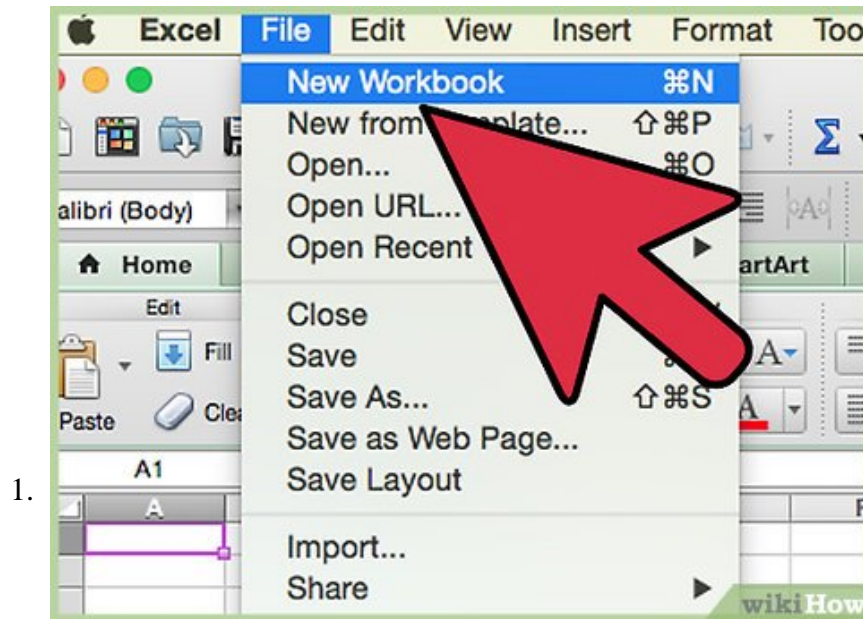


How to Create Artistic Patterns in Microsoft Excel

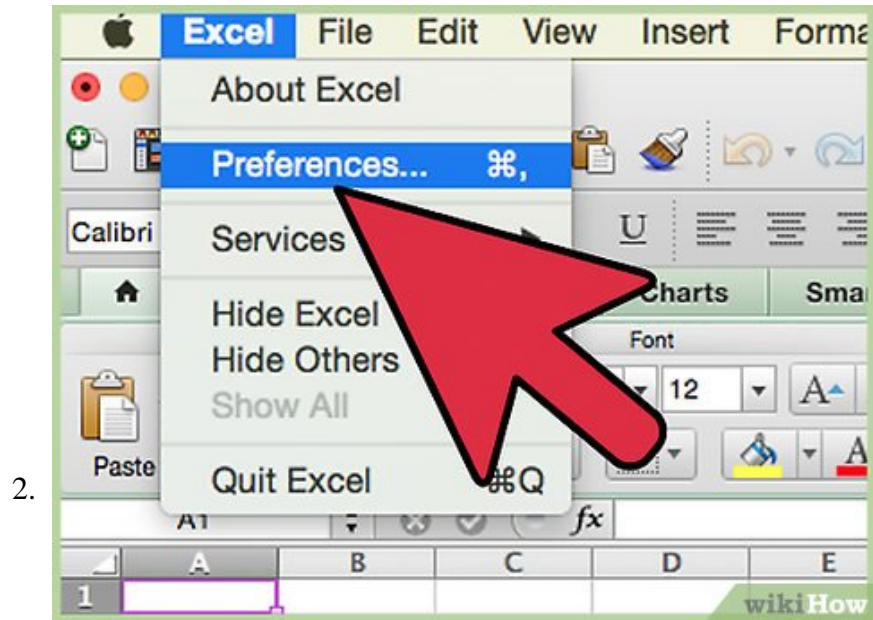
Have you ever wanted to create special designs and patterns? This article will show you how you can make cool patterns using Microsoft Excel. It's followed by 14 more articles of artistic designs that build from this beginning. Open a new...

Part 1 of 3:

The Tutorial

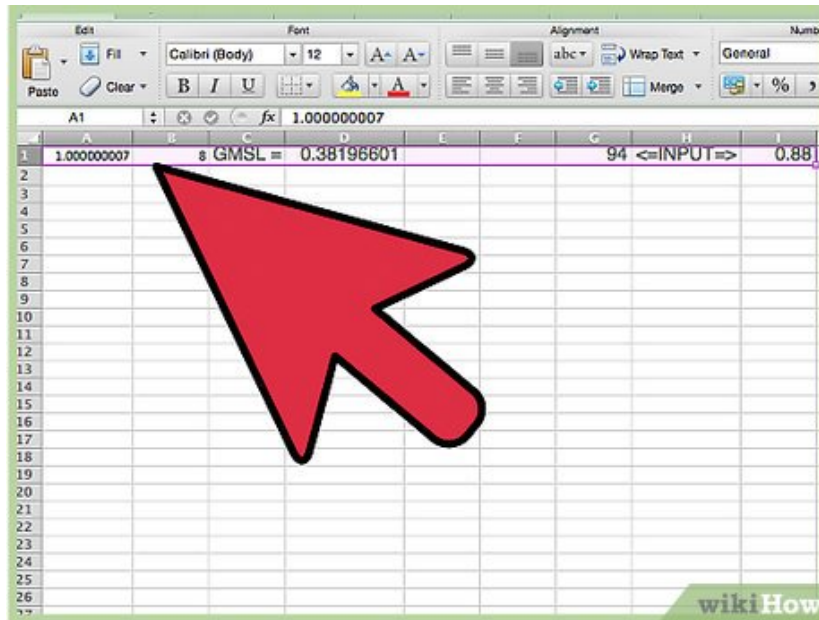


Open a new Excel workbook and create 3 worksheets. Name them Data, Chart (unless you're using Chart Wizard) and Saves. Save the workbook into a folder with a name you can easily remember.



Set Your Preferences: Open Preferences in the Excel menu and follow the directions below for each tab.

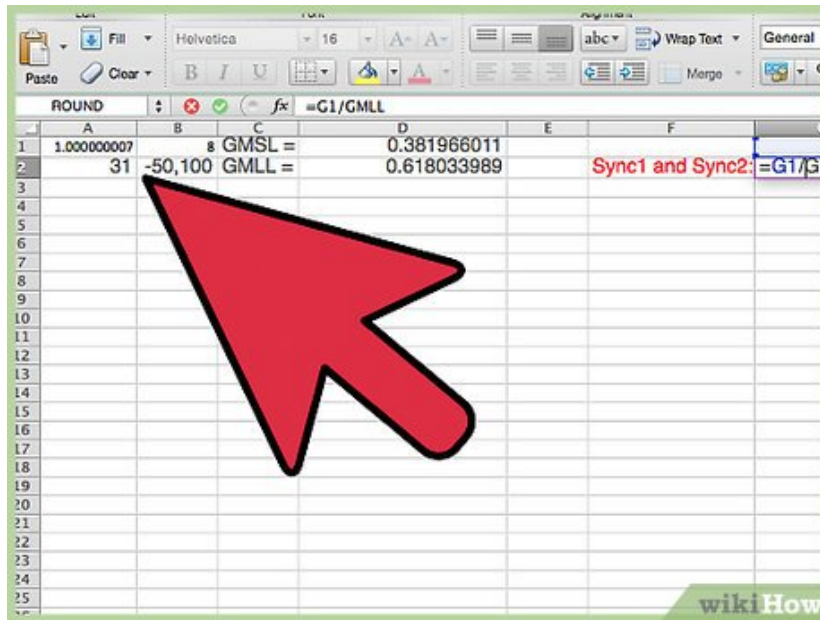
1. In General, set *RIC1* to Off and select *Show the 10 Most Recent Documents*.
2. In Edit, set all the first options to checked except *Automatically Convert Date System*. Set *Display number of decimal places* to blank (as integers are preferred). Preserve the display of dates and set 30 for 21st century cutoff.
3. In View, click on show *Formula Bar* and *Status Bar* and hover for *comments of all Objects*. Check *Show grid lines* and set all boxes below that to auto or checked.
4. In Chart, allow *show chart names* and set *data markers* on hover and leave the rest unchecked for now.
5. In Calculation, Make sure *Automatically* and *calculate before save* is checked. Set max change to .000,000,000,000,01 without commas as goal-seeking is done a lot. Check *save external link values* and *use 1904 system*
6. In Error checking, check all the options.
7. In Save, select *save preview picture with new files* and *Save Auto-recover* after 5 minutes
8. In Ribbon, keep all of them checked except *Hide group titles* and *Developer*.



3.

Select the Data worksheet and input the row 1 Defined Variables and Formatting.

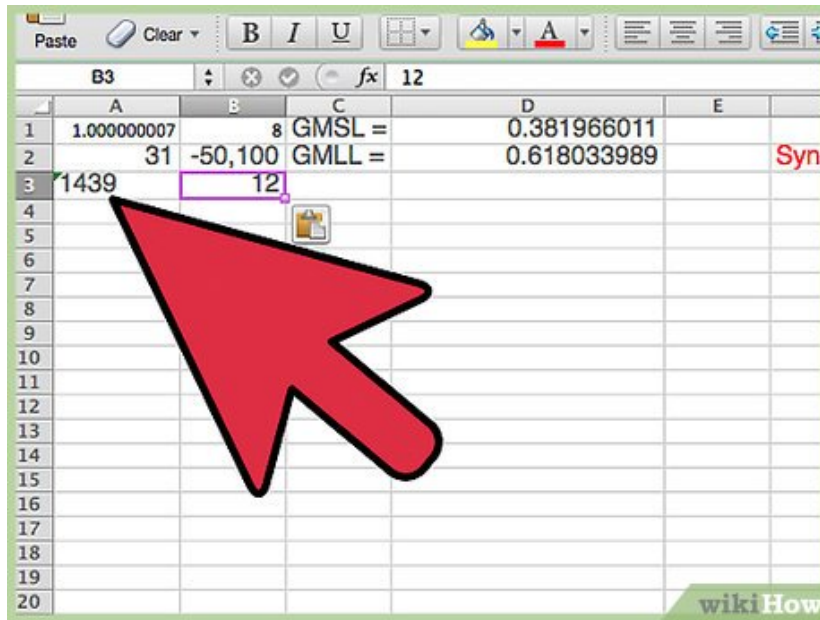
1. A1: 1.000 000 007 w/o spaces and Format Cells Number Number Custom "Adjuster" 0.000 000 000 (with quotes and w/o spaces). This number is very sensitive to extremely small changes. The image at top is with setting = 1. Format Cells Fill Light Yellow and Font Orange.
2. B1: 8 and Format Cells Number Number Custom "S's Count" 0 (for Spheroids Count originally) and Format Cells Fill Green and Font Black Bold. Insert Name Define name S_COUNT to cell \$B\$1.
3. C1: "GMSL =" w/o quotes and aligned right.
4. D1: 0.381 966 011 250 105 w/o spaces between decimals. Insert Name Define name GMSL to cell \$D\$1.
5. G1: .94 and Format Cells Number Number Custom "Sync1 ".0000 and Fill Light Yellow and Border Black bold Outline.
6. H1: "=INPUT=> " w/o quotes. and alignment Horizontal Center.
7. I1: .88 and Format Cells Number Number Custom "Sync2 ".0000 and Fill Light Yellow and Border Black bold Outline.



4.

Input the row 2 Defined Variables and Formatting.

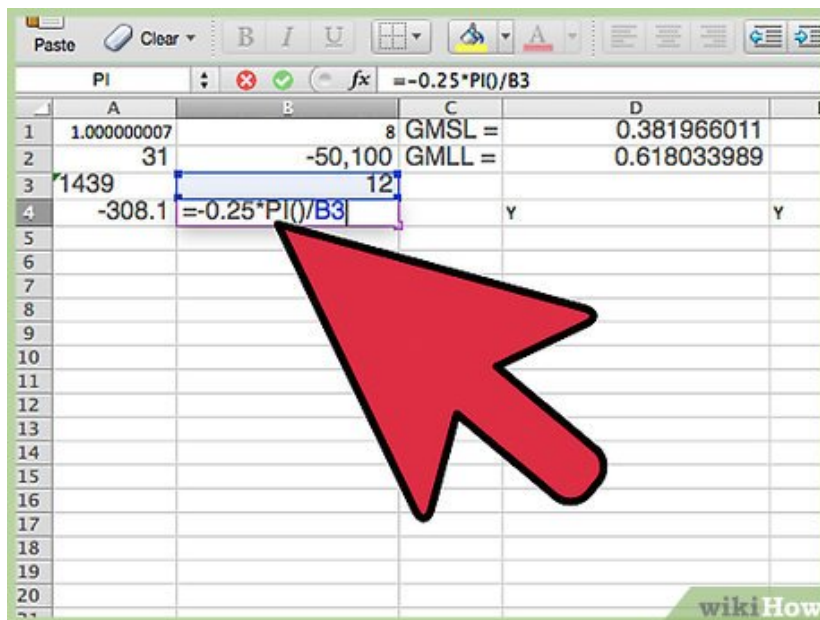
1. A2: 31 and Format Cells Number Number Custom "TURNS "+0;"TURNS "-0 and Format Cells Fill Canary Yellow and Font Blue and Insert Name Define Name TURNS to cell \$A\$2.
2. B2: -50,100 and Format Cells Number Number Custom "Designer "+0;"Designer"-0;"Zero Tolerated"+0. Insert Name Define name Designer to cell \$B\$2 and Format Font Italic.
3. C2: "GMLL = " w/o quotes and aligned right.
4. D2: 0.618 033 988 749 895 w/o spaces between decimals. Insert Name Define name GMLL to cell \$D\$2.
5. F2: Sync1 and Sync2: in red font and aligned right.
6. G2: Input the formula w/o quotes "=G1/GMLL" and Insert Name Define name Sync1 to cell \$G\$2 and Format Cells Fill Color Blue and Font Dark Blue.
7. H2: "=Let Calc=> "
8. I2: Input the formula w/o quotes "=I1/GMSL" and Insert Name Define name Sync2 to cell \$I\$2 and Format Cells Fill Color Blue and Font Dark Blue.



5.

Input the row 3 Defined Variables and Formatting.

1. A3: 1439 and Format Cells Number Number Custom "AdjRows "0 and align right. Insert Name Define Name AdjRows to cell \$A\$3.
2. B3: 12 and Format Cells Number Number Custom "Var" +0.000000;"Var" -0.000000

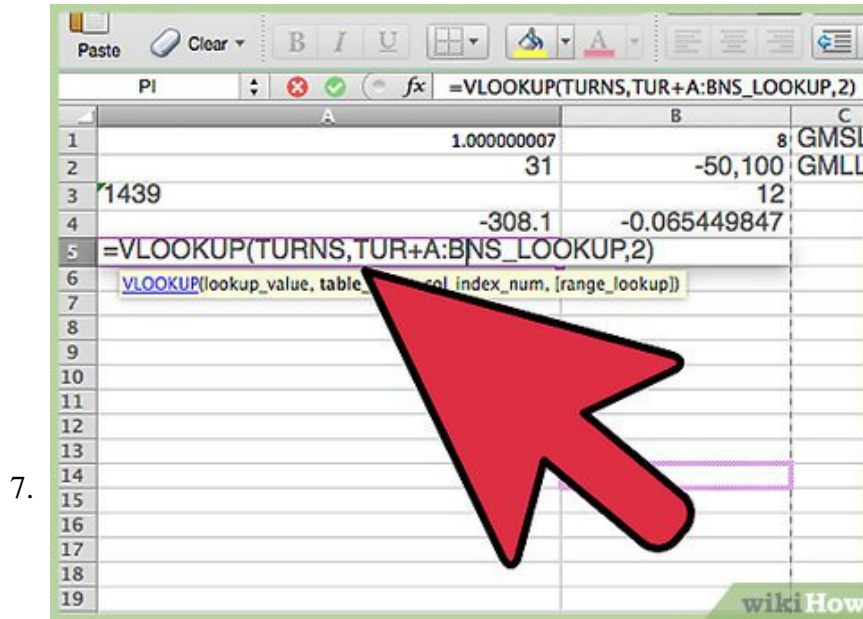


6.

Input the row 4 Defined Variables and Formatting.

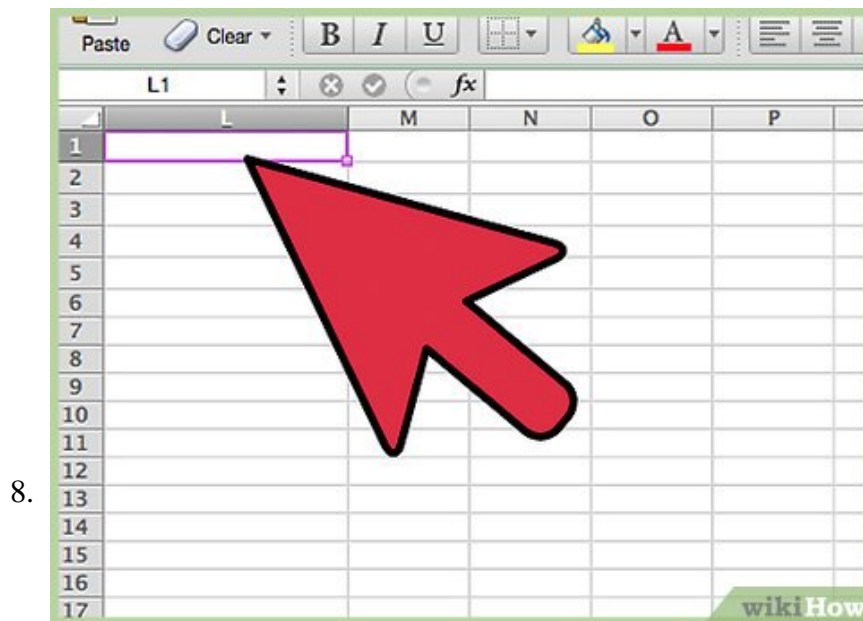
1. A4: -308.100 and Format Cells Number Number Custom "t" +0.0000;"t" -0.0000 and align right.
2. B4: Input the formula w/o quotes " $=-0.25*PI()/B3$ " and Format Cells Number Number Custom "Cc" +0.00000000;"Cc" -0.00000000 and align right and Insert Name Define Name Cc to cell \$B\$4.
3. D4: Y and Format Cells font red and Border Double Line Red Outline and here is the image if N is selected:
4. E4 Align left the following message in red font: "Input Y or N: If Y and cell B1 Input 24 and Even, Factor variable will be proportioned"

- E5 Align left the rest of the message: "so that the Spheroids are more spherical in a partial Circle and less elongated/podoid."



Input the row 5 Defined Variables and Formatting.

- A5: Enter the formula w/o quotes "`=VLOOKUP(TURNS,TURNS_LOOKUP,2)`" and format italic and align right.
- B5: 4.5 and Format Cells Number Number Custom "db" +0.00000000;"db" -0.00000000 and Insert Name Define name db to cell \$B\$5.
- C5: Enter the formula w/o quotes "`=ABS(Factor/0.25)`" and Format Cells Number Number Percent 2 decimal places and align right.
- D5: Enter the formula w/o quotes "`=IF(AND(S_COUNT`

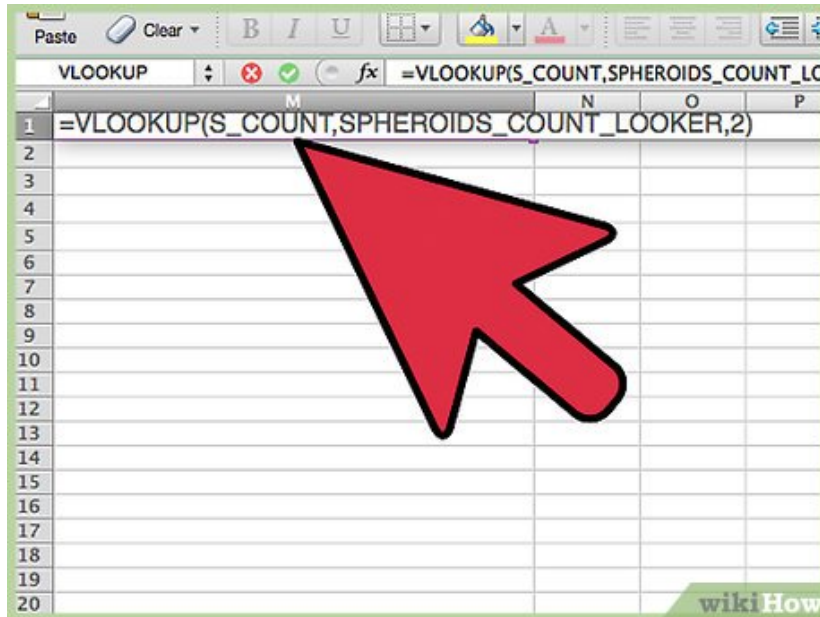


Enter the TURNS_LOOKUP table.

- Select cell L1 and enter TURNS_LOOKUP

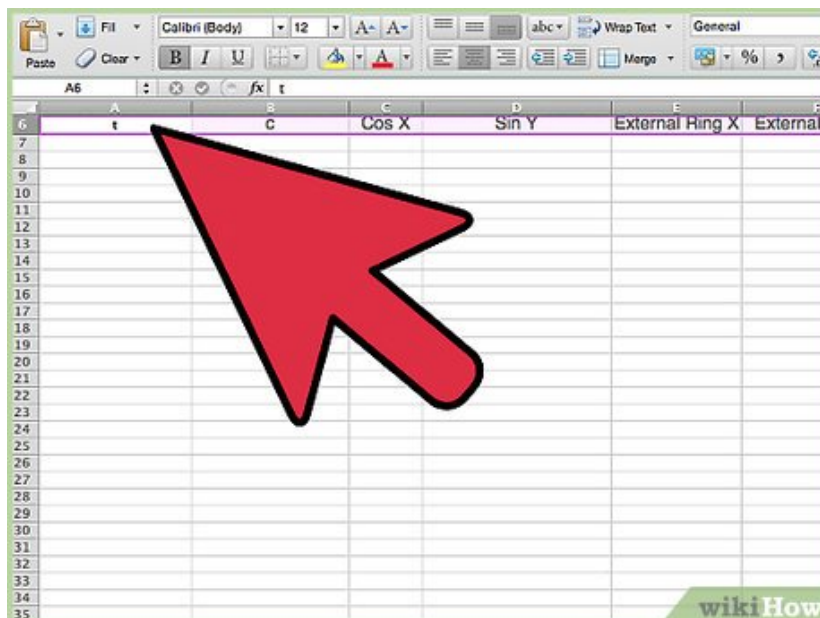
2. Enter 1 into cell L2 and Edit Go To cell range L2:L121 and Edit Fill Series Columns Linear Step Value 1 OK.
3. Select cell M10 and enter 190. Format font red.
4. Select cell range M2:M9 and with M2 the active cell, enter the formula w/o quotes " $=M3-70$ " and Edit Fill Down. Select cell range M11:M121 and with M11 the active cell, enter w/o quotes the formula " $=M10+70$ " and Edit Fill Down.
5. Edit Go To cell range L2:M121 and Insert Name Define Name TURNS_LOOKUP to cell range $\$L\$2:\$M\121 .

9.



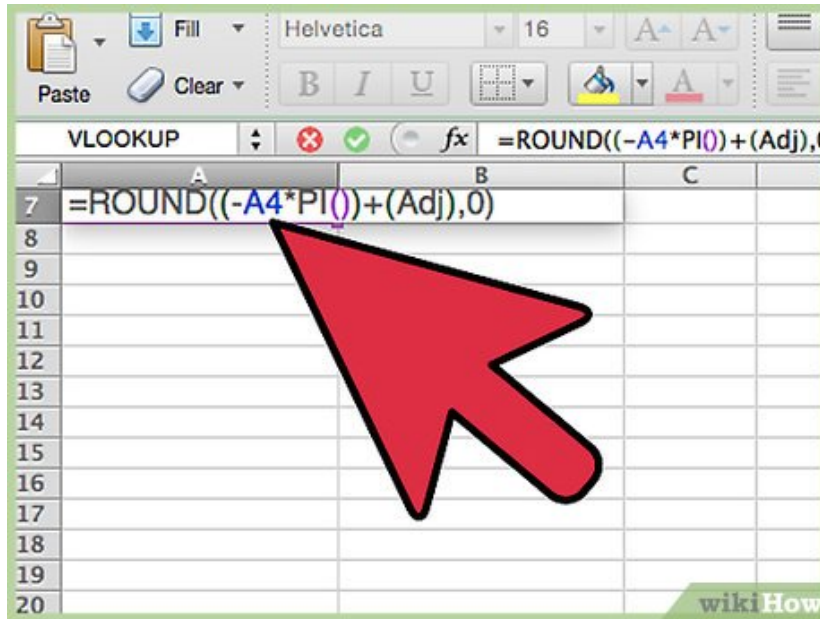
There was an old Lookup Table that was used, SPHEROIDS_COUNT_LOOKER, but it's so inexact and lengthy to impart that it will be included as a table in the Tips section. It can be used with the Designer cell as the following formula: " $=VLOOKUP(S_COUNT,SPHEROIDS_COUNT_LOOKER,2)$ ".

10.



Enter the column headings of row 6.

1. A6: t; B6: c; C6: Cos X; D6: Sin Y; E6: External Ring X; F6: External Ring Y; G6: GMLL x; H6 GMLL y; I6: GMSL x; J6: GMSL y.



11.

Input the columnar formulas:

1. A7: Enter the formula w/o quotes " $=\text{ROUND}((-A4*\text{PI}())+(\text{Adj}),0)$ " and format bold and align right and Insert Name Define Name top to cell A7. Format Cells Number Number Custom "top" 0.0000 -- the result should be 969655
2. Edit Go To cell range A8:A1447 and with A8 active input w/o quotes the formula " $=((A7+(-\text{top}*2)/(\text{AdjRows})))*\$A\$1$ " and Edit Fill Down. The result in cell A1446 should be 969655.0068
3. Edit Go To cell B7 and enter w/o quotes the formula " $=\text{ROUND}(-\text{EXP}((\text{PI}())^2)+(\text{Cc}-(\text{db}))),0)+\text{Designer}$ " -- the result should be -76055
4. Edit Go To cell range B8:B1447 and enter " $=B7$ " and Edit Fill Down.
5. Edit Go To cell range C7:C1447 and enter " $=\text{COS}((\text{ROW}()-7)*\text{Factor}*\text{PI}()/180)$ " and Edit Fill Down.
6. Edit Go To cell range D7:D1447 and enter " $=\text{SIN}((\text{ROW}()-7)*\text{PI}()/180)^2$ " and Edit Fill Down -- do not miss the fact that it's squared compared to the cosine. It's a nice chart either way.
7. Edit Go To cell range E7:E1447 and enter " $=\text{PI}()*(((\text{SIN}(A7/(B7*2))*\text{GMLL}*\text{COS}(A7)*\text{GMLL}*(\text{COS}(A7/(B7*2))))*\text{GMLL})+C7))$ " and Edit Fill Down.
8. Edit Go To cell range F7:F1447 and enter " $=\text{PI}()*((\text{SIN}(A7/(B7*2))*\text{GMLL}*\text{SIN}(A7)*\text{GMLL}*(\text{COS}(A7/(B7*2))))*\text{GMLL})+D7)$ " and Edit Fill Down.
9. Edit Go To cell range G7:G1447 and enter " $=E7*\text{GMLL}*\text{Sync1}$ " and Edit Fill Down.
10. Edit Go To cell range H7:H1447 and enter " $=F7*\text{GMLL}*\text{Sync1}$ " and Edit Fill Down.
11. Edit Go To cell range I7:I1447 and enter " $=E7*\text{GMSL}*\text{Sync2}$ " and Edit Fill Down.
12. Edit Go To cell range J7:J1447 and enter " $=F7*\text{GMSL}*\text{Sync2}$ " and Edit Fill Down.

12.

A	B	C	D	E
Adjuster 1.00000000	S's COUNT 8	GMSL =	0.381966011	
TURNS +31	Designer-50100.00	GMLL =	0.618033989	
AdjRows 1439	Var+12.000000			
t -308100.0000	Cc-0.06544985	Y		Y
Adj +1730.0000	db +4.50000000			
t	C	Cos X	Sin Y	External
top 968115.0000	-76055.0000	1.0000		
966769.4682	-76055.0000	1.0000		
965423.9364	-76055.0000	1.0000		
964078.4046	-76055.0000	0.9999		
Bottom Row values:				
-966959.6353	-76055.0000			
-968307.321	-76055.0000			
-969655.0068	-76055.0000			
-971002.6925	-76055.0000			

The top and bottom rows should look like this:

Part 2 of 3:

Explanatory Charts, Diagrams, Photos

1. (dependent upon the tutorial data above)

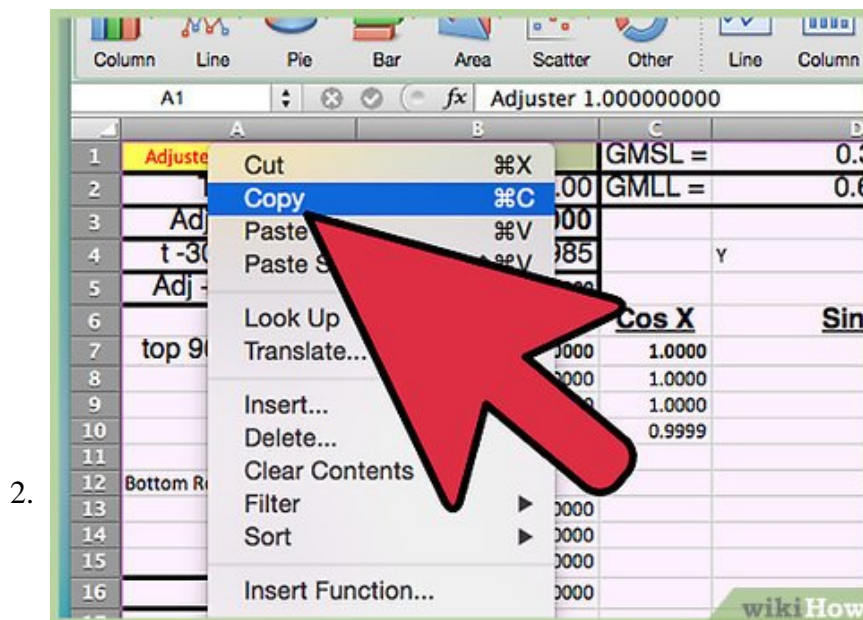
1.

A	B	C	D
Adjuster 1.00000000	S's COUNT 8	G	0.3819
TURNS +31	Designer-50100.00	GM	6180
AdjRows 1439	Var+12.000000		
t -308100.0000	Cc-0.06544985	Y	
Adj +1730.0000	db +4.50000000		
t	C	Cos X	Sin Y
top 968115.0000	-76055.0000	1.0000	
966769.4682	-76055.0000	1.0000	
965423.9364	-76055.0000	1.0000	
964078.4046	-76055.0000	0.9999	

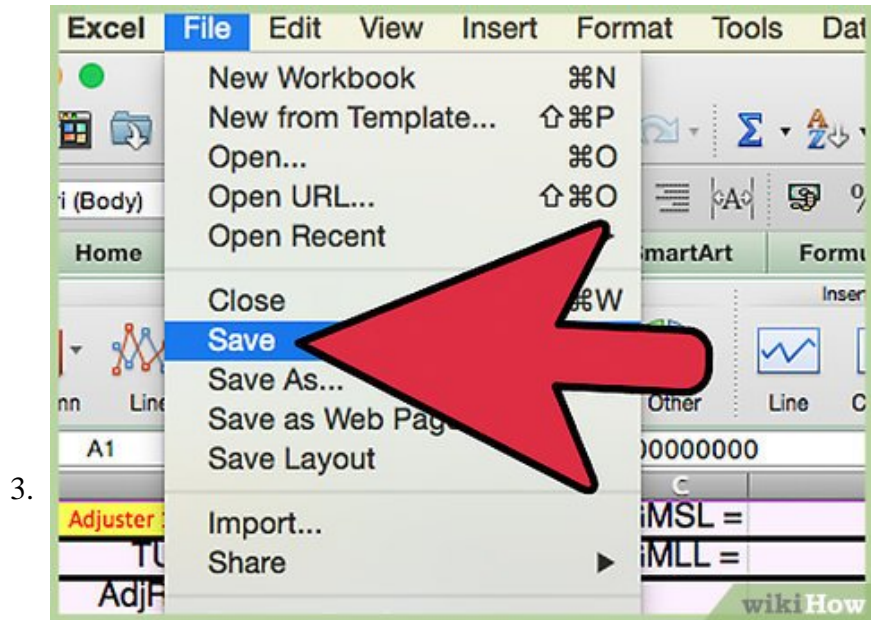
Create the Chart:

1. Edit Go To cell range E7:F1447 and if you're using Chart Wizard, follow along, else go on the Ribbon to Charts, All/Other, Scroll Down to Scatter, Smoothed Line Scatter and a small chart should appear atop your data. Cut or Copy and Paste it to The Chart worksheet A1 cell and hover

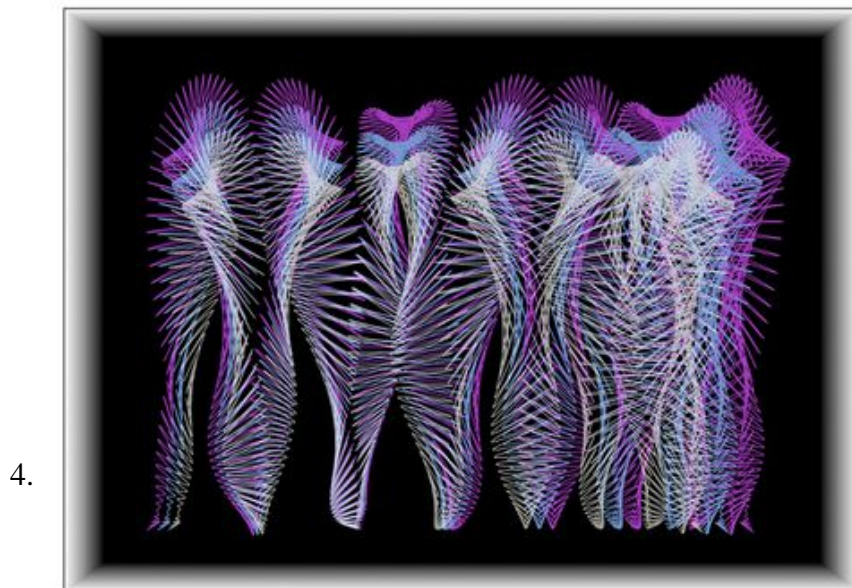
- over the bottom right corner until the cursor becomes the double-headed arrow and expand the chart to about L49. Select the Chart Frame and set it to No line and Fill No Fill. Select the Plot Series and double click it or go to chart Layout and select it from Format Selection and do Line Weigh 1 and Color from the Color Wheel Hot Pink. Click on the Plot Area and do Format Selection at the far left of Chart Layout and set Fill to Gradient Rectangular Centered Black gradient 90% and white for the right selector for the outside edge.
2. Edit Go To cell range G7:H1447 back on the Data worksheet and copy it and paste it directly into the chart. It may come out wrong and the series may have to be edited in the formula bar until it reads: `"=SERIES('Data'!G7:G1447,'Dara'!H7:H1447,2)"`. Double-click on the data-series or Format Selection via the Chart Layout option and set line weight 1 and color sky blue.
 3. Edit Go To cell range I7:J1447 back on the Data worksheet and copy it and paste it directly into the chart. It may come out wrong and the series may have to be edited in the formula bar until it reads: `"=SERIES('Data'!I7:I1447,'Data'!J7:J1447,3)"`. Double-click on the data-series or Format Selection via the Chart Layout option and set line weight 1 and color off white Ta Dah! You're done!



Go to the data worksheet so you can save the original values and settings and column widths, etc. onto the Saves worksheet as both formulas and pasted Values. Hold down the shift key and do command+c Copy the chart and activate the Saves worksheet and Paste Picture. Now you're done.



The worksheet contains many interesting designs, so feel free to explore the various variables. If one is a scientist, one keeps notes, and so one should consider Insert New Comment for every Original formula, so one can easily backtrack in case of blunder. Save the workbook and you're finished!



Part 3 of 3:

Helpful Guidance

1. Make use of helper articles when proceeding through this tutorial

1. See the article How to Create a Spiralic Spin Particle Path or Necklace Form or Spherical Border for a list of articles related to Excel, Geometric and/or Trigonometric Art, Charting/Diagramming and Algebraic Formulation.

2. For more art charts and graphs, you might also want to click on [Category:Microsoft Excel Imagery](#), [Category:Mathematics](#), [Category:Spreadsheets](#) or [Category:Graphics](#) to view many Excel worksheets and charts where Trigonometry, Geometry and Calculus have been turned into Art, or simply click on the category as appears in the upper right white portion of this page, or at the bottom left of the page.

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