

Data Analysis and visualization

Charts

Charts allow you to present information contained in the worksheet in a graphic format. Excel offers many types of charts including: Column, Line, Pie, Bar, Area, Scatter and more. To view the charts available, click the Insert Tab on the Ribbon.

Creating a Chart:

- Select the cells that contain the data you want to use in the chart. In our example we can select the shipping cost column to be used as chart data
- Click the Insert tab on the Ribbon
- Click the type of Chart you want to create. There are different chart types as show in **Figure 2. 15**.



Figure 2. 15: Chart Tool

- Click the Column chart button and then select the 2d chart
- A bar chart will appear showing the shipping cost as chart as shown in **Figure 2. 16**.
- You can observe the costs at the Y-axis and as there are four items so you can see 4 bars at X-axis
- This chart has four components and you can right click on them separately to see the advance options available.



Figure 2. 16: Resulting Chart

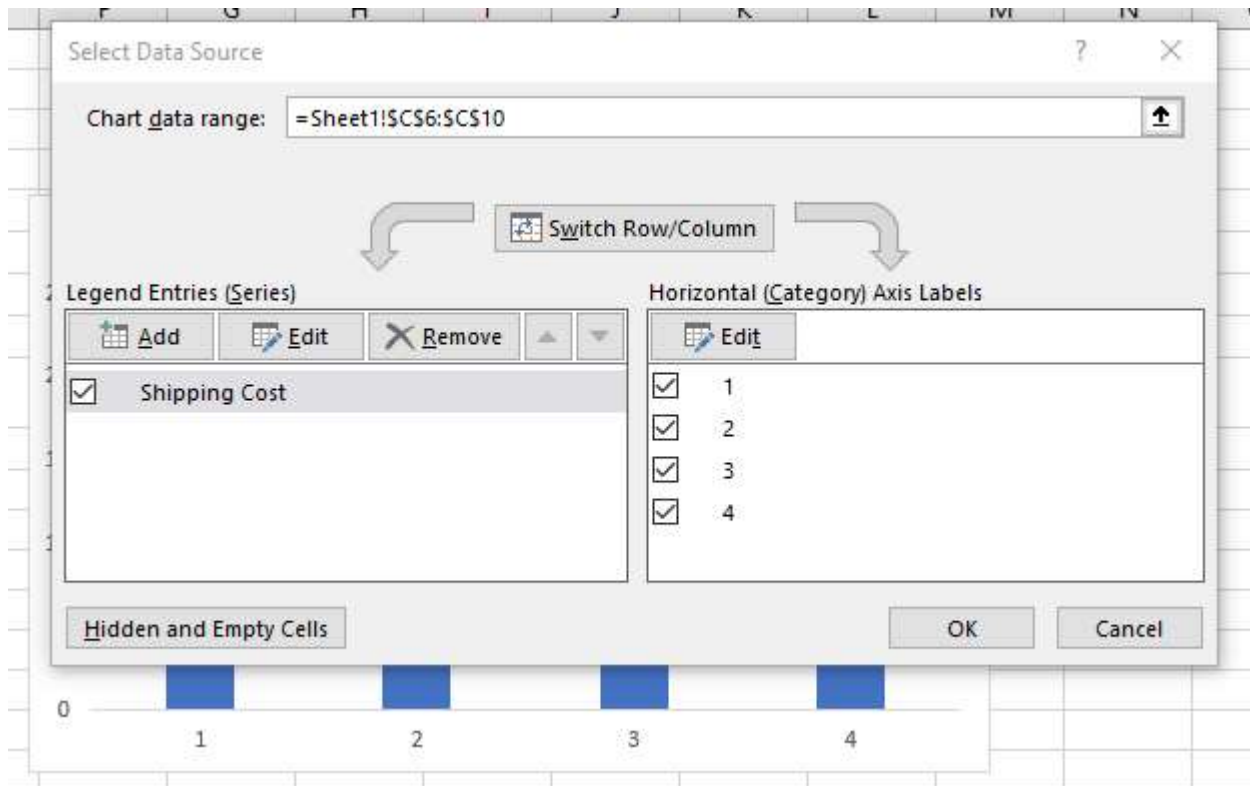


Figure 2. 17: Modifying chart data

Modifying a Chart:

- Once you have created a chart you can do several things to modify the chart.
- Move the chart

To change the data included in the chart:

- Right click the Chart
- Click the Select Data button on the Design tab as shown in **Figure 2. 17**.

- You can see the data selected in the “Chart data Range” box.
- =Sheet1!\$C\$6:\$C\$10 tells us that we are using the data from sheet1 and our data starts from C6 and it goes till C10. The \$ signs in the middle tell us that it is address of the cell and not the data inserted by user.

To reverse which data are displayed in the rows and columns, **Figure 2. 18** shows how to achieve this task.

- Click the Chart
- Click the Switch Row/Column button on the Design tab

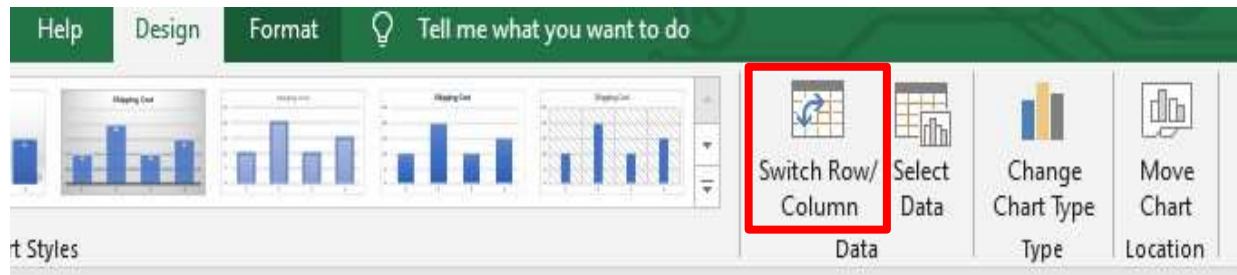


Figure 2. 18: Reverse Rows and Columns Data

Chart Tools

The Chart Tools appear on the Ribbon when you click on the chart. The tools are located on three tabs:

- Design
- Layout
- Format

Design Tab

Within the Design tab you can control the chart type, layout, styles, and location. This tab is shown in **Figure 2. 19**.



Figure 2. 19: Design Tab

1. Select the chart that you have drawn and now apply different chart layout to see the differences.
2. Apply the different colors available in the ribbon such as green or orange.
3. Try moving the chart with the help of the Move chart button in the end and move it to another sheet of this Excel File.

Format Tab

Within the Format tab you can modify shape styles, word styles and size of the chart. Format tab is shown in **Figure 2. 20**.



Figure 2.20: Format Tab

7.2.3 Page Layout

Page layout ribbon is shown in **Figure 2.21**. This ribbon contains different options related to page setup. All these options have been covered in lab of Microsoft Word.

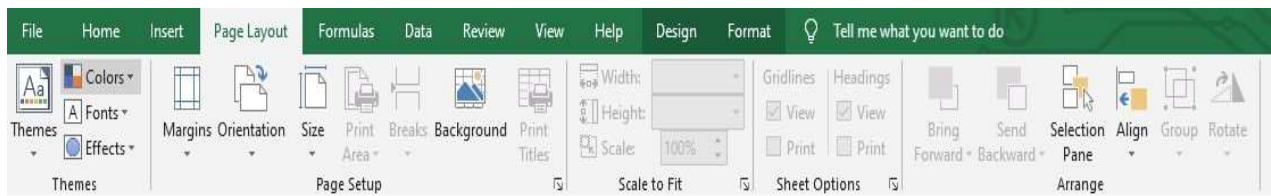


Figure 2.21: Page Layout Tab

1. Select the chart and apply different format type to see what effect it makes on your chart style and color.

7.2.4 Formulas

[Expected time = 25 min]

A formula is a set of mathematical instructions that can be used in Excel to perform calculations. Formulas are started in the formula box starting with an = sign. A sample formula is shown in **Figure 2.22**.

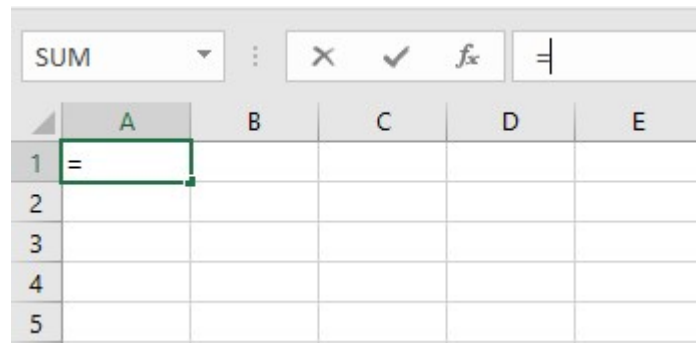


Figure 2.22: Formula Example

The formula ribbon is shown in **Figure 2.23**. This ribbon gives you different options for applying formulas. The first section represents Function library. Function library contains different formulas from various categories.



Figure 2. 23: Formulas Tab

Product	Price	Shipping Cost
Toothpaste	25	10
Shampoo	120	20
Soap	30	10
MouthWash	50	15

Figure 2. 24: Data for Sum Formula

Creating Basic Formula

To create a basic formula in Excel we need the data on which we need to apply the formula. Data is represented in **Figure 2. 24**.

To create a basic formula, you need to do the following:

- Select the cell for the formula
- Type “=” (the equal sign) and the formula
- The formula is of sum which would sum the values.
- “:” is used to specify the range of the cell on which you want to apply the formula
- Click Enter

Creating a basic formula is shown in **Figure 2. 25**.

	A	B	C	D
1	Product	Price	Shipping Cost	Total Price
2	Toothpaste	25	10	=sum(B2+C2)
3	Shampoo	120	20	
4	Soap	30	10	
5	Mouthwash	50	15	
6				

Figure 2. 25: Sum Formula

When you click enter you would get the result as shown in **Figure 2. 26** the highlighted column represents the result after applying the formula.

	A	B	C	D
1	Product	Price	Shipping Cost	Total Price
2	Toothpaste	25	10	35
3	Shampoo	120	20	140
4	Soap	30	10	40
5	Mouthwash	50	15	65

Figure 2. 26: Result of Sum Formula

Calculate with Functions

A function is a built-in formula in Excel. A function has a name and arguments (the mathematical function) in parentheses.

- Sum: Adds all cells in the argument
- Average: Calculates the average of the cells in the argument
- Min: Finds the minimum value
- Max: Finds the maximum value
- Count: Finds the number of cells that contain a numerical value within a range of the argument

To calculate a function:

- Click the cell where you want the function applied
- Click the Insert Function button
- Choose the function
- Click OK

The process of calculating through a function is shown in following figures.

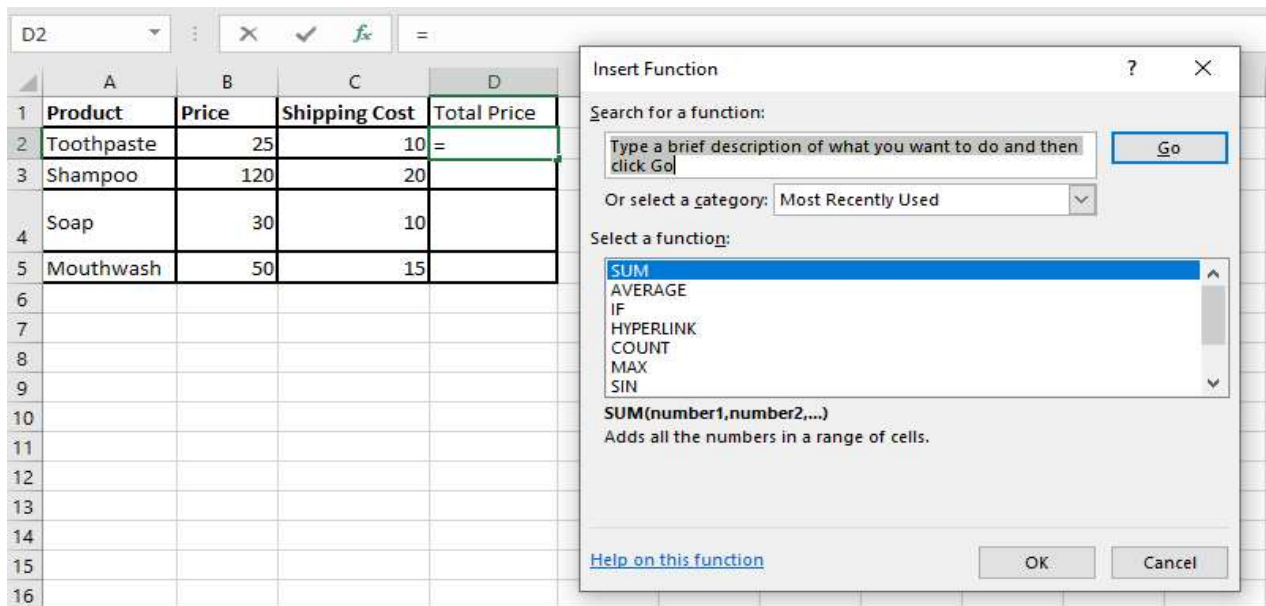


Figure 2. 27: Applying sum function

Function Arguments

SUM

Number1: B2 = 25

Number2: C2 = 10

Number3: = number

= 35

Adds all the numbers in a range of cells.

Number2: number1,number2,... are 1 to 255 numbers to sum. Logical values and text are ignored in cells, included if typed as arguments.

Formula result = 35

[Help on this function](#)

OK Cancel

Figure 2. 28: Applying sum function

	A	B	C	D
1	Product	Price	Shipping Cost	Total Price
2	Toothpaste	25	10	35
3	Shampoo	120	20	
4	Soap	30	10	
5	Mouthwash	50	15	

Figure 2. 29: Output of sum function

Function Library

The function library is a large group of functions on the Formula Tab of the Ribbon.

- AutoSum: Easily calculates the sum of a range
- Recently Used: All recently used functions
- Financial: interest, cash flow return rates and additional financial functions – Logical: And, If, True, False, etc.
- Text: Text based functions
- Date & Time: Functions calculated on date and time
- Math & Trig: Mathematical Functions

The categories of Function library are shown in **Figure 2. 30**.

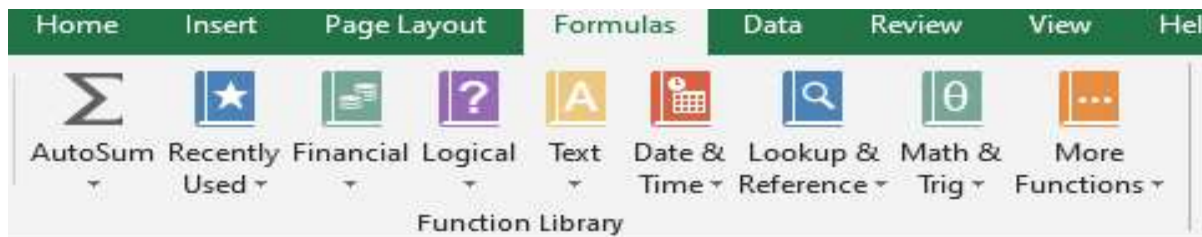


Figure 2. 30: Function Library

If-else Formula

If-else is an important formula in Microsoft Excel. There are always situations in which you need to decide what you want to do when a particular stage is reached. Suppose you want to apply 5% of tax on all those products whose price is greater than 5000 rupees. To do such a task in Microsoft Excel, you need IF-ELSE formula. Before you apply IF-ELSE formula you need the data again on which you apply the IF-ELSE formula. To apply the IF formula the data is given in **Figure 2. 31**.

Product	Price	Shipping Cost	Total Price
Toothpaste	25	10	35
Shampoo	120	20	140
Soap	30	10	40
MouthWash	50	15	65

Figure 2. 31: Sample Data

Now we want to know whether the products are expensive or cheap. To do so we would apply the IF formula. The condition for expensive is greater than or equal to 50. If the product's price is greater than or equal to 50 then it is expensive otherwise it is cheap.

To apply IF formula, you need to do the following:

- Select the cell where you want to apply the formula
- Put = (equal sign) in that cell
- Then write the if formula as shown in **Figure 2. 32**.



Figure 2. 32: IF formula

When you apply the formula shown in **Figure 2. 32**, you will get the result shown in **Figure 2. 33**.

	A	B	C	D	E
1	Product	Price	Shipping Cost	Total Price	Decision
2	Toothpaste	25	10	35	Cheap
3	Shampoo	120	20	140	Expensive
4	Soap	30	10	40	Cheap
5	Mouthwash	50	15	65	Expensive

Figure 2. 33: IF formula Result

Percentage Formula

There are some situations where you need to find some percent of a particular number, marks, price or the percentage of salary to incremented annually for employees. For all such tasks you need a percentage formula. We would apply a percentage formula for finding out how much sales tax to be applied on the products price. To do so we need the data i.e., prices of products. **Figure 2. 34** shows sample data for products

Product	Price	Shipping Cost	Total Price
Toothpaste	25	10	35
Shampoo	120	20	140
Soap	30	10	40
MouthWash	50	15	65

Figure 2. 34: Data for Percentage Formula

We need to find 2% sales tax on product's prices. To do so you need to do the following:

- Select the cell where you want to apply the formula
- Put = (equal sign) in that cell
- Apply the percentage formula as shown in **Figure 2. 35**.

	A	B	C	D	E
1	Product	Price	Shipping Cost	Total Price	Sales Tax
2	Toothpaste	25	10	35	=D2*2/100
3	Shampoo	120	20	140	

Figure 2. 35: Percentage Formula

When you would apply the formula, you would get the required sales tax as shown in **Figure 2. 36**. Sales tax is shown in Highlighted column.

Product	Price	Shipping Cost	Total Price	Sales Tax
Toothpaste	25	10	35	0.7
Shampoo	120	20	140	2.8
Soap	30	10	40	0.8
Mouthwash	50	15	65	1.3

Figure 2. 36: Sales tax after percentage formula

7.2.5 Data Tab

[Expected time = 25 min]

In Excel you need to play around data to achieve the desired goals. Therefore, the Data tab has very importance. In this tab you are given with various options that you can apply on the data in the Excel Sheet. We will not be covering everything from this ribbon shown in **Figure 2. 37**. We look at Sorting and filtering and how to get the external data from other sources.

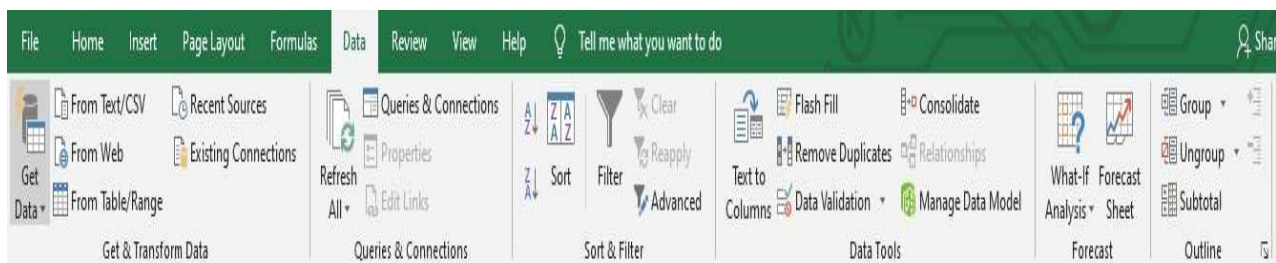


Figure 2. 37: Data Tab

Sort & Filter

Sorting and Filtering allow you to manipulate data in a worksheet based on given set of criteria. You can sort the data in ascending and descending order. There are two types of sorts in Microsoft Excel i.e., Basic Sorts and Custom Sorts.

Basic Sort

To execute a basic descending or ascending sort based on one column perform the following steps:

- Highlight the cells that will be sorted
- Click the Sort & Filter button on the Home tab
- Click the Sort Ascending (A-Z) button or Sort Descending (Z-A) button

These steps are shown in **Figure 2. 38**.

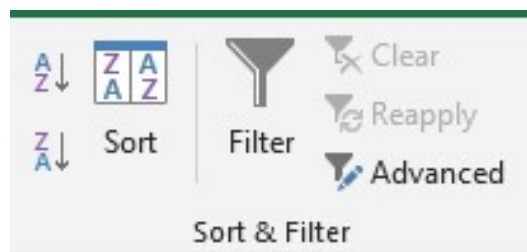


Figure 2. 38: Sort and Filter

Custom Sort

To sort on the basis of more than one column:

- Click the Sort & Filter button on the Home tab
- Choose which column you want to sort by first
- Click Add Level
- Choose the next column you want to sort
- Click OK

This process is represented in following figures.

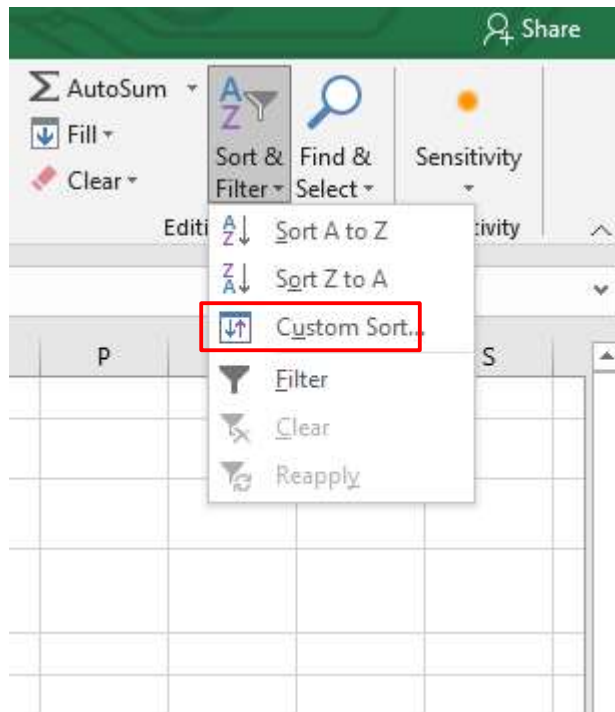


Figure 2. 39: Custom Sort

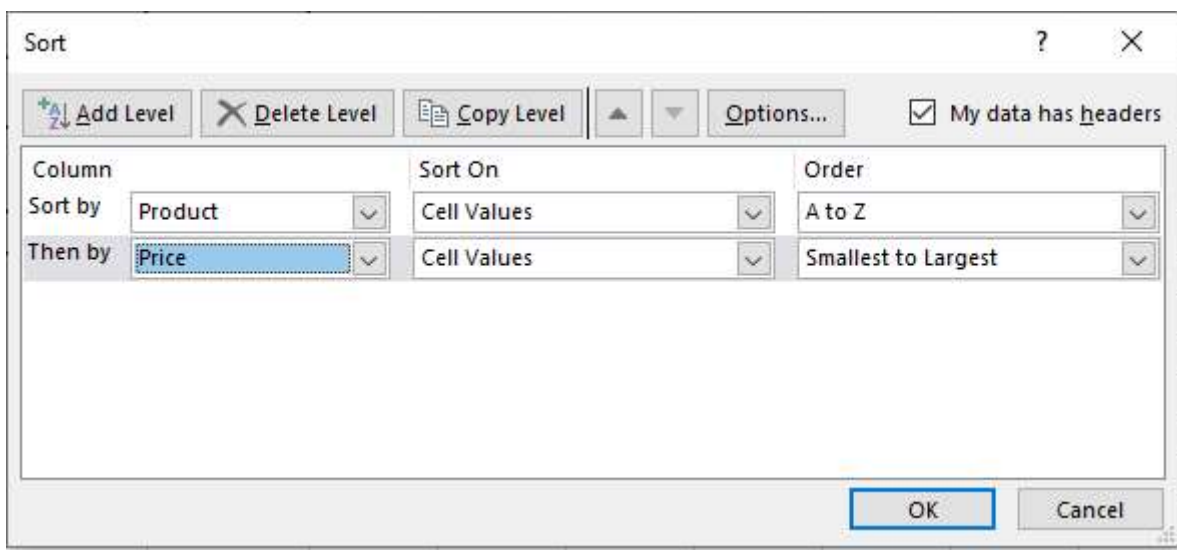


Figure 2. 40: Custom Sort column selection

Get and Transform Data

This section of Data tab gives you the option of importing data from other sources. As you can see in **Figure 2. 41** various sources have been shown from where you can get the data. The data sources are Access, Web, and Text etc.

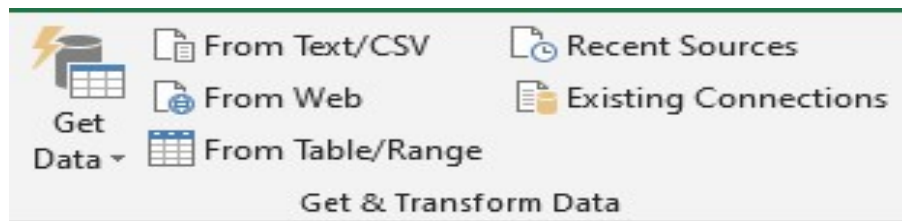


Figure 2. 41: Get and Transform Data

Data from File

Suppose you have created some data and that data is stored in some other file. You need that data in your Excel sheet. To get the data from the file click on “From File” option given in the Get Data section. When you click the option a dialog box would appear asking you to choose your data location. This dialog box is shown in **Figure 2. 42**.

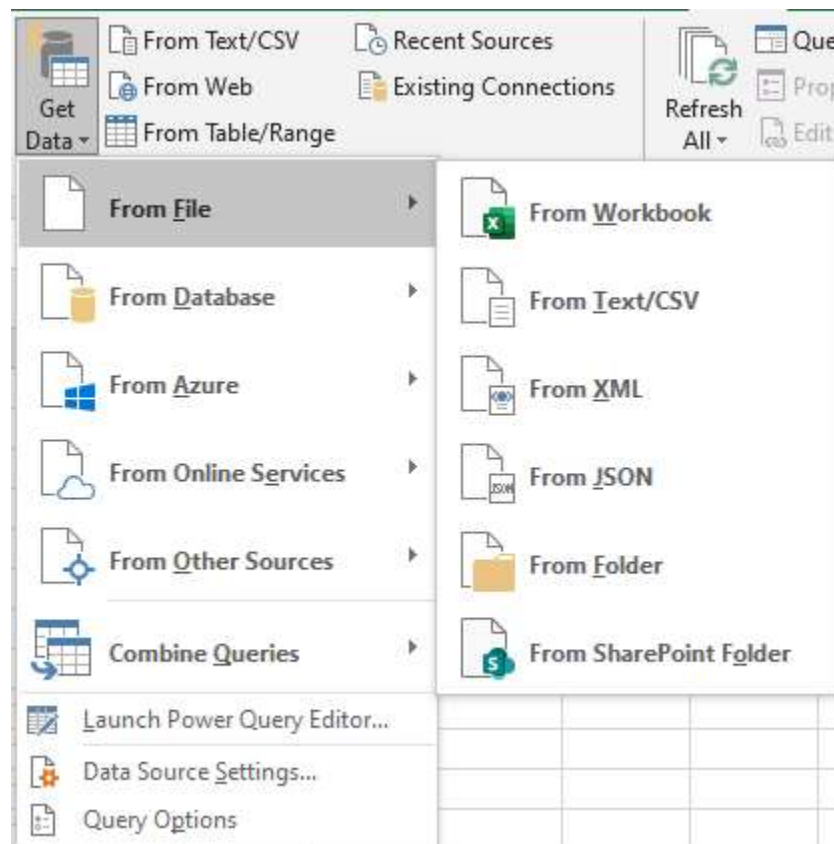


Figure 2. 42: Data from file

Click on New source button. When you click on this button, a wizard would appear which would ask you to choose the type of data. This wizard is shown in **Figure 2. 43**.

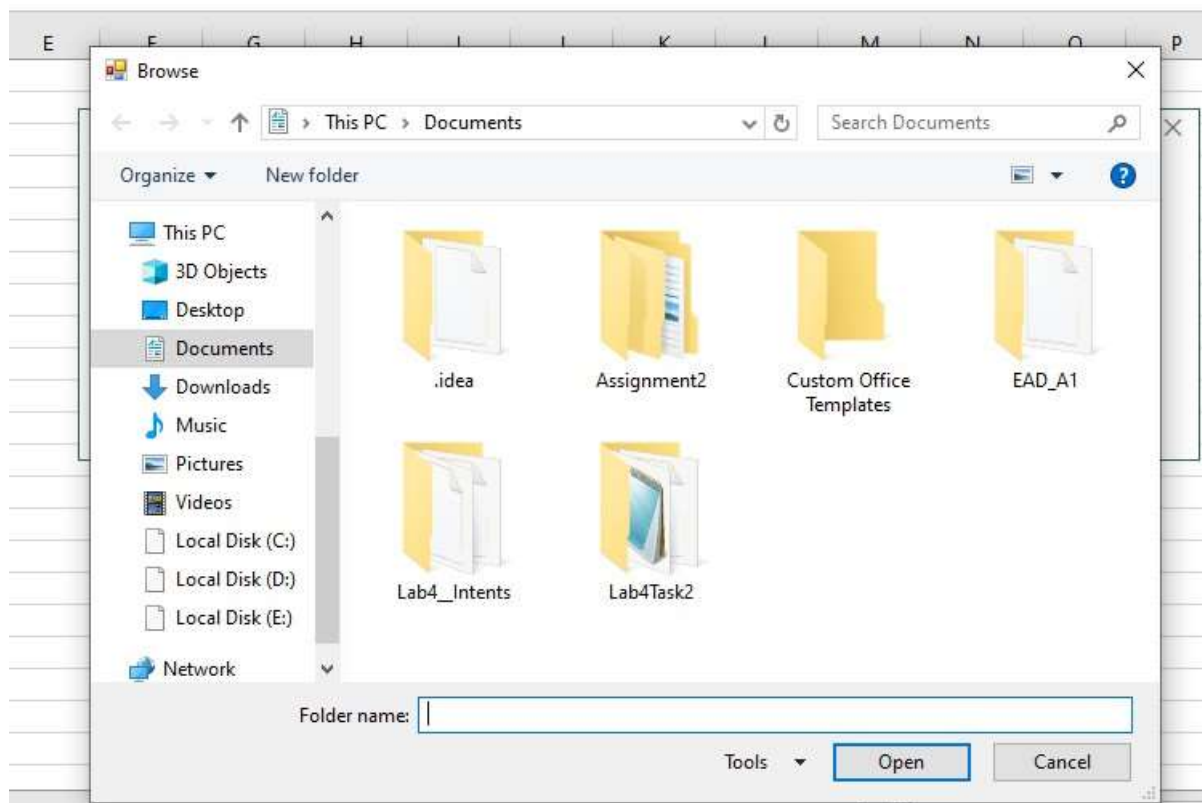


Figure 2. 43: Selecting Data Source Wizard

8. Practice Tasks

[Expected time = 30 min]

You are given the sheet below in Table 1. You are supposed to create an Excel spreadsheet and fill in the data and then complete the tasks given below. The data is given in the table. Copy this data into a newly created Excel sheet.

Table 2.3.: Sample data for Practice Tasks

S. No	S. Name	1 st Term (50)	2 nd Term (50)	Obt. Marks	Total Marks	%age	Grade
1	Huma	20	25		100		
2	Awais	22	12		100		
3	Ali	33	25		100		
4	Musab	21	33		100		
5	Musawar	32	22		100		
6	Mariam	25	32		100		
7	Sumbal	32	34		100		
8	Hammad	22	22		100		
9	Naveed	26	20		100		
10	Ashraf	28	18		100		

8.1 Calculate the obtained marks for the two terms

8.2 After calculating the marks find the percentage

8.3 Then apply the if formula and calculate the grades according to the MAJU scheme as given in the following table

Table 2.4: Grading Scheme for Practice Tasks

Grade	Marks
A	≥ 90
A-	$>85 \ \&\& \ <90$
B+	$>80 \ \&\& \ \leq 85$
B	$>75 \ \&\& \ \leq 80$
B-	$>71 \ \&\& \ \leq 75$
C+	$>65 \ \&\& \ \leq 71$
C	$>61 \ \&\& \ \leq 65$
C-	$>56 \ \&\& \ \leq 60$
D+	$>52 \ \&\& \ \leq 56$
D	$>50 \ \&\& \ \leq 52$
F	<50

8.4 Sort the grades in ascending order

8.5 Plot the data into a bar chart that shows the relationship between 1st term, 2nd term and total obtained marks. A sample is shown below in the **Figure 2. 44**.

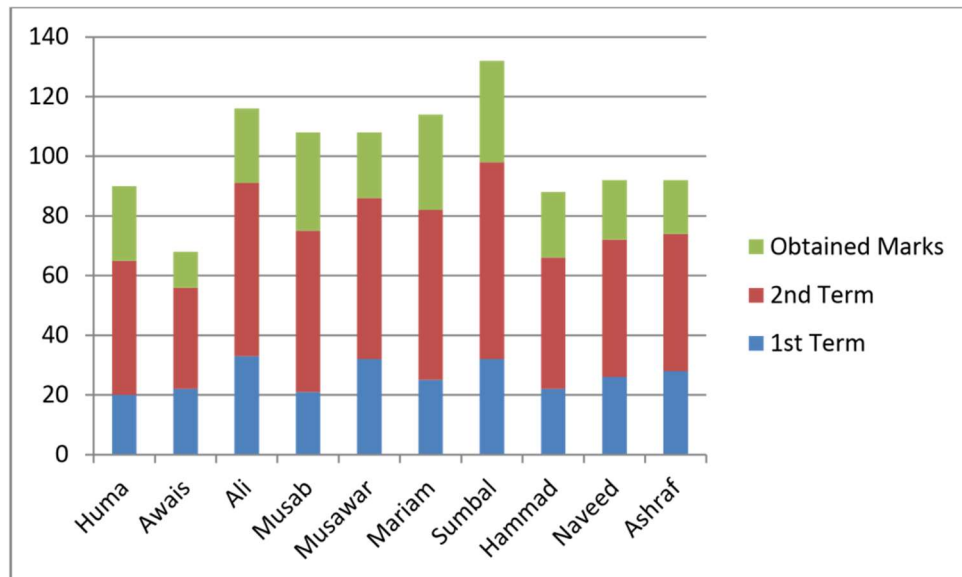


Figure 2. 44: Expected Outcome of Task 8.5

9. Evaluation Criteria

The evaluation criteria for this lab will be based on the completion of the following tasks. Each task is assigned the marks percentage which will be evaluated by the instructor in the lab whether the student has finished the complete/partial task(s)

Table 2.5: Evaluation of the Lab

Sr. No	Task No.	Task Description	Grade
1	5.1	Homework	20
2	6.1	Understanding Excel Layout	5
3	6.2	Walkthrough Tasks	5
4	7. 1-7.5	Practice Tasks	30
5		Quiz	40

10. Further Reading

☐ Free MS EXCEL tutorial: o

<http://www.gcflearnfree.org/excel>