# A Short Guide to Microsoft Excel

The following document has been prepared using Microsoft Excel 2019 (or Microsoft Office 365) on Windows.

Some small changes may occur between versions or operating systems.

If you are looking for something in particular, try use **Ctrl+F** to search this document or jump to a section.

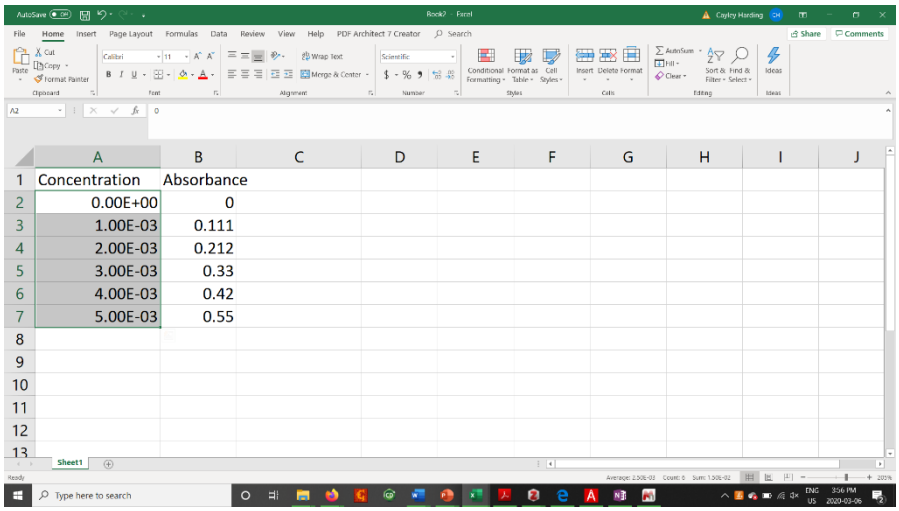


*Adapted from guidelines originally prepared by CHEM 203 Lead TAs, Rishabh Shukla and Shauna Schechtel, Fall 2019*

# Making a graph in Excel

1. Label two columns with appropriate specific titles for your data, including units (e.g., concentration (M) and absorbance).

Type your experimental data into the columns under the correct title. Should look like the example to the right. Whatever you want on the x-axis should be in the left column, the right column will be your y-axis.



| | A | B |
|---|---|---|
| 1 | Concentration | Absorbance |
| 2 | 0.00E+00 | 0 |
| 3 | 1.00E-03 | 0.111 |
| 4 | 2.00E-03 | 0.212 |
| 5 | 3.00E-03 | 0.33 |
| 6 | 4.00E-03 | 0.42 |
| 7 | 5.00E-03 | 0.55 |

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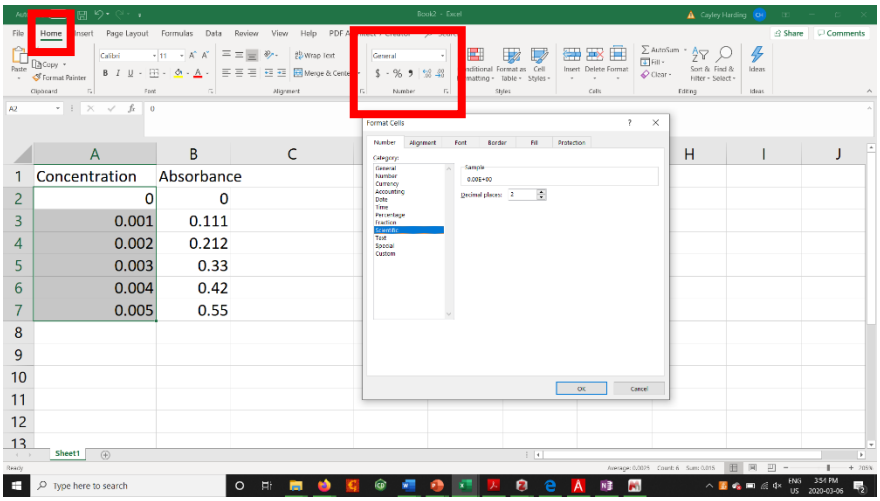
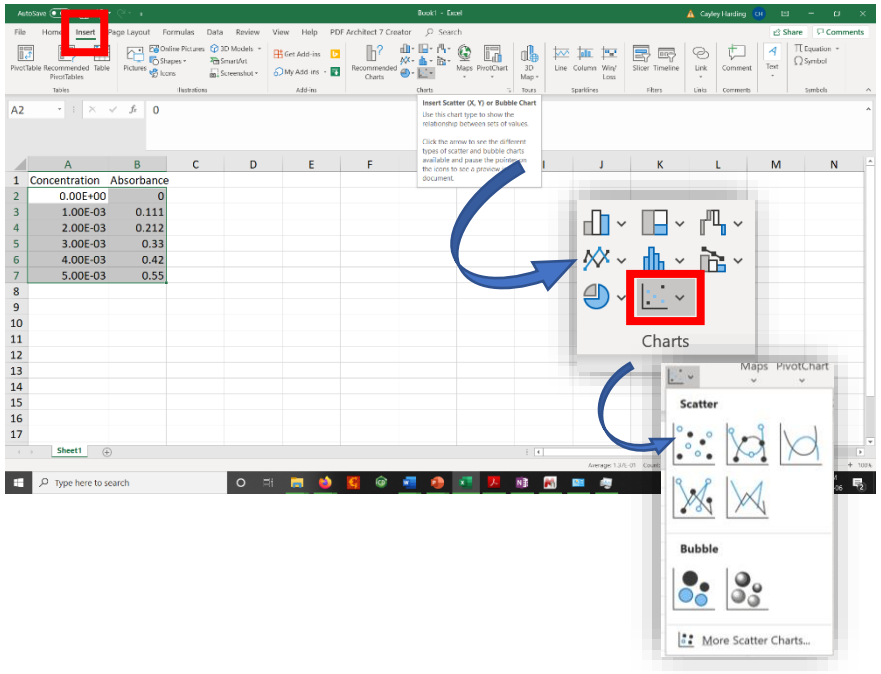
2. If you want to change your values to **scientific notation** select the numbers, click number tab in the home tab and select scientific notation.



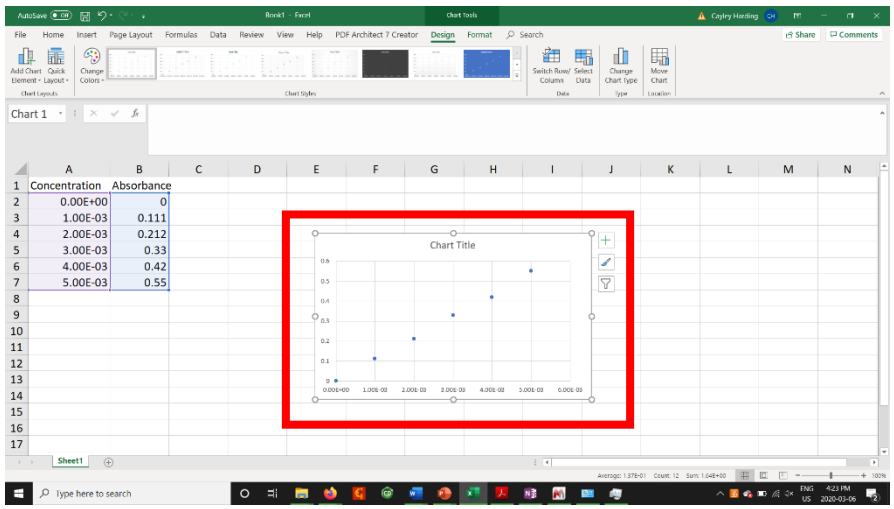
| | A | B |
|---|---|---|
| 1 | Concentration | Absorbance |
| 2 | 0 | 0 |
| 3 | 0.001 | 0.111 |
| 4 | 0.002 | 0.212 |
| 5 | 0.003 | 0.33 |
| 6 | 0.004 | 0.42 |
| 7 | 0.005 | 0.55 |

3. Once values are entered select your data. Click on the ***Insert*** tab. Under the insert tab you will look for the section labeled ***Charts***.




The type of chart you would like to select is ***Scatter,*** represented by the graph axes and dots.

After locating the scatter plot graph click on the drop-down menu for the scatter plot and select the graph type which is labeled as ***Scatter*** by clicking on the icon for the scatter graph.



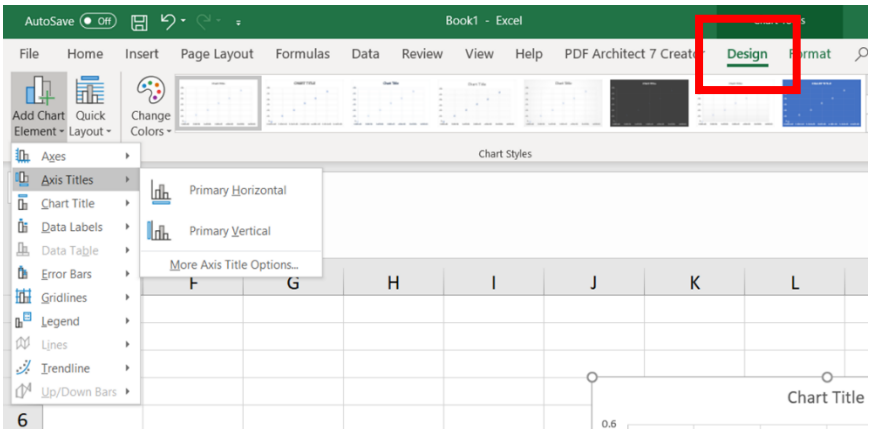

Once you have clicked on the scatter graph (Chart) should appear.

# Formatting a graph in Excel

1. **Adding axis titles.**

Select your graph by clicking it.

Under *Design* tab, select *Add Chart Element,* then the option o*f Axis Titles. Y*ou can add to your x axis by selecting *Primary Horizontal* and to your y axis by selecting *Primary Vertical.*

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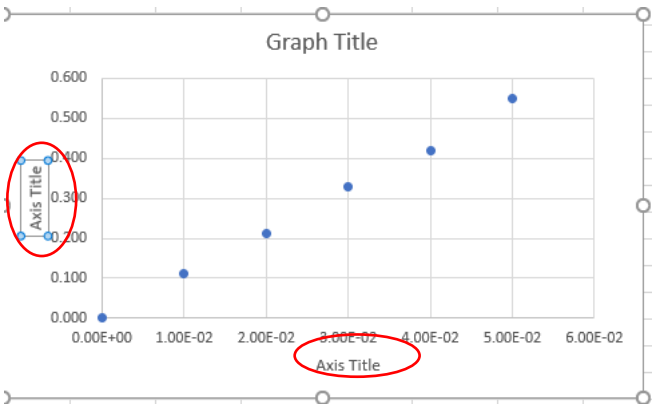
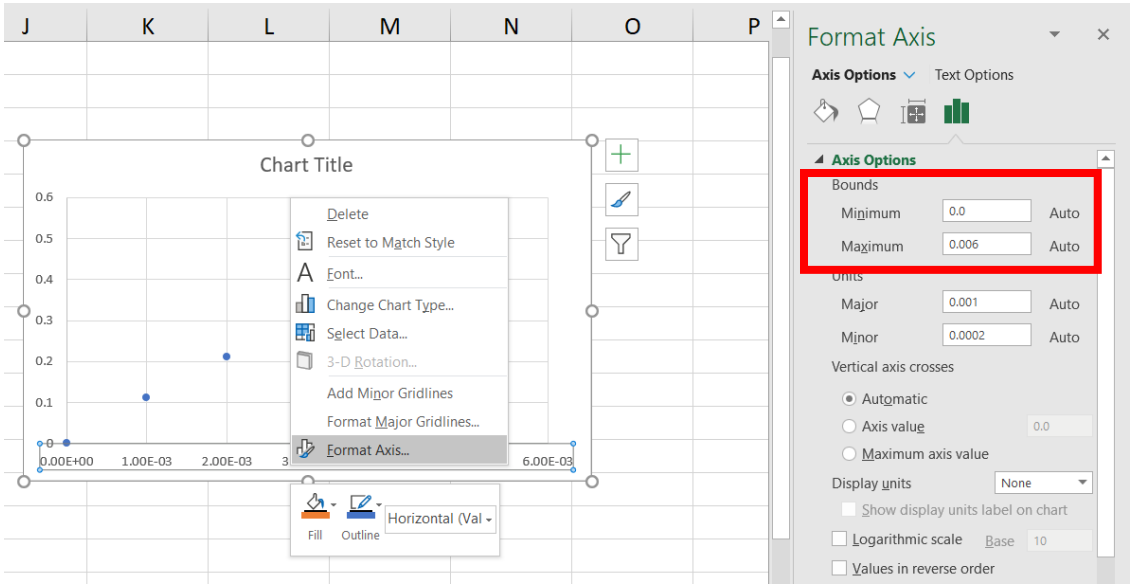
2. You will see small boxes next to the x and y axes. Edit the boxes by double clicking on them. Add axes label with proper units.



3. **Scale the axes** to the appropriate size.
Click on the numbers on the graph you want to change to select them. Right click and select Format axis from the dropdown menu. A new menu will appear on the right, you can change the values under the *Bounds* to specifically what you want. The major units value will add a repeating and labelled tick mark in the entered increment. You can repeat this for each axis.

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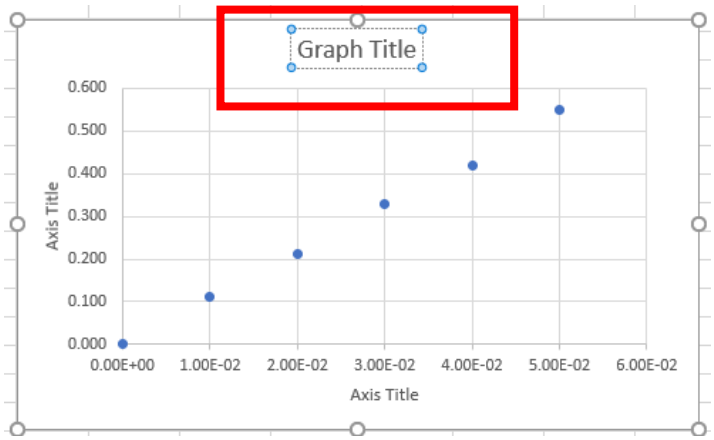
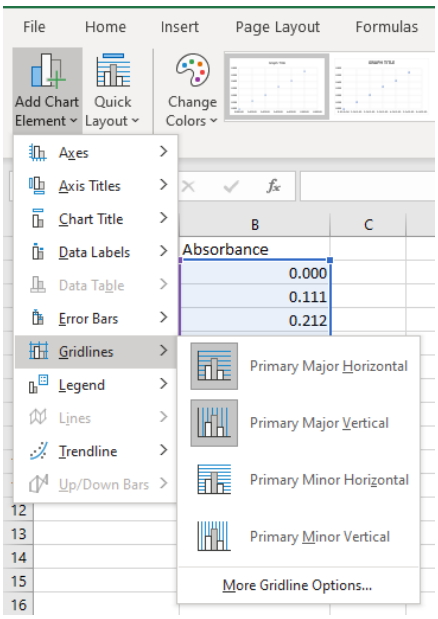
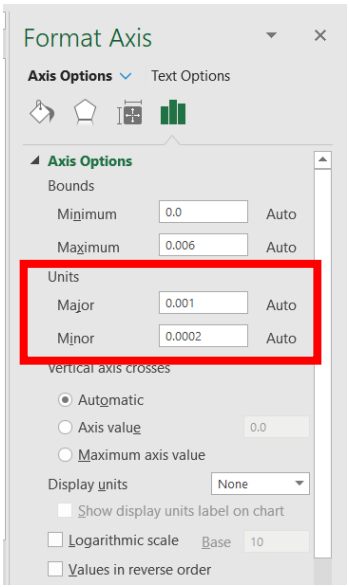
6. **Edit your title**
Click twice on Graph Title box on your chart, you can edit it to an appropriate one. *(See Appendix D, page A12 of Chem 203 Laboratory Manual for how to write a title of graphs/tables)*



7. **Add gridlines to the graph**
With graph selected and under *Chart Design* tab, select *Add Chart Element*, and then *Gridlines.* You will now be able to find its sub-tab of both major and minor grids for both horizontal and vertical.




The more gridlines you have, the more precisely you can read your graph (until they start to blur together on the printer!).

If you go back to the *Axis options* sub-menu, you can determine the major and minor units and hence the spacing between your gridlines.

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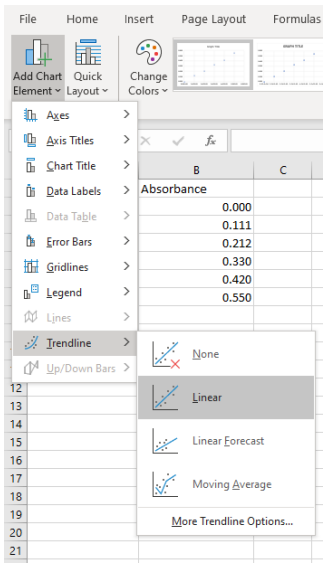
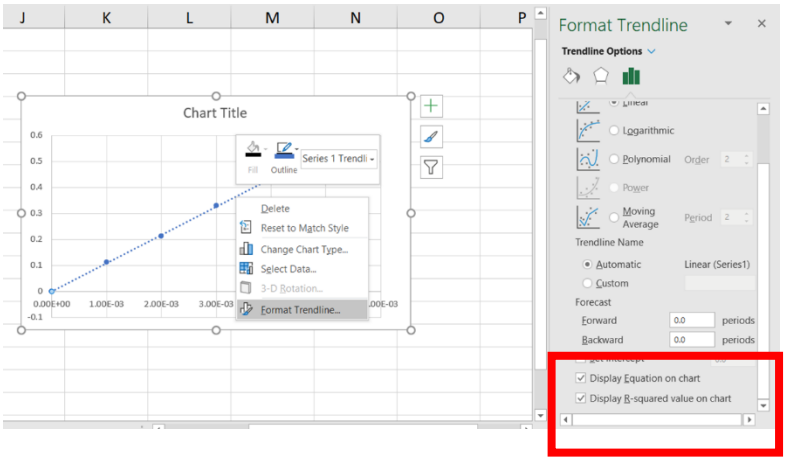
8. **Adding a line of best fit to your graph**
Go to *Add Chart Element* under *Chart Design* tab, by selecting *Trendline*, you will be able to find its sub-tab *Linear* to add a straight line to fit your data.

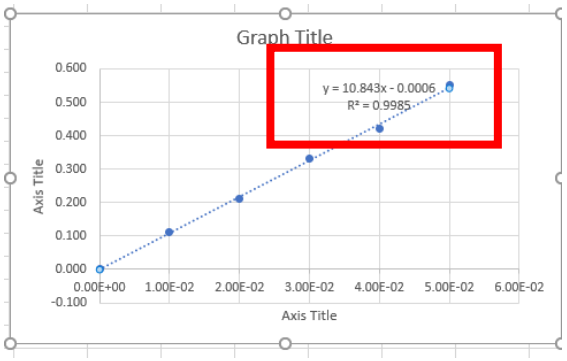
If your data does not follow a rough linear trend, you should draw a smooth curve by hand.



9. **Adding the equation of the trendline.**

Click the trendline on your graph, right click and select Format Trendline. A menu will appear to the right, scroll to the bottom and select Display Equation on chart and Display R-squared value on chart. The equation will appear on your graph.



# Performing Repeated Calculations in Excel

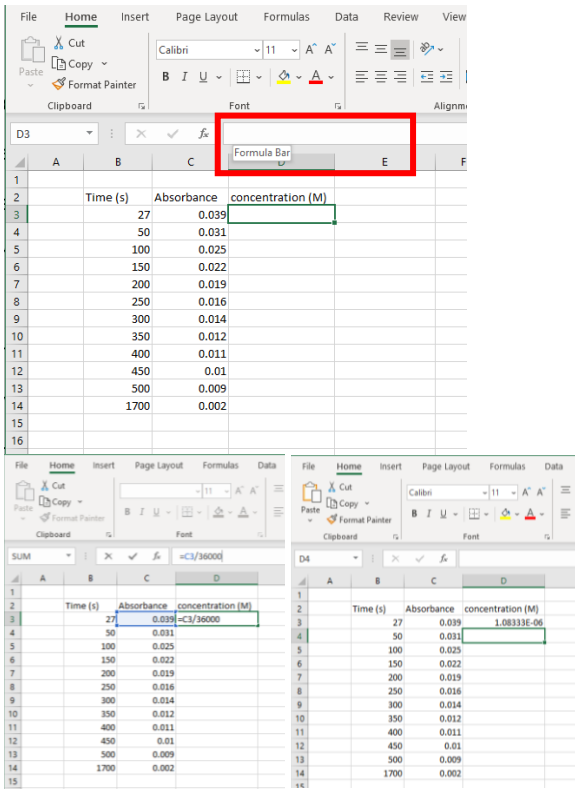
1. **Equations in Excel**

Click the cell where you want to add the equation. Click on formula bar highlighted in the screenshot and type "=" followed with your equation.

For example, if you want to calculate the concentration based on known *el* value 36000 and first absorbance reading in the screenshot, you type =C3/36000 into the Formula Bar.

Instead of formula bar, you can also type into a cell directly by double clicking the cell.

After entering correct formula, hit ***Enter*** to get the actual value.

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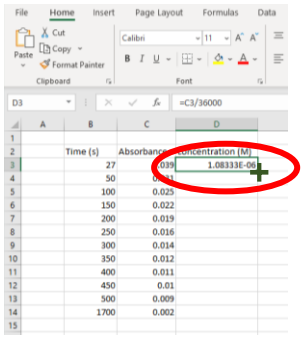
2. **Repeating a calculation**

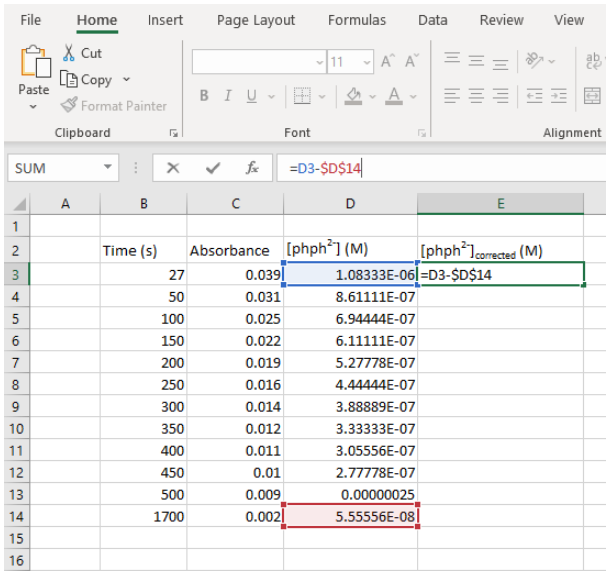
Select the cell which already has a formula, put your cursor to the bottom right corner of the cell until you see a solid cross, hold your cursor and drag down to the box you want.

Excel guesses the new formula based on the original formula. If you typed "=C3/36000" in cell D3, and dragged as above to cell D5, Excel will populate cell D4 with "=C4/36000" and cell D5 with "=C5/26000". If you drag across a row, it will change the column letter in the formula.



3. **Absolute references**

Sometimes, you want Excel to vary only parts of a formula, while keeping parts of it fixed. Then, you can use absolute references.
For example, in experiment 3, the corrected concentration of $phph^{2-}$ at equilibrium is calculated. You can use the value of the real-time value subtracts the unreacted concentration value, by doing this, you can use the formula =D3-$D$14 as shown in the screenshot for first value calculated in ***E3*** and hit ***Enter.***




In "$D$14", the first $ locks the column and second $ locks the row to the referenced cell.

4. You can repeat step 2 here to repeat the same calculation for other absorbance values.

5. **Natural logarithms**

In experiment 3, you will also use a function to calculate natural logarithms.
You can call the function with "=LN(E3)" to calculate natural log of the value in E3.

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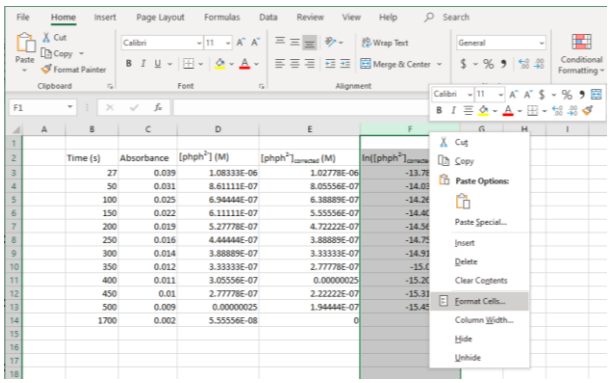
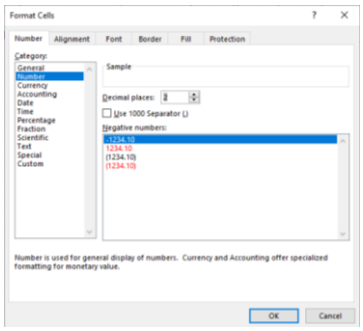
5. **Significant figures in excel**
Right click a cell or a selection of cells and go to **Format Cells**. In **Number** tab, select **Number** category. Type the number of decimal places you need.

*(See Appendix D, page A8 of Chem 203 Laboratory Manual for how many significant figures to report)*

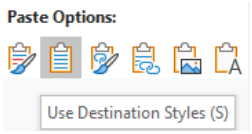


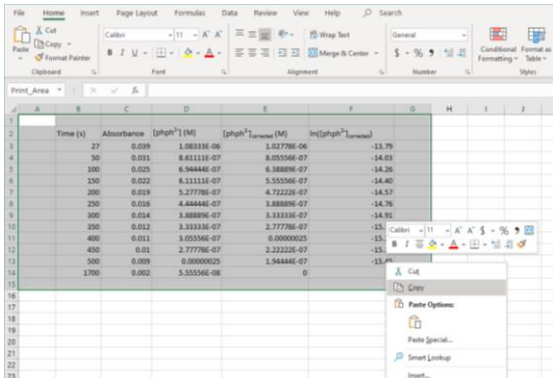



Note: Please *do not* use the scientific notation of Excel (e.g., 1.0E+00)

6. Copy Excel tables

Select the area you want to copy in Excel, then go to Word, right click the place you want to paste it by selecting ***Use Destination Styles***.



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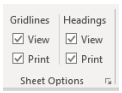
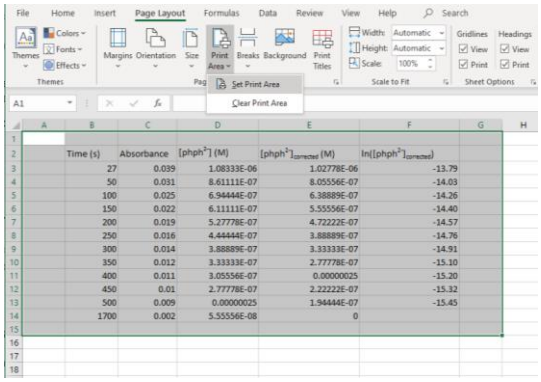
7. Print Excel tables to Word

Click ***Page Layout*** tab, select the data/area you want to print, then go to ***Set Print Area*** under ***Print Area*** tab.

Under Page Layout tab, check the print box for Gridlines option. Go to File tab and click print to print the table.



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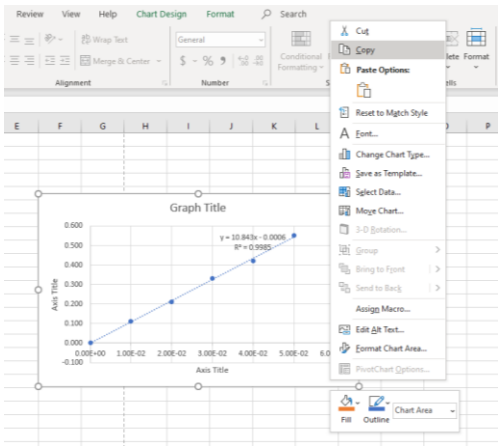
7. Copy Excel graphs to Word

Select the graph you want to copy, then copy and paste it to Word.

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7. Print Excel graphs

Select the graph you want to print, then go to the ***Print*** command under ***File*** tab.

Set to landscape orientation and press ***Print***.