M365 Excel Basics Video 02: Formula Inputs, Excel Model and Golden Rule

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Topics covered in the M365 Excel Basics Video 2:

Formula Inputs and Golden Rule

- ❖ Formula Inputs
- ❖ Build Worksheet Models
- ❖ Formulas and Calculations
- ❖ Relative Cell Reference
- ❖ Absolute Cell Reference
- ❖ Number Formatting
- ❖ Insert a chart

Additional Helpful Hints

How to Download files and save to folder

1. Right-click file link
2. Click on Save As
3. In the Save As Dialog box, create a folder where you can save all class files. Ctrl + Shift + N is keyboard to create a new folder
4. Save files to the folder that you created

How to Create a New Workbook

1. On your Search Box on the Task bar, Type Excel to search for the Microsoft Excel app.
2. Select Excel app to open a new Excel Workbook (default name is Book 1)
3. Press F12 to open the Save As dialog box, choose the folder where you would like to save your file into
4. On the File Name box, name the Excel Workbook to reflect what data will be stored in the workbook
5. Optional - If you would like to change the file extension type, click on the Save as type box arrow and select the file extension type.
6. Click the Save Button to save your file and close the Save As dialog box.

Please note: For this class we will use F12 to save our files for the first time and CTRL +S to save the changes we make to our files.

Proper Data Set

A *proper dataset* is also known as a *Table*.

A *Proper Dataset* has:

- **Column Headers** or **Field Names** in the first row. The Column headers at the top of each column indicates what data the column contains
- **Records** in the subsequent Rows
- Proper Dataset must also be surrounded by empty cells or worksheet column headers (Letters) and Worksheet row headers (Numbers)

Using Column names helps the user of the table to understand what the table contains. In our picture below, we can see that the Months are listed in the column named Months, Revenue is listed in the columns named Revenue, and so on. We also have implied the data type for each column, and we have the text value in one column the Months column and we have the number values in the other columns.

Each Row in a proper dataset is called a record, in the picture below each Row contains a record showing the monthly transactions.

	A	B	C	D	E	F	G	H
1	Months	Revenue	Expenses	Net Income				
2	January	$35,000	$26,250.00	$8,750.00				
3	February	$40,250.00	$30,187.50	$10,062.50				
4	March	$46,287.50	$34,715.63	$11,571.88				
5	April	$53,230.63	$39,922.97	$13,307.66				
6	May	$61,215.22	$45,911.41	$15,303.80				
7	June	$70,397.50	$52,798.13	$17,599.38				
8	July	$80,957.13	$60,717.85	$20,239.28				
9	August	$93,100.70	$69,825.52	$23,275.17				
10	September	$107,065.80	$80,299.35	$26,766.45				
11	October	$123,125.67	$92,344.25	$30,781.42				
12	November	$141,594.52	$106,195.89	$35,398.63				
13	December	$162,833.70	$122,125.27	$40,708.42				
14								
15								

Proper Dataset

	A	B	C	D	E	F	G	H	I
1	Months	Revenue	Expenses	Net Income					
2	January	$35,000	$26,250.00	$8,750.00					
3	February	$40,250.00	$30,187.50	$10,062.50					
4	March	$46,287.50	$34,715.63	$11,571.88					
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13	December	$162,833.70	$122,125.27	$40,708.42					
14									
15									

Field Names in First Row

Records

Why are Proper Datasets Important

We store our data in a proper Data set because:

- It helps to avoid repetition by having each filed listed once, for example the Month field is listed once.
- It enables you to easily make calculations, perform data analysis and create formulas
- Many of the tools and features in Excel require proper datasets, for example PivotTables, Filtering, Power Query and Power Pivot).

Excel Worksheet Models

An **Excel Model** is an Excel solution that you build in a worksheet and use to solve a problem, perform data analysis, or do what-if-analysis and can be used more than once. An Excel Table always starts with an Assumption Table (Formula inputs) or raw data. When building the Excel Model, we should always follow the Excel Golden Rule for building Excel Models by Mr. Michael Girvin and the rules for proper datasets. Examples of Excel models include a net projected income, payroll calculation or a financial cash flow model.

Excel Golden Rule

Golden Rule:

Always label your formula inputs so that any one who uses your worksheet can clearly understand your formula inputs and your Excel model.

If a formula input can change, put it in a cell and refer to it in the formula with a cell reference.

If a formula input will not change, it is ok to type it into a formula. For example 24 hours in a day, 7 days in a week, 24 months in a year.

Excel Golden Rules (by Michael Girvin)

- Always label your formula inputs so that it can be clearly understood by any user of the worksheet
- If a formula input can change, put it in a cell and refer to it in the formula with a cell reference
- If a formula input will not change, it is ok to type it into a formula for example 24 hours in a day, 7 days in a week, 24 months in a year.

Benefits of using the Excel Golden Rule

- When you list the Formula inputs with labels on the face of the worksheet, it makes the solution transparent, easy to find and read and clear to understand.
- The input label indicates exactly what the input represents
- It is easy to change the formula inputs when listed on the face of the worksheet
- It is easy to understand how the Excel solution is constructed if the inputs are visible on the face of the worksheet, it is also easy for others and your future self to understand how the calculations were made since you are documenting your Excel solution.
- Empirical research shows that hard coding the value into the formulas is the leading cause of spreadsheet errors. Following Michael Girvin's Excel Golden Rule and building an Excel Model will help avoid the risk of these errors (Girvin, Michael)

Create a Proper Dataset for the Net Projected Income

Open a new Excel Workbook and enter the following data. Be sure to name your workbook and the worksheet and save your workbook in your chosen location. You can name the worksheet Net Projected Income, Budget or the name of your choice to reflect what data is in the worksheet.

On the worksheet go to cell A9 and we will create an Assumption Table (Formula Inputs) for our Net Projected Income.

Assumption Table (Formula Inputs)	
Start Revenue for January	$35,000
Revenue % Increase	115.00%
Expenses as a % of Revenue	75.00%

On Cell A1, enter the data as shown on the picture below.

	A	B	C	D	E	F	G	H	I
1	**2024 3rd and 4th Quarter Net Projected Income**								
2	Months	January	February	March	April	May	June	Total	
3	Revenue								
4	Expenses								
5	Net Income								
6									
7									

As we learned in our Introduction to Excel video, or as seen in this video, apply the style formatting of your choice. Refer also to the notes for M365 Excel Basics video 1 on how to add the style formatting.

In Cell B3 we will follow Mr. Michael Girvin's Excel Golden Rules, and we will not (hard code) type in the Start Revenue for January, but we will use a Cell Reference, our cell reference will be: =B10. In this way if we change the Start Revenue for January from our Assumption Table, it will also update our Net Projected Income calculations.

Here is an explanation of how our formulas are calculating:

Start Amount	$100.00		100 + 100*.15	100 + 100*.15
Increase	15.00%		100 + 15	100*1 + 100*.15
Increase Amount	$15.00		115	100*(1+.15)
End	$115.00			100*1.15
				100*115%

Formula Inputs and Calculations

Formulas used in this calculation are as seen below.

2024 3rd and 4th Quarter Net Projected Income							
Months	January	February	March	April	May	June	Total
Revenue	=B11	=B4*B12	=C4*B12	=D4*B12	=E4*B12	=F4*B12	=SUM(B4:G4)
Expenses	=B4*B13	=C4*B13	=D4*B13	=E4*B13	=F4*B13	=G4*B13	=SUM(B5:G5)
Net Income	=B4-B5	=C4-C5	=D4-D5	=E4-E5	=F4-F5	=G4-G5	=SUM(B6:G6)

Assumptions Table (Formula Inputs)	
Start Revenue for January	35000
Revenue % Increase	1.15
Expenses as a % of Revenue	0.75

	A	B	C	D	E	F	G	H
1	2024 3rd and 4th Quarter Net Projected Income							
2	Months	January	February	March	April	May	June	Total
3	Revenue	$35,000.00	$40,250.00	$46,287.50	$53,230.63	$61,215.22	$70,397.50	$306,380.85
4	Expenses	$26,250.00	$30,187.50	$34,715.63	$39,922.97	$45,911.41	$52,798.13	$229,785.63
5	Net Income	$8,750.00	$10,062.50	$11,571.88	$13,307.66	$15,303.80	$17,599.38	$76,595.21
6								
7								
8								
9	Assumption Table (Formula Inputs)							
10	Start Revenue for January	$35,000						
11	Revenue % Increase	115.00%						
12	Expenses as a % of Revenue	75.00%						
13								

In our calculations for the Net Projected Income in addition to building an Excel Model and following the Excel Golden Rules, we also used Relative and Absolute Cell References. We also applied style formatting and added Number Formatting. We learned about the Relative and Absolute Cell References in our M365 Excel Basics Video 1, and we will learn more about number formatting in our next lesson M365 Excel Basics Video 3.

Number Formatting is a **Façade**, and it allows you to change the appearance of a number which is how the number is displayed without changing the actual number in the cell.

To add Number formatting to your values:

- On your Ribbon, click on the>>> Home Tab >>> Number Group
- Click on the General box arrow to show the drop-down list, select the type of Number Formatting you would like to apply.

Or

- Use the Keyboard shortcut CTRL +1 to open the Format Cells Dialog Box
- Select the Number Tab
- Choose from the Category box they type of the Number Formatting that you would like to use and then click OK button.
    - For the case of our example, we will select Currency or Accounting Number Formatting.
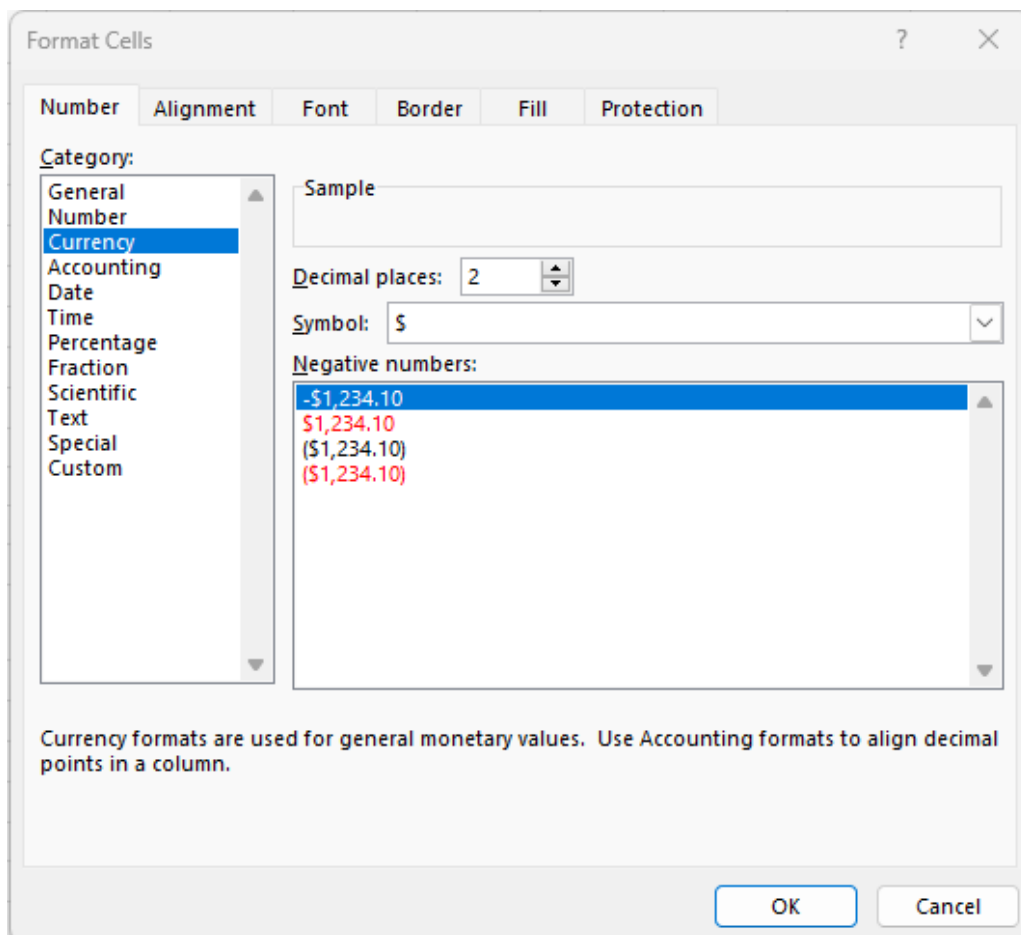
Relative Cell Refences and Absolute Cell Reference

Refer to M365 Excel Basics 1 handout notes on a more in-depth definition and explanation of the Relative and Absolute cell references.

Relative Cell References

- By default, cell references in Excel are relative. Formulas that contain the Relative Cell References change or move throughout the copy selection as you copy it from one cell to another. Thus, Relative Cell references that will move throughout the copy action

Absolute Cell References

- Absolute Cell References are Cell References that "Do Not Move" as you copy a formula. The Cell references that is always locked throughout the copy action.

Visualize Data with Excel Charts

1. What do Charts do?
    a. Visually shows quantitative data (number data).
    b. Give a quick impression of the number data.
    c. Create a picture that can communicate more quickly than just the numbers alone.
    d. Charts allow you to see patterns or trends that you may not be able to see if you are looking at just the number data.
    e. Allows you to make relative comparisons more quickly than if you are using a table

2. Types of Charts
    a. **Column**: Use to compare differences across categories. Height of column conveys number.
    b. **Bar**: Use to compare differences across categories. Length of bar conveys number.
    c. **Stacked Column/Bar**: Good for displaying crosstabulation, emphasis on horizontal axis categories.
    d. **Clustered Column/Bar**: Good for displaying crosstabulation, emphasis on legend categories.
    e. **Line**: Use to show trend for a number variable over a category such as time.
    f. **X-Y Scatter**: Used to show relationship between two number variables (x and y variables).

3. Rules for Charts:
    a. No Chart Junk.
    b. Eliminate all chart elements that do not help to communicate the message.

4. Formatting Charts:
    a. You can add and remove chart elements by using the Green + on the right side of chart.
    b. To format a chart element, select element and use the keyboard Ctrl + 1 to open the Format Chart Element task pane.

5. Link Labels to Cells
    a. Click on Chart Title, type an equal sign, click on cell with title, hit Enter key on your keyboard.

How to Insert a chart for data the Net Projected Income

1. Select the cells Range B2:G2, (Months)hold down the CTRL Key and select the cell range B5:G5 (Net Income).
2. On your Ribbon select the Insert Tab and on the Charts Group, select or click on the Insert Column or Bar Chart Button arrow, then select Clustered column from the 2-D section.
3. Select the Chart Title (be sure to see a solid line) also don't select inside the chart title as this will put it in edit mode. Type the = sign (you should see the = sign on the formula bar). Click on Cell A1 and press Enter (cell A1 has the title for our report and we are referencing that title in our chart.
4. Make sure that the Chart is selected and click on the Chart elements button which is the GREEN + on the right side of the chart. Add a check mark on the Data Labels. You can also select the arrow on the Data Labels to select where to position your data labels on the chart. (I'm selecting the Outside End option)
5. To remove the Vertical Axis:
   a. Click on the Chart Elements, click on the Axes arrow, uncheck the box for the Primary Vertical
      Or
   b. On your Chart, carefully select the Vertical Axis (be sure to see the solid line) and press the Delete Key
6. To remove or delete the horizontal lines, carefully click on one of the inside horizontal lines (be careful not to click on the top line as it will select the plot area), then press the Delete key on your keyboard.
7. To change the color of the columns, Press CTRL +1 to open the Format Chart Area if you do not have it open.
   Format Chart Area to format is used to format the charts. Use CTRL +1 to open the Format Chart Area.
   a. Click on the Fill & Line button.
   b. Click on the Fill (make sure that you have selected the columns on your chart).
   c. Click on the Solid Fill (to expand the Fill section)
   d. On the Color button, click on the arrow to select the color of your choice
      i. If you would like to have different colors for the column bars, check the box Vary colors by point.
   e. Close the format chart area once you are done formatting
   f. Use the Move Cursor to place the chart where you would like it to be on your worksheet. ALT key helps snap the chart to the grid.
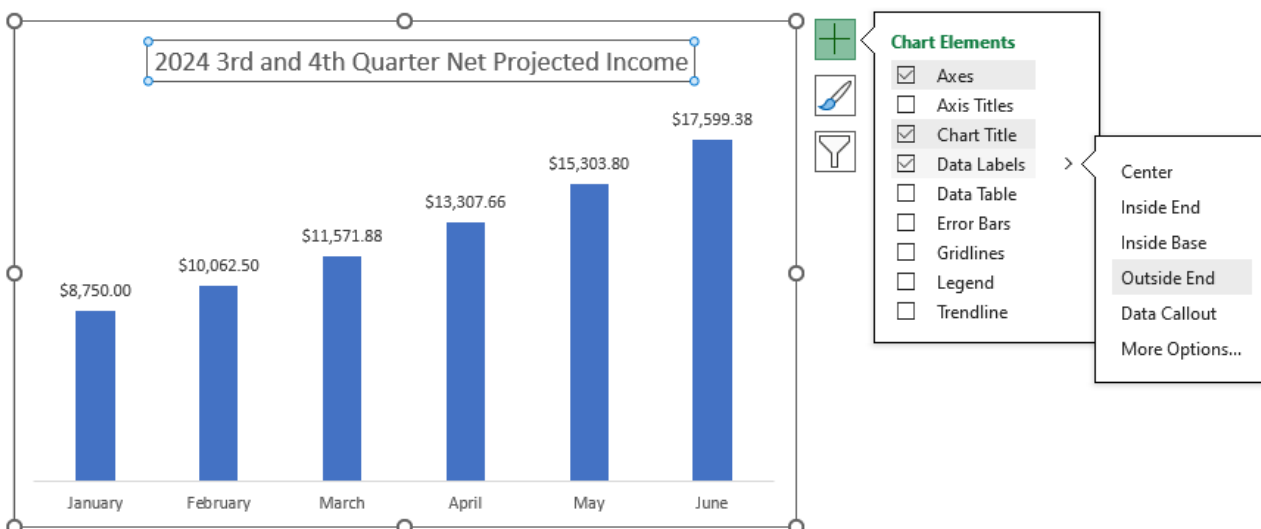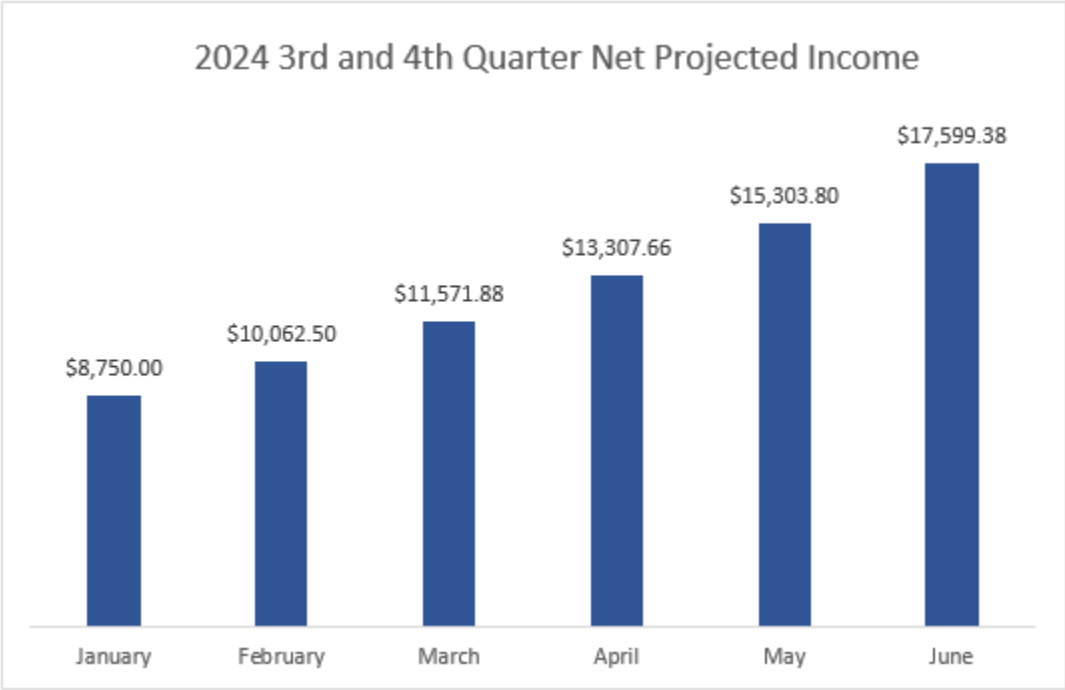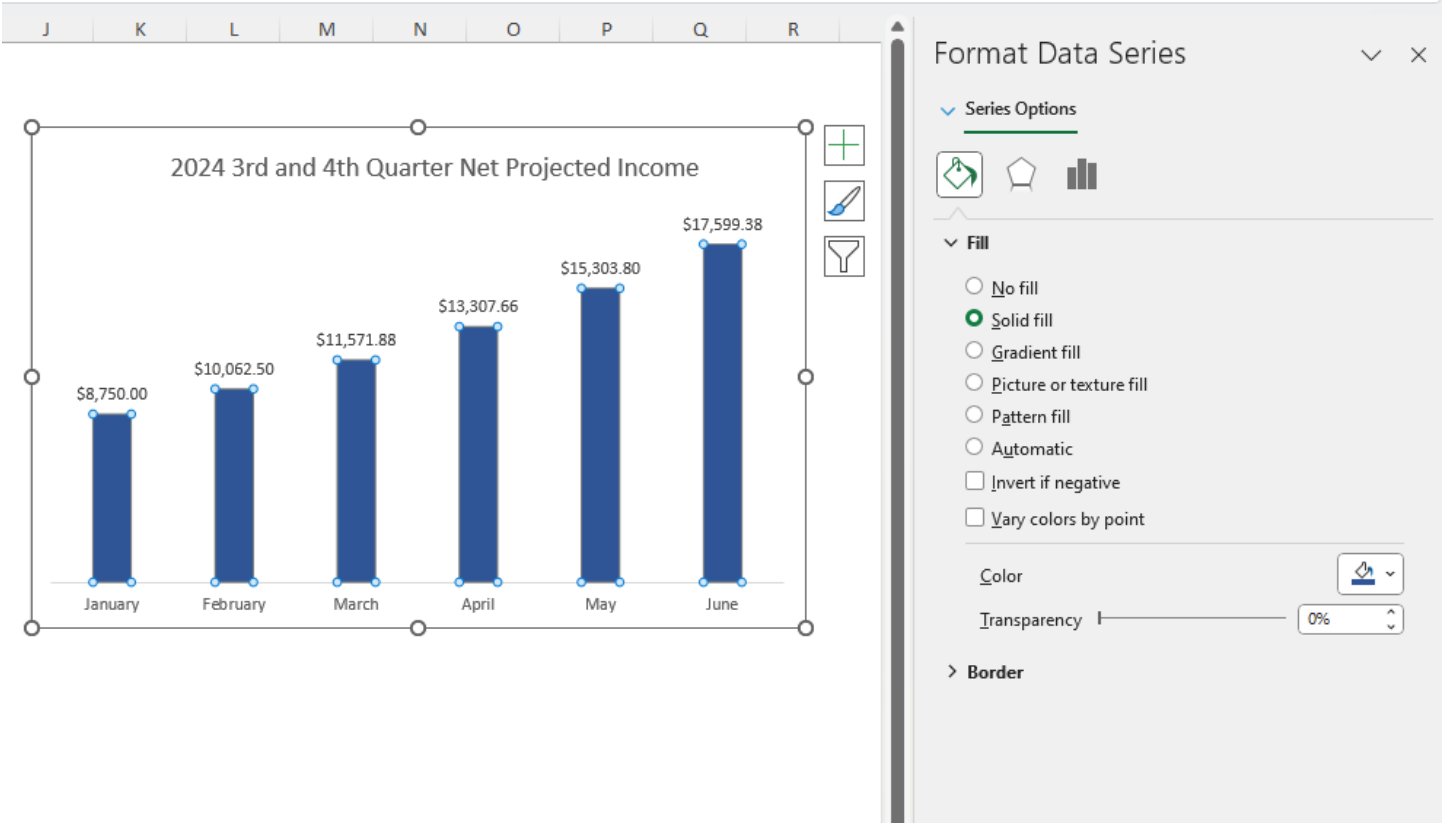
Net Projected Income calculation and Chart

	A	B	C	D	E	F	G	H	I
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9	Assumption Table (Formula Inputs)								
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2024 3rd and 4th Quarter Net Projected Income