



DATA ANALYSIS MS OFFICE EXCEL – PART I

WEEK 8

DATA ANALYSIS - MS EXCEL

Objectives



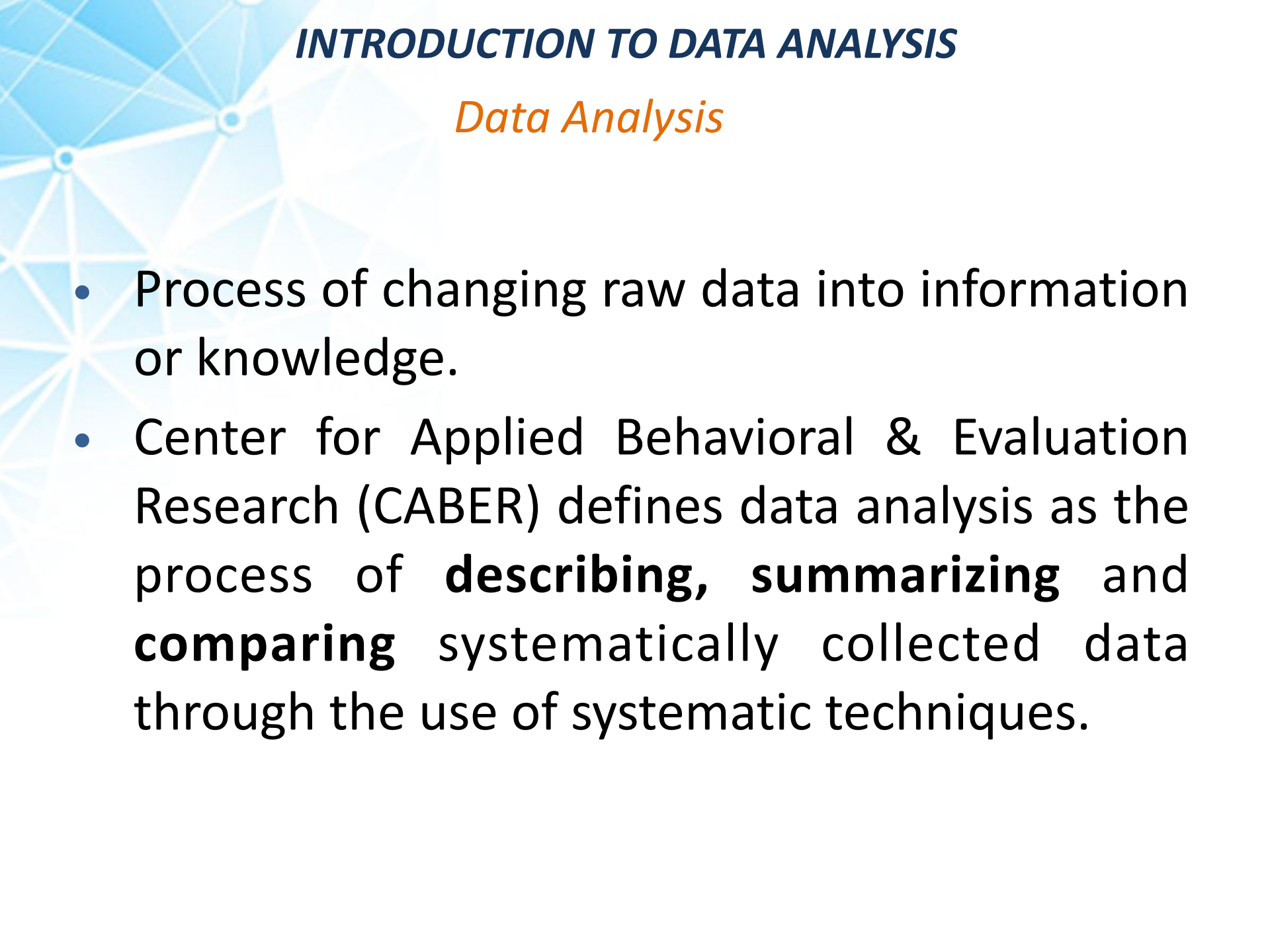
At the end of this chapter, you will learn Data analysis and Excel basics:

- Importance of data analysis
- Excel environment
- Data entry, editing and formatting tasks
- Handling data using some functions, e.g. filtering, sorting, etc.
- Analyzing given data set using spreadsheets

INTRODUCTION TO DATA ANALYSIS

Data-Information-Knowledge

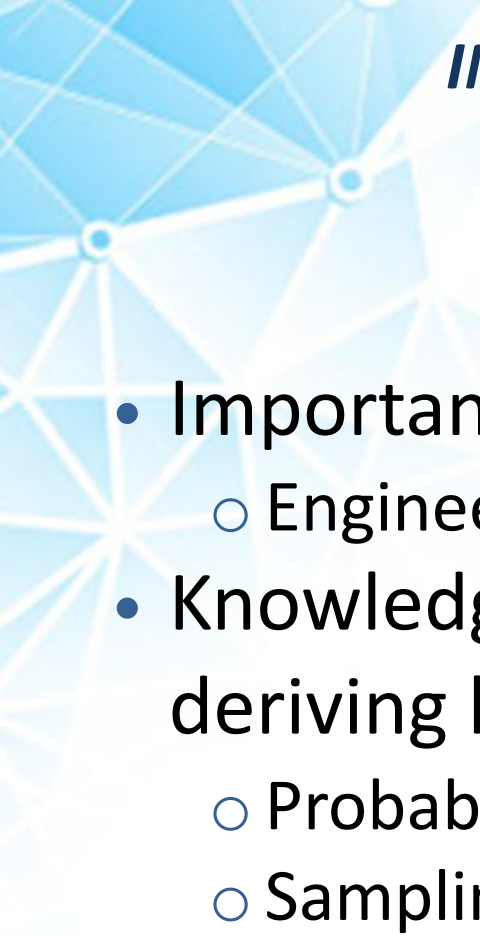
- Data is the factual information (as measurements or statistics) used as a basis for reasoning, discussion, or calculation.
- 1234567.89 is a datum. Data is raw resource.
- "Your bank balance has jumped from \$8087 to \$1234567.89" is information. Information is processed data.
- "Nobody owes me that much money" is knowledge. Knowledge is the conclusion derived from the processed data.



INTRODUCTION TO DATA ANALYSIS

Data Analysis

- Process of changing raw data into information or knowledge.
- Center for Applied Behavioral & Evaluation Research (CABER) defines data analysis as the process of **describing, summarizing and comparing** systematically collected data through the use of systematic techniques.



INTRODUCTION TO DATA ANALYSIS

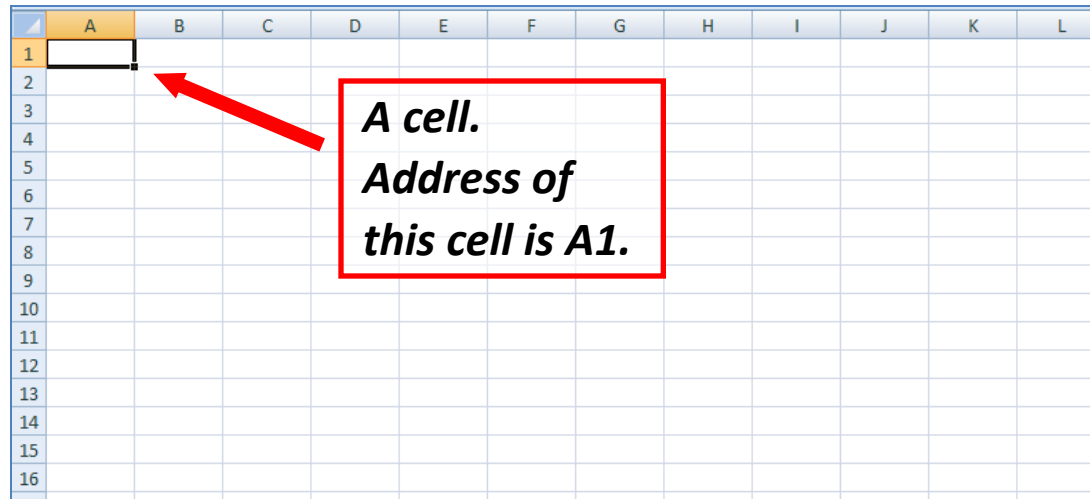
Importance of Data Analysis

- Important in almost any field;
 - Engineering, science, social sciences, etc.
- Knowledge of data analysis is necessary for deriving knowledge. You may need
 - Probability analysis
 - Sampling and statistics
 - Ability to make inferences from tables and graphs
- Provides users the ability to summarize a set of data and to reach a conclusion.

INTRODUCTION TO DATA ANALYSIS

What is a Spreadsheet?

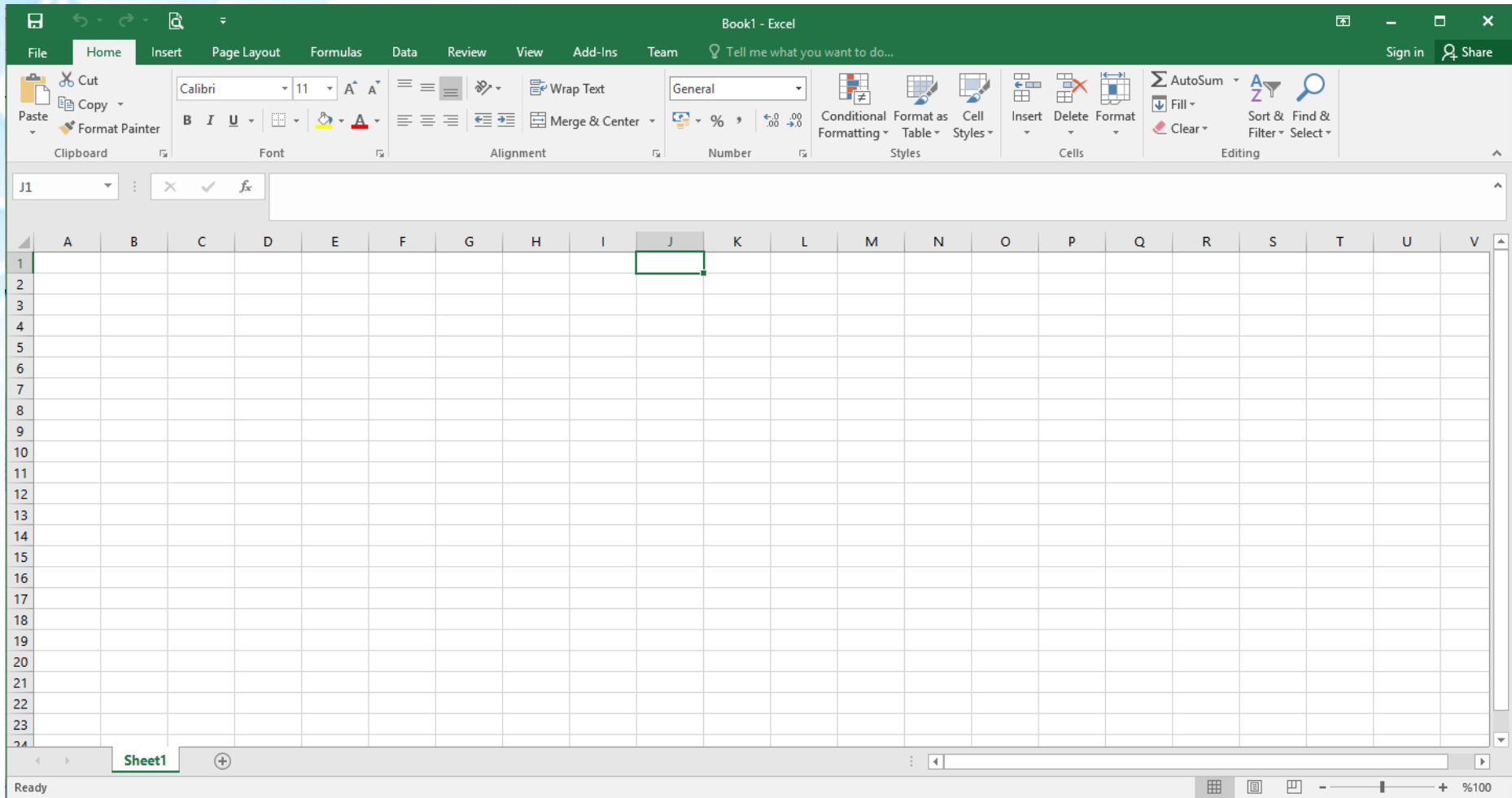
- Electronic spreadsheet software, such as Microsoft Excel, can be used to analyze data.
- A **spreadsheet** is a rectangular grid composed of addressable units called **cell**.
- A cell can contain numerical data, textual data, macros or formulas.



Spreadsheet

INTRODUCTION TO ENVIRONMENT

Appearance of MS Excel

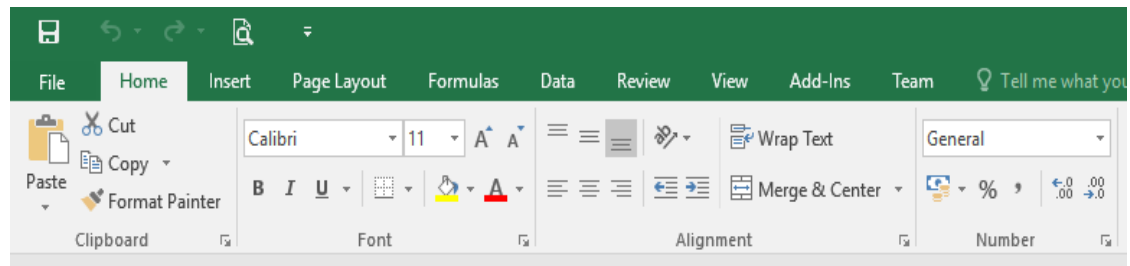
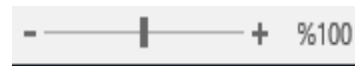


INTRODUCTION TO ENVIRONMENT

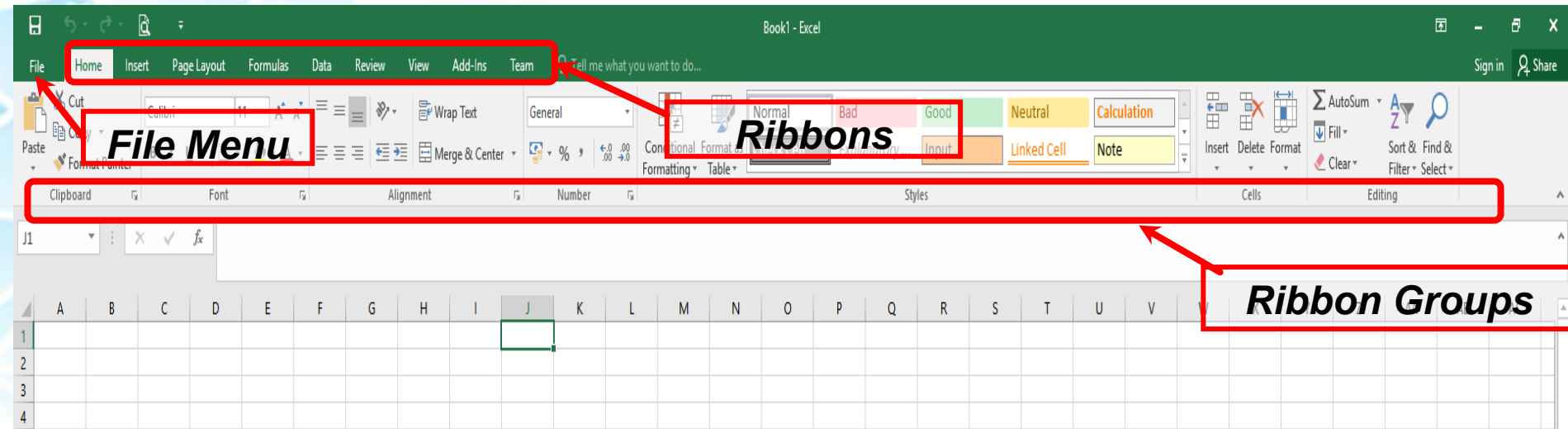
Ms Excel

- Some features of Office programs are common.

- Quick Access Toolbar
- View tools
- Zoom tools
- Ribbons



INTRODUCTION TO ENVIRONMENT



Excel Ribbons:

- Home Ribbon
- Insert Ribbon
- Page Layout Ribbon
- Formulas Ribbon
- Data Ribbon
- Review Ribbon
- View Ribbon

INTRODUCTION TO ENVIRONMENT

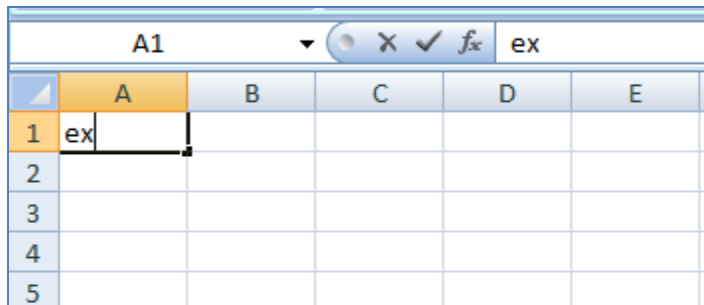
Groups in Each Ribbon

- Home Ribbon
 - *Clipboard, Fonts, Alignment, Number, Styles, Cells, Editing*
- Insert Ribbon
 - *Tables, Illustrations, Charts, Sparklines, filter, Links, Texts, Symbols*
- Page Layout Ribbon
 - *Themes, Page Setup, Scale to Fit, Sheet Options, Arrange*
- Formulas Ribbon
 - *Function Library, Defined Names, Formula Auditing, Calculation*
- Data Ribbon
 - *Get External Data, Connections, Sort & Filter, Data Tools, Outline*
- Review Ribbon
 - *Proofing, Comments, Changes*
- View Ribbon
 - *Workbook Views, Show(/Hide), Zoom, Window, Macros*

DATA

Enter Data Manually

- You can enter numbers, text, dates, or times in one cell or in several cells at once. To enter data in a cell:
 - On the worksheet, click onto a cell
 - Type the numbers or text that you want, and then press ENTER or TAB



DATA

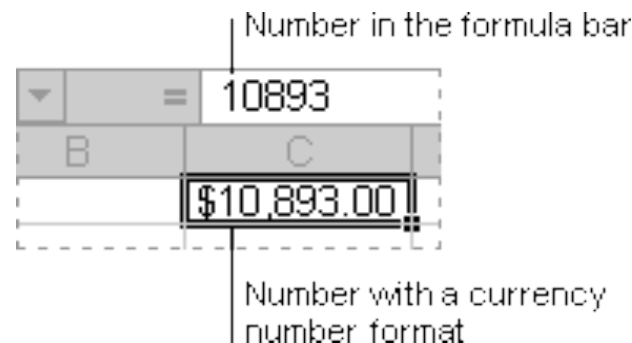
Importing Data

- You can also import data from different sources, such as:
 - Microsoft Office Access
 - Web
 - Text file etc.
- To import data from a text file into a worksheet, you can use 'Get External Data-> From Text' option for;
 - Delimited text files (.txt)
 - Comma separated values text files (.csv)

DATA

Data Formats

- You can change the appearance of numbers by applying different formats
 - Currency, percentage, etc.
- Formatting the number **does not affect** the actual cell value
 - Excel uses actual values to perform calculations
- The **actual value** is displayed in the formula bar.



DATA

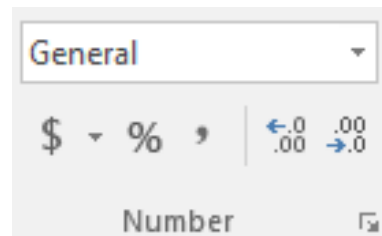
Data Formats

Common data formats:

- General, Numbers, Currency, Accounting, Date, Time, Percentage, Fraction, Text, Custom, etc.

How to format data:

1. Select a cell or a cell range.
2. On the **Home** tab, select a **data format** from the drop-down.



Data Formats

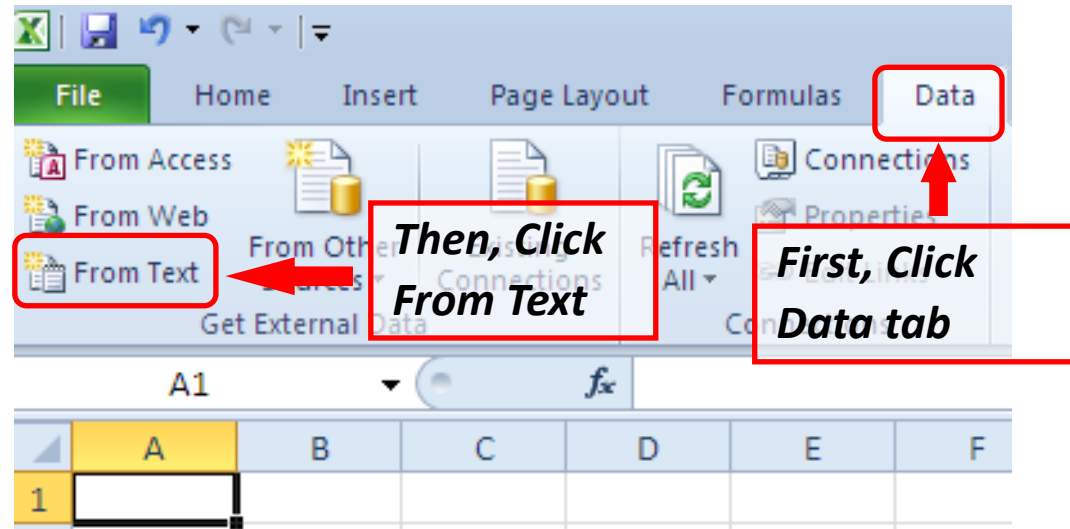
DATA

Importing Data

- Importing data from an external text file



Check detailed instructions



You can also import from an external text file from 'File → Open' menu. But you should select the 'all files' from the file types in the 'Open' dialog box.



DATA

Organizing Your Data: Insert Cells, Rows or Columns

- You can insert blank columns or rows to the **left or above** the **active cell**
- Then the cells in the active column or row will be shifted right or down respectively

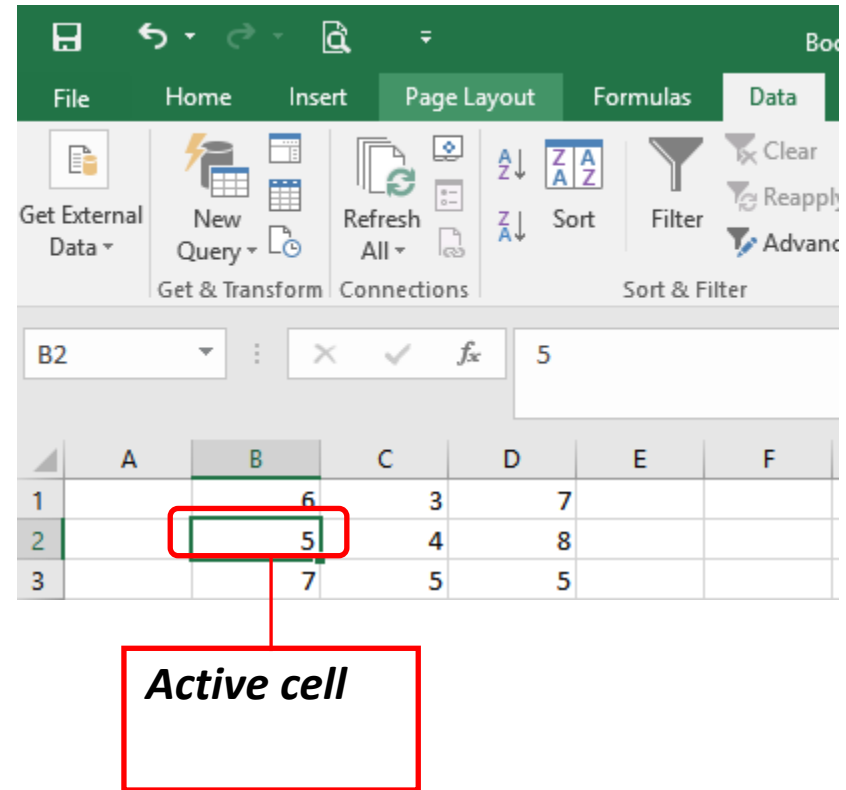


NOTE: Active cell is the selected cell, highlighted by a thick black border, to which data is entered when you begin typing. Only one cell is active at a time.

DATA

Organizing Your Data: Insert Cells, Rows or Columns

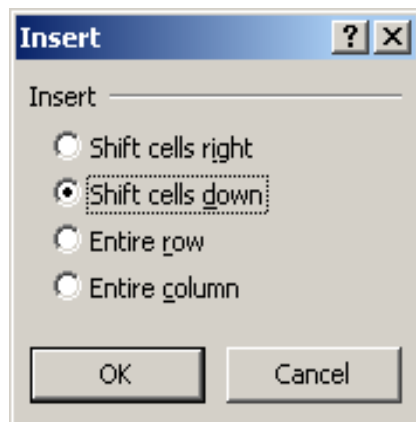
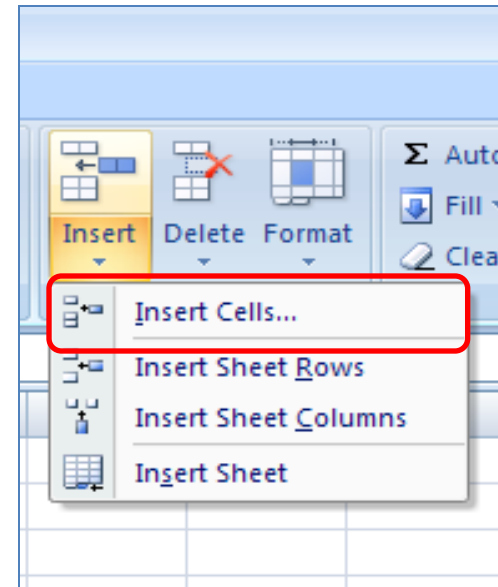
- To insert new cells on a worksheet:
 - Select the cell or the range of cells where you want to insert the new blank cells.
 - Select number of cells equal to the number that you want to insert. For example, to insert five blank cells, you need to select five cells.



DATA

Organizing Your Data: Insert Cells, Rows or Columns

- On the **Home** tab, in the **Cells** group, click the down arrow under **Insert**, and then click **Insert Cells**.

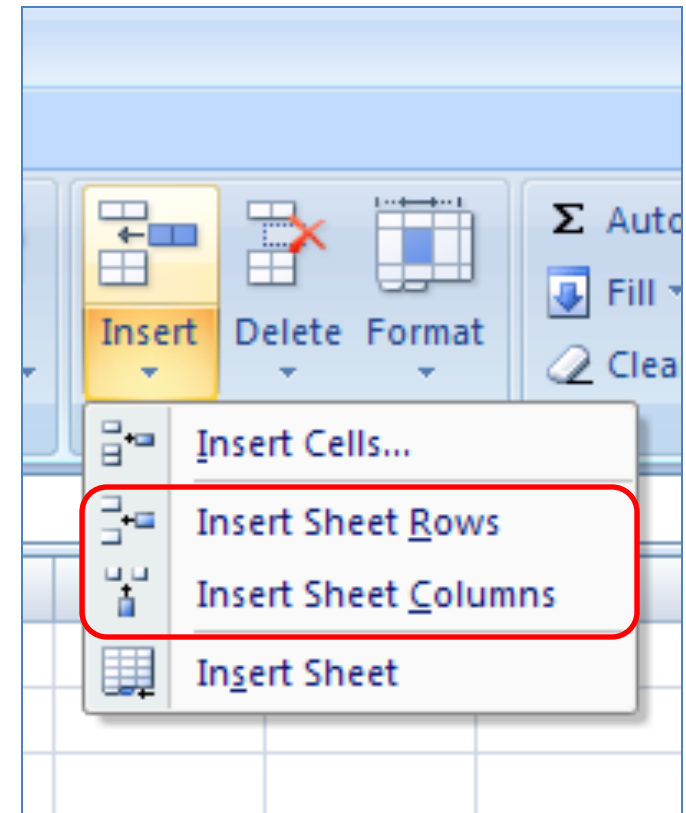


- In the **Insert** dialog box, click the direction in which you want to shift the surrounding cells.

DATA

Organizing Your Data: Insert Cells, Rows or Columns

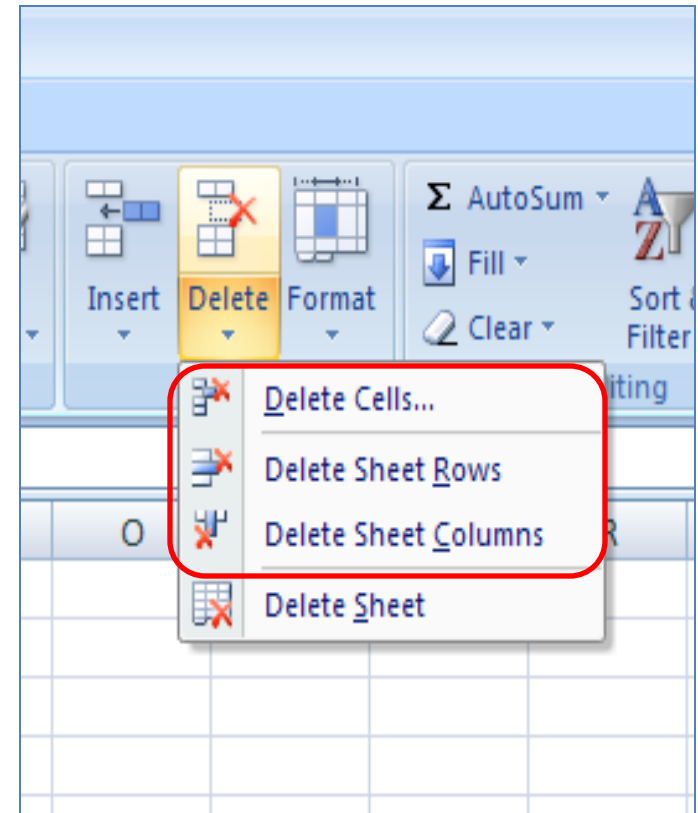
- To insert rows/columns on a worksheet:
 - Select the rows/columns where you want to insert new rows/columns.
(Select the same number of rows/columns that you want to insert.)
 - On the **Home** tab, in the **Cells** group, click the arrow under the **Insert**, and then click **Insert Sheet Rows**/ **Insert Sheet Columns**.



DATA

Organizing Your Data: Delete Cells, Rows or Columns

- To delete cell/rows/columns from a worksheet:
 - Select the cells, rows, or columns to be deleted.
 - On the **Home** tab, in the **Cells** group, click the arrow under the **Delete** and select one of the options



IMPORTANT NOTE: Pressing DELETE key on the keyboard deletes only the contents of the selected cells, not the cells themselves.

DATA

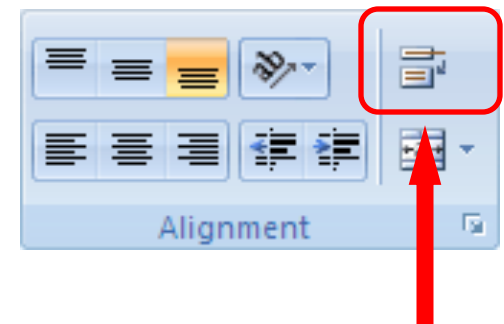
Organizing Your Data: Wrapping a Text

- If you want a text to appear on multiple lines in a cell, you can format the cell so that the text wraps automatically.
- To wrap a text:
 - Select the cells that you want to format
 - On the **Home** tab, in the **Alignment** group, click **Wrap Text**

	A	B	C
1	Wrap ThisText		
2			
3			
4			
5			

	A	B	C
1	Wrap This Text		
2			
3			
4			
5			

Before and After Wrapping

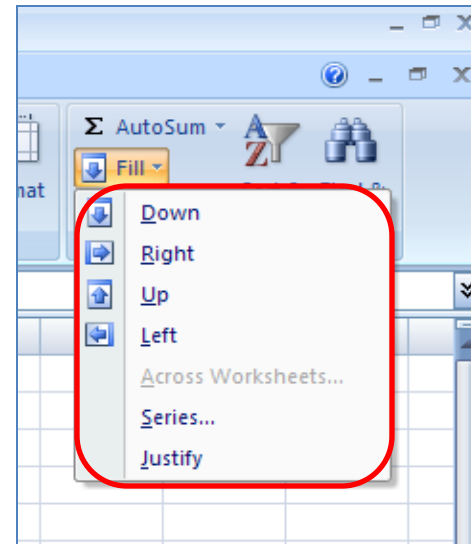


**Wrap Text
Tool**

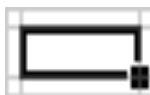
DATA

Organizing Your Data: Auto Fill

- Fast data entry
 - To repeat data automatically
 - To continue a series automatically
- To fill data automatically ,
 - Select cells you want to fill together with the cell that contains data
 - On the **Home** tab in the **Editing** group, click **Fill**
 - Select related direction or series



- To fill in several types of data series quickly , you should select the cell(s) and drag from the fill handle (the small black square in the lower-right corner of the cell)



DATA

Organizing Your Data

- Flash Fill, a new tool in Excel, detects the patterns and trends of your data.
- For example, it enables you to split one column into multiple columns automatically.

B2	:	X	✓	<i>fx</i>	Harry
	A	B	C	D	
1	Annik Stahl	Annik			
2	Harry Miller	Harry			
3	Josh Barnhill	Josh			
4	Jonathan Foster	Jonathan			
5	Doug Thomas	Doug			
6	Ron Owens	Ron			
7	Colin Wilcox	Colin			
8					

DATA

Organizing Your Data: Cell Borders

- To enhance the appearance of your worksheet, you can add borders around cells or ranges of cells
- You can use different
 - Border styles
 - Line styles
 - Color

	bread	soap	banana	
	jam	bread	juice	
	fruit	potato	coke	

Cells without border

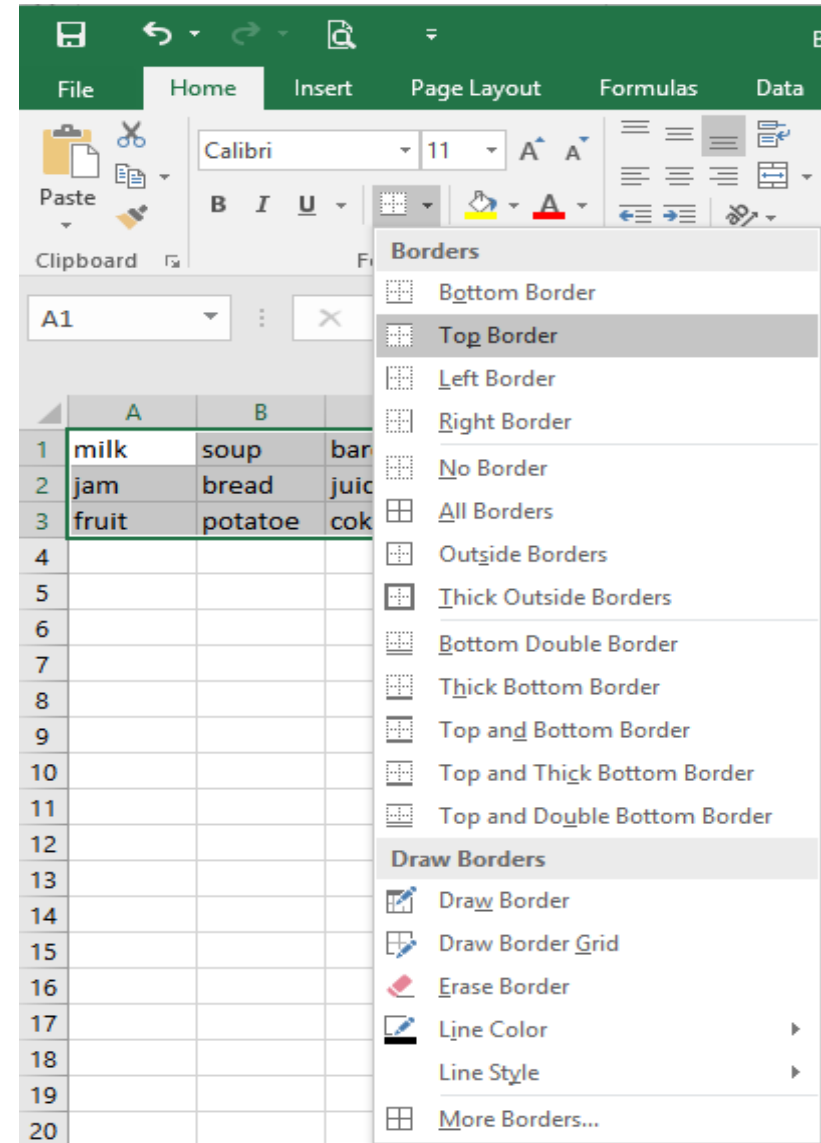
	bread	soap	banana	
	jam	bread	juice	
	fruit	potato	coke	

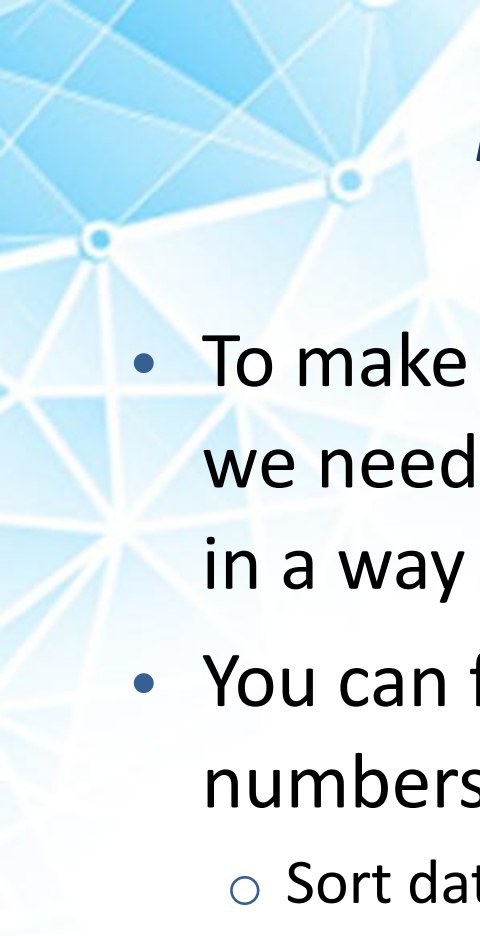
Cells with border

DATA

Organizing Your Data: Cell Borders

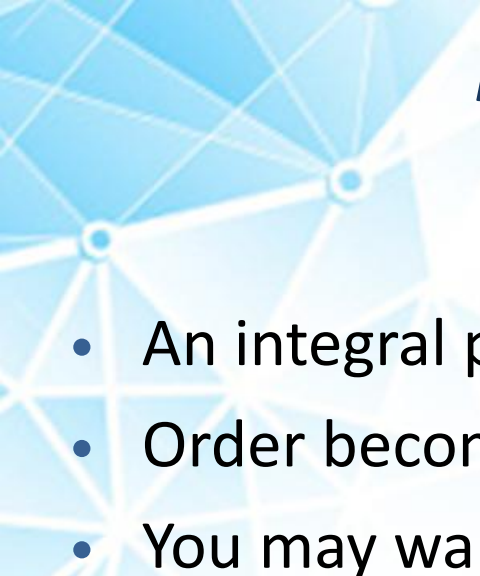
- First, select cells to apply border
- On the **Home** tab, in the **Font** group;
 - To apply new or different border style, click the arrow next to **Borders**, and then click a border style.
 - To apply a custom border style or a diagonal border, click **More Borders**
 - To remove cell borders, click **No Border**





HANDLING AND ANALYZING DATA

- To make information relevant and memorable, we need to select the proper data and present it in a way that emphasizes the important points.
- You can follow some simple rules to make your numbers coherent and easily recognizable.
 - Sort data
 - Filter data
 - Add focus to data
 - Keep comparisons close
 - Round numbers for clarity
 - Provide a summary



HANDLING AND ANALYZING DATA

Sorting Data

- An integral part of data analysis
- Order becomes critical with long lists and tables
- You may want to;
 - put a list of names in alphabetical order
 - compile a list of product inventory levels from highest to lowest, etc.
- Sorting data helps you to;
 - Understand data better
 - Organize and find the data you want
 - Ultimately make more effective decisions
- Mostly sort operations are performed by columns, but you can also sort your data by rows.

HANDLING AND ANALYZING DATA

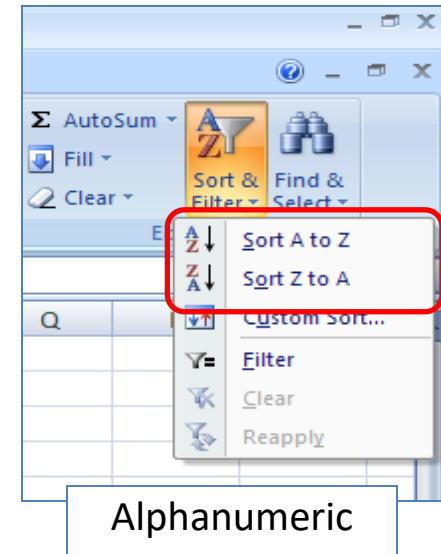
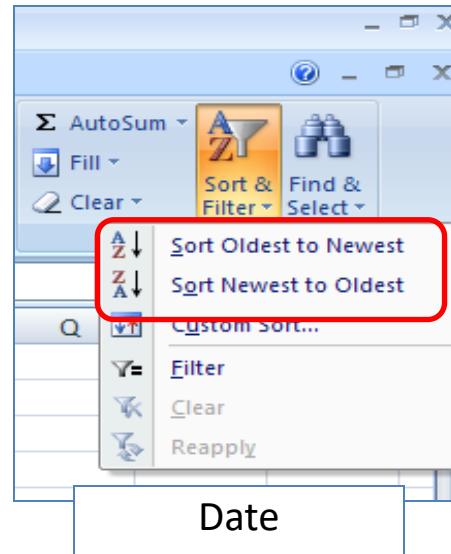
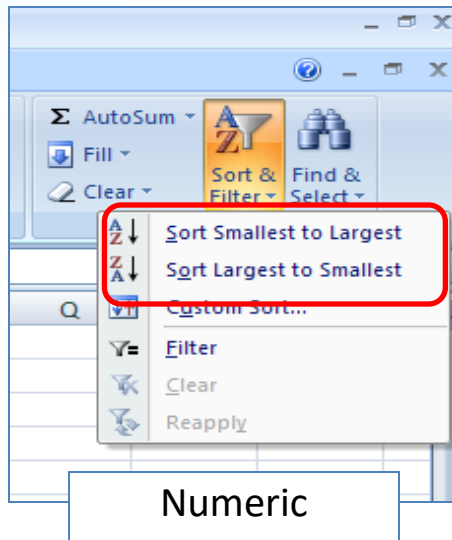
Sorting Data

- In one or more columns, you can sort data by
 - text (A to Z or Z to A)
 - numbers (smallest to largest or largest to smallest)
 - dates and times (oldest to newest or newest to oldest)
- Depending on the information that you want to use;
 - **Size order** guides the reader through the numbers, makes the comparison easier
 - **Alphabetical or chronological order** produces a random array of numbers contained in other columns
 - Not suitable if you want to compare the numbers
 - Suitable if you want to compare the profits according to years

HANDLING AND ANALYZING DATA

Sort Data: Sorting Text, Numbers and Date

- Select column(s) containing data
- On the **Home** tab, in the **Editing** group, click **Sort & Filter**.
- Choose sort order that you want from the list



- According to your data type the appropriate sorting criteria (e.g. Smallest/largest, newest/oldest) will appear in the list

HANDLING AND ANALYZING DATA

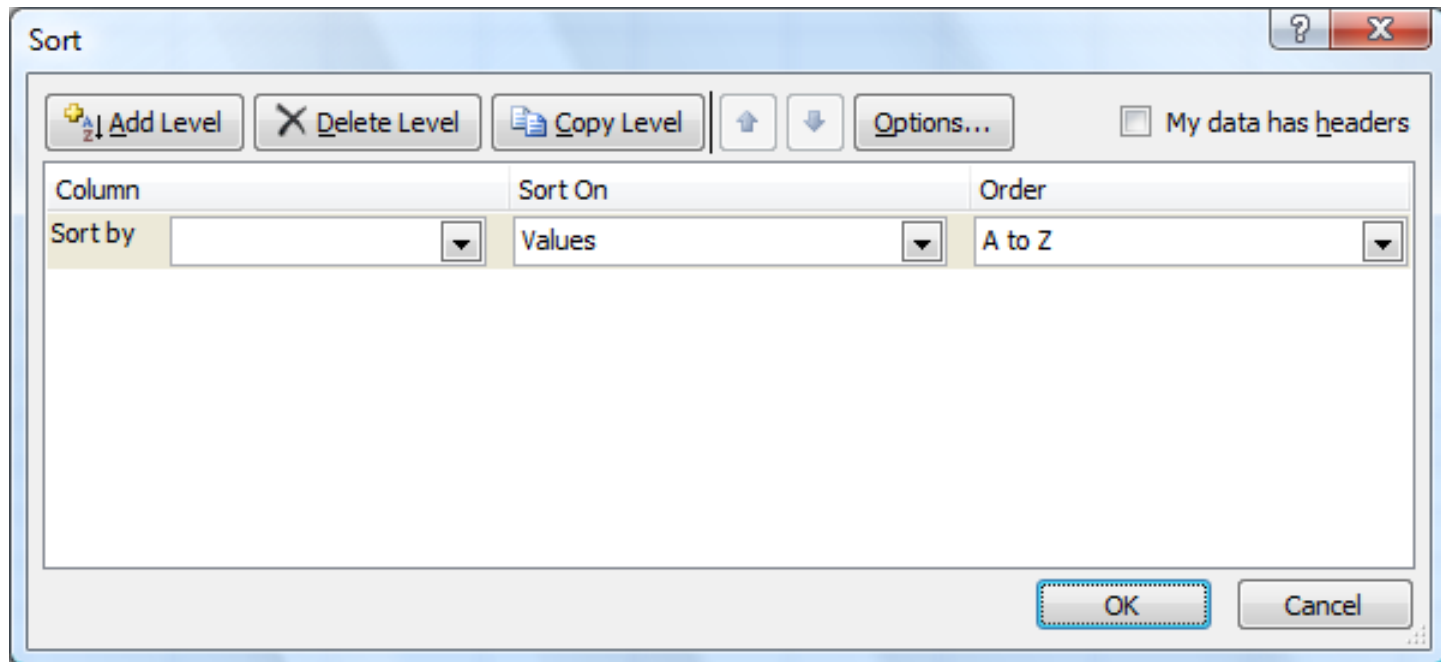
Sort Data: Sorting by More Than One Column or Row

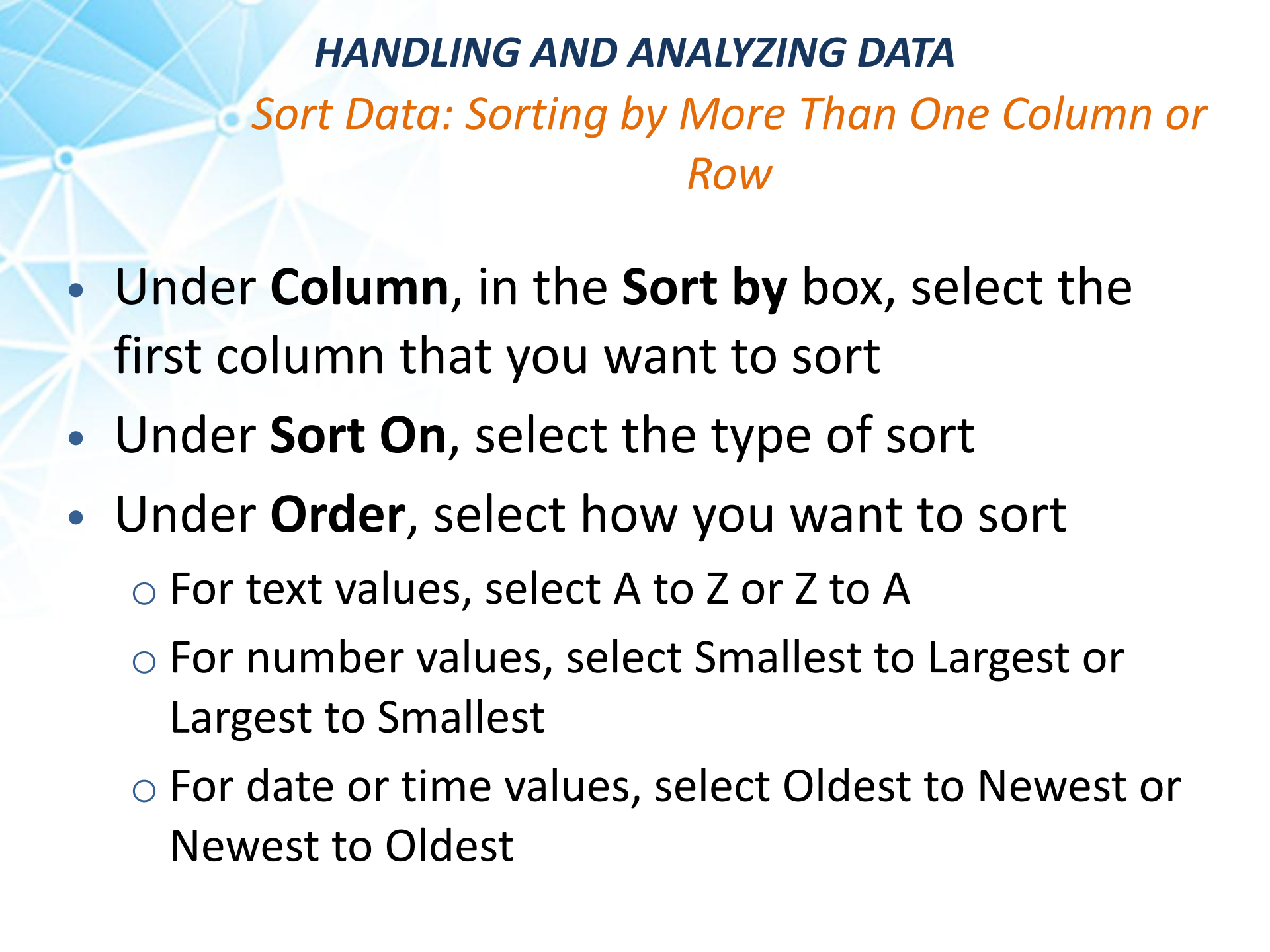
- You might sort data by more than one column or row
- For example, if you have a Department and Employee column;
 - first sort by Department (to group all the employees in the same department together)
 - then sort by name (to put the names in alphabetical order within each department)
- You can sort by up to 64 columns

HANDLING AND ANALYZING DATA

Sort Data: Sorting by More Than One Column or Row

- Select a range of cells with two or more columns of data
- On the **Home** tab, in the **Editing** group, click **Sort & Filter**, and then click **Custom Sort**.
- The **Sort** dialog box is displayed.





HANDLING AND ANALYZING DATA

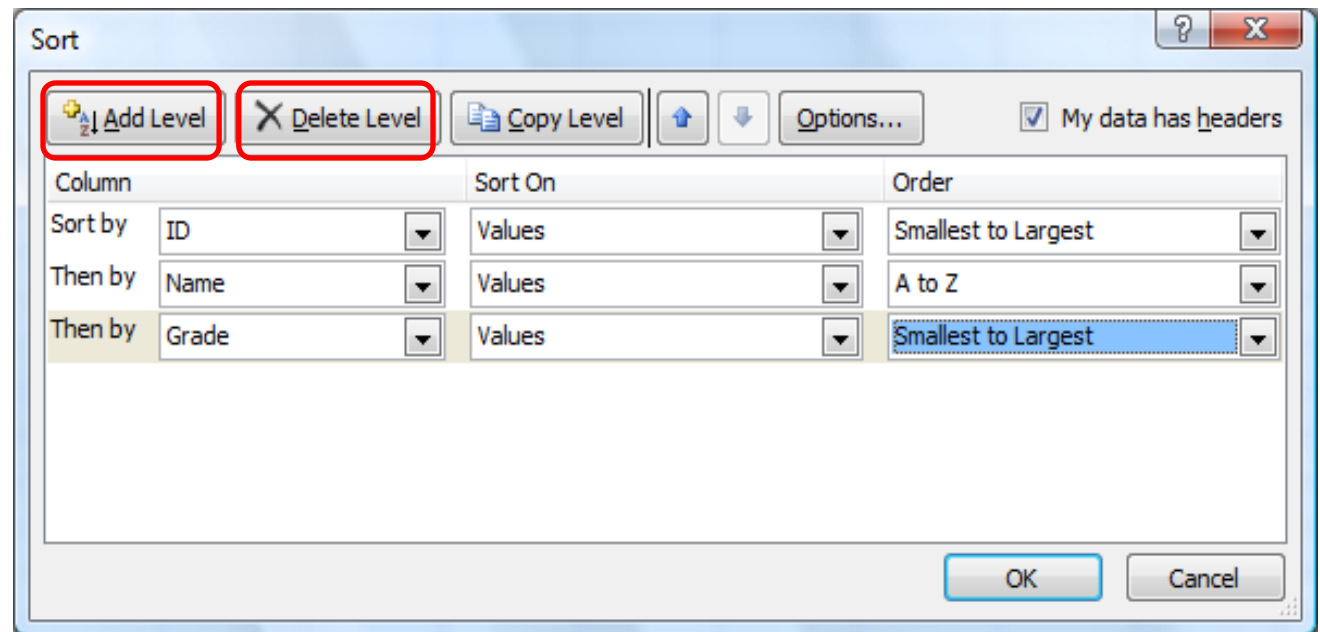
Sort Data: Sorting by More Than One Column or Row

- Under **Column**, in the **Sort by** box, select the first column that you want to sort
- Under **Sort On**, select the type of sort
- Under **Order**, select how you want to sort
 - For text values, select A to Z or Z to A
 - For number values, select Smallest to Largest or Largest to Smallest
 - For date or time values, select Oldest to Newest or Newest to Oldest

HANDLING AND ANALYZING DATA

Sort Data: Sorting by More Than One Column or Row

- To add another column to sort by, click **Add Level**, and then repeat previous steps.
- To delete a column from sort list, select the entry, and then click **Delete Level** (You must keep at least one entry in the list)



HANDLING AND ANALYZING DATA

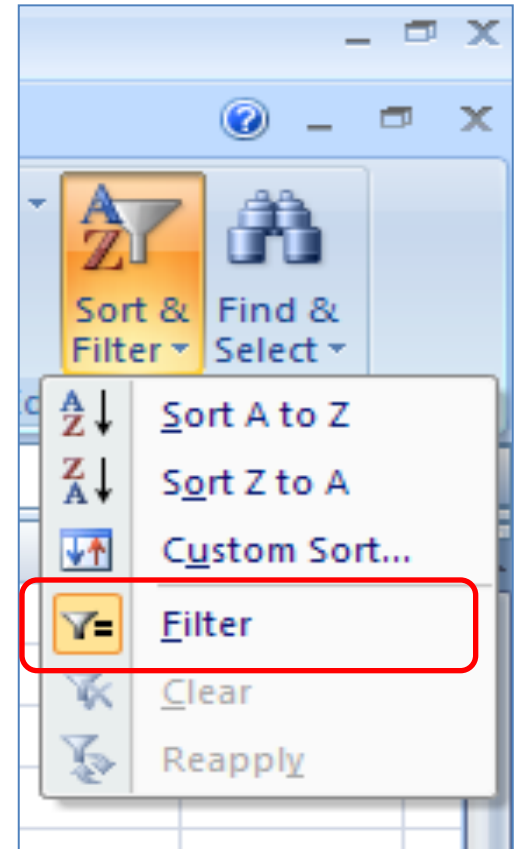
Filter Data

- Filtering data is a quick and easy way to find and work with a subset of data.
- Filtered data displays only the rows that meet the criteria you specify and hides rows you do not want to display.
- After you filter data, you can;
 - copy, find, edit, format, chart, and print the subset of filtered data
- You can also filter more than one column
- Filters are additive; each additional filter is based on the current filter and reduces the subset of data further.

HANDLING AND ANALYZING DATA

Filter Data: Filtering Values- Range of Cells

- Select a range of cells containing data
- On the **Home** tab, in the **Editing** group, click **Sort & Filter**, and then click **Filter**.



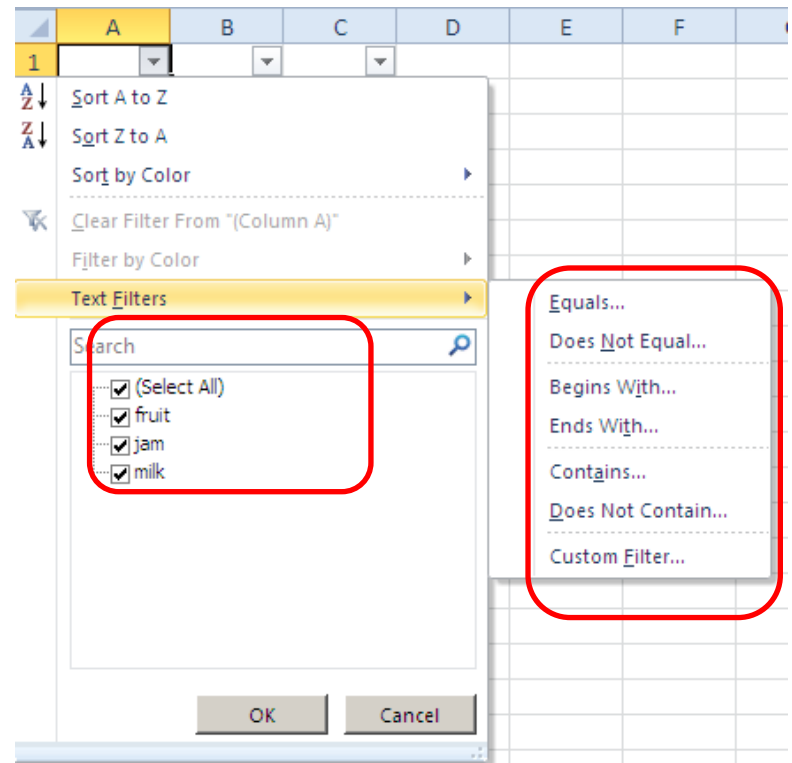
HANDLING AND ANALYZING DATA

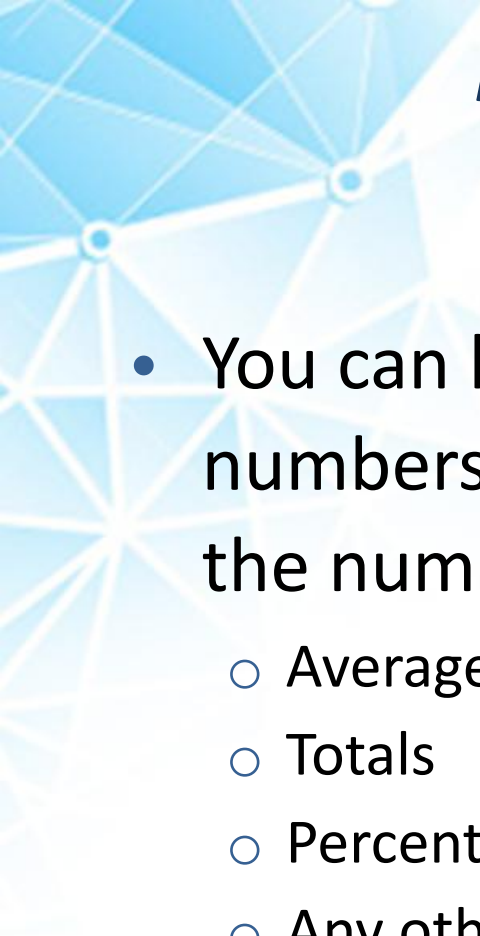
Filter Data: Filtering Values - Table

- After clicking on **Filter**, you will see arrows in column headings (first row) 
- To see filtering options, click on the arrow
- You can
 - Select the ones to be filtered individually or
 - Define a custom criteria

	A	B	C
1			
2	milk	cow	banana
3	jam		juice
4	fruit	potatoe	coke

(Column A):
(Showing All)





HANDLING AND ANALYZING DATA

Data Operations

- You can help readers understand what your numbers mean the and message embodied in the numbers by listing
 - Averages
 - Totals
 - Percentage
 - Any other calculations
- For instance,
 - Averages provide a row or column summary
 - Totals give readers the big picture
 - Percentages give an idea of proportion

HANDLING AND ANALYZING DATA

Formulas

- Formulas are equations that perform calculations on values in your worksheet
- A formula should start with an equal sign (=)
- For example, the following formula multiplies 2 by 3 and then adds 5 to the result

$$=5+2*3$$



NOTE: Pay attention to **operation precedence** when working with formulas.

HANDLING AND ANALYZING DATA

Formulas

- A formula can also contain any or all of the following:
 - Functions
 - References
 - Operators
 - ✓ Mathematical (+, -, %, ...)
 - ✓ Comparison (>, <, =, ...)
 - ✓ Logical (OR, AND, ...)
 - ✓ Reference operators
 - Constants



NOTE: “^” sign is used for power operation.
Eg: $3^2=9$

HANDLING AND ANALYZING DATA

Creating Formula Using References

- *Cell reference* - Combination of column name and row number to which the cell belongs, such as B3.
- *Relative reference* - Relative position of the cell that contains the formula and the cell the reference refers to (e.g., A1)
 - If you copy the formula across rows or down columns, the reference automatically adjusts.
- *Absolute reference* - Refer to a cell in a specific location (e.g., \$A\$1)
 - If the position of the cell that contains the formula changes, the absolute reference remains the same.

	A	B
1		
2		=A1
3		=A2

Copied formula with relative reference

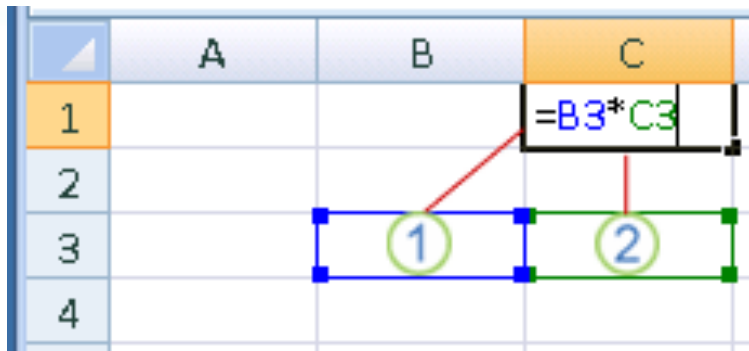
	A	B
1		
2		=\$A\$1
3		=\$A\$1

Copied formula with absolute reference

HANDLING AND ANALYZING DATA

Creating Formula Using References

- To create a formula using references
 - Click the cell in which you want to enter the formula
 - Type = (equal sign)
 - To create a reference, select a cell or type reference of a cell
 - Press ENTER

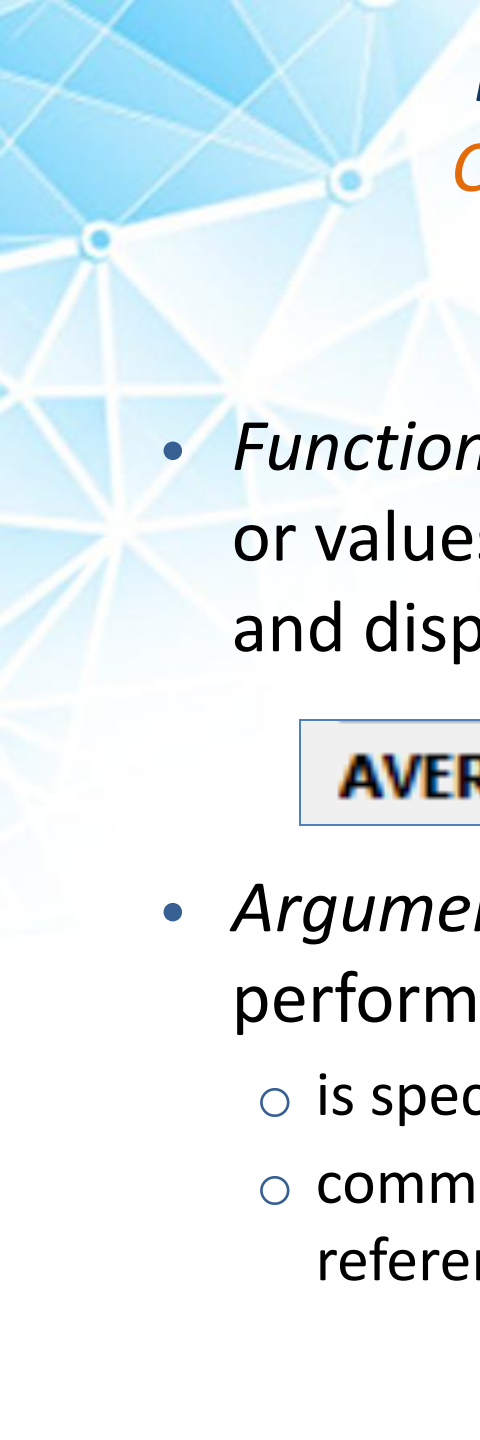


The image shows an Excel spreadsheet with columns A, B, and C, and rows 1 through 4. Cell C1 contains the formula `=B3*C3`. A blue border with square corners highlights cell B3, which is circled with a blue '1'. A green border with square corners highlights the range C3:C4, which is circled with a green '2'. Red lines connect the formula bar to these highlighted cells.

	A	B	C
1			=B3*C3
2			
3			
4			

The first cell reference is B3, the color is blue, and the referred cell has a blue border with square corners.

The second cell reference is C3, the color is green, and the referred cell range has a green border with square corners.



HANDLING AND ANALYZING DATA

Creating Formula Using Functions

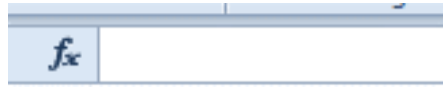
- *Function* - A built-in formula that takes a value or values, performs an operation, and returns and displays the output.

AVERAGE(number1;number2;...)

- *Argument* - The values that a function uses to perform operations or calculations;
 - is specific to the function
 - common arguments are; numbers, text, cell references, and names

HANDLING AND ANALYZING DATA

Creating Formula Using Functions

- To create a formula with function(/s):
 - Click the cell in which you want to enter the formula
 - To start the formula with the function, click Insert Function  on the formula bar 
 - Select the function you want to use
 - Enter the arguments. To enter cell references as an argument, click Collapse Dialog  (which temporarily hides the dialog box), select the cells on the worksheet, and then press Expand Dialog 
 - When you complete the formula, press ENTER

DEMO

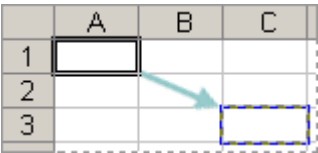


List of
Functions

HANDLING AND ANALYZING DATA

Moving or Copying a Formula

- When you move (cut) a formula, the cell references within the formula do not change no matter what type of cell reference you use
- When you copy a formula, the cell references may change based on the type of cell reference you use
- The following table summarizes how a reference type is updated if a formula that contains the reference is copied two cells down and two cells to the right.

formula being copied to:	If the reference is:	It changes to:
	\$A\$1 (absolute column and absolute row)	\$A\$1
	A\$1 (relative column and absolute row)	C\$1
	\$A1 (absolute column and relative row)	\$A3
	A1 (relative column and relative row)	C3

HANDLING AND ANALYZING DATA

Copy References Example

Cell References - Excel

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW

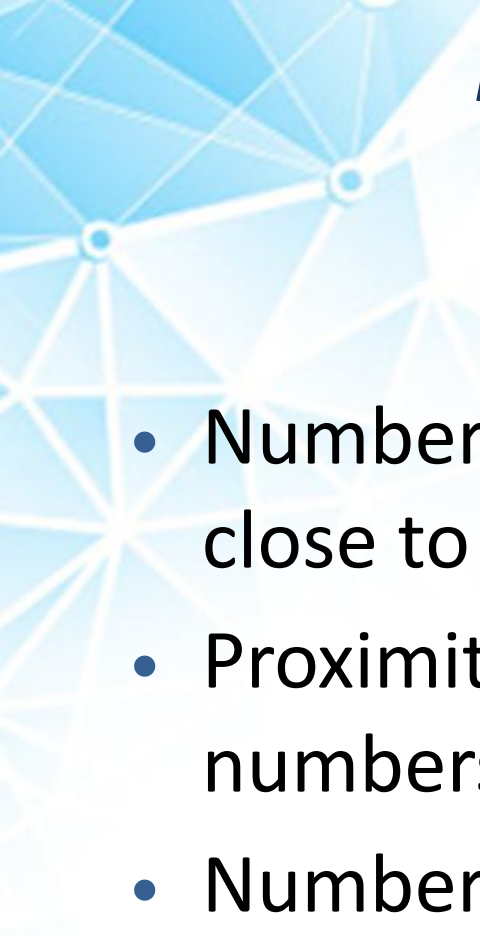
Clipboard Font Alignment Number Styles Cells

SUM : X ✓ fx =F3/\$E\$2

	A	B	C	D	E	F	G
1	Relative cell reference				Absolute cell reference		
2	4	5	9		3	6	2
3	5	3	8			12	=F3/\$E\$2
4	2	4	6			9	3
5	3	6	9			3	1
6							



Check demo for detailed demonstration of Cell References



HANDLING AND ANALYZING DATA

Keep Comparisons Close

- Numbers to be compared should be physically close to one another.
- Proximity helps your readers compare numbers.
- Numbers in the columns are physically closer to one another than numbers in rows.
- **Put numbers to be compared in columns, not rows.**

HANDLING AND ANALYZING DATA

Keep Comparisons Close

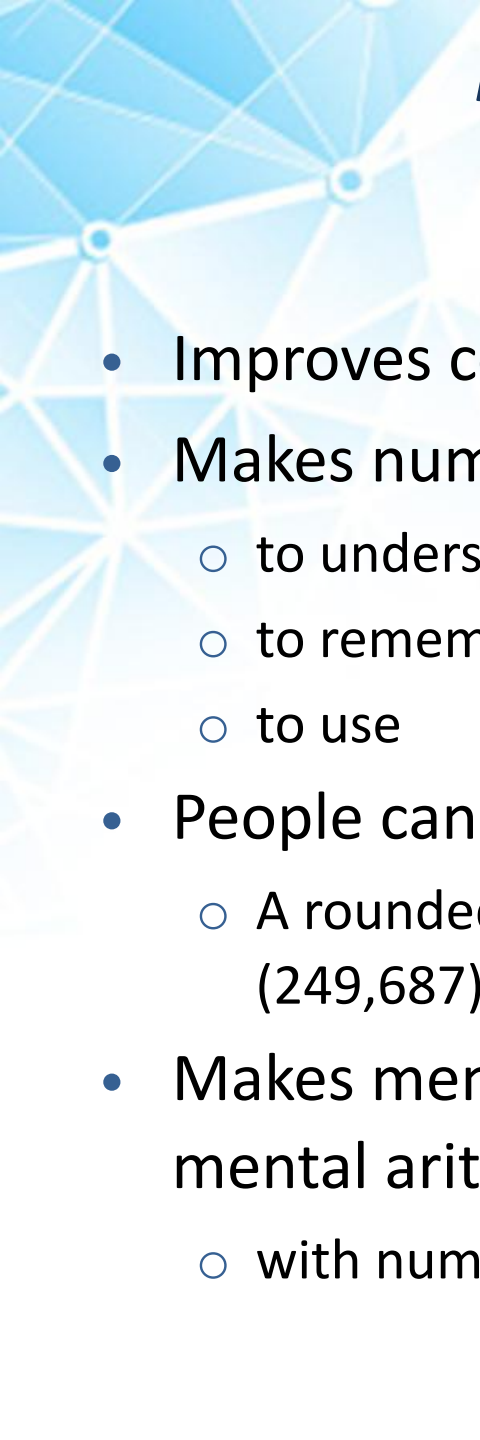
- For instance, following two tables give the same information. Which one is more convenient for comparison?

Trademark	Toshiba	HP	Dell	Asus
Price	\$1550	\$1375	\$1240	\$1310

Numbers in row

Trademark	Price
Toshiba	\$1550
HP	\$1375
Dell	\$1240
Asus	\$1310

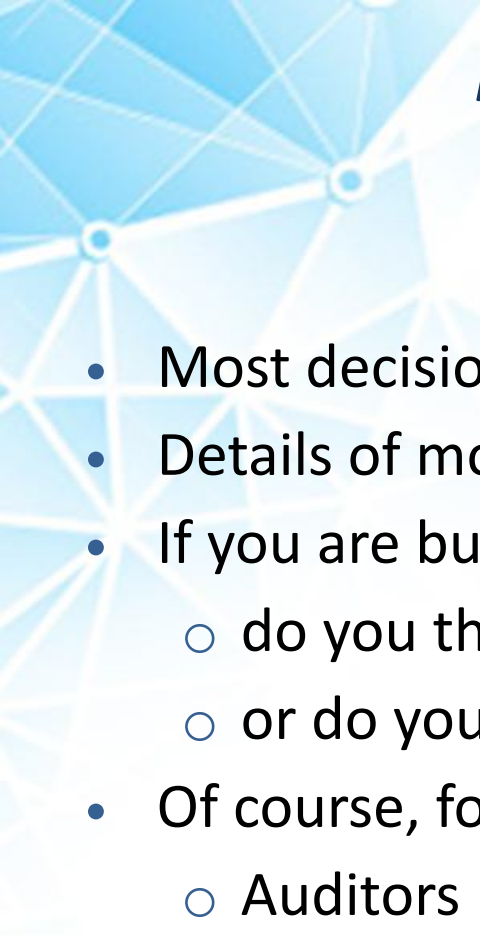
Numbers in column



HANDLING AND ANALYZING DATA

Rounding Numbers for Clarity

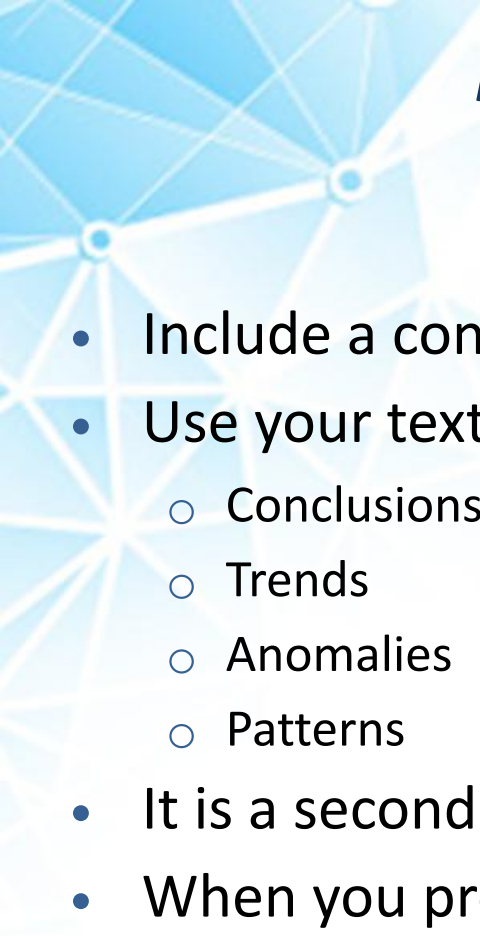
- Improves communication
- Makes numbers easier
 - to understand
 - to remember
 - to use
- People can remember;
 - A rounded number (250,000) easier than a detailed number (249,687)
- Makes mental arithmetic easier. Most people can perform mental arithmetic;
 - with numbers of two digits at most



HANDLING AND ANALYZING DATA

Rounding Number for Clarity

- Most decisions in management are made on rounded numbers
- Details of more than two digits rarely influence a decision
- If you are buying a car,
 - do you think to yourself “I have \$7,224.16”?
 - or do you think, “ I have about \$7,200”?
- Of course, for some fields, rounding is not appropriate;
 - Auditors
 - Precision engineers
 - Pharmacists



HANDLING AND ANALYZING DATA

Provide a Summary

- Include a concise written summary in the text.
- Use your text (or speech) to emphasize;
 - Conclusions
 - Trends
 - Anomalies
 - Patterns
- It is a second opportunity to convey your message.
- When you provide a summary:
 - Always include a table or graph with an explanation in your text or speech.
 - Writing “Table X shows that there has been little change over the last five years” is more helpful to readers than merely stating “Please see Table X for the outcomes”
 - Summarize the overall point or message of the table

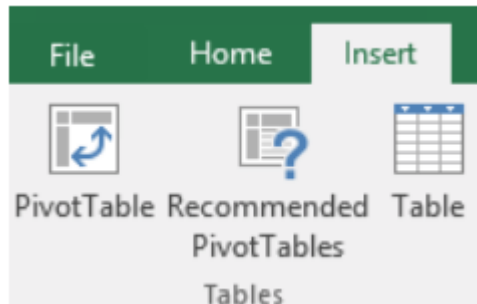
HANDLING AND ANALYZING DATA

Pivot Table

- A PivotTable is a powerful tool to calculate, summarize, and analyze data that lets you see comparisons, patterns, and trends in your data.

Creating a Pivot Table

- Select the cells you want to create a PivotTable from.
- Select Insert > PivotTable.

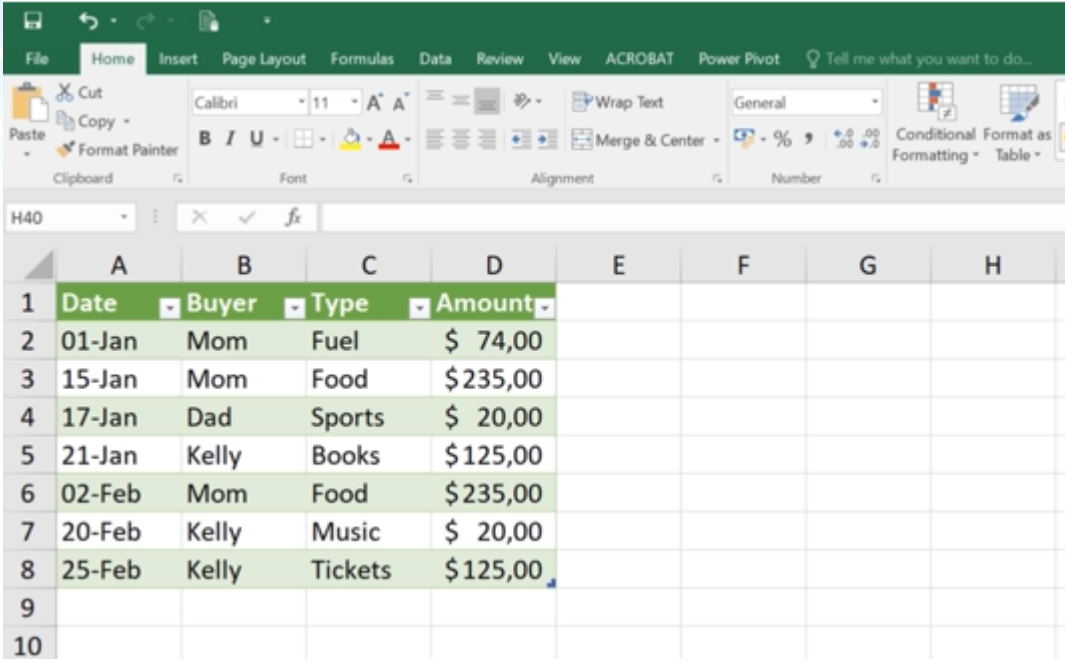


- Choose the data to be analyzed, select a table or range.
- Choose where you want the PivotTable report to be placed.

HANDLING AND ANALYZING DATA

Pivot Table

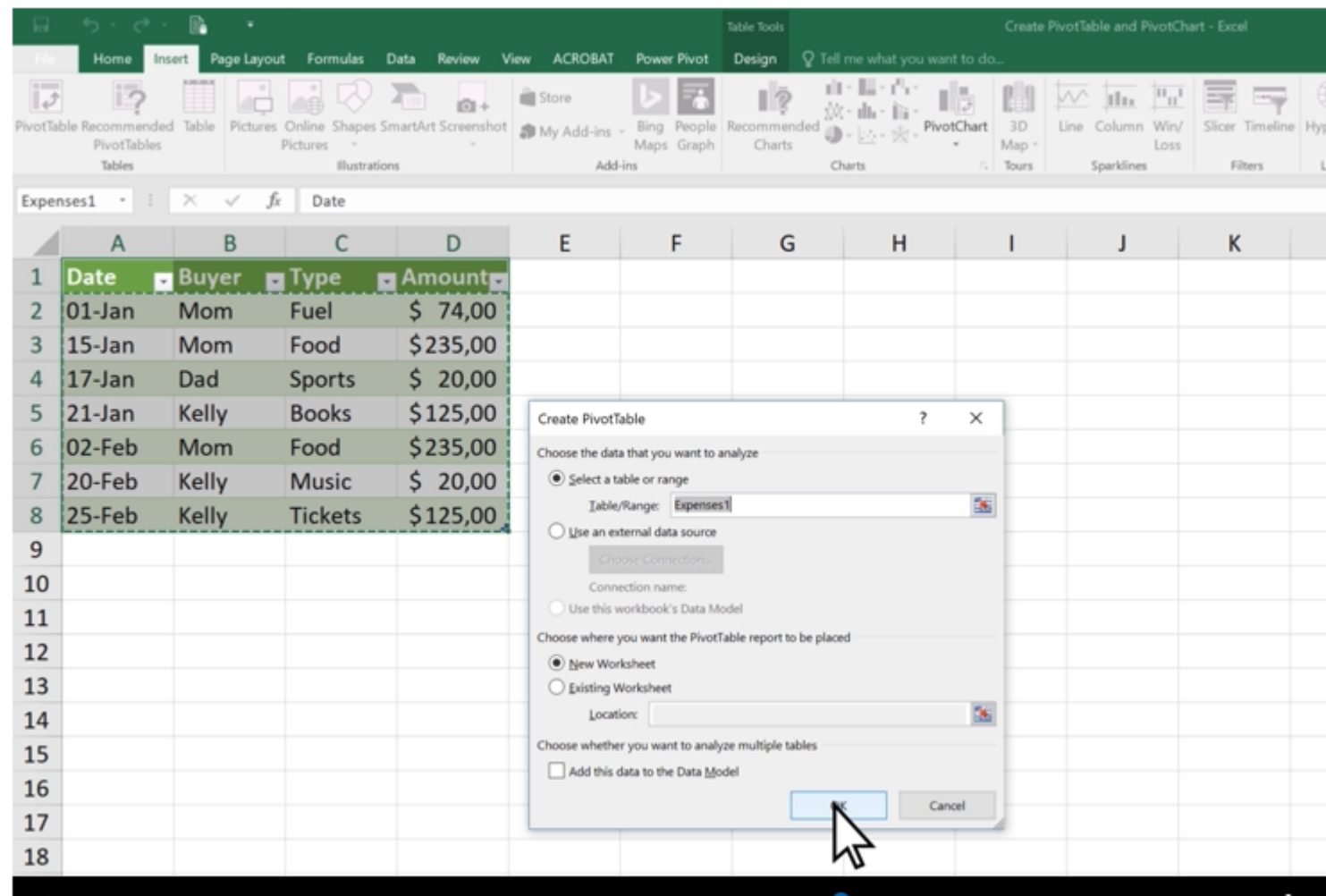
- Creating Pivot Table from base table



	A	B	C	D	E	F	G	H
1	Date	Buyer	Type	Amount				
2	01-Jan	Mom	Fuel	\$ 74,00				
3	15-Jan	Mom	Food	\$ 235,00				
4	17-Jan	Dad	Sports	\$ 20,00				
5	21-Jan	Kelly	Books	\$ 125,00				
6	02-Feb	Mom	Food	\$ 235,00				
7	20-Feb	Kelly	Music	\$ 20,00				
8	25-Feb	Kelly	Tickets	\$ 125,00				
9								
10								

Pivot Table

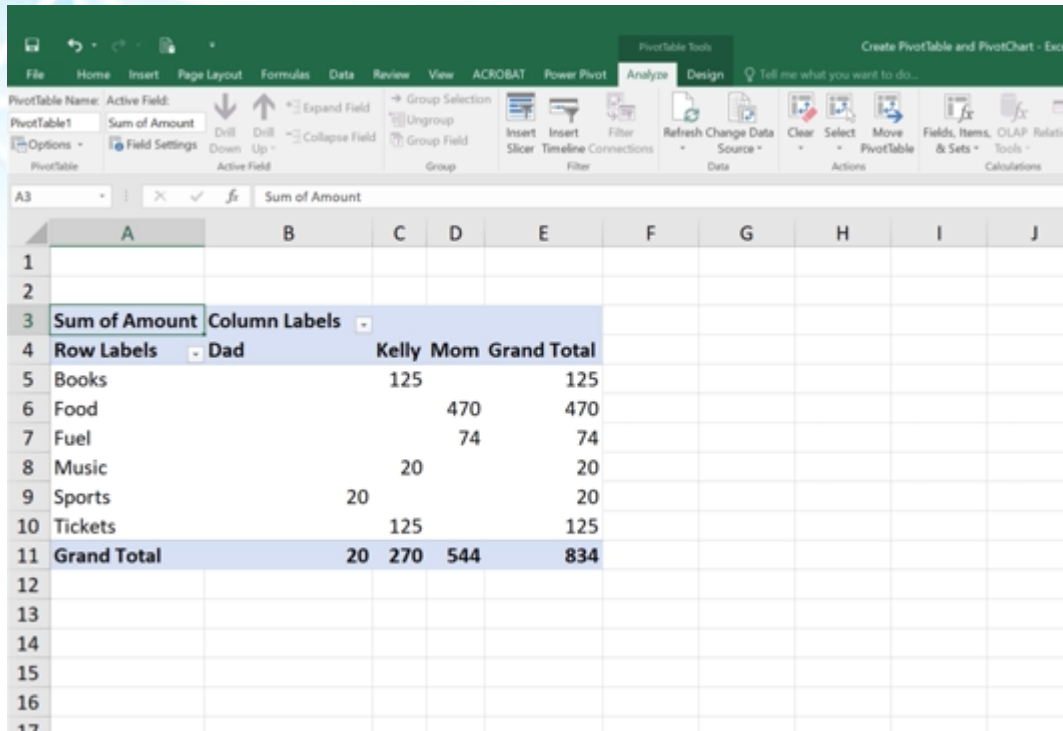
- Choose area where the pivot table is placed.



HANDLING AND ANALYZING DATA

Pivot Table

- Pivot table is created.



	A	B	C	D	E	F	G	H	I	J
1										
2										
3	Sum of Amount	Column Labels								
4	Row Labels	Dad	Kelly	Mom	Grand Total					
5	Books		125		125					
6	Food			470	470					
7	Fuel			74	74					
8	Music		20		20					
9	Sports	20			20					
10	Tickets		125		125					
11	Grand Total	20	270	544	834					
12										
13										
14										
15										
16										
17										



[See full demonstration](#)



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TEST YOURSELF

References

1. Microsoft Office Support, <https://support.office.com/en-us/article/Import-or-export-text-txt-or-csv-files-5250ac4c-663c-47ce-937b-339e391393ba> Last visit: January, 2019
2. Microsoft Office Support, https://support.office.com/en-us/article/available-number-formats-0afe8f52-97db-41f1-b972-4b46e9f1e8d2?wt.mc_id=otc_excel Last visit: January, 2019
3. Microsoft Office Support, <https://support.office.com/en-us/article/excel-functions-alphabetical-b3944572-255d-4efb-bb96-c6d90033e188> Last visit: January, 2019
4. Microsoft Office Support, <https://support.office.com/en-us/article/video-copying-formulas-d46cac82-1754-439c-bc72-bfe85ad51c30?ui=en-US&rs=en-US&ad=US> Last visit: January, 2019
5. Microsoft Office Support, <https://support.office.com/en-us/article/Create-a-PivotTable-to-analyze-worksheet-data-A9A84538-BFE9-40A9-A8E9-F99134456576> Last visit: January, 2019