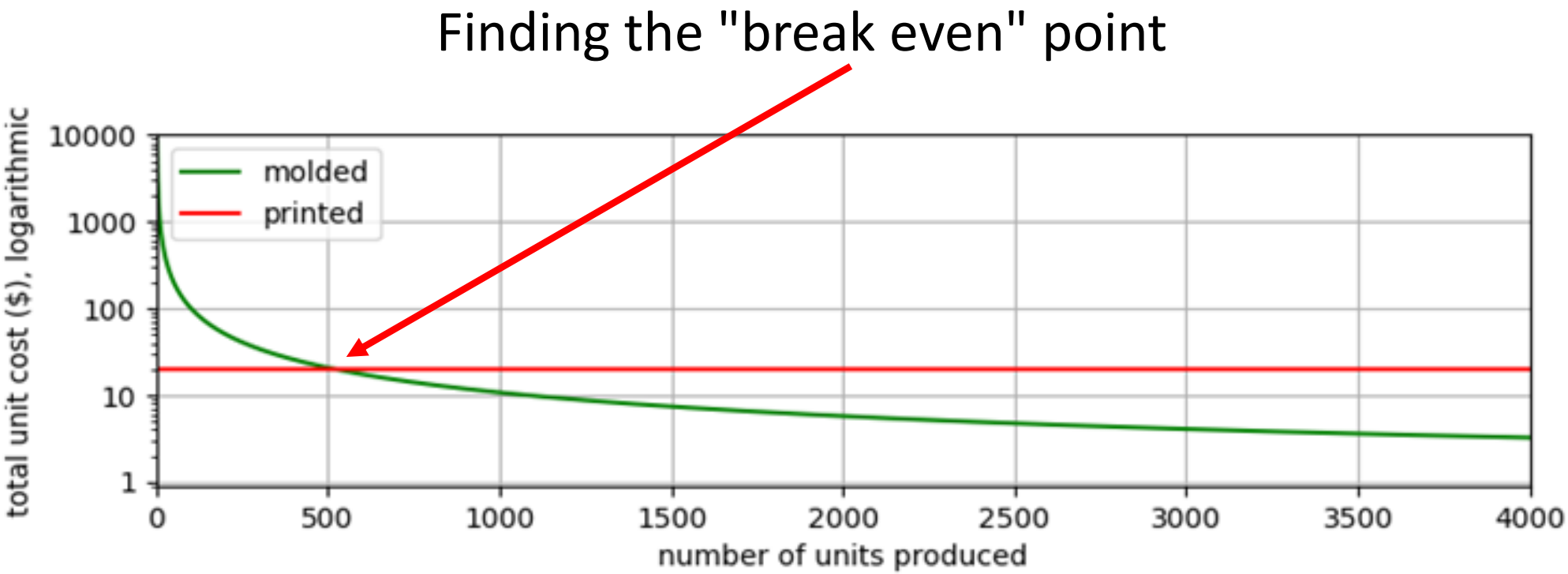
To Mold or Not to Mold That is the Question



Today's lesson is sponsored by **Nickelodeon Universe** at the **American Dream Mall**

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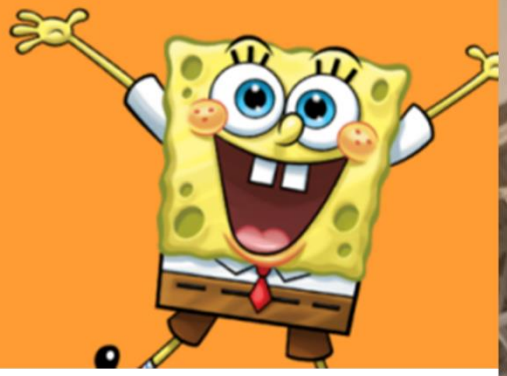
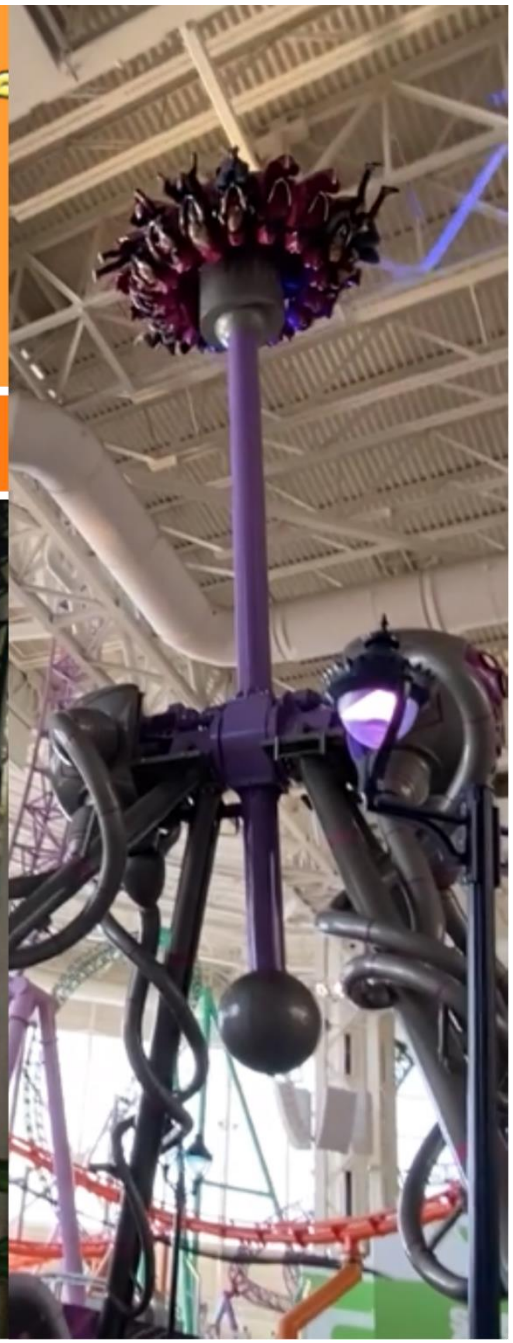
AMERICAN DREAM.

The Western Hemisphere's

Largest Indoor Theme Park



Kraang Prime Pandemonium!

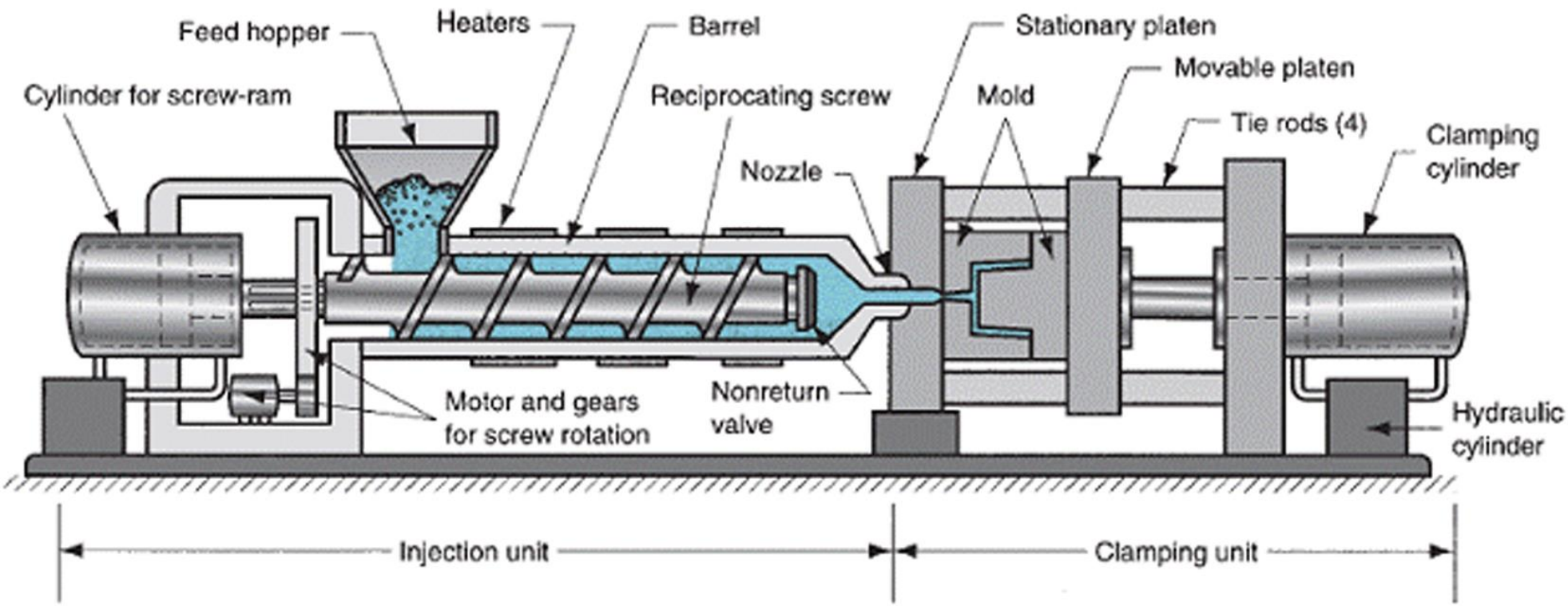


In 2010, Lego's tire production was topped at **381 million tires**, easily beating all other tire manufacturers.

This 8 cavity mold was retired after making **120,000,000** LEGO bricks.

Currently, there are about **7,000 active molds** being used at Lego.
The average mold is worth **$72,000**, with its most expensive being **$360,000**.
Total Lego mold value is **$504,000,000**.

Injection molding machine.



The plastic injection molding process cycle in 9 steps:

1. Material enters the barrel
2. Material melts and mixes
3. Volume of material (Shot sizes in barrel is created)
4. Mold closes
5. Injection of the plastic into the mold cavity
6. Molten material cooled (during this process, steps 1-3 are preparing for next cycle)
7. Mold opens
8. Part ejects
9. Return to Step 4 for the next cycle

Creating an Excel spreadsheet to analyse a business scenario

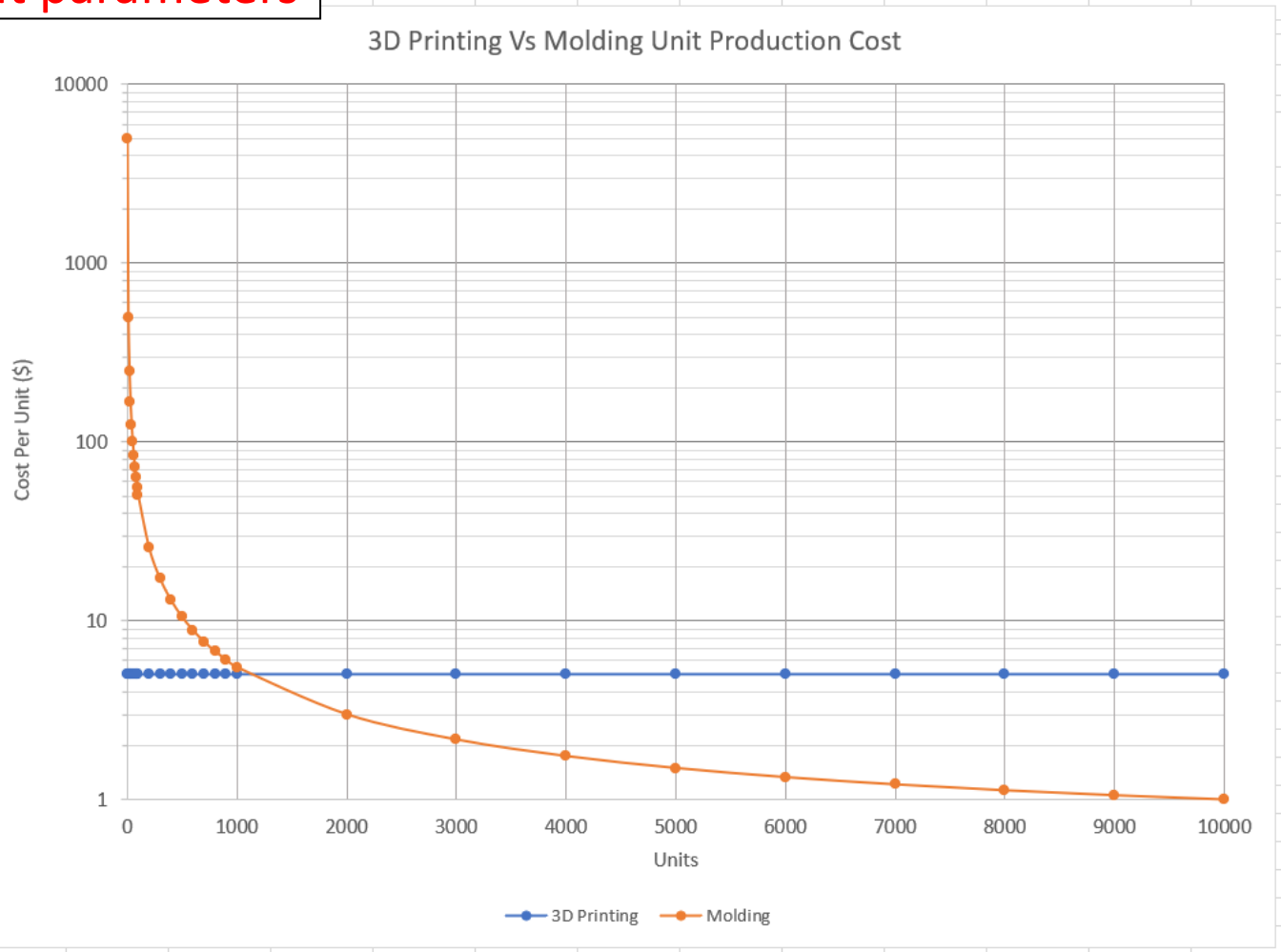
Below is an example Excel spreadsheet to find the breakeven point.

JoeBarbetta_3D Printing vs Molding Cost, Rev0

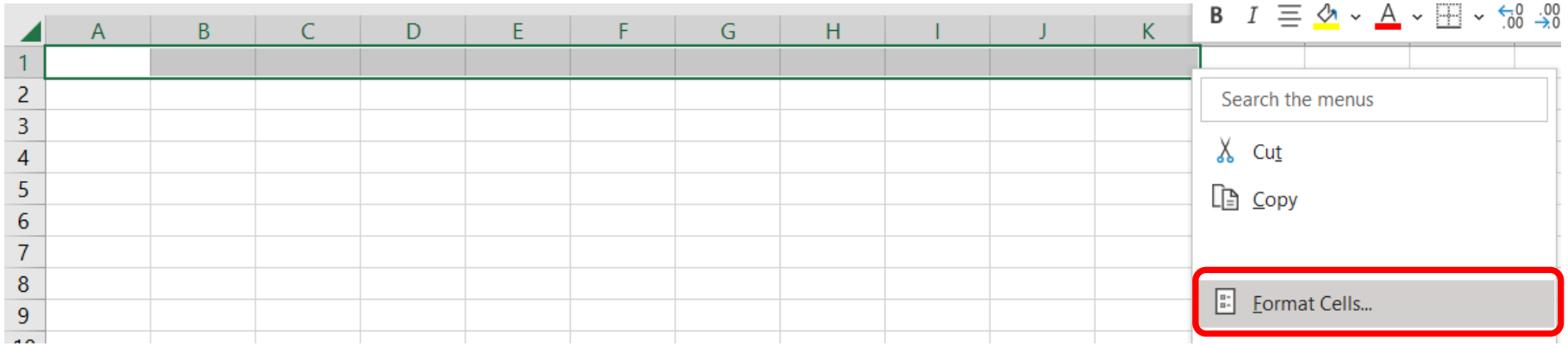
Input parameters

3D Printing Cost Per Unit	5
Tooling Cost	5000
Molding Cost Per Unit	0.5

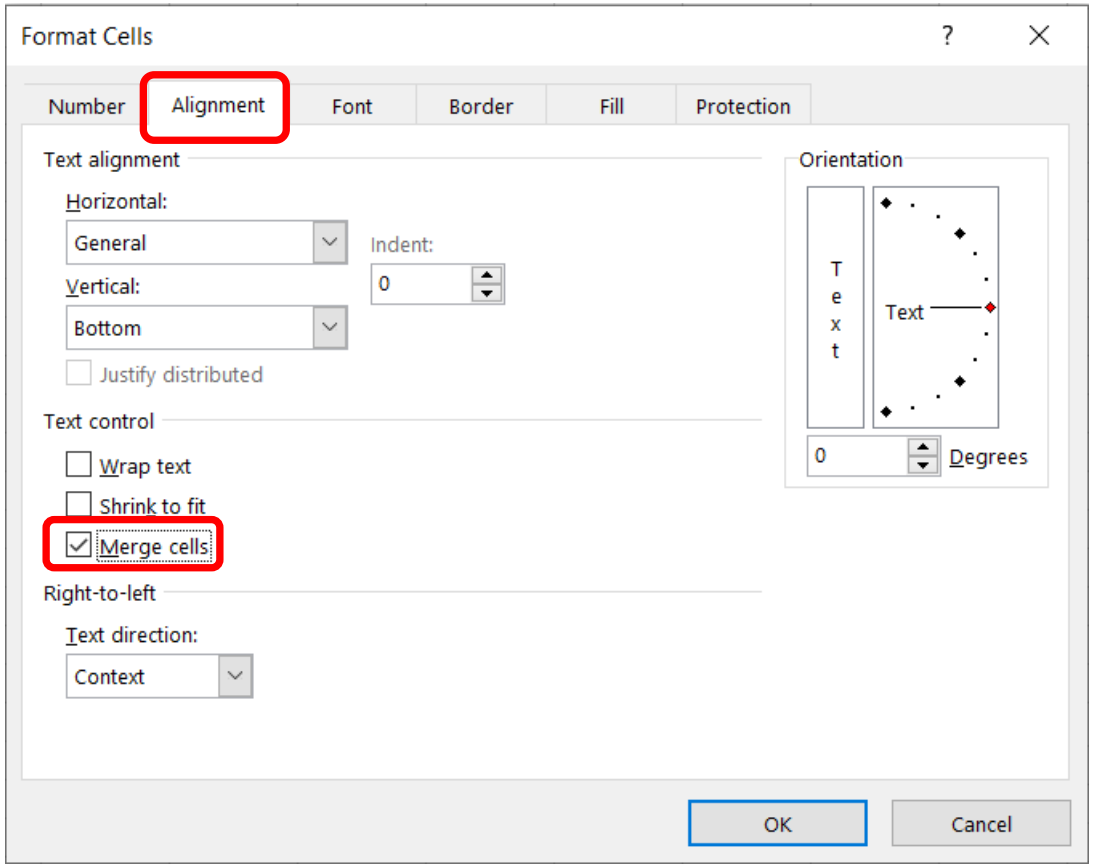
Units	Cost Per Unit	Molding Cost Per Unit
1	5	5000.50
10	5	500.50
20	5	250.50
30	5	167.17
40	5	125.50
50	5	100.50
60	5	83.83
70	5	71.93
80	5	63.00
90	5	56.06
100	5	50.50
200	5	25.50
300	5	17.17
400	5	13.00
500	5	10.50
600	5	8.83
700	5	7.64
800	5	6.75
900	5	6.06
1000	5	5.50
2000	5	3.00
3000	5	2.17
4000	5	1.75
5000	5	1.50
6000	5	1.33
7000	5	1.21
8000	5	1.13
9000	5	1.06
10000	5	1.00



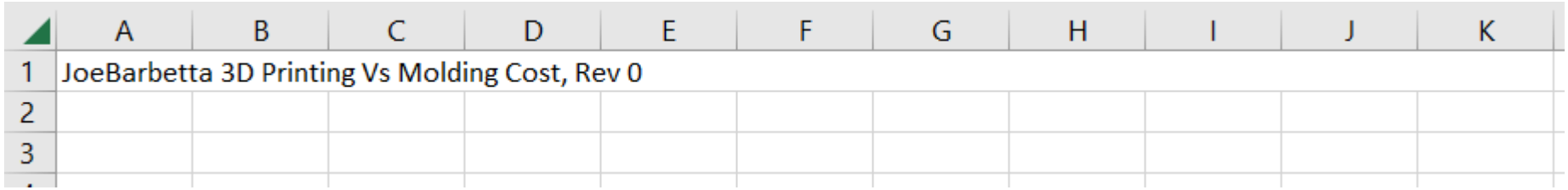
- open Excel and select **Blank workbook**
- select **first row** of cells from column **A** to column **K**
- right-click on one of these cells and select **Format Cells… It is far down in the list.**



- select the **Alignment tab**
- enable **Merge cells**
- click **OK**

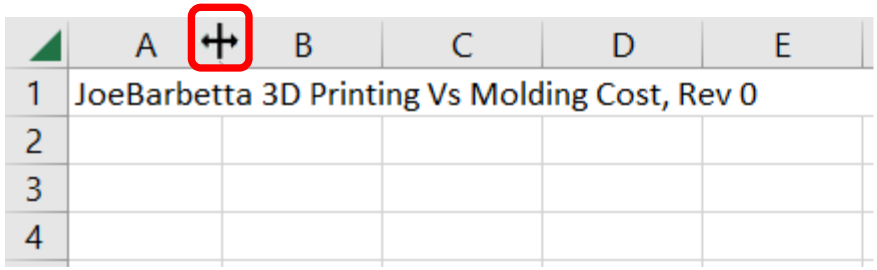


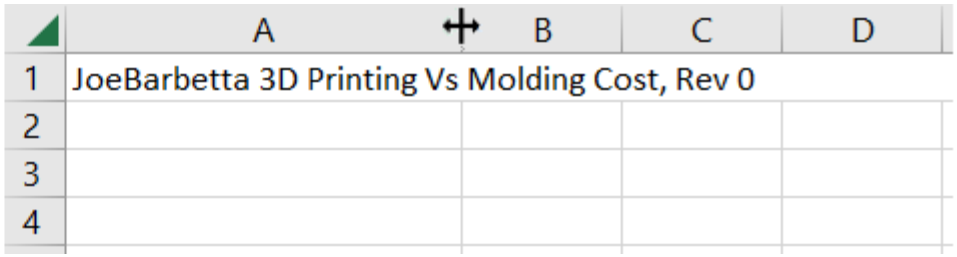
- enter **your name** followed by **3D Printing Vs Molding Cost, Rev 0**



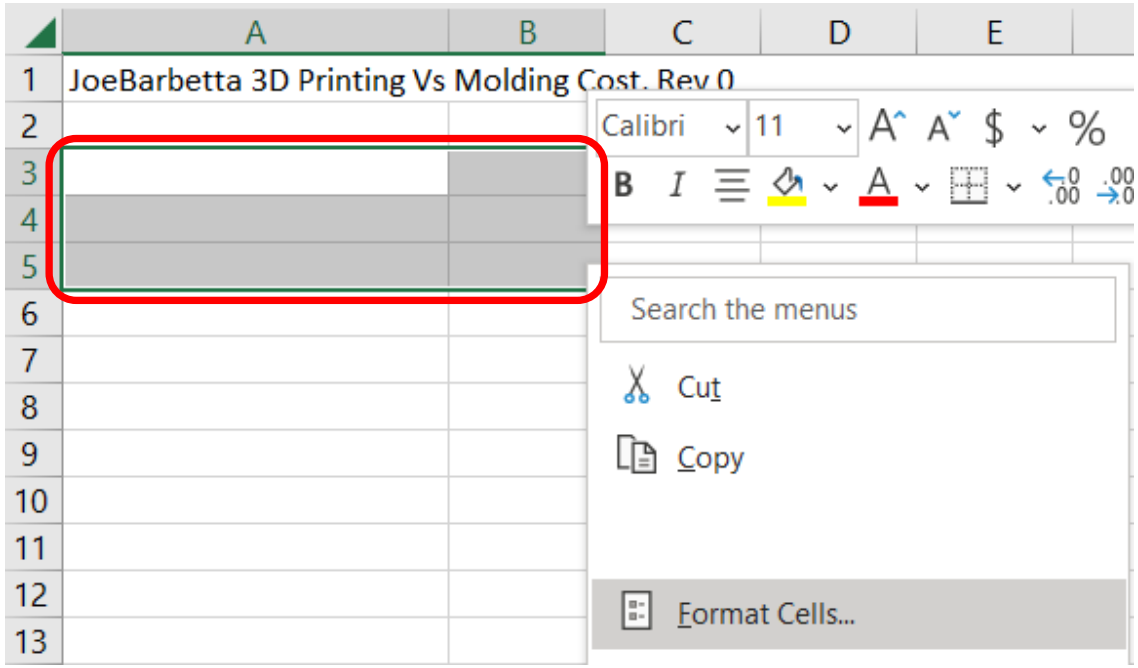
- hover over the **line** between the **A** and **B** columns and drag the cursor to the right to widen column **A**, as shown on the right

This method can be used to widen any column

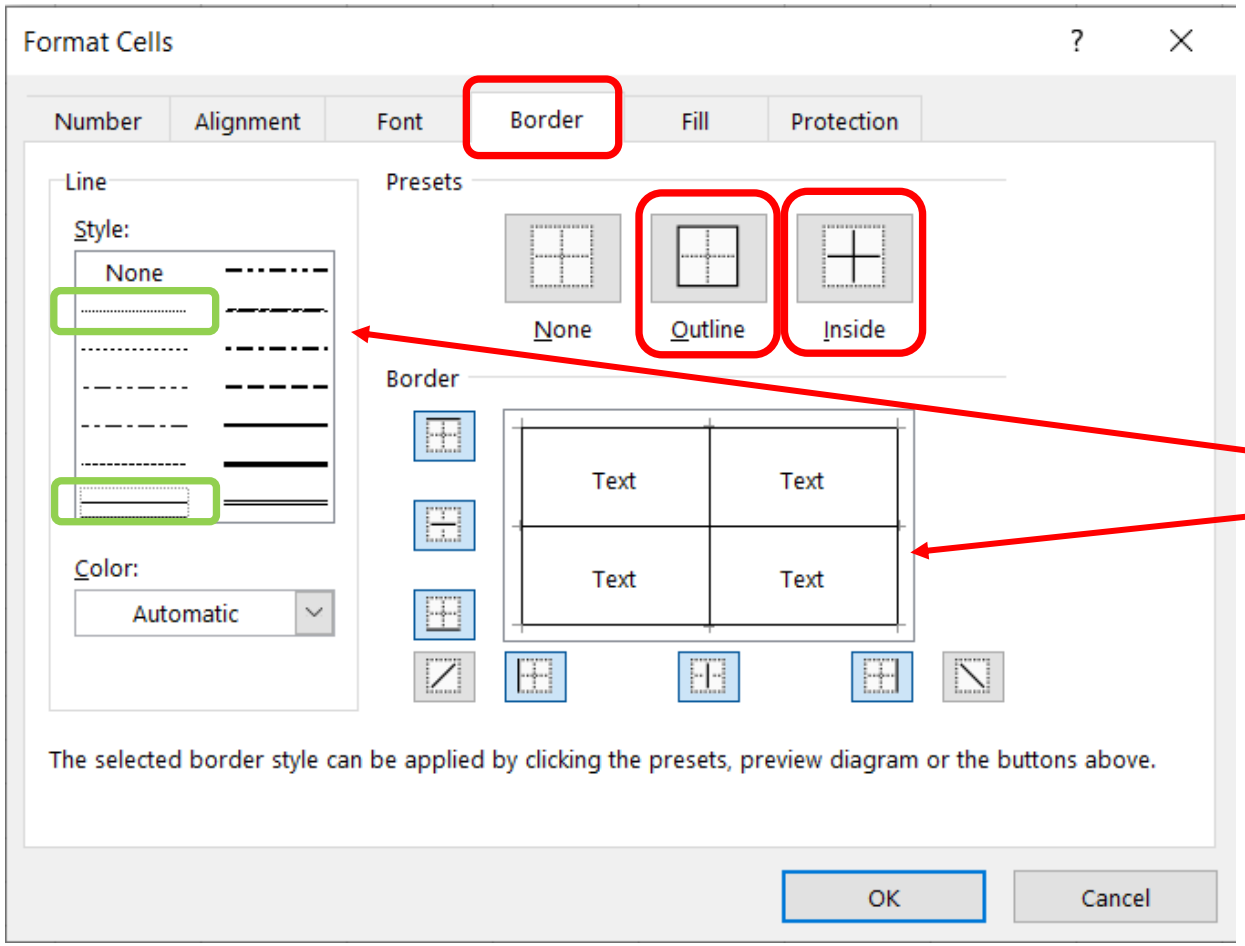




- select the group of Cells comprising **Columns A and B** and **Rows 3, 4, and 5**. Right-click and select **Format Cells…**



- select the **Border tab**
- click on **Outline** and **Inside**. Border lines will appear in the lower Border section.
- click **OK**

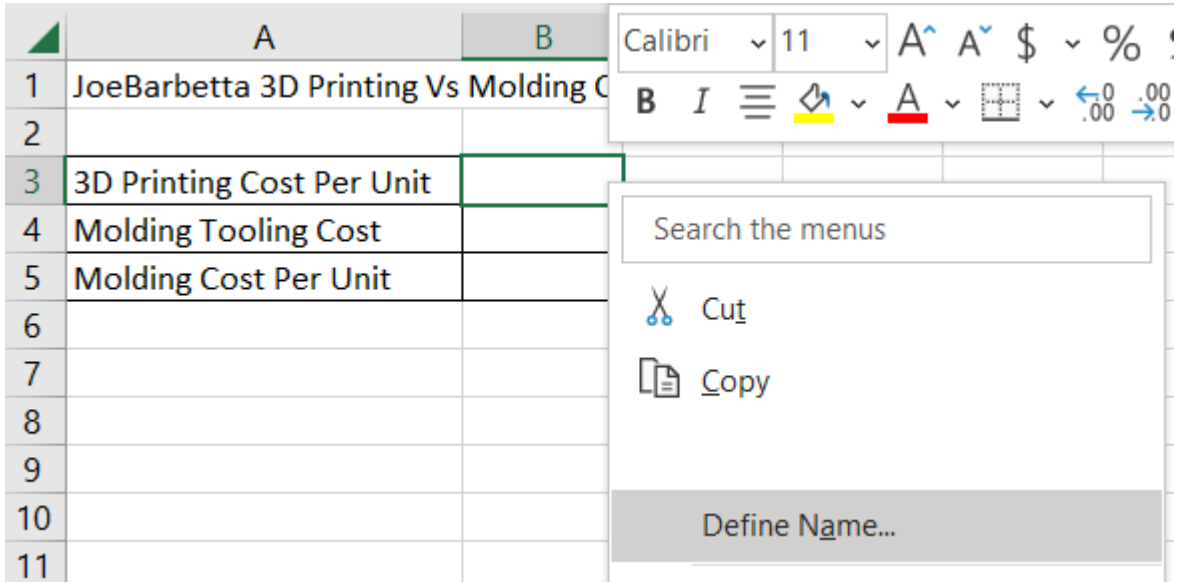


For further border custimization, one can choose a Line Style and then click on the desired Border lines to apply the line style. Clicking on Border lines will also remove lines.
The best two line styles to use are indicated in green.

	A	B	C
1	JoeBarbetta 3D Printing Vs Molding Cost, Rev 0		
2			
3	3D Printing Cost Per Unit		
4	Molding Tooling Cost		
5	Molding Cost Per Unit		
6			

- enter the text as shown in the 3 cells

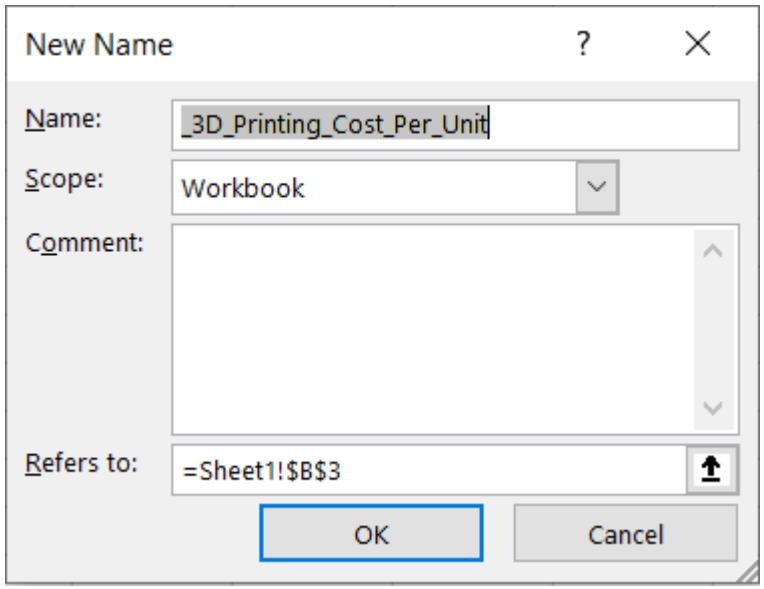
- right-click on the **cell to the right** of 3D Printing Cost Per Unit and select **Define Name…** It is far down in the list.



This feature allows one to specify a **name for the Cell** and this cell name can then be used when entering **formulas** in Excel. We will use the default in Excel, wherein the text of the adjacent cell will be used. However, a different name can be entered if desired.

- click **OK**.

- do this for the **other two cells** next to the remaining names.



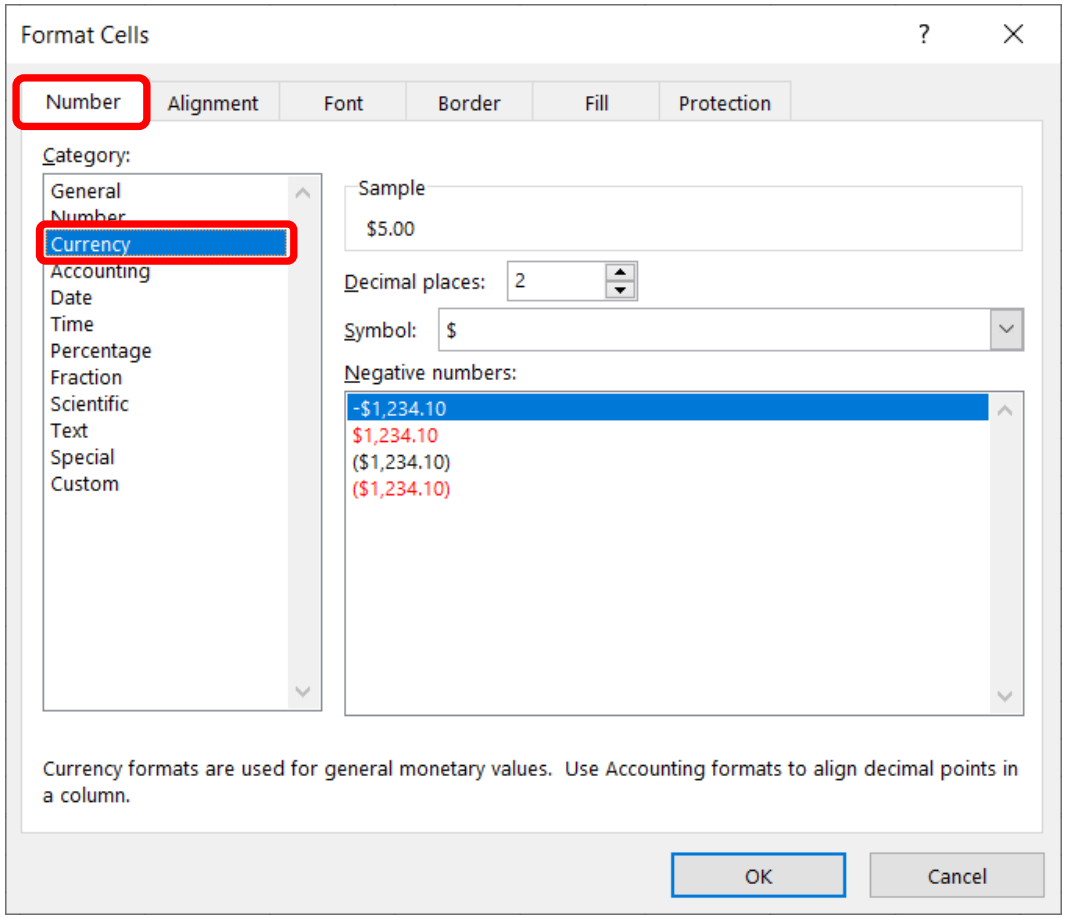
- enter the **3 cost parameters** for your analysis. **Your parameters will be those in the row corresponding to the first letter of your first name.**

Throughout this document, the values and plot curves will be different from those shown as examples!

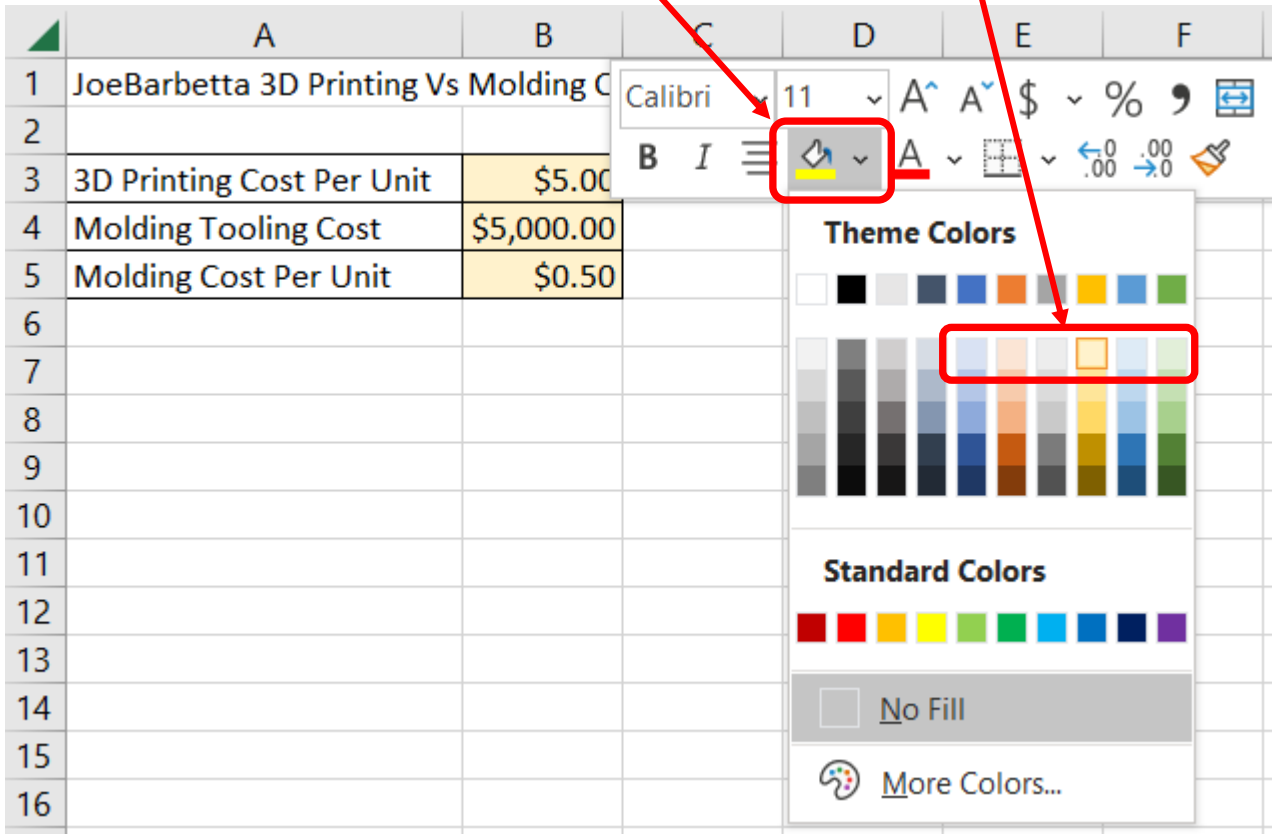
	A	B	C
1	JoeBarbetta 3D Printing Vs Molding Cost, Rev 0		
2			
3	3D Printing Cost Per Unit	5	
4	Molding Tooling Cost	5000	
5	Molding Cost Per Unit	0.5	
6			

	3D Printing Cost Per Unit	Molding Tooling Cost	Molding Cost Per Unit
A,B,C	$8.00	$11,000.00	$0.75
D,E,F	$4.50	$ 8,000.00	$0.60
G,H,I	$3.50	$ 7,500.00	$0.40
J,K,L	$7.00	$ 9,500.00	$0.55
M,N,O	$9.50	$12,000.00	$0.75
P,Q,R	$8.50	$11,000.00	$0.70
S,T,U	$6.50	$ 9,000.00	$0.45
V,W,X	$5.50	$ 8,500.00	$0.40
Y,Z	$5.50	$ 8,500.00	$0.40

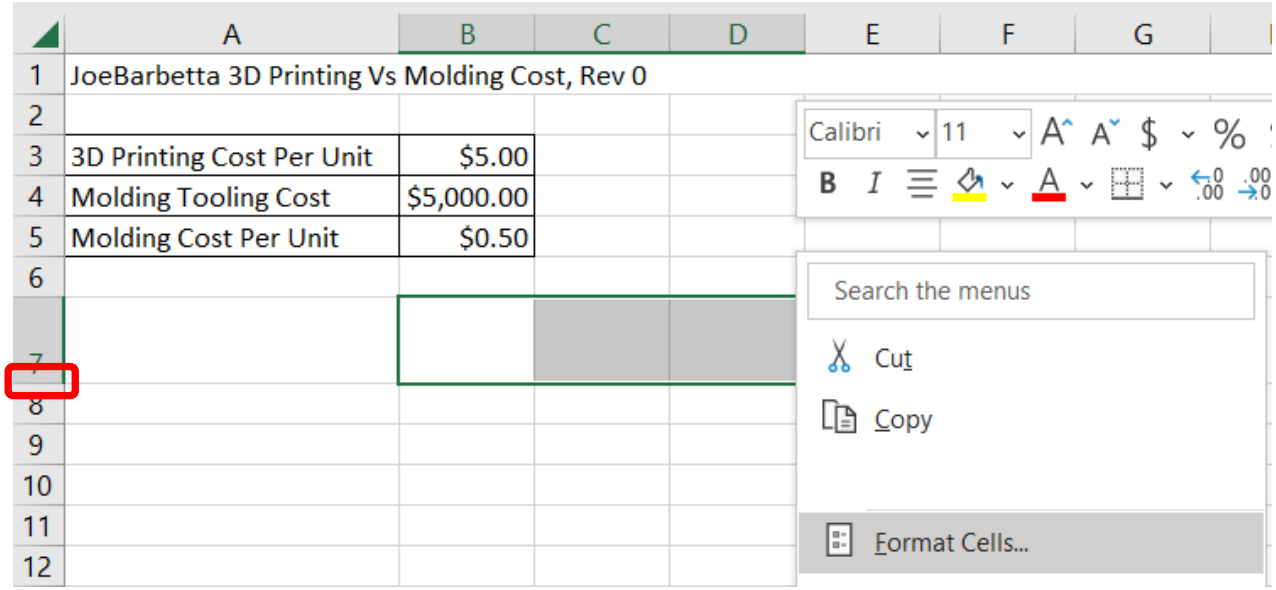
- select the **3 cells holding these parameters**
- right-click on one and select **Format Cells…**
- select the **Number tab** and **Currency** and click **OK**

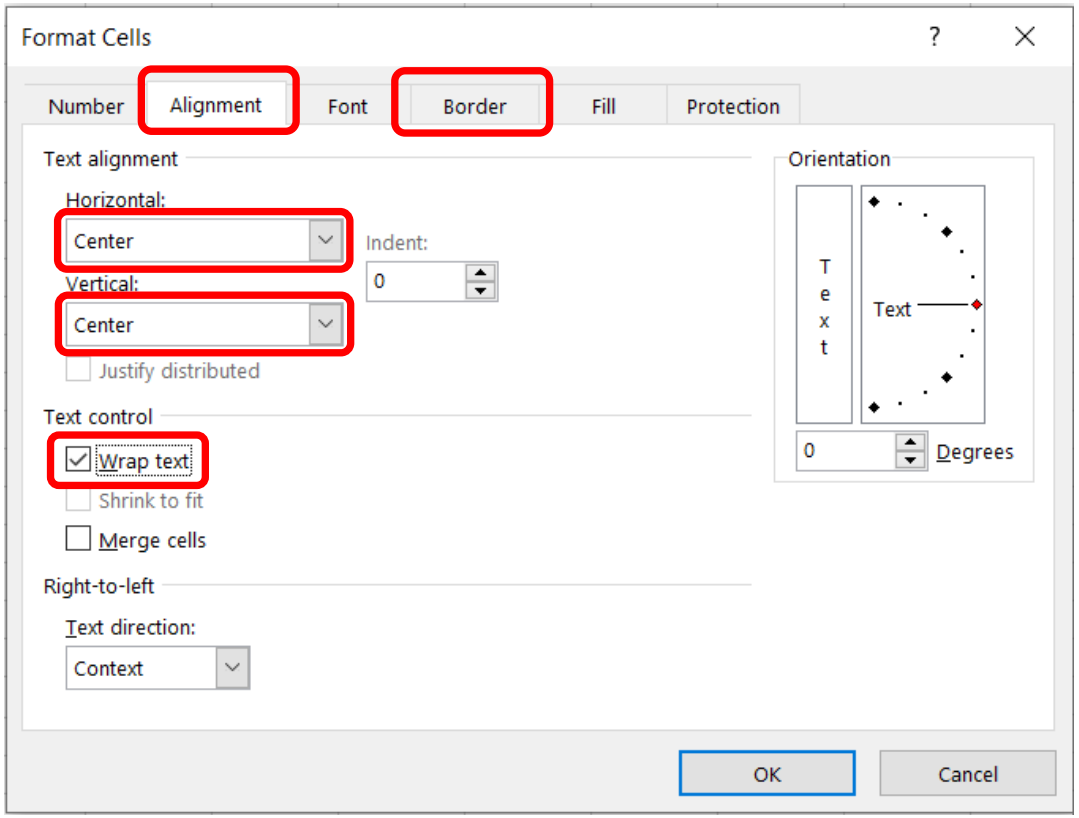


- select the 3 cells again and right-click to select the **Fill** icon and then select a **light color**. This will highlight the cells used for the cost parameters.



- As done previously to widen a Column, click on the **line between Row 7 and 8** and move the line down to increase the **Height of Row 7**.
- select the 3 cells **B, C, and D** of **Row 7**. Right-click and select **Format Cells**.. near the bottom of the menu.





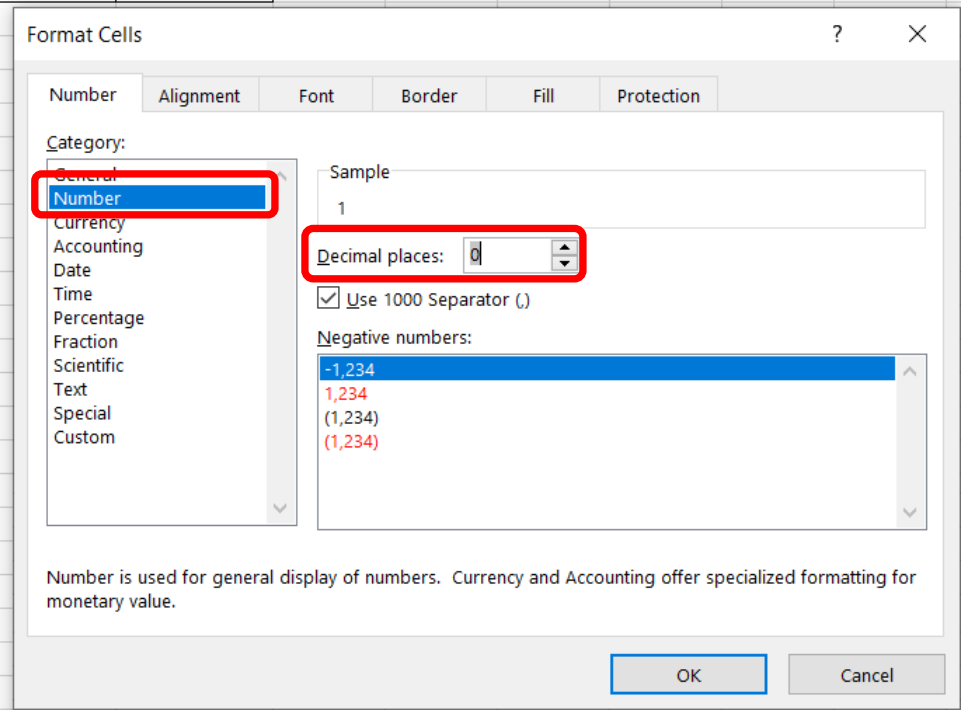
- select the **Alignment tab**
- select **Center** for both **Horizontal** and **Vertical**
- enable **Wrap text**
- select the **Border tab**
- click on **Outline** and **Inside**
- click **OK**

- in the 3 cells enter **Units**, **3D Printing Cost Per Unit**, and **Molding Cost Per Unit**. Columns **C and D will need to be widened** to accommodate the text.

	A	B	C	D	E
1	JoeBarbetta 3D Printing Vs Molding Cost, Rev 0				
2					
3	3D Printing Cost Per Unit	$5.00			
4	Molding Tooling Cost	$5,000.00			
5	Molding Cost Per Unit	$0.50			
6					
7		Units	3D Printing Cost Per Unit	Molding Cost Per Unit	
8					

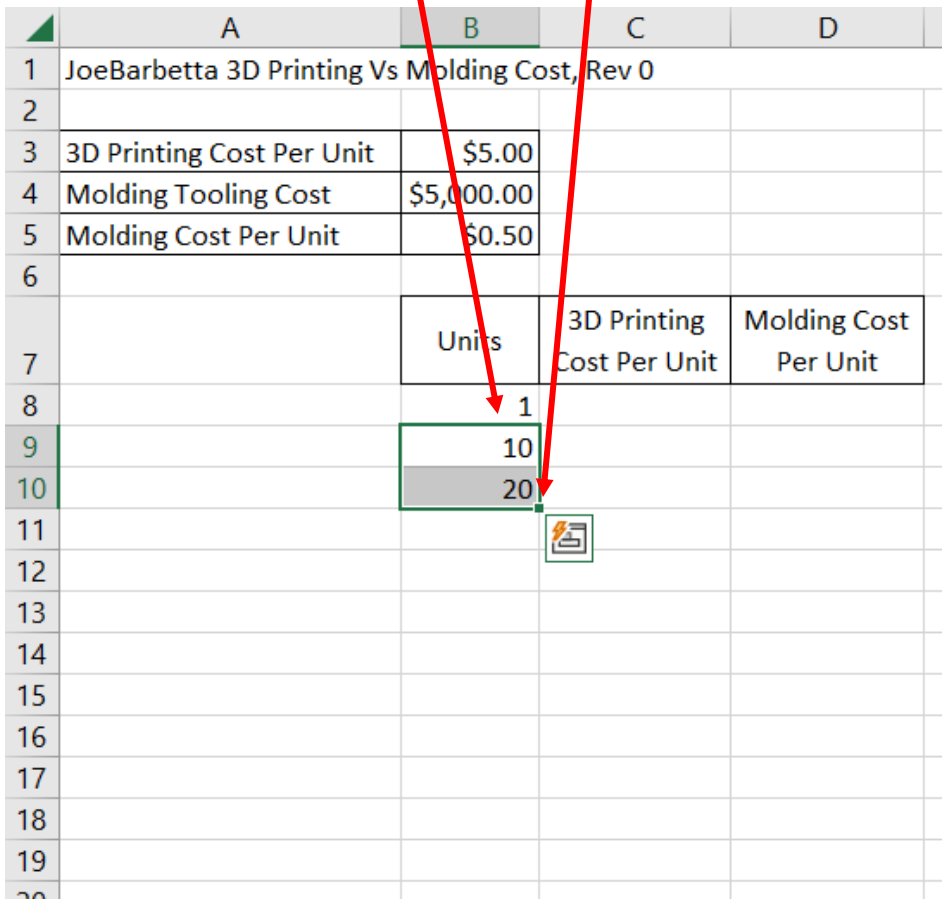
- type **1** in the cell under Units. If it shows as $1.00, right-click on the cell, select **Format Cells…,** and select **Number** and change **Decimal places to 0**.

	A	B	C	D	E	F	G	H	I	J
1	JoeBarbetta 3D Printing Vs Molding Cost, Rev 0									
2										
3	3D Printing Cost Per Unit	$5.00								
4	Molding Tooling Cost	$5,000.00								
5	Molding Cost Per Unit	$0.50								
6										
7		Units	3D Printing Cost Per Unit	Molding Cost Per Unit						
8		$1.00								

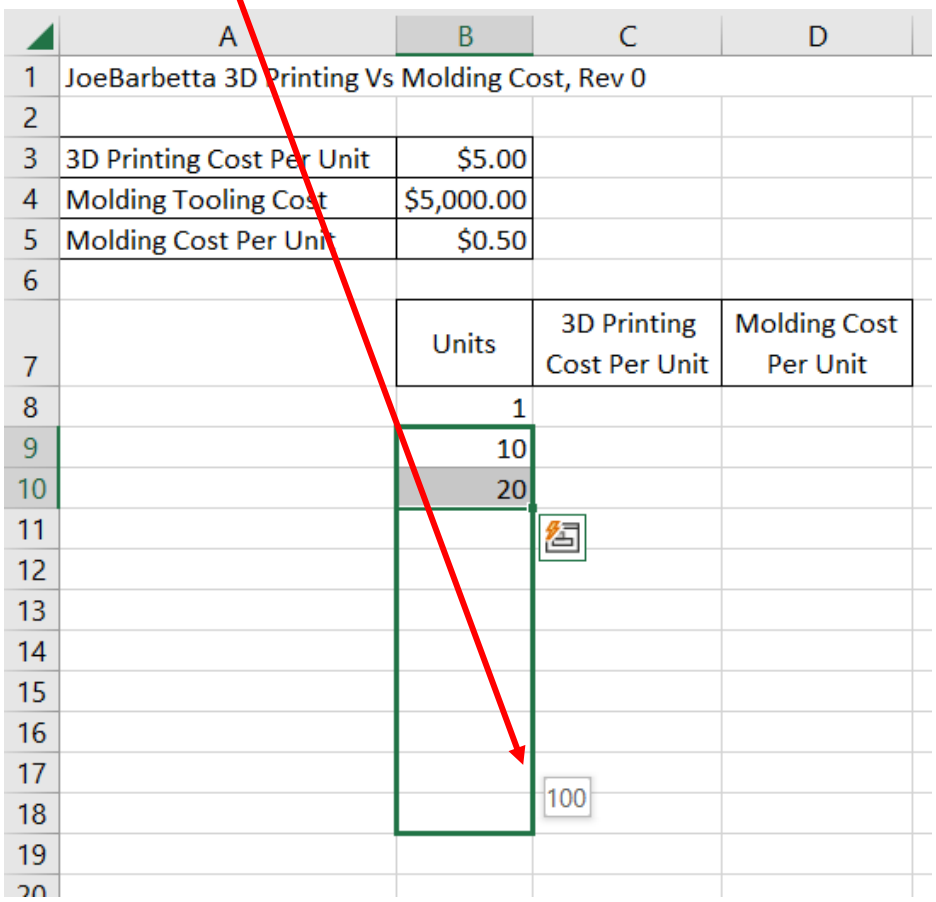


- enter **10** and **20** in the lower **two cells**

- select these **two cells** and click on the **bottom corner** of the selection rectangle and drag it down until **100** shows



	A	B	C	D
1	JoeBarbetta 3D Printing Vs Molding Cost, Rev 0			
2				
3	3D Printing Cost Per Unit	$5.00		
4	Molding Tooling Cost	$5,000.00		
5	Molding Cost Per Unit	$0.50		
6				
7		Units	3D Printing Cost Per Unit	Molding Cost Per Unit
8		1		
9		10		
10		20		
11				
12				
13				
14				
15				
16				
17				
18				
19				



	A	B	C	D
1	JoeBarbetta 3D Printing Vs Molding Cost, Rev 0			
2				
3	3D Printing Cost Per Unit	$5.00		
4	Molding Tooling Cost	$5,000.00		
5	Molding Cost Per Unit	$0.50		
6				
7		Units	3D Printing Cost Per Unit	Molding Cost Per Unit
8		1		
9		10		
10		20		
11				
12				
13				
14				
15				
16				
17			100	
18				
19				

- under **100** enter **200**

- select these **two cells** and as before drag the **bottom corner** down until **1000** shows

	A	B	C	D
1	JoeBarbetta 3D Printing Vs Molding Cost, Rev 0			
2				
3	3D Printing Cost Per Unit	$5.00		
4	Molding Tooling Cost	$5,000.00		
5	Molding Cost Per Unit	$0.50		
6				
7		Units	3D Printing Cost Per Unit	Molding Cost Per Unit
8		1		
9		10		
10		20		
11		30		
12		40		
13		50		
14		60		
15		70		
16		80		
17		90		
18		100		
19		200		
20				
21				
22				
23				
24				
25				
26				
27				
28				

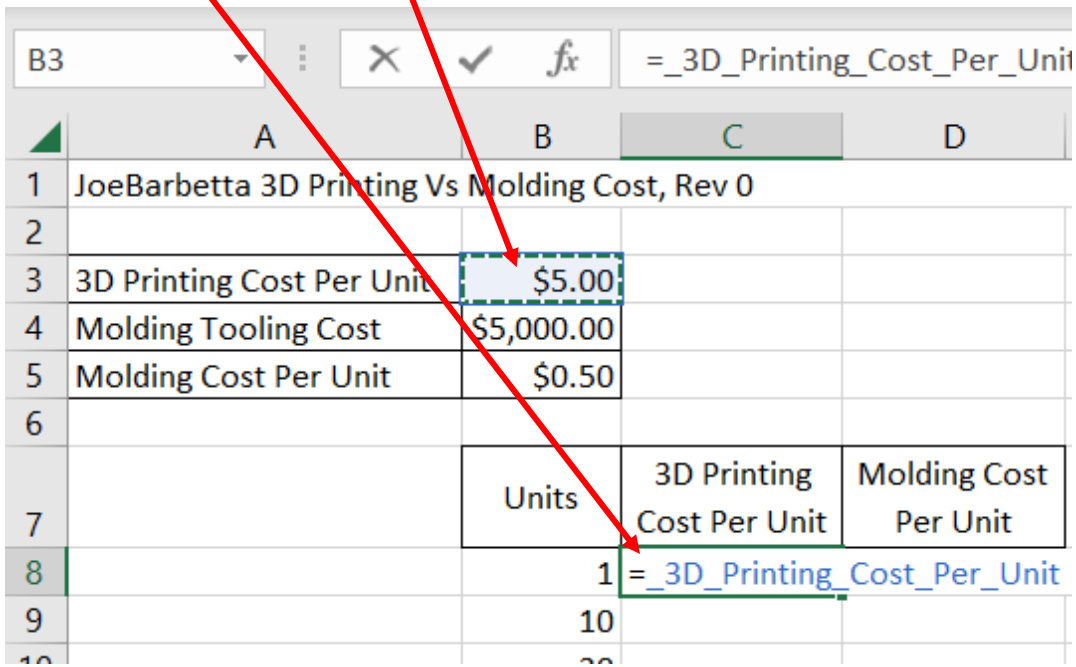
	A	B	C	D
1	JoeBarbetta 3D Printing Vs Molding Cost, Rev 0			
2				
3	3D Printing Cost Per Unit	$5.00		
4	Molding Tooling Cost	$5,000.00		
5	Molding Cost Per Unit	$0.50		
6				
7		Units	3D Printing Cost Per Unit	Molding Cost Per Unit
8		1		
9		10		
10		20		
11		30		
12		40		
13		50		
14		60		
15		70		
16		80		
17		90		
18		100		
19		200		
20		300		
21		400		
22		500		
23		600		
24		700		
25		800		
26		900		
27		1000		
28				

- under **1000** enter **2000** and extend the column values as before to get to **10000**

	A	B	C	D
1	JoeBarbetta 3D Printing Vs Molding Cost, Rev 0			
2				
3	3D Printing Cost Per Unit	$5.00		
4	Molding Tooling Cost	$5,000.00		
5	Molding Cost Per Unit	$0.50		
6				
7		Units	3D Printing Cost Per Unit	Molding Cost Per Unit
8		1		
9		10		
10		20		
11		30		
12		40		
13		50		
14		60		
15		70		
16		80		
17		90		
18		100		
19		200		
20		300		
21		400		
22		500		
23		600		
24		700		
25		800		
26		900		
27		1000		
28		2000		
29		3000		
30		4000		
31		5000		
32		6000		
33		7000		
34		8000		
35		9000		
36		10000		

- select the cell **under the 3D Printing Cost Per Unit cell**

- enter **=** and then click on the **cell next to 3D Prnting Cost Per Unit** and then the **Enter key**

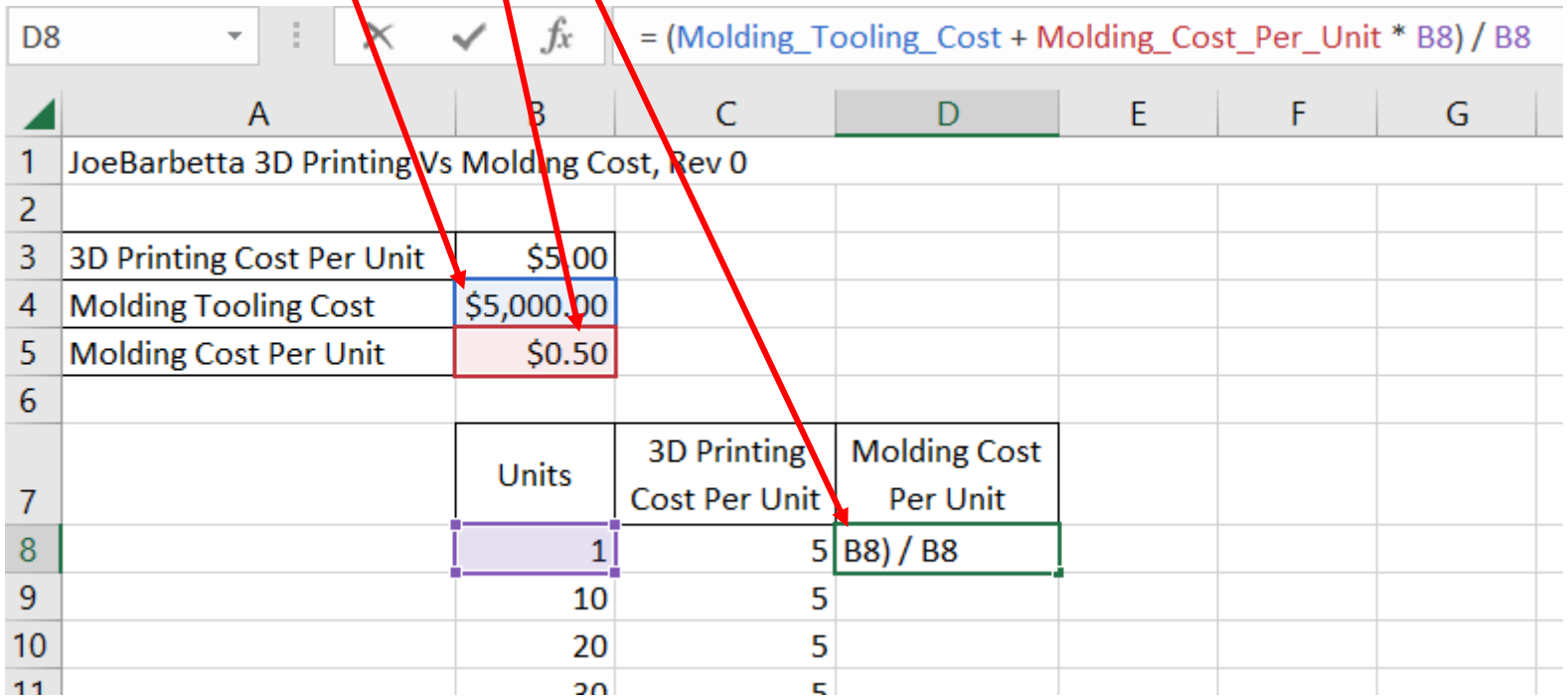


- drag the **bottom corner** of that cell down to the cell **next to 10000** and release the mouse

The entire column should show **5**.

Units	3D Printing Cost Per Unit	Molding Cost Per Unit
1	5	
10		
20		
30		
40		
50		
60		
70		
80		
90		
100		
200		
300		
400		
500		
600		
700		
800		
900		
1000		
2000		
3000		
4000		
5000		
6000		
7000		
8000		
9000		
10000		

- select the **cell under Molding Cost Per Unit**
- in the top formula bar type **= (**
- click on the **Molding Tooling Cost value**
- type **+**
- click on the **Molding Cost Per Unit value**
- type *** B8) / B8** and then the **Enter key**



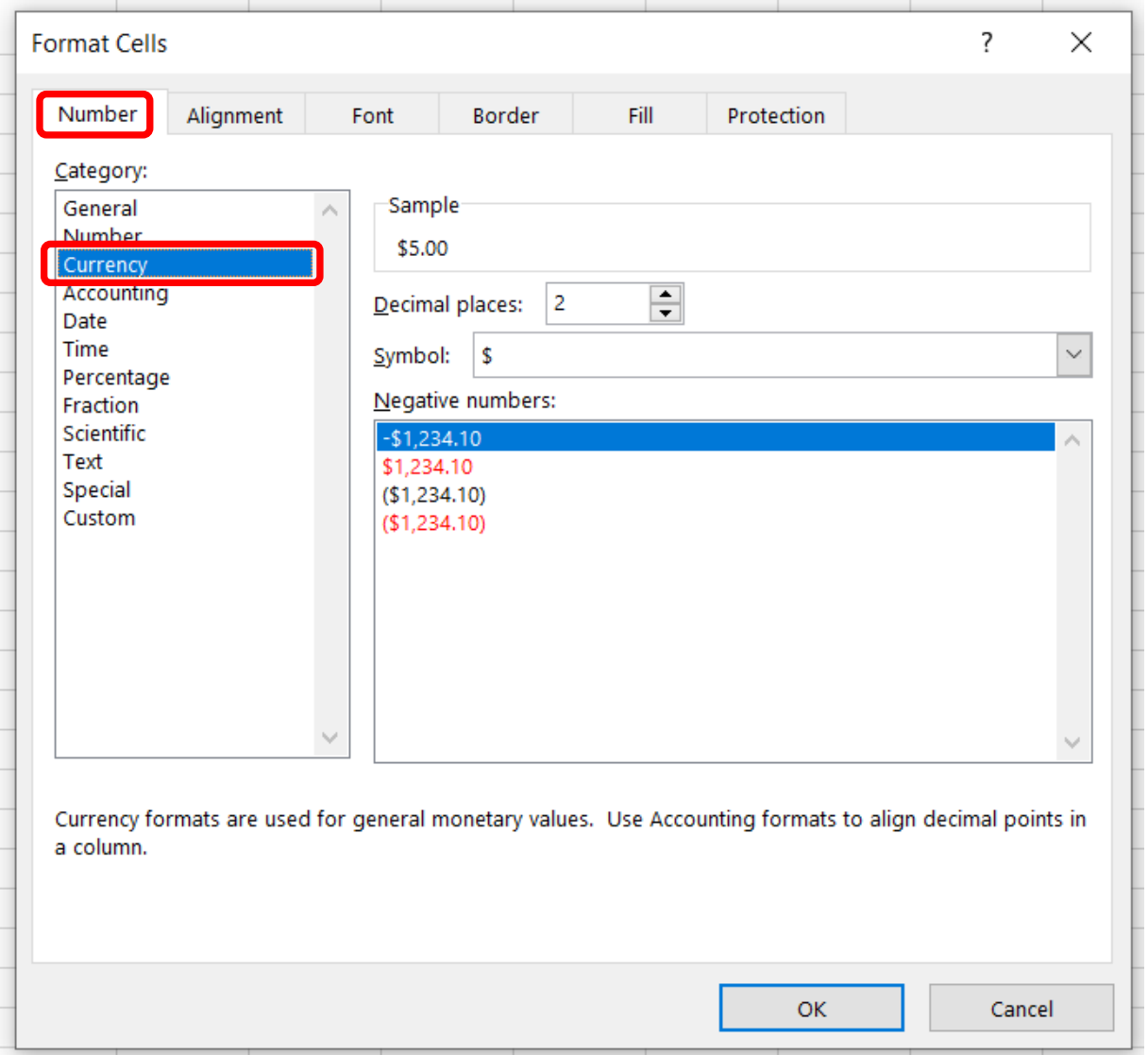
As done here, any cell can be set to a formula based on the values of other cells. Neat !

- drag the cell just set down to the 10000 row and values should populate. Yes. Some cells may have values with many digits.

Units	3D Printing Cost Per Unit	Molding Cost Per Unit
1	5	5000.5
10	5	500.5
20	5	250.5
30	5	167.1666667
40	5	125.5
50	5	100.5
60	5	83.83333333
70	5	71.92857143
80	5	63
90	5	56.05555556
100	5	50.5
200	5	25.5
300	5	17.16666667
400	5	13
500	5	10.5
600	5	8.833333333
700	5	7.642857143
800	5	6.75
900	5	6.055555556
1000	5	5.5
2000	5	3
3000	5	2.166666667
4000	5	1.75
5000	5	1.5
6000	5	1.333333333
7000	5	1.214285714
8000	5	1.125
9000	5	1.055555556
10000	5	1

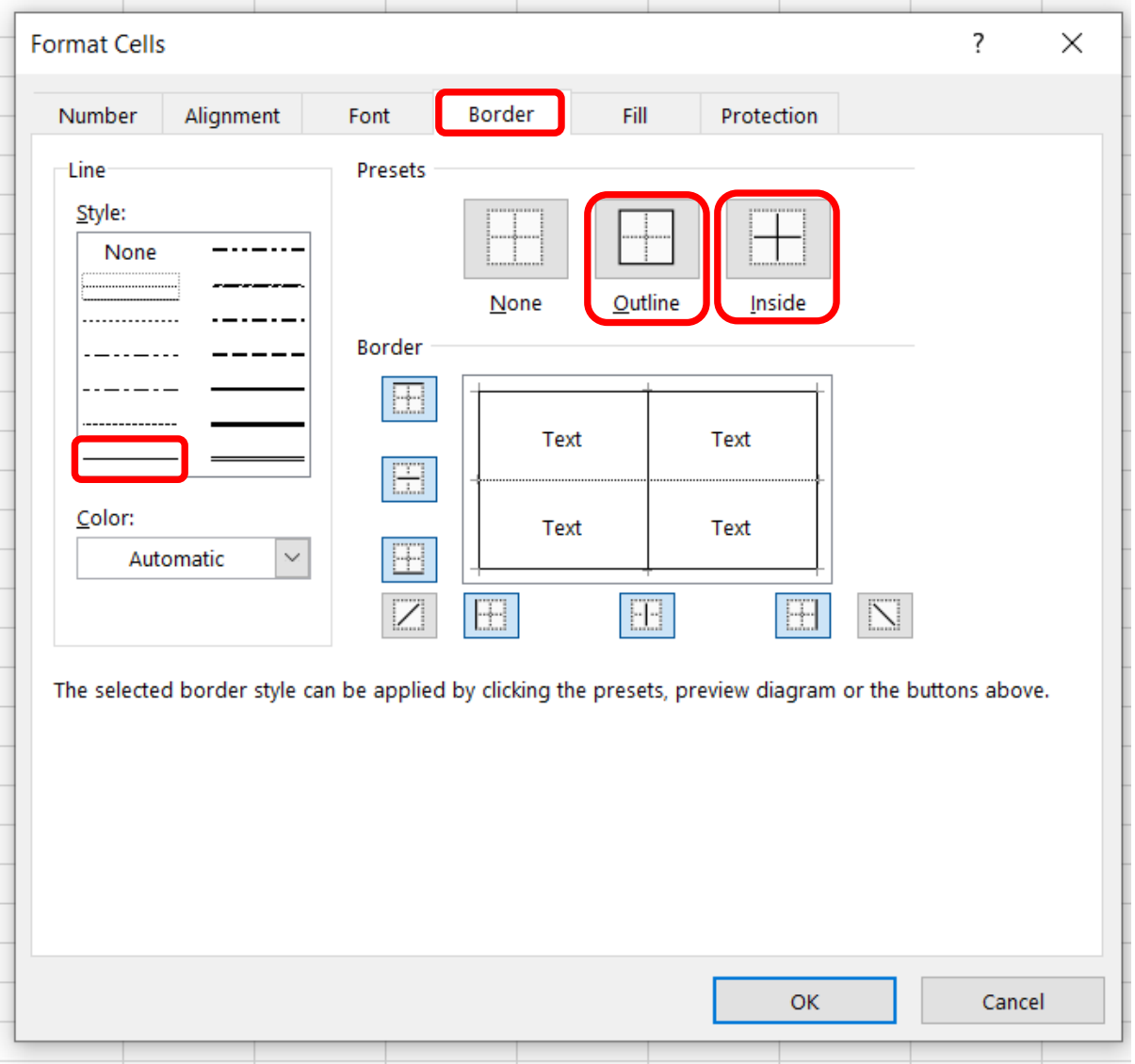
- select the **two columns** as shown
- right-click on a selected cell and select **Format Cells…**
- select the **Number tab** and **Currency**

Units	3D Printing Cost Per Unit	Molding Cost Per Unit
1	5	5000.5
10	5	500.5
20	5	250.5
30	5	167.1666667
40	5	125.5
50	5	100.5
60	5	83.83333333
70	5	71.92857143
80	5	63
90	5	56.05555556
100	5	50.5
200	5	25.5
300	5	17.16666667
400	5	13
500	5	10.5
600	5	8.833333333
700	5	7.642857143
800	5	6.75
900	5	6.055555556
1000	5	5.5
2000	5	3
3000	5	2.166666667
4000	5	1.75
5000	5	1.5
6000	5	1.333333333
7000	5	1.214285714
8000	5	1.125
9000	5	1.055555556
10000	5	1

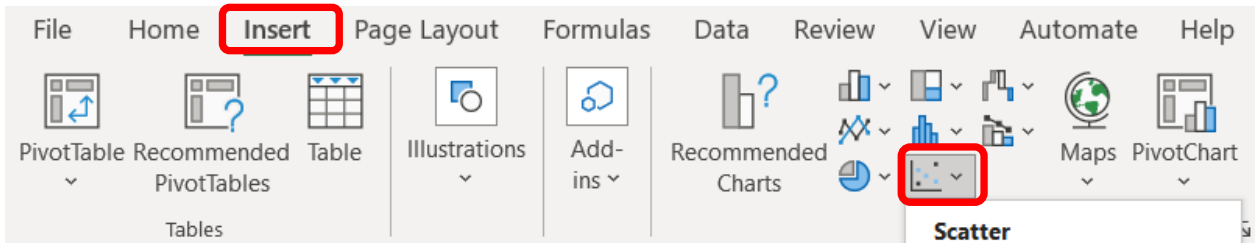


- select the **three columns** as shown (only the data and Not the headings)
- right-click on a selected cell and select **Format Cells…**
- select the **Border tab**, select the **line style**, click on **Outline** and **Inside**, and click **OK**

Units	3D Printing Cost Per Unit	Molding Cost Per Unit
1	$5.00	$5,000.50
10	$5.00	$500.50
20	$5.00	$250.50
30	$5.00	$167.17
40	$5.00	$125.50
50	$5.00	$100.50
60	$5.00	$83.83
70	$5.00	$71.93
80	$5.00	$63.00
90	$5.00	$56.06
100	$5.00	$50.50
200	$5.00	$25.50
300	$5.00	$17.17
400	$5.00	$13.00
500	$5.00	$10.50
600	$5.00	$8.83
700	$5.00	$7.64
800	$5.00	$6.75
900	$5.00	$6.06
1000	$5.00	$5.50
2000	$5.00	$3.00
3000	$5.00	$2.17
4000	$5.00	$1.75
5000	$5.00	$1.50
6000	$5.00	$1.33
7000	$5.00	$1.21
8000	$5.00	$1.13
9000	$5.00	$1.06
10000	$5.00	$1.00



- select the **three columns** again (only the data and Not the headings)
- select the top **Insert tab**, the **Chart** options, and the **Scatter plot with lines**



	Units	3D Printing Cost Per Unit	Molding Cost Per Unit
8	1	$5.00	$5,000.50
9	10	$5.00	$500.50
10	20	$5.00	$250.50
11	30	$5.00	$167.17
12	40	$5.00	$125.50
13	50	$5.00	$100.50
14	60	$5.00	$83.83
15	70	$5.00	$71.93
16	80	$5.00	$63.00
17	90	$5.00	$56.06
18	100	$5.00	$50.50
19	200	$5.00	$25.50
20	300	$5.00	$17.17
21	400	$5.00	$13.00
22	500	$5.00	$10.50
23	600	$5.00	$8.83
24	700	$5.00	$7.64
25	800	$5.00	$6.75
26	900	$5.00	$6.06
27	1000	$5.00	$5.50
28	2000	$5.00	$3.00
29	3000	$5.00	$2.17
30	4000	$5.00	$1.75
31	5000	$5.00	$1.50
32	6000	$5.00	$1.33
33	7000	$5.00	$1.21
34	8000	$5.00	$1.13
35	9000	$5.00	$1.06
36	10000	$5.00	$1.00

- **move** the chart and **resize** it as shown

What kind of crazy chart is this !

JoeBarbetta 3D Printing Vs Molding Cost, Rev 0

3D Printing Cost Per Unit	$5.00
Molding Tooling Cost	$5,000.00
Molding Cost Per Unit	$0.50

Units	3D Printing Cost Per Unit	Molding Cost Per Unit
1	$5.00	$5,000.50
10	$5.00	$500.50
20	$5.00	$250.50
30	$5.00	$167.17
40	$5.00	$125.50
50	$5.00	$100.50
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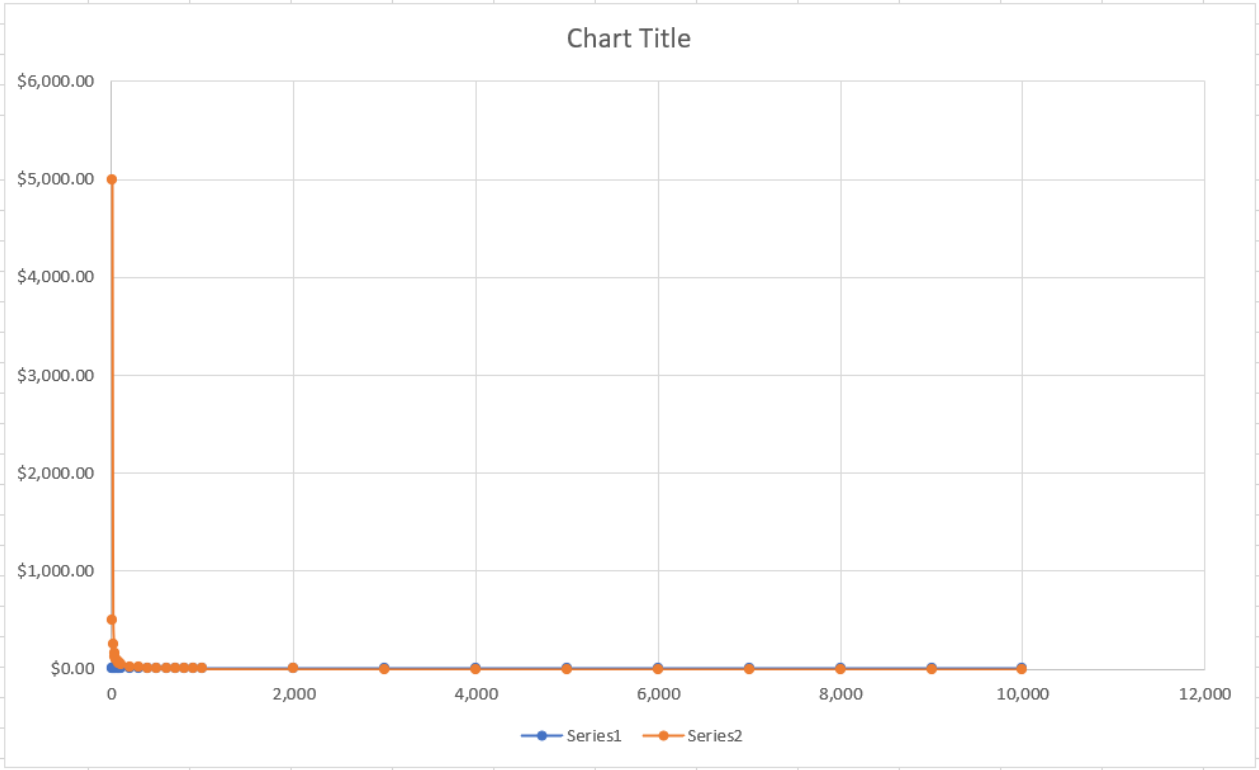
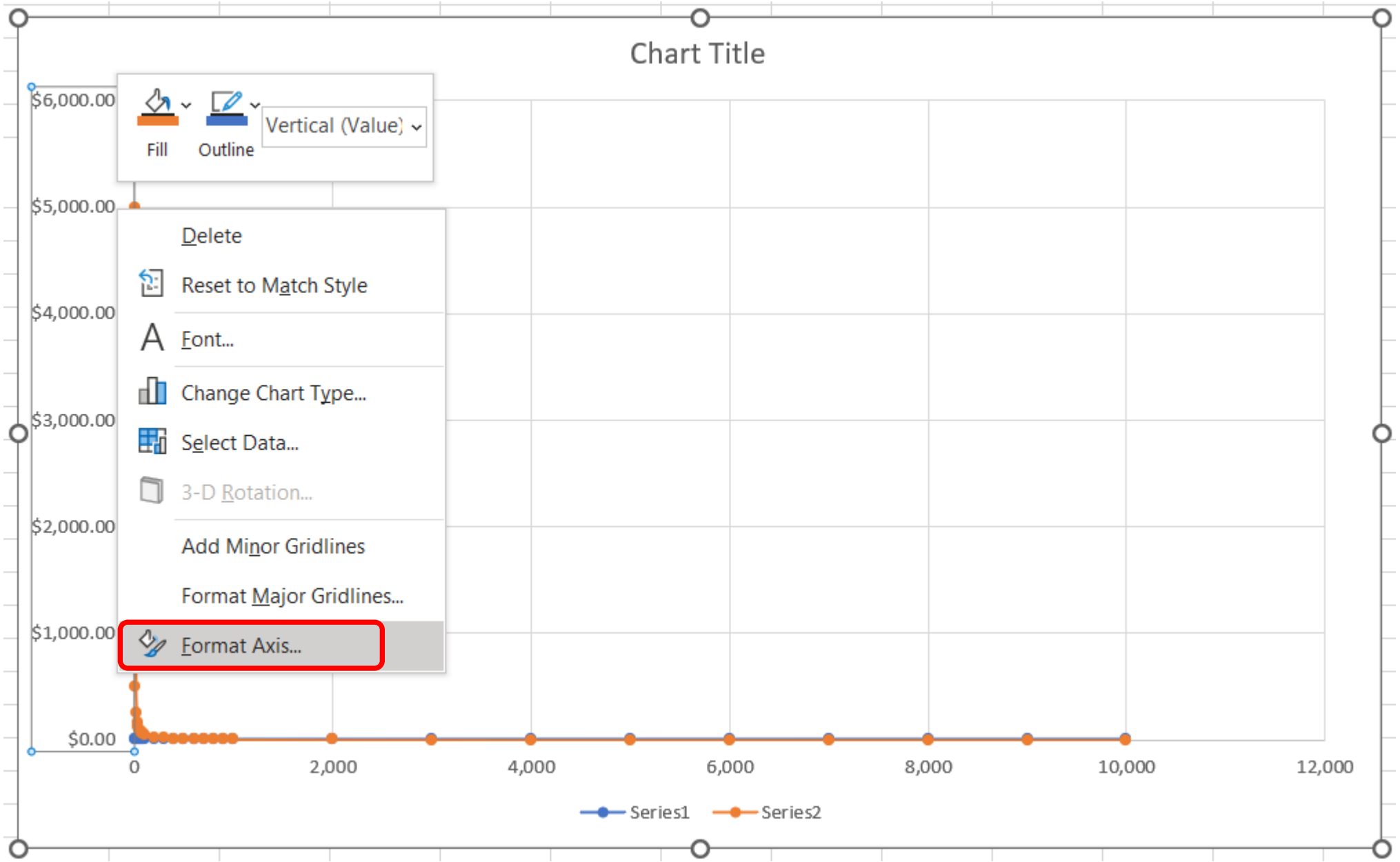
700	$5.00	$7.64
800	$5.00	$6.75
900	$5.00	$6.06
1000	$5.00	$5.50
2000	$5.00	$3.00
3000	$5.00	$2.17
4000	$5.00	$1.75

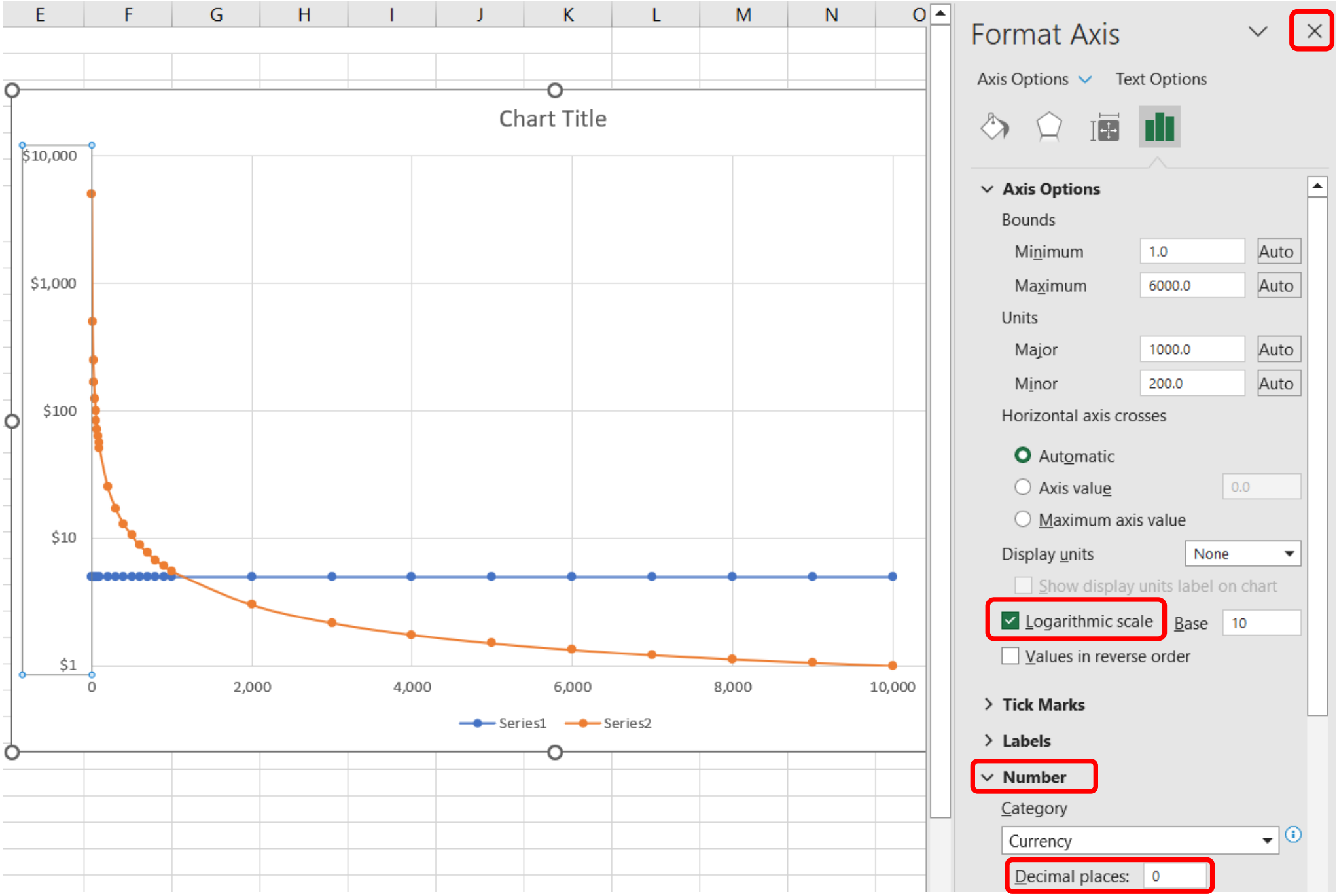


- select the **Y-Axis scale value area** and then right-click and select **Format Axis…**



- check **Logarithmic scale**, expand the **Number options**, set **Decimal places to 0**, and then click the **X**

Note that your chart curves will likely look different.



- from the chart you can get a good idea of your breakeven point