M365 Excel Basics Video 03: Number Formatting, Round Function, and Dynamic Spilled Formula

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Topics covered in the M365 Excel Basics Video 3:

Formula Inputs and Golden Rule

- ❖ Number Formatting is a Façade
- ❖ Different Types of Number Formatting
- ❖ Round Function
- ❖ Dynamic Spill Formula

<u>Additional Helpful Hints</u>

How to Download files and save to folder

1. Right-click file link
2. Click on Save As to open the Save As dialog box
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

To Save in our system of Folders:

1. Right-click file link
2. Click on Save As to open the Save As dialog box
3. Locate the Class Folder and click on it to open the folder and make sure it is the active folder (be sure to save in the BUSN 216 Excel Folder that you created)
4. Click 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.

Number Formatting

Number Formatting only changes the appearances of the number, it is different from style formatting as style formatting can change many of the aspects of formatting cells.

Why is Number Formatting a Façade?

Number Formatting is a façade because it stores one thing but displays or shows another. For example, in our F1 worksheet, the façade shows the number 5281, but underneath the actual number is 5280.830802. The Number Formatting is used here to show or display the numbers on the surface of the cell (as a façade) without changing the actual number in the cell.

An example of an architecture façade: - we see a very beautiful picture of the building below, but we do not know what is inside the building.

Although General is a type of Number Formatting, it means that no number formatting is applied to the values, what you see is what is actually stored in the cell. We use the General Number Formatting to remove all number formatting and to more easily detect errors or mistakes as we will see in this class video.

Number formatting is a façade, and formulas act on the underlying numbers. Formulas do not see the number formatting.

PS. Formulas also see spaces as characters.

Example 1:

Number Formatting is a Façade

Sales Rep	Commission Amount
Faith	5281
Mason	3984
Carmen	3,571.15
Miles	4,012.08
Marcus	$3,574.33
Violet	$4,381.45
Cecelia	$ 2,209.77
RoseMary	$ 2,578.76

| Sales Rep	Commission Amount
Faith	5280.830802
Mason	3983.904729
Carmen	3571.150356
Miles	4012.082280
Marcus	3574.325718
Violet	4381.451514
Cecelia	2209.766913
RoseMary	2578.761603

Facts about Number Formatting:

- Number Formatting changes the display of numbers without changing the underlying numbers.
- Number formatting provides benefits such as having smaller file size, and it also faciltates date and time calculations and speeds up data entry (we will see the date and time calculations in Classs video 4).
- Formulas do not see number formatting and make calculations on the underlying number.

What Does Number Formatting Do:

- Number Formatting allows you to change the appearance of numbers which is how the Number is displayed, including dates and time,s without the changing the actual number.
- The number format does not affect the cell value that Excel uses to perform calculations.
- Formulals do not see the Number Formatting but use the actual value on the cell to perform calculations.
- The actual value is displayed in the formula bar (with an exception if the value is a formula result).

How to Access the Number Group on your Ribbon:

- Click on the Home Tab on your Ribbon and select the Number Group as shown in the picture below. Click on the General box arrow to select the type of number format you would like to use.
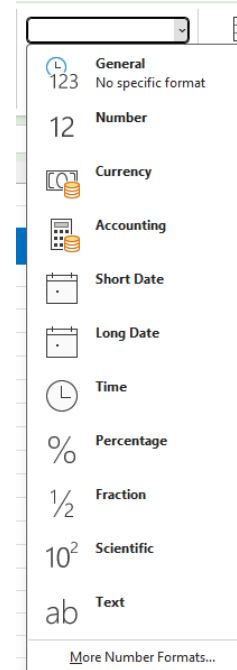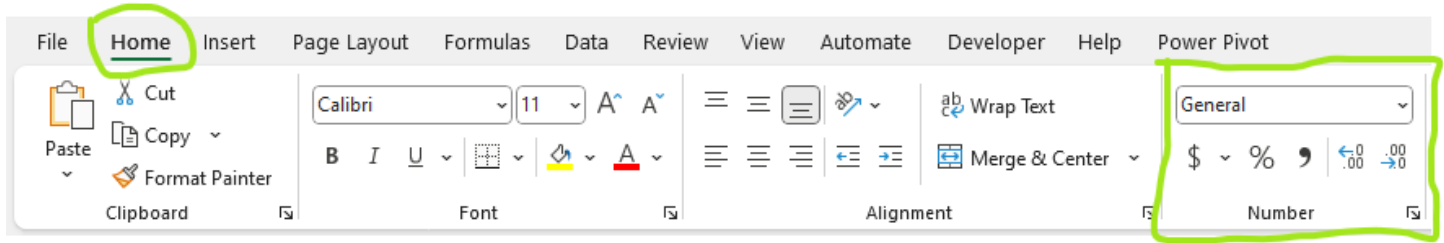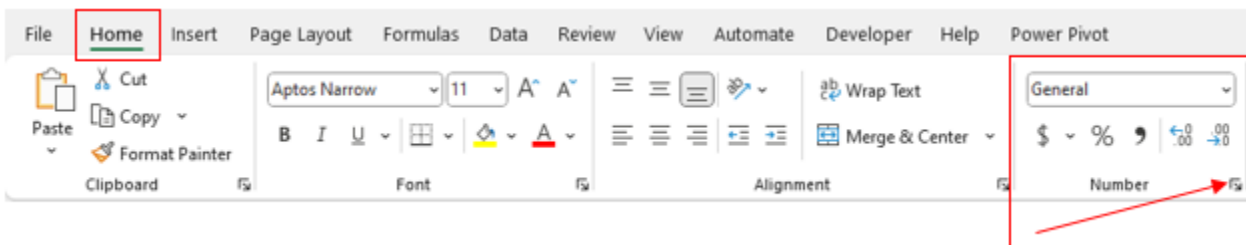

Different Types of Number Formatting

Excel provides several types of Number Formatting

Excel provides several types of Number Formatting and in this video we will learn the General, Currency and Accounting Number Fomatting. In the next video we will learn about the Date and Time Number Formatting.

The different Types of Number Formatting

You can access the Format Cell dialog box by using the keyboard shortcut CTRL +1 to open the Format Cells dialog box, click on the More Number Formats... as circled in the picture below, or you can click on the Number Group dialog box launcher as seen below
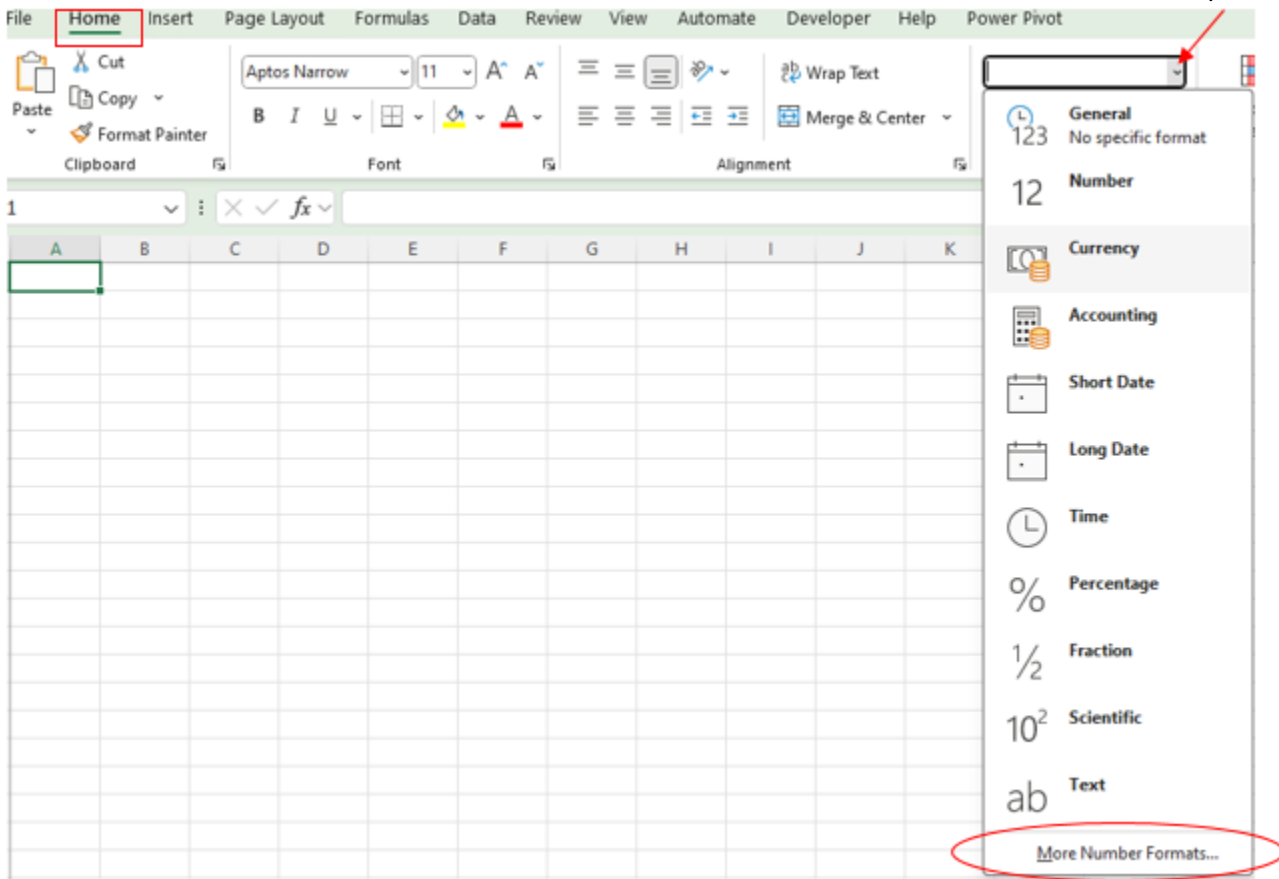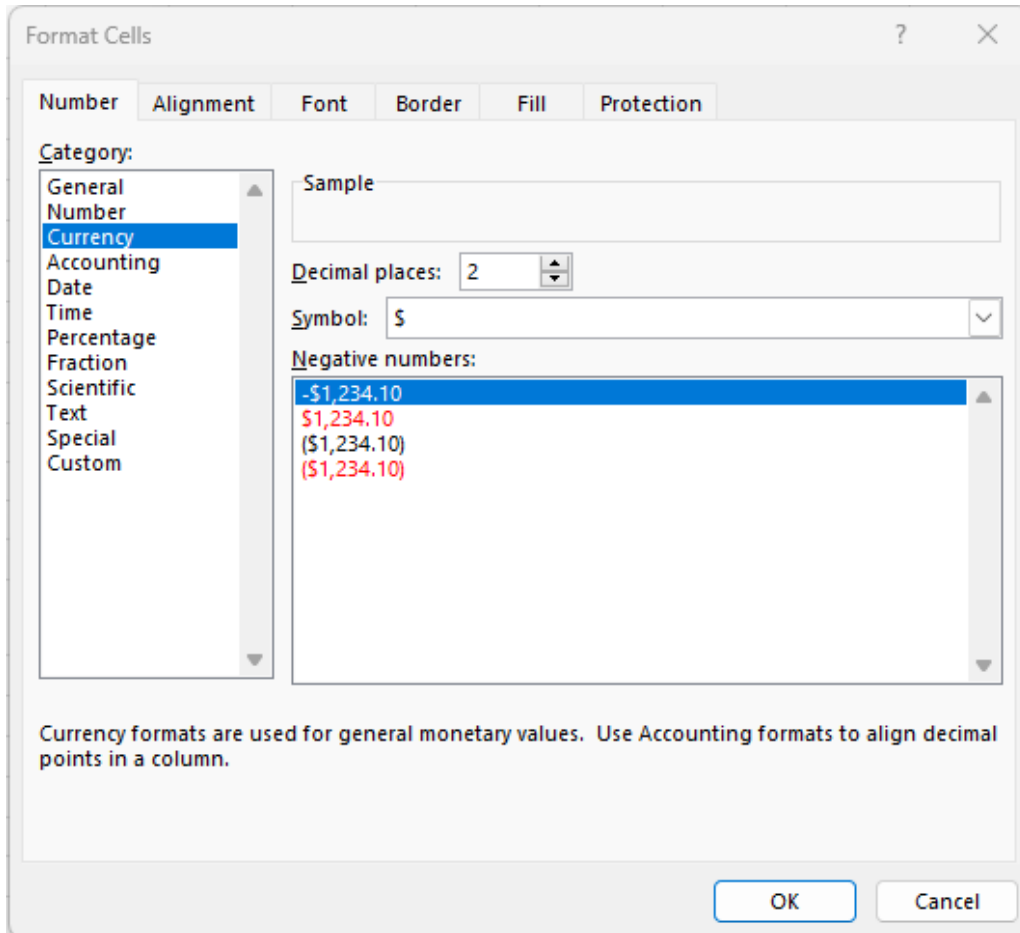
Some Types of Number Formatting:

- **General**: General Format has no specific Format
- **Number**: Number Format is used for general display of numbers. Has an option to show how many decimals you want displayed, an option to use the comma for the 1000 separator and an option on how to display the negative numbers
- **Currency**: Currency formats are used for general monetary value. Has an option to choose how many decimal places to show, what symbol to use and how to display the negative numbers.
- **Accounting**: Accounting formats line up the currency symbols and decimal points in a column. Has an option to choose the number of decimals to display and what symbol to use for the monetary value.
- **Date**: Date formats display the date serial numbers as date values. Has an option to choose the type of date to use.
- **Time**: Time formats displays the time serial numbers
- **Percentage**: Percentage formats multiply the cell value by 100 and displays the result with a percent symbol
- **Text**: Text format cells are treated as text even when a number is in the cell. The cell is displyed exactly as it is entered.
- **Special**: Special formats are useful for tracking list and database values for example Zip Code, and Phone number. Has an option to change the location.
- **Fractions**: Fractions evaluate the decimal value, Excel only displays up to 15 significant digits.
- **Custom**: you can create custom number formats like for the date, time, fractions and percentages.

The Number Formatting that we use this video:

General Number Formatting

- ❖ General Number Formatting = means no Number Formatting is applied
- ❖ General Number Formatting = what you see is actually what is stored in the cell
- ❖ General Number Formatting will ERASE all preciously applied Number Formatting

Currency Number Formatting

- ❖ Has a floating Dollar symbol
- ❖ Decimals will usually line up
- ❖ Zeros will show as Zeros
- ❖ You have an option to choose how to show the negative values

Accounting Number Formatting

- ❖ Dollar symbol is fixed on the left edge of the cell
- ❖ Decimals always line up
- ❖ Zeros will show as dashes
- ❖ Negative values will show in parenthesis

Some things to note:

- ▪ Number Formatting can save a lot of time with data entry
- ▪ The number format does not affect the cell value that Excel used to perform calculations
- ▪ Formulas do not see the Number Formatting but use the actual value on the cell to perform calculations

Example 2:

Examples of some Types of Number Formatting

General		Currency		Accounting	
Balance Amount		**Balance Amount**		**Balance Amount**	
37.5		$37.50		$	37.50
13.1		$13.10		$	13.10
0		$0.00		$	-
24.2		$24.20		$	24.20
148		$148.00		$	148.00
-95		-$95.00		$	(95.00)
5		$5.00		$	5.00
2.87		$2.87		$	2.87

Example 3:

Number Formatting can save you time when you enter data

	Currency	Accounting
Balance Amount to Enter:	**Balance Amount**	**Balance Amount**
$37.50	$37.50	$ 37.50
$13.10	$13.10	$ 13.10
$2.87	$2.87	$ 2.87
$24.20	$24.20	$ 24.20
$148.00	$148.00	$ 148.00
$10.00	$10.00	$ 10.00
$5.00	$5.00	$ 5.00

Example 4:

When you have formula in the cell, it is difficult to know what number is underneath since on the Formula bar you can only see the formula. If the number is formatted you can increase the Decimals or remove the Number Formatting by applying General to see what number is actually in the cell.

Calculation using Formatted numbers

Price per Item	Quantity	Total Price		Formula in cell C7 and C8	
$51	2	$101.00		=A7*B7	Price per Item * Quantity
$51	2	$102.00		=A8*B8	Price per Item * Quantity

Calculation using numbers without any Number Formatting

Price per Item	Quantity	Total Price		Formula in cell C7 and C8	
$50.50	2	$101.00		=A7*B7	Price per Item * Quantity
$51.00	2	$102.00		=A8*B8	Price per Item * Quantity

Round Function

We use the ROUND Function in Excel to round our numbers to a specified number of digits

We can use the ROUND function to remove unwanted decimals

When you MUST use ROUND Function

- ❖ You are required to ROUND when you are dealing with money (When Multiplying and Dividing)
- ❖ You have extraneous decimals which are past the penny position
- ❖ You will use the formula result in a subsequent formula

When not to use ROUND Function

- ❖ When you are not doing calculation and are just looking at the number, you can use Number Formatting

Rules for ROUND Function (Number of Digits to ROUND to):

- ❖ Round to the penny (hundredths position) use 2 for the number digits
- ❖ Round to Dollar (ones position) use 0 for the number digits
- ❖ Round to hundreds (hundrends position) use -2 for the number digits
- ❖ Round to thousands (thousands position) use -3 for the number digits

Some examples of when you will need to Round the numbers

- ❖ Payroll Calculation
- ❖ Gross Pay or Commission Calculations
- ❖ Invoice Calculations
- ❖ Tax Calculations

Using Round Functions to Round Values

- ☐ *Number* is the number to be rounded and the *Num_digits* is the digits to round the number to.
- ☐ *Multiple* is the multiple to be rounded to.

- ❖ To Round a Number to the nearest digit use ROUND(number, num_digits)
- ❖ To Round a Number down to the next lowest digit, use ROUNDDOWN(number, num_digits)
- ❖ To Round a Number up to the next highest digit, use ROUNDUP(number, num_digits)
- ❖ To Round a Number to the nearest Integer use INT(number)
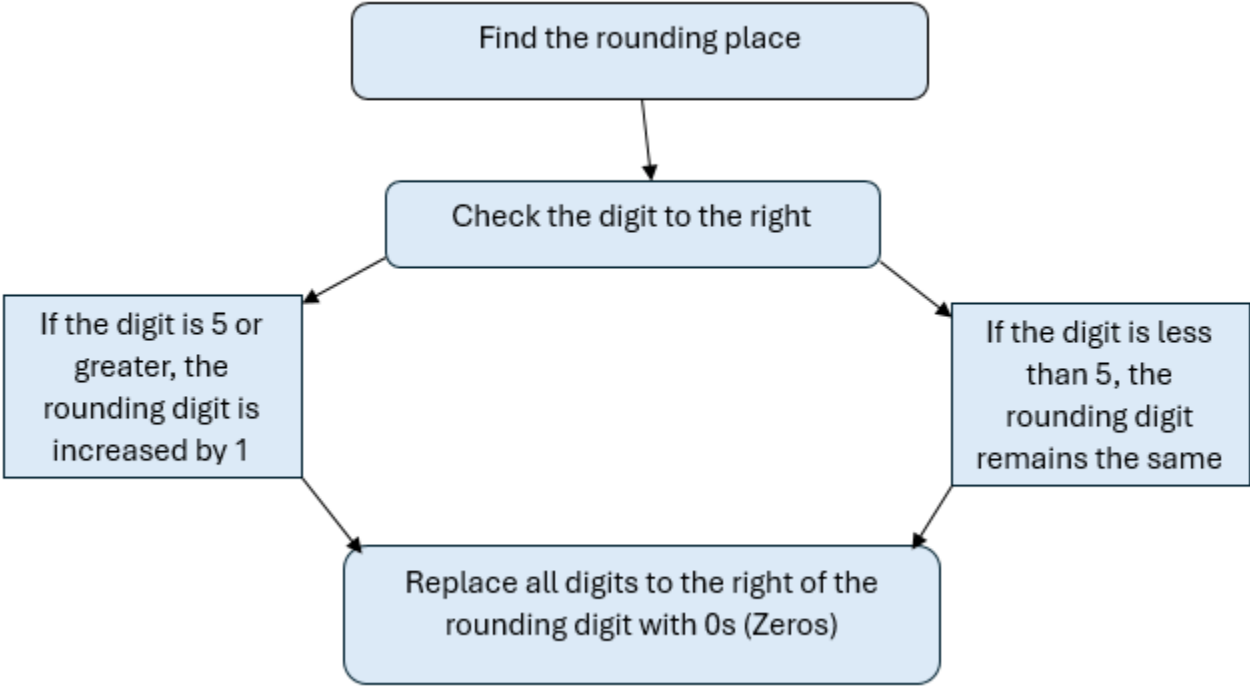- ❖ To Round a number to the nearest multiple of a value, use MROUND(number, multiple)

How to ROUND by hand

1) Pick position you want to round to
2) look at digit to right:

  5 or bigger ==>> add one to position you are rounding to and remove unwanted digits
  4 or less   ==>> remove unwanted digits

Find the rounding place

Check the digit to the right

If the digit is 5 or greater, the rounding digit is increased by 1

If the digit is less than 5, the rounding digit remains the same

Replace all digits to the right of the rounding digit with 0s (Zeros)

| 164.97351 | 164.9**7**351 | 164.97**3**51 | 164.9**(7+0)**351 | 164.97 |
| 164.97531 | 164.9**7**531 | 164.97**5**31 | 164.9**(7+1)**531 | 164.98 |

| 164.97351 | 164.97351 | 164.97351 | 164.9(7+0)351 | 164.97000 |
| 164.97531 | 164.97531 | 164.97531 | 164.9(7+1)531 | 164.98000 |

How to ROUND using Excel

Formula is: =ROUND(Number, Num_digits)

Number is the number to be rounded and the **Num_digits** is the digits to round the number to.

Weekly Pay			No Number Format	Currency Number Format does NOT Remove Decimals	ROUND Removes Decimals after Penny Position
Employee	**Tax Rate**	**Gross Pay**	**Tax Deduction**		**Tax Deduction**
Tiana Anderson	0.0702	2350.05	164.97351	$164.97351	$164.97000
			Formula in above cell is: =C18*D18	Formula in above cell is: =C18*D18	Formula in above cell is: =ROUND(C18*D18,2)

Example 5:

Traditional Formulas (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.

Tax Rate calculation using the Traditional Formula (Relative and Absolute Cell Reference)

	A	B	C	D	E	F	G
1	**Example 5:**						
2							
3	Tax Rate	0.0762					
4			=B7*B3	=ROUND(B7*B3,2)			
5	**Weekly Pay**		No ROUND	ROUND			
6	**Employee**	**Gross Pay**	**Tax Deduction**	**Tax Deduction**		**Type What you see:**	
7	Tiana Anderson	2350.05	$179.07381	$179.0700		179.07	
8	Cinderelli Carson	1625.05	$123.82881	$123.8300		123.83	
9	Carmen Williams	1525.25	$116.22405	$116.2200		116.22	
10	Brixten Luis	875.00	$66.67500	$66.6800		66.68	
11	Stella Farewell	2019.22	$153.86456	$153.8600		153.86	
12		**Total**	$639.66623	$639.6600		639.66	
13			=SUM(C7:C11)	=SUM(D7:D11)		=SUM(F7:F11)	
14							

Dynamic Spilled Array Formulas

Dynamic Spilled Array formulas deliver a spilled array to the worksheet as the final answer.
Dynamic Spilled Array formulas spill from the top cell and only live in the top cell
If you spill a formula from Cell L5, you refer to the spilled array with the spilled range operator #, for example AVERAGE(L5#) when you want to average the values or SUM(L5#) to add the values.

The advantages of using the Dynamic Spilled Array formula:
▪ Do not need to lock cell references
▪ Do not need to manually copy the formula
▪ Editing a formula is faster and easier

If you are using Excel 365 with Dynamic Spilled Array Formulas:

- ❖ You create one formula, and the formula will spill down to the columns or the neighboring cells without you copying
- ❖ Formula is only in one cell, when you edit you will only edit in the cell that has the formula
- ❖ You do not have to decide about using Relative or Absolute cell reference
- ❖ ALWAYS remember to select all the cells needed in the formula
- ❖ In the column where you are spilling the answers be sure the cells are empty to avoid getting #SPILL error
- ❖ You have fewer steps and use less effort.

Example 5b (Dynamic Spilled Array Formula):
Tax Rate calculation using the Relative and Absolute Cell Reference

15	**Example 5b (Dynamic Spilled Array Formula):**			
16				
17	Tax Rate	0.0762		
18			=B21:B25*B17	=ROUND(B21:B25*B17,2)
19	**Weekly Pay**		No ROUND	ROUND
20	**Employee**	**Gross Pay**	**Tax Deduction**	**Tax Deduction**
21	Tiana Anderson	2350.05	$179.07	$179.07
22	Cinderelli Carson	1625.05	$123.83	$123.83
23	Carmen Williams	1525.25	$116.22	$116.22
24	Brixten Luis	875.00	$66.68	$66.68
25	Stella Farewell	2019.22	$153.86	$153.86
26		**Total**	$639.67	$639.66
27			=SUM(C21#)	=SUM(D21#)
28				

Example 6:

Example 6:					
		Jewerly Trio			
Invoice Number		125			
Item	**Price**	**Units**		**Total**	
A pair of earings	5.55	15		$83.25	=ROUND(B34*C34,2)
Bracelets	2.45	50		$122.50	
Necklaces	8.9	10		$89.00	
Key chains	2.1	12		$25.20	
		Subtotal		$319.95	Tax Rate
		Tax		$33.27	10.40%
		Total		$353.22	
	Thanks for your Order!				

Example 6b (Dynamic Spilled Array Formula):

Example 6b (Dynamic Spilled Array Formula):				
Jewerly Trio				
Invoice Number	125			
Item	Price	Units	Total	
A pair of earings	5.55	15	$83.25	=ROUND(B48:B51*C48:C51,2)
Bracelets	2.45	50	$122.50	
Necklaces	8.9	10	$89.00	
Key chains	2.1	12	$25.20	
		Subtotal	$319.95	Tax Rate
		Tax	$33.27	10.40%
		Total	$353.22	
Thanks for your Business!				

Example 7:

**Payroll Taxes and Invoices often have to round to the penny.
**Sometimes for INCOME TAXES you have to round to the dollar.

57	**Example 7:**				
58					
59	**Income Tax:**				
60	**Taxable Amount**	**Tax Deduction Rounded to dollar**		Tax Rate	
61	$2,345.98	$364.00		0.155	
62	$345.49	$54.00			
63	$235.80	$37.00			
64	$2,541.12	$394.00		=ROUND(A64*D61,0)	
65					

Example 7b (Dynamic Spilled Array Formula):

Income Tax:

Taxable Amount	Tax Deduction Rounded to dollar		Tax Rate	
$2,345.98	$364.00		0.155	
$345.49	$54.00			
$235.80	$37.00			
$2,541.12	$394.00		=ROUND(A71:A74*D71,0)	