



Microsoft Office Virtual Learning

Creating Complex Formulas

May 12, 2020



Lesson: May 12, 2020

Objective/Learning Target:

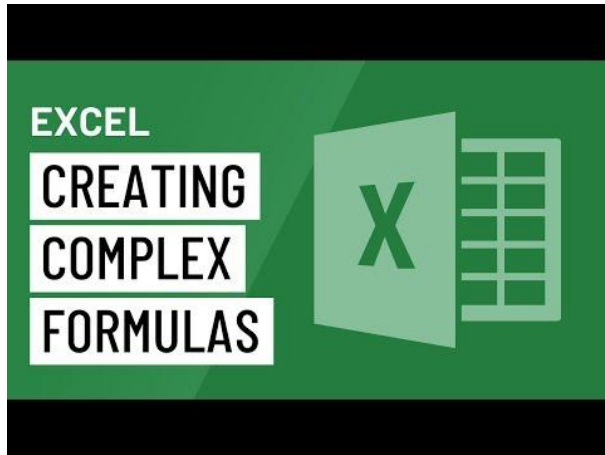
Students will learn how to create more complex formulas
Excel and Google Sheets



Introduction

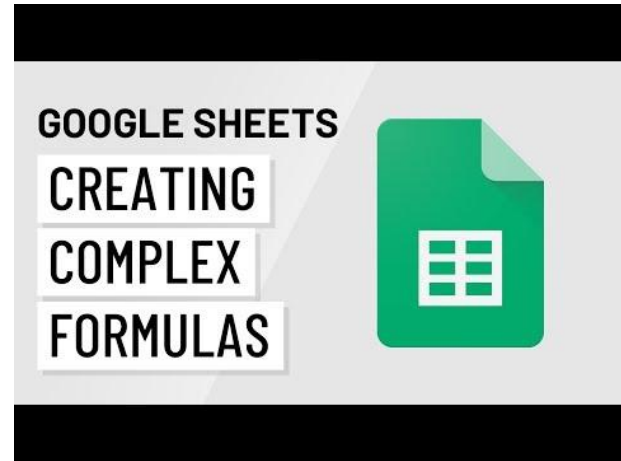
You may have experience working with formulas that contain only one operator, such as $7+9$. More complex formulas can contain several mathematical operators, such as $5+2*8$. When there's more than one operation in a formula, the order of operations tells Google Sheets and Excel which operation to calculate first. To write formulas that will give you the correct answer, you'll need to understand the order of operations.

Excel



<https://youtu.be/J-W3thqtDpQ>

Google Sheets



https://youtu.be/iJE0S4Wkk_o



Order of Operations

Excel and Google Sheets calculates formulas based on the following order of operations:

- Operations enclosed in parentheses
- Exponential calculations (3^2 , for example)
- Multiplication and division, whichever comes first
- Addition and subtraction, whichever comes first

A mnemonic that can help you remember the order is Please Excuse My Dear Aunt Sally.

Creating Complex Formulas

In the example below, we'll demonstrate how Excel (Left) and Google Sheets (Right) use the order of operations to solve a more complex formula. Here, we want to calculate the cost of sales tax for a catering invoice. To do this, we'll write our formula as $= (D3+D4+D5)*0.075$ in cell D6. This formula will add the prices of our items, then multiply that value by the 7.5% tax rate (which is written as 0.075) to calculate the answer.

NETWORK... | x | ✓ | ✗ | = (D3+D4+D5)*0.075

	A	B	C	D	E
2	MENU ITEM	UNIT PRICE	QUANTITY	LINE TOTAL	
3	Tamales: Carnitas	\$2.29	20	\$45.80	
4	Tamales: Vegetable	\$2.29	30	\$68.70	
5	Empanadas: Nutella & Banana	\$3.99	40	\$159.60	
6		TAX		= (D3+D4+D5)*0.075	
7		TOTAL			

SABROSA
 Empanadas & More

Catering Invoice
 Sabrosa Empanadas & More
 1202 Biotech Bay Drive
 Orlando, FL 32804
 Invoice #: 56908

	A	B	C	D	E
2	MENU ITEM	UNIT PRICE	QUANTITY	LINE TOTAL	
3	Tamales: Carnitas	\$2.29	20	\$45.80	
4	Tamales: Vegetable	\$2.29	30	\$68.70	
5	Empanadas: Nutella & Banana	\$3.99	40	\$159.60	
6		TAX		= (D3+D4+D5)*0.075	
7		TOTAL			

Excel follows the order of operations and first adds the values inside the parentheses: $(45.80+68.70+159.60) = 274.10$. It then multiplies that value by the tax rate: $274.10*0.075$. The result will show that the sales tax is \$20.56.

NETWORK... | x | ✓ | ✗ | = (D3+D4+D5)*0.075

	A	B	C	D	E
2	MENU ITEM	UNIT PRICE	QUANTITY	LINE TOTAL	
3	Tamales: Carnitas	\$2.29	20	\$45.80	
4	Tamales: Vegetable	\$2.29	30	\$68.70	
5	Empanadas: Nutella & Banana	\$3.99	40	\$159.60	
6		TAX		\$20.56	
7		TOTAL			

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	A	B	C	D	E
2	MENU ITEM	UNIT PRICE	QUANTITY	LINE TOTAL	
3	Tamales: Carnitas	\$2.29	20	\$45.80	
4	Tamales: Vegetable	\$2.29	30	\$68.70	
5	Empanadas: Nutella & Banana	\$3.99	40	\$159.60	
6		TAX		\$15.08	
7		TOTAL			

To Create Complex Formulas

In the example below, we'll use cell references along with numerical values to create a complex formula that will calculate the subtotal for a catering invoice. The formula will calculate the cost of each menu item first, then add these values. (Excel - Left; Google Sheets - Right)

1. Select the cell that will contain the formula. In our example, we'll select cell C5.

MENU ITEM	UNIT PRICE	QUANTITY
Empanadas: Poblano & Cheese	\$2.79	35
Empanadas: Spicy Sweet Potato	\$2.29	20
SUBTOTAL		
TOTAL w/ TAX		

MENU ITEM	UNIT PRICE	QUANTITY
Empanadas: Poblano & Cheese	\$2.79	35
Empanadas: Spicy Sweet Potato	\$2.29	20
SUBTOTAL		
TOTAL w/ TAX		

2. Enter your formula. In our example, we'll type `=B3*C3+B4*C4`. This formula will follow the order of operations, first performing the multiplication: $2.79 * 35 = 97.65$ and $2.29 * 20 = 45.80$. It then will add these values to calculate the total: $97.65 + 45.80$.

MENU ITEM	UNIT PRICE	QUANTITY
Empanadas: Poblano & Cheese	\$2.79	35
Empanadas: Spicy Sweet Potato	\$2.29	20
SUBTOTAL		<code>=B3*C3+B4*C4</code>
TOTAL w/ TAX		

MENU ITEM	UNIT PRICE	QUANTITY
Empanadas: Poblano & Cheese	\$2.79	35
Empanadas: Spicy Sweet Potato	\$2.29	20
SUBTOTAL		<code>=B3*C3+B4*C4</code>
TOTAL w/ TAX		

3. Double-check your formula for accuracy, then press Enter on your keyboard. The formula will calculate and display the result. In our example, the result shows that the subtotal for the order is \$143.45.

MENU ITEM	UNIT PRICE	QUANTITY
Empanadas: Poblano & Cheese	\$2.79	35
Empanadas: Spicy Sweet Potato	\$2.29	20
SUBTOTAL		\$143.45
TOTAL w/ TAX		

MENU ITEM	UNIT PRICE	QUANTITY
Empanadas: Poblano & Cheese	\$2.79	35
Empanadas: Spicy Sweet Potato	\$2.29	20
SUBTOTAL		\$143.45
TOTAL w/ TAX		

Challenge

Excel

1. Open Excel 2016.
2. Enter the following into the designated Cells

A1	10
A2	2
A3	5

3. Use the fill handle to copy the same numbers into cells B1 through B3
4. In cell A4, create a formula that multiplies cells A1 and A2. Be sure to use cell references.
5. In Cell B4, create a formula that calculates the total using 20% off the total in cell A4
6. In cell A5, create a formula that subtracts 15 from the total in cell A4

Sheets

1. Open Google Sheets and create a new blank spreadsheet.
2. Enter the following into the designated Cells

A1	10
A2	2
A3	5

3. Use the fill handle to copy the same numbers into cells B1 through B3
4. In cell A4, create a formula that multiplies cells A1 and A2. Be sure to use cell references.
5. In Cell B4, create a formula that calculates the total using 20% off the total in cell A4
6. In cell A5, create a formula that subtracts 15 from the total in cell A4

For More Resources:

Microsoft Excel:

<https://edu.gcfglobal.org/en/excel2016/creating-more-complex-formulas/1/>

Google Sheets:

<https://edu.gcfglobal.org/en/googlespreadsheets/creating-complex-formulas/1/>