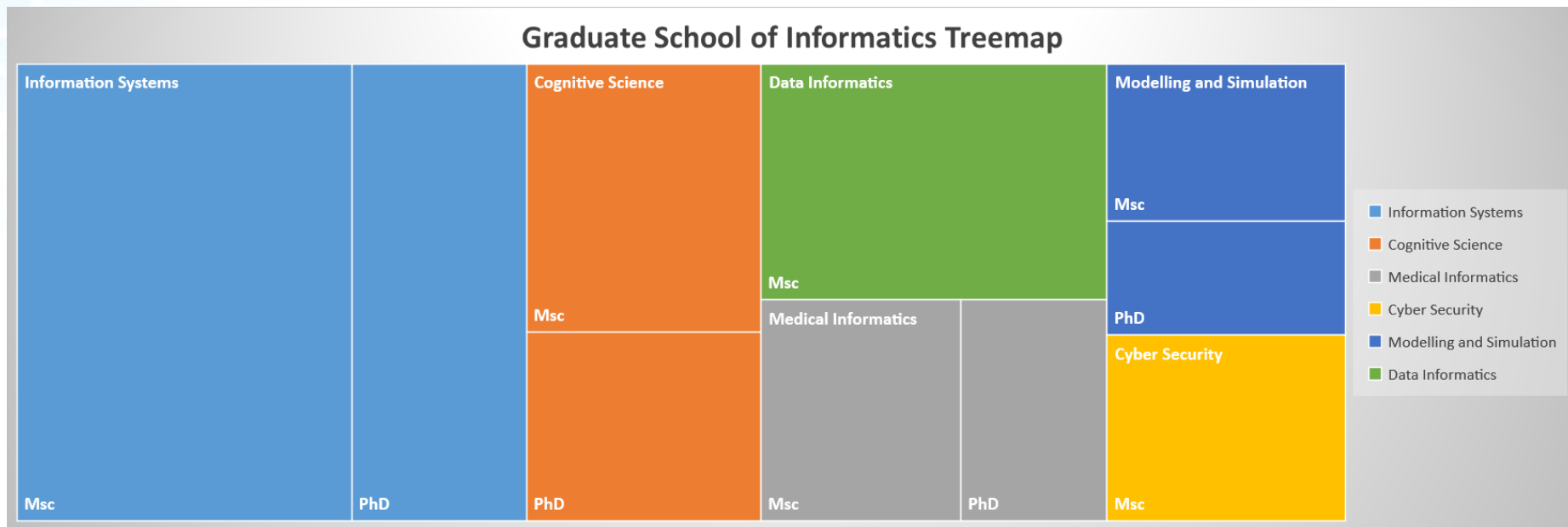


IMPROVEMENT:

- Sorted categories for instant value comparison.
- Minimalist design removes distractions.

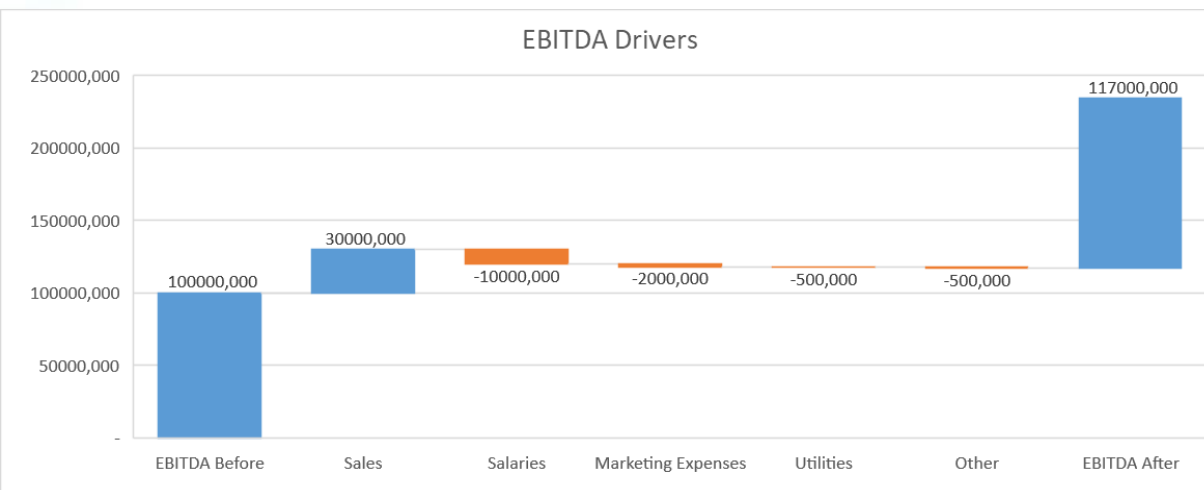
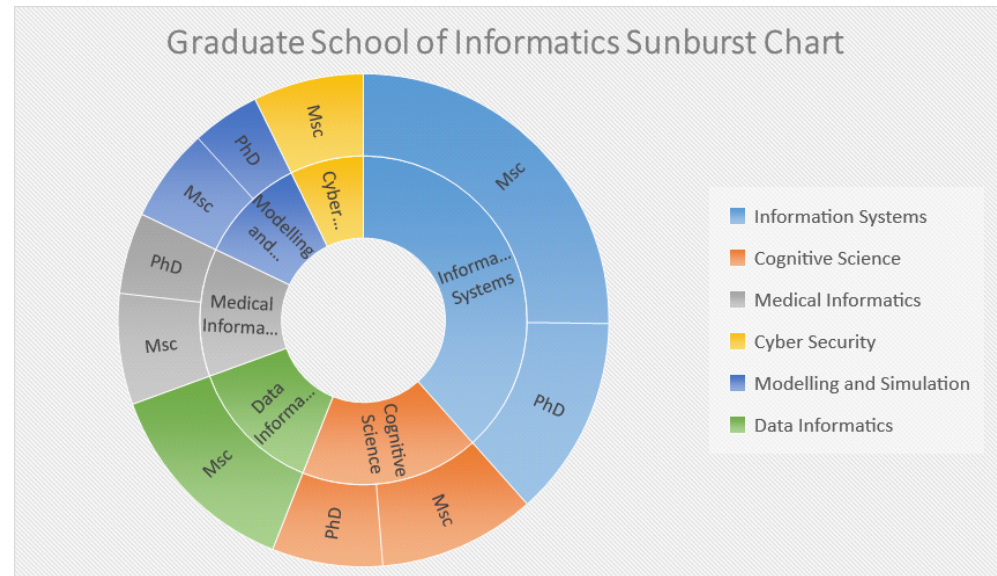
THE AFTER: Clean Chart

1. Treemap Chart: Displays hierarchical data using nested rectangles. Ideal for comparing proportions within a whole, such as sales breakdown by Region, then by Store.



Visualizing Hierarchy and Flow

2. Sunburst Chart: Similar to a Treemap, but uses concentric circles. It effectively illustrates multiple levels of categorical data, radiating from the root outward.



3. Waterfall Chart: Also known as a "Bridge" chart. Perfect for finance, showing how an initial value is affected by a series of positive and negative intermediate values

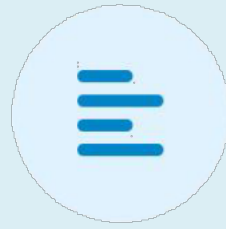
In-Cell Visualizations

Not all visualizations require a dedicated chart object. Excel can visualize data directly inside the grid.



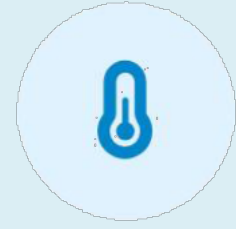
Sparklines

Miniature, word-sized charts (line, column, or win/loss) embedded within a single cell. Perfect for providing visual context of a trend right next to the data table.



Data Bars

A Conditional Formatting tool that creates a horizontal bar inside a cell, proportional to the cell's value relative to others. Great for scanning long lists of numbers.



Color Scales

Applies a background color gradient (a heatmap) to a range of cells based on their values. Excellent for spotting high/low anomalies in dense data matrices.

Interactive Dashboards

- By linking Pivot Charts to underlying data models, visualizations can become dynamic.
- Slicers are interactive, button-based filters. When a user clicks a Slicer, all connected Pivot Charts instantly update to reflect only that data, enabling real-time exploratory analysis.

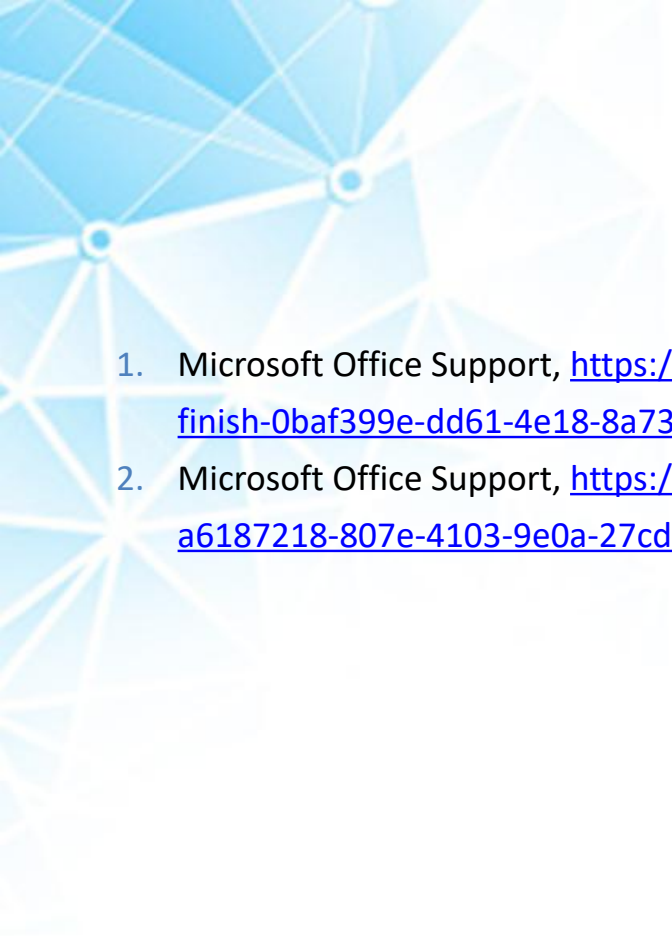




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References

1. Microsoft Office Support, <https://support.office.com/en-us/article/create-a-chart-from-start-to-finish-0baf399e-dd61-4e18-8a73-b3fd5d5680c2> Last visit: May, 2026
2. Microsoft Office Support, <https://support.office.com/en-us/article/available-chart-types-in-office-a6187218-807e-4103-9e0a-27cdb19afb90> Last visit: May, 2026