Technical Institute of Administration

Business Administration

Computer Skills

2. Microsoft Excel - Number Formats and Multiple Worksheets - Formulas

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2. Understanding Number Formats

2.1. Introduction

Whenever you're working with a spreadsheet, it's a good idea to use appropriate **number formats** for your data. Number formats tell your spreadsheet exactly what type of data you're using, like percentages (%), currency ($), times, dates, and so on.

2.2. Why use number formats?

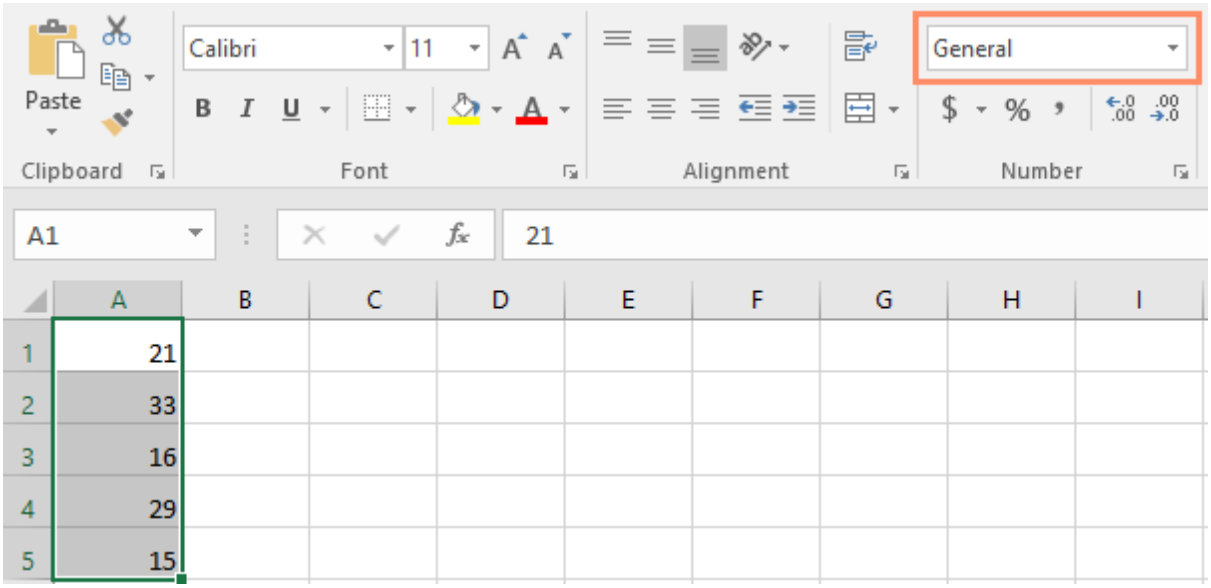
Number formats don't just make your spreadsheet easier to read—they also make it easier to use. When you apply a number format, you're telling your spreadsheet exactly **what types of values** are stored in a cell. For example, the **date** format tells the spreadsheet that you're entering **specific calendar dates**. This allows the spreadsheet to better understand your data, which can help ensure that your data remains consistent and that your formulas are calculated correctly.

If you don't need to use a specific number format, the spreadsheet will usually apply the **general** number format by default. However, the general format may apply some small formatting changes to your data.

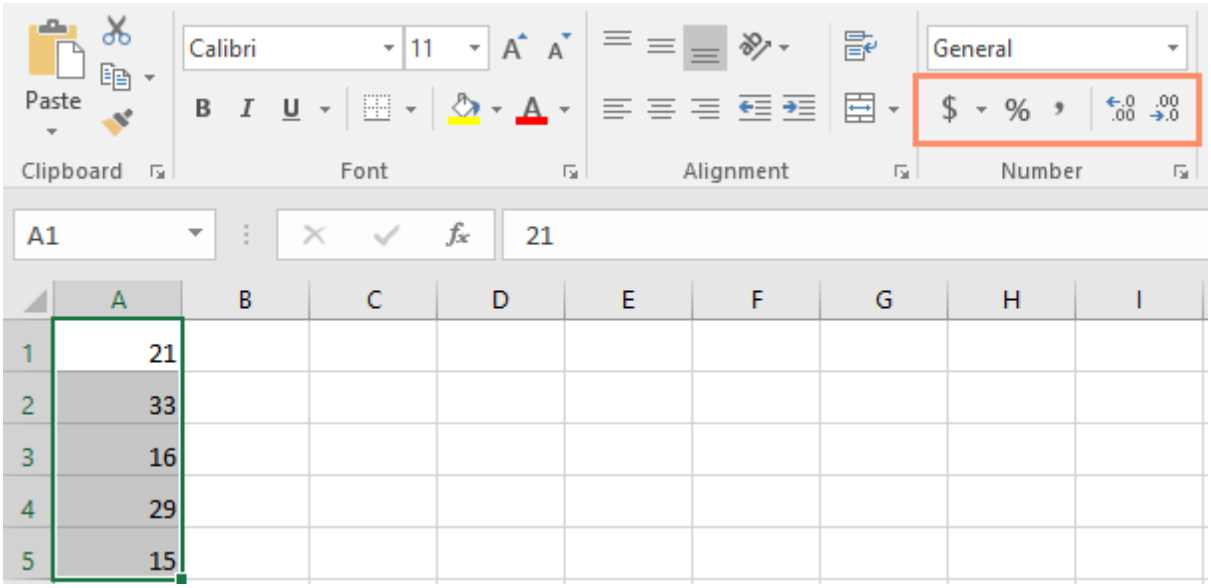
2.3. Applying number formats

Just like other types of formatting, such as changing the font color, you'll apply number formats by selecting cells and choosing the desired formatting option. There are two main ways to choose a number format:

- Go to the **Home** tab, click the **Number Format** drop-down menu in the **Number** group, and select the desired format.

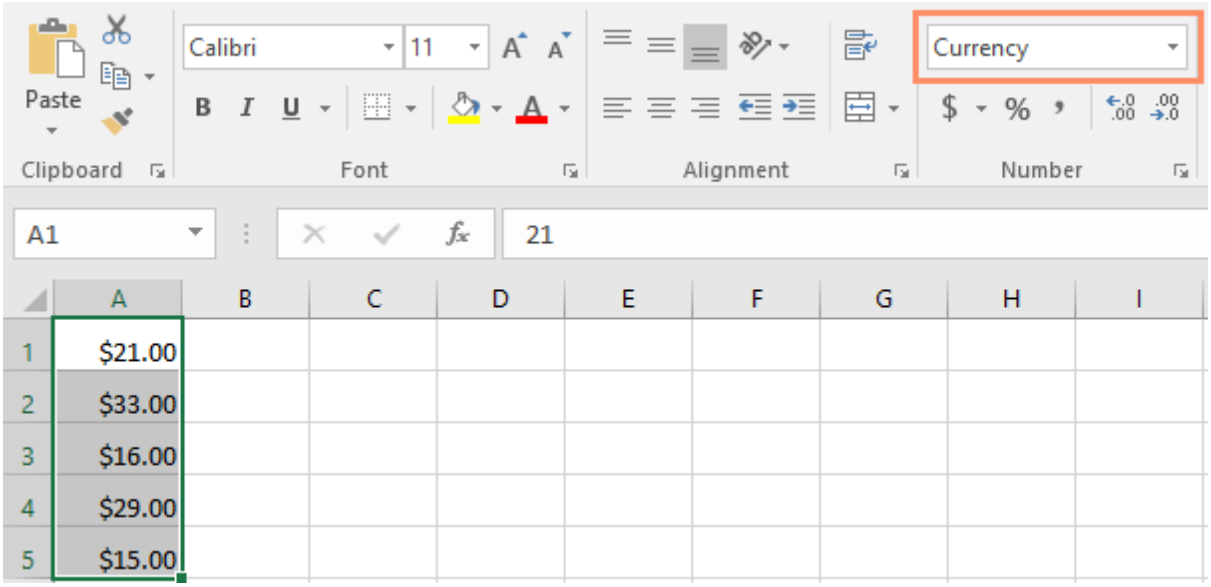


- You can also click one of the quick number-formatting commands below the drop-down menu.

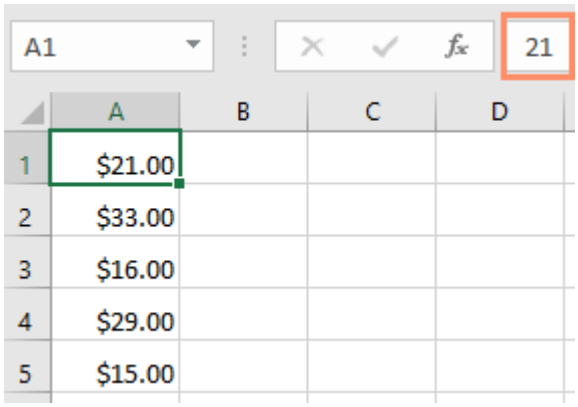


You can also select the desired cells and press **Ctrl+1** on your keyboard to access more number-formatting options.

In this example, we've applied the **Currency** number format, which adds currency symbols ($) and displays two decimal places for any numerical values.

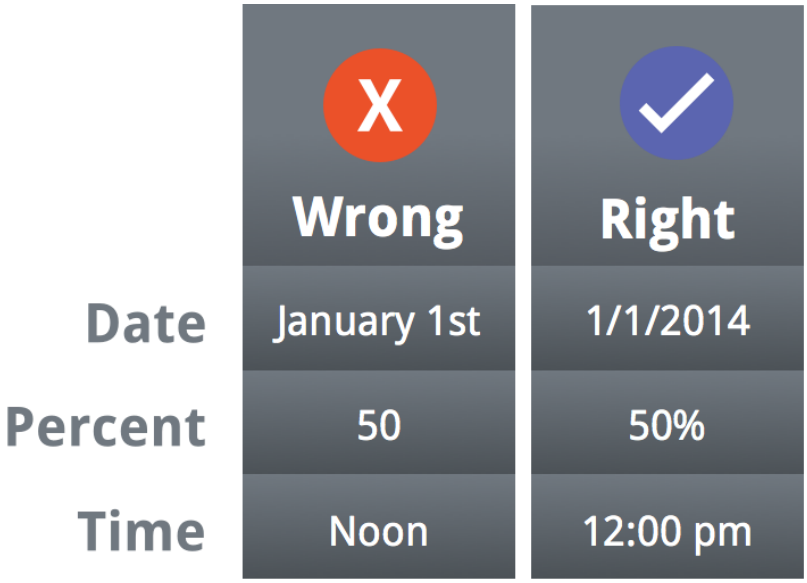


If you select any cells with number formatting, you can see the **actual value** of the cell in the formula bar. The spreadsheet will use this value for formulas and other calculations.



2.3.1. Using number formats correctly

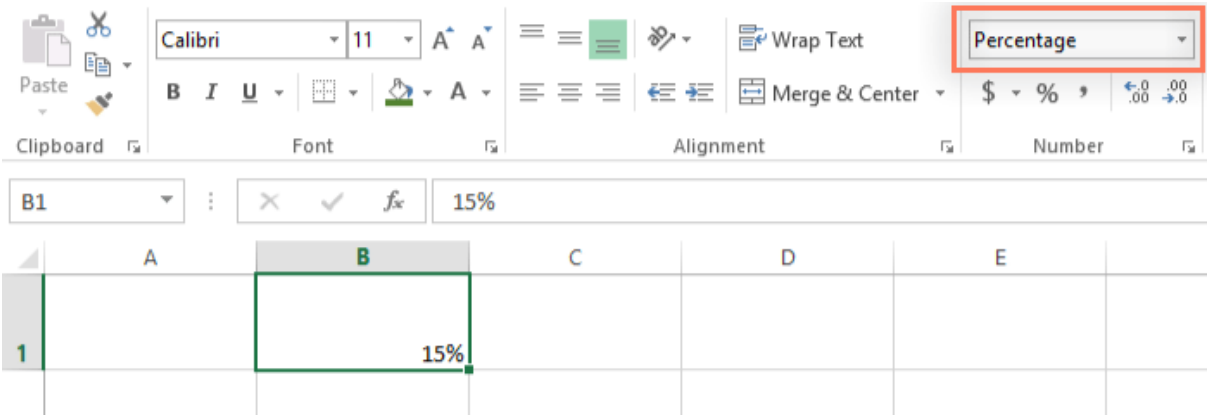
There's more to number formatting than selecting cells and applying a format. Spreadsheets can actually apply a lot of number formatting **automatically** based on the way you enter data. This means you'll need to enter data in a way the program can understand, and then ensure that those cells are using the proper number format. For example, the image below shows how to use number formats correctly for dates, percentages, and times:



Now that you know more about how number formats work, we'll look at a few different number formats in action.

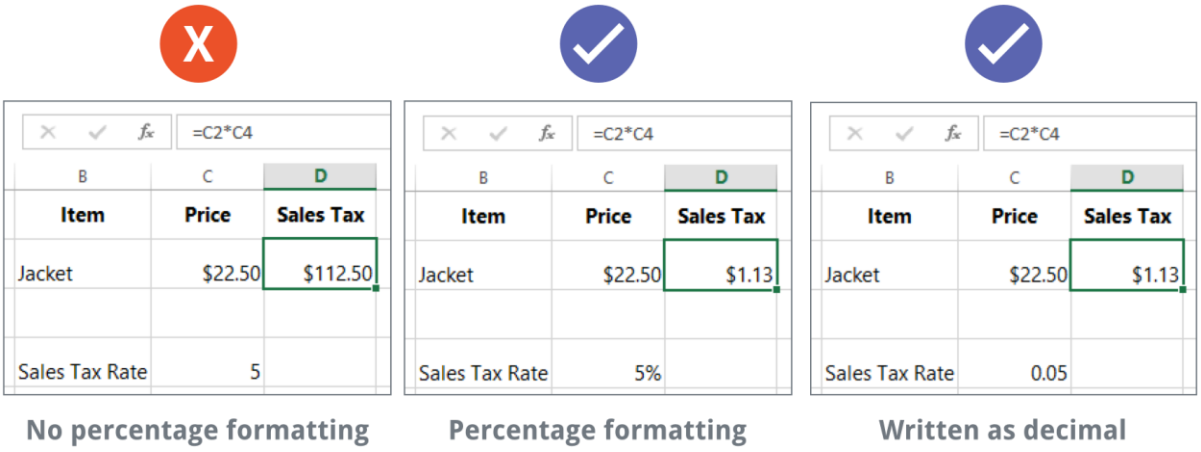
2.4.Percentage formats

One of the most helpful number formats is the **percentage** (%) format. It displays values as percentages, such as **20%** or **55%**. This is especially helpful when calculating things like the cost of sales tax or a tip. When you type a percent sign (%) after a number, the percentage number format will be be applied to that cell **automatically**.



As you may remember from math class, a percentage can also be written as a **decimal**. So 15% is the same thing as 0.15, 7.5% is 0.075, 20% is 0.20, 55% is 0.55, and so on. You can review this lesson from our Math tutorials to learn more about converting percentages to decimals.

There are many times when percentage formatting will be useful. For example, in the images below, notice how the **sales tax rate** is formatted differently for each spreadsheet (5, 5%, and 0.05):



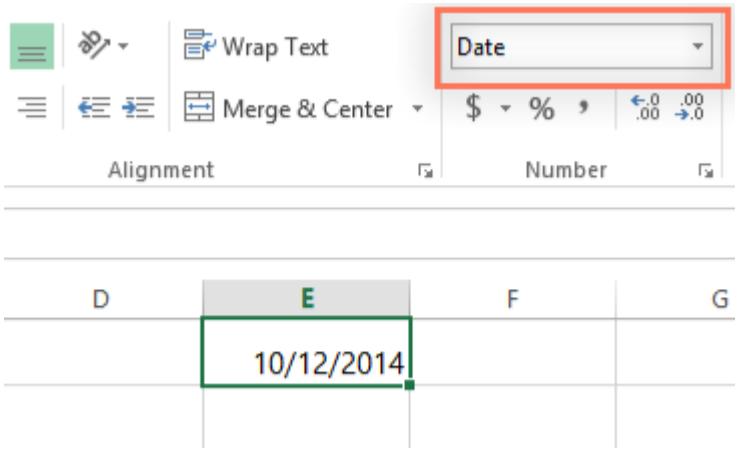
As you can see, the calculation in the spreadsheet on the left didn't work correctly. Without the percentage number format, our spreadsheet thinks we want to multiply $22.50 by 5, not 5%. And while the spreadsheet on the right still works without percentage formatting, the spreadsheet in the middle is easier to read.

2.4.1. Date formats

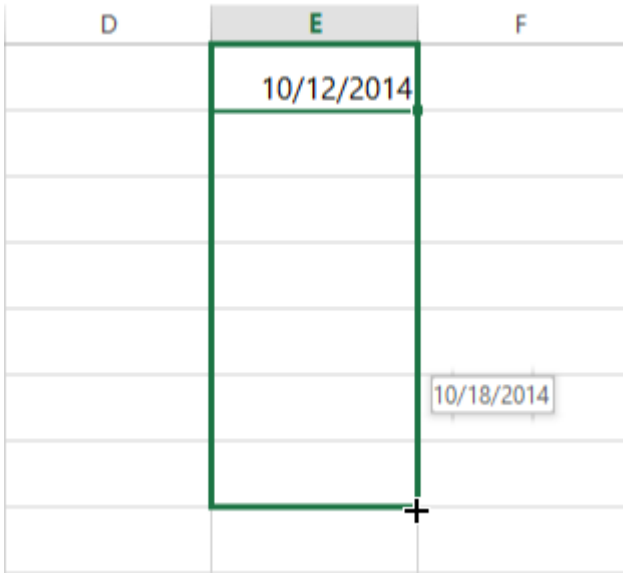
Whenever you're working with **dates**, you'll want to use a date format to tell the spreadsheet that you're referring to **specific calendar dates**, such as July 15, 2014. Date formats also allow you to work with a powerful set of date functions that use time and date information to calculate an answer.

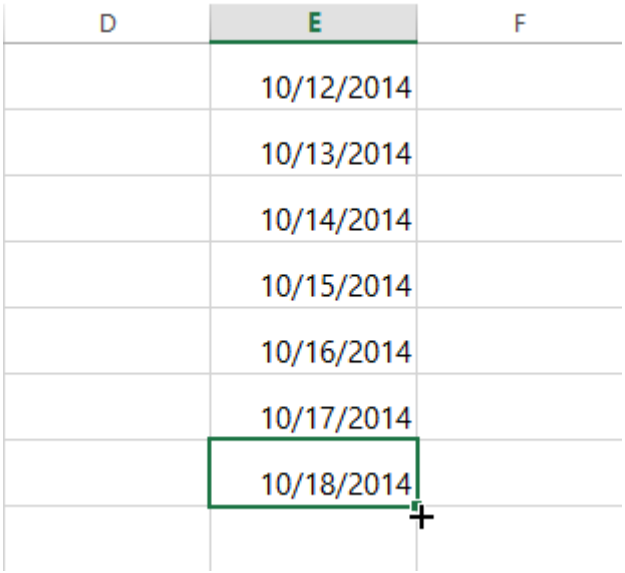
Spreadsheets don't understand information the same way a person would. For instance, if you type **October** into a cell, the spreadsheet won't know you're entering a date so it will treat it like any other text. Instead, when you enter a date, you'll need to use a **specific format** your

spreadsheet understands, such as **month/day/year** (or **day/month/year** depending on which country you're in). In the example below, we'll type **10/12/2014** for October 12, 2014. Our spreadsheet will then automatically apply the date number format for the cell.

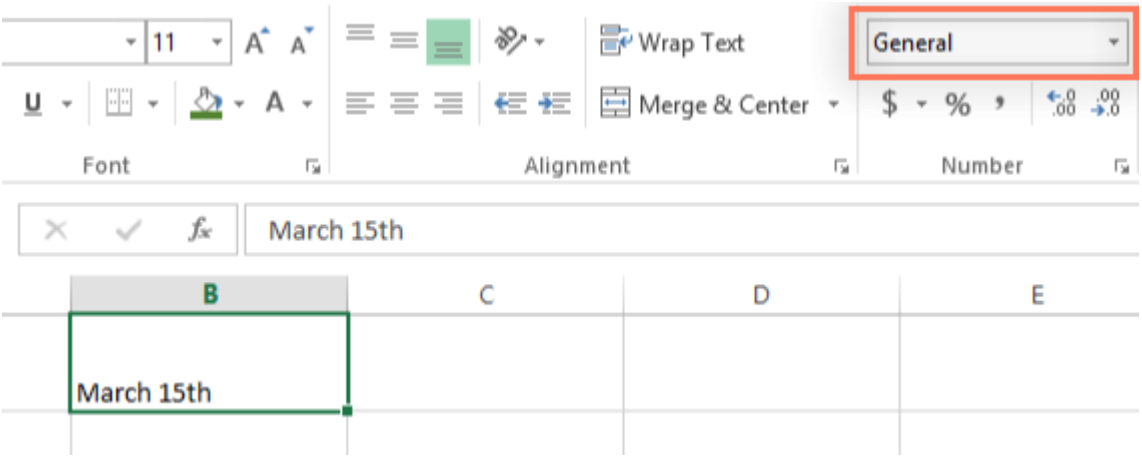


Now that we have our date correctly formatted, we can do many different things with this data. For example, we could use the fill handle to continue the dates through the column, so a different day appears in each cell:





If the date formatting isn't applied automatically, it means the spreadsheet did not understand the data you entered. In the example below, we've typed **March 15th**. The spreadsheet did not understand that we were referring to a date, so this cell is still using the **general** number format.



On the other hand, if we type **March 15** (without the "th"), the spreadsheet **will** recognize it as a date. Because it doesn't include a year, the spreadsheet will automatically add the current year so the date will have all of the necessary information. We could also type the date several other ways, such as **3/15**, **3/15/2014**, or **March 15 2014**, and the spreadsheet would still recognize it as a date.

Try entering the dates below into a spreadsheet and see if the date format is applied automatically:

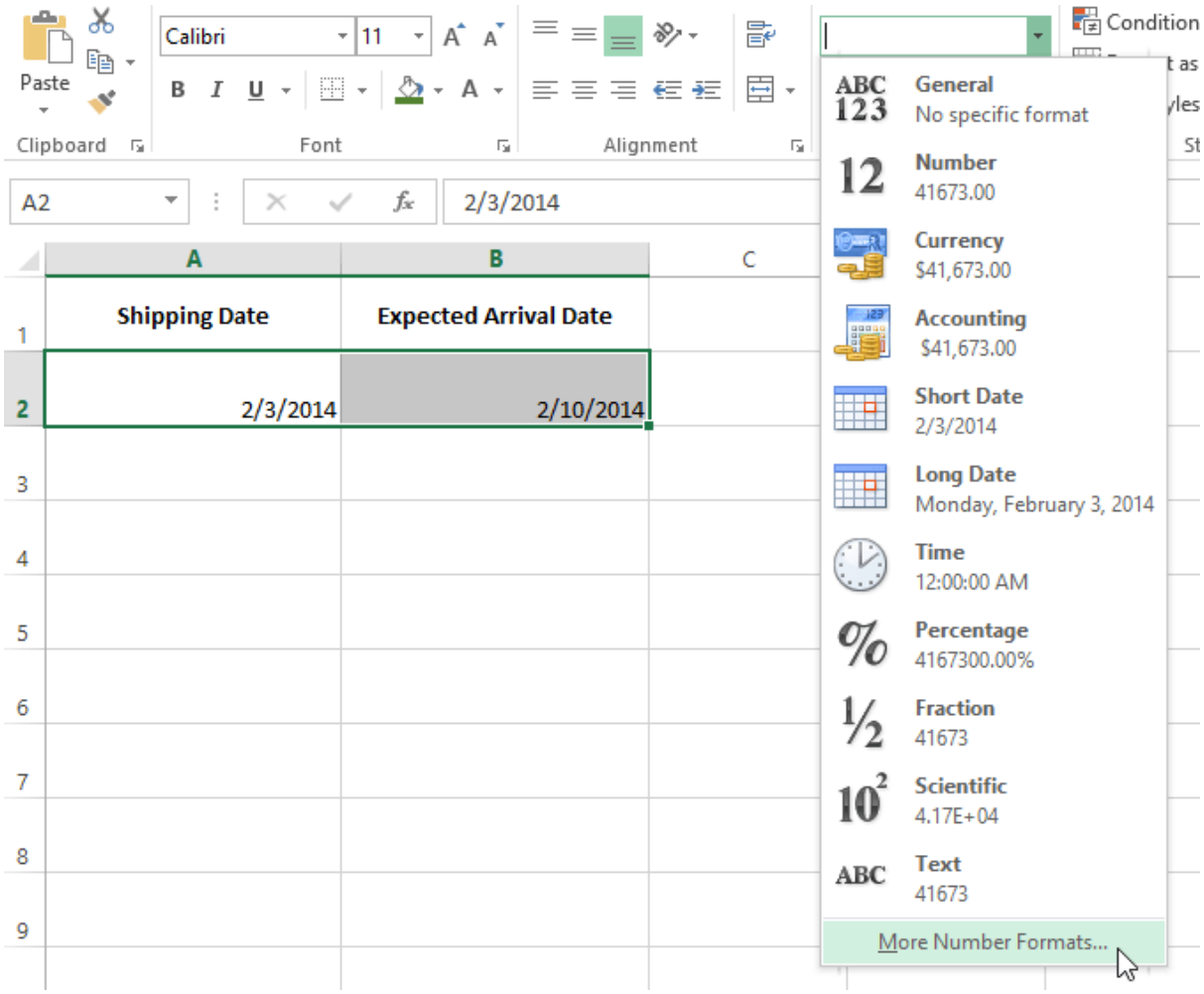
- 10/12
- October
- October 12
- October 2016
- 10/12/2016

- October 12, 2016
- 2016
- October 12th

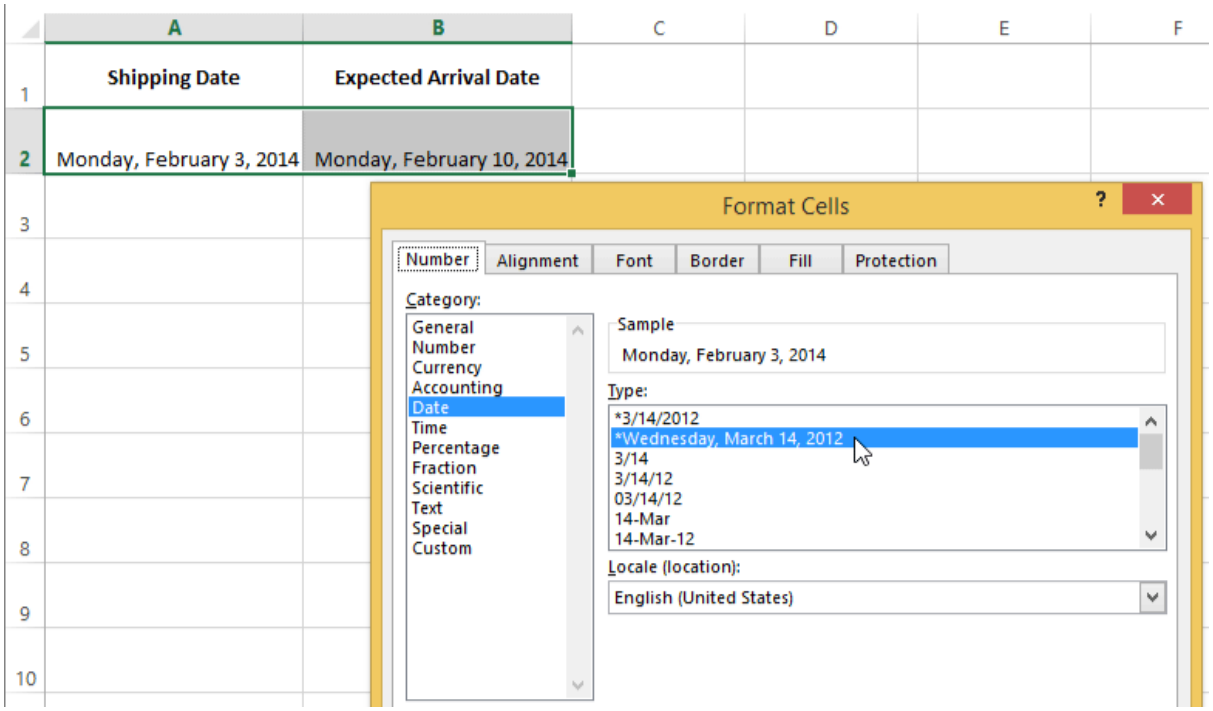
If you want to add the current date to a cell, you can use the **Ctrl+;** shortcut, as shown in the video below.

2.4.2. Other date formatting options

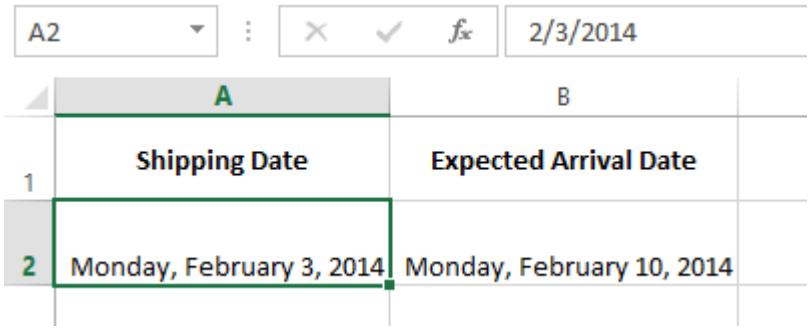
To access other date formatting options, select the **Number Format** drop-down menu and choose **More Number Formats**. These are options to display the date differently, like including the day of the week or omitting the year.



The **Format Cells** dialog box will appear. From here, you can choose the desired date formatting option.



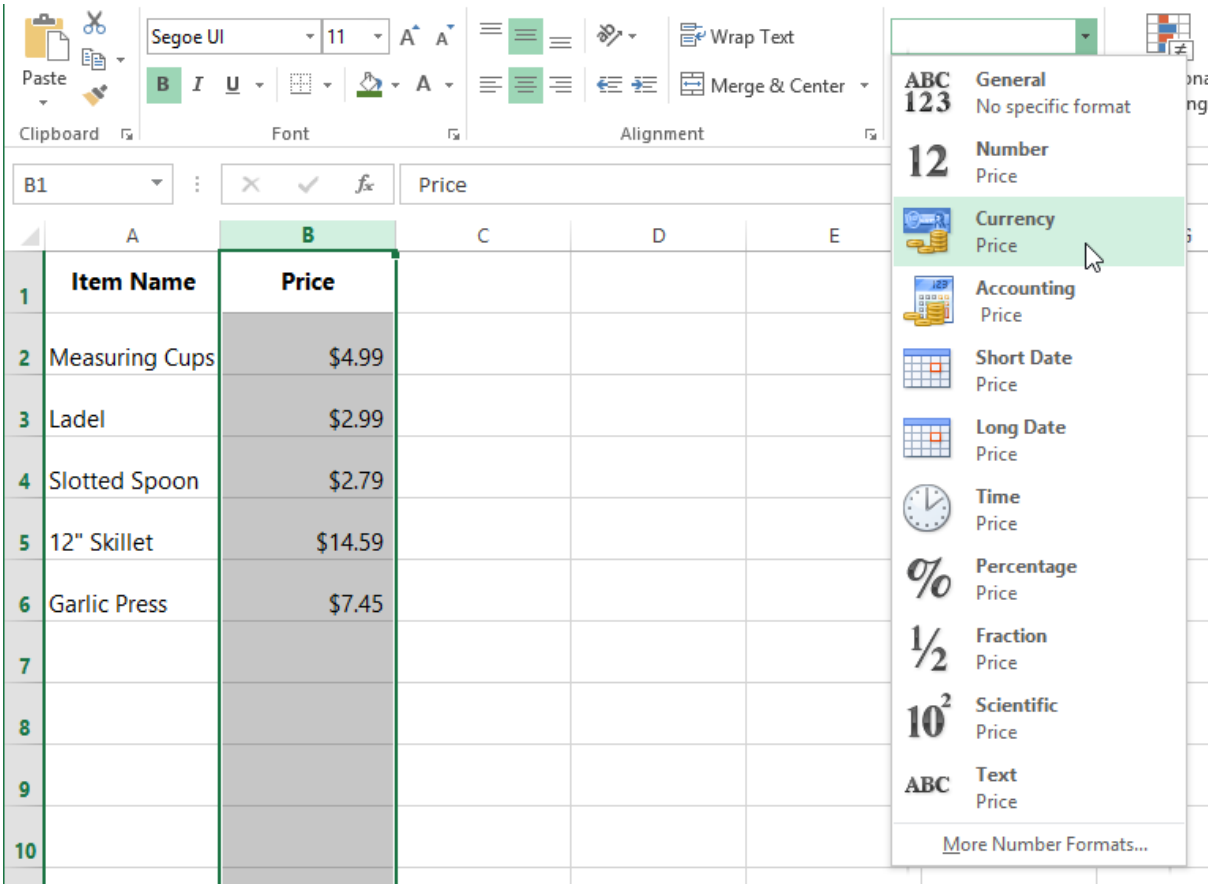
As you can see in the formula bar, a custom date format doesn't change the actual date in our cell—it just changes the way it's displayed.



2.4.3. Number formatting tips

Here are a few tips for getting the best results with number formatting:

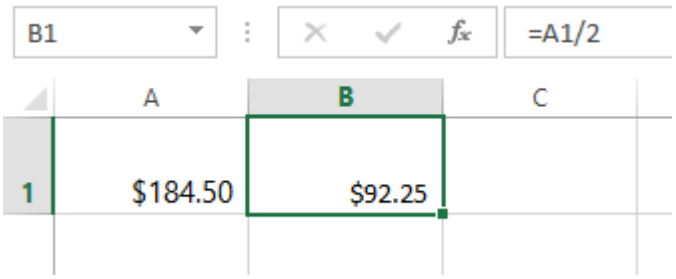
- **Apply number formatting to an entire column**: If you're planning to use one column for a certain type of data, like dates or percentages, you may find it easiest to select the entire column by clicking the column letter and applying the desired number formatting. This way, any data you add to this column in the future will already have the correct number format. Note that the header row usually won't be affected by number formatting.



- **Double-check your values after applying number formatting**: If you apply number formatting to existing data, you may have unexpected results. For example, applying **percentage** (%) formatting to a cell with a value of 5 will give you 500%, not 5%. In this case, you'd need to retype the values correctly in each cell.

	A	B
1	**Percentage of Total**	
2	500%	
3	7300%	
4	1200%	
5	550%	
6	1200%	

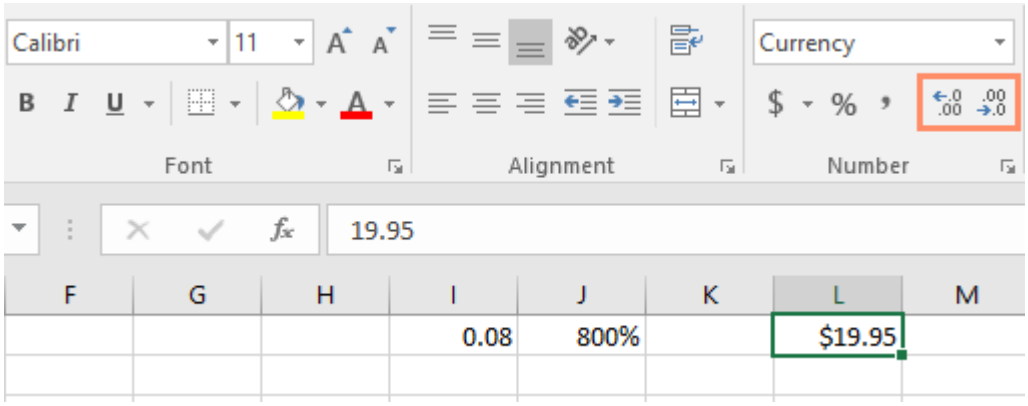
- If you reference a cell with number formatting in a formula, the spreadsheet may automatically apply the same number formatting to the new cell. For example, if you use a value with currency formatting in a formula, the calculated value will also use the currency number format.



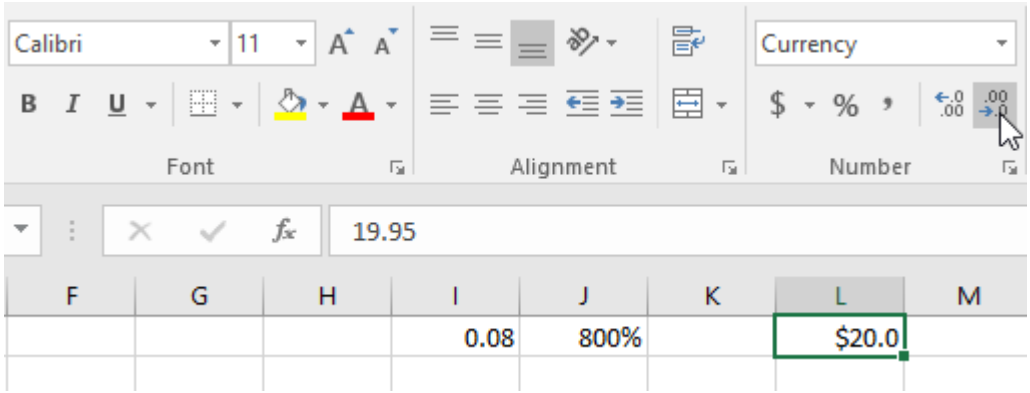
- If you want your data to appear **exactly as entered,** you'll need to use the **text** number format. This format is especially good for numbers you don't want to perform calculations with, such as phone numbers, zip codes, or numbers that begin with 0, like **02415**. For best results, you may want to apply the text number format before entering data into these cells.

2.4.4. Increase and Decrease Decimal

The **Increase Decimal** and **Decrease Decimal** commands allow you to control how many decimal places are displayed in a cell. These commands don't change the value of the cell; instead, they display the value to a set number of decimal places.



Decreasing the decimal will display the value rounded to that decimal place, but the actual value in the cell will still be displayed in the formula bar.

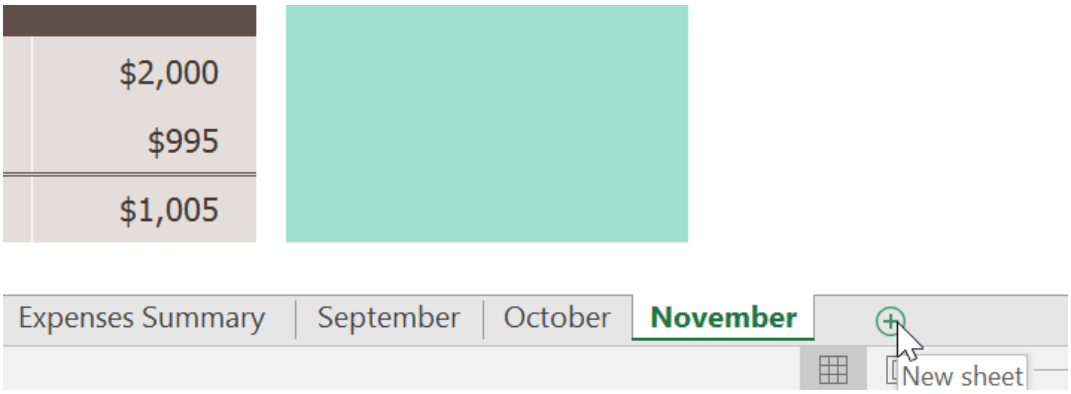


The **Increase/Decrease Decimal** commands don't work with some number formats, like **Date** and **Fraction**.

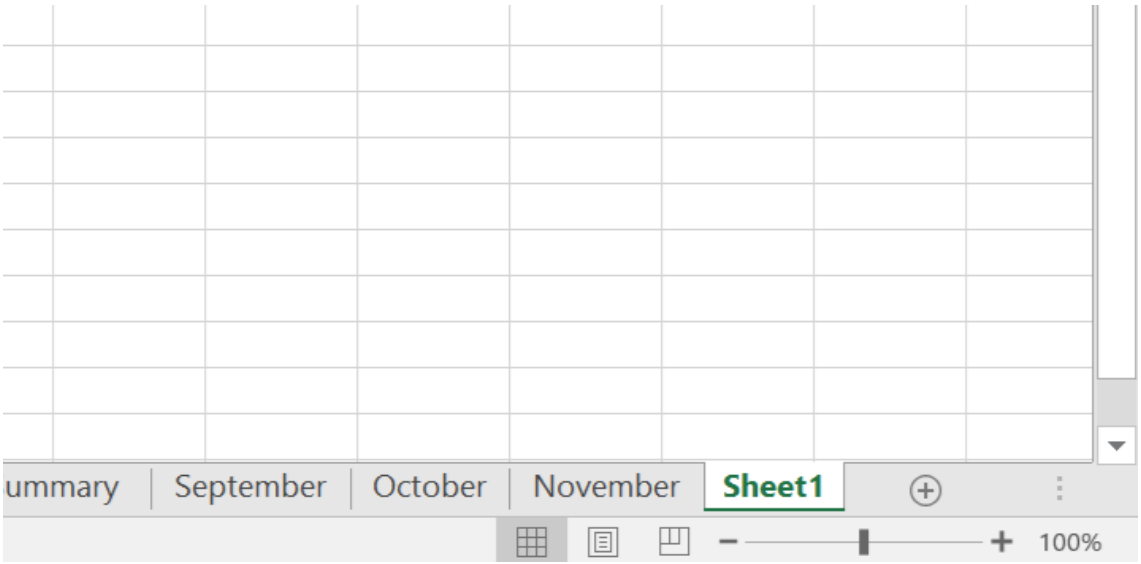
2.5. Working with Multiple Worksheets

2.5.1. o insert a new worksheet:

1. Locate and select the **New sheet** button near the bottom-right corner of the Excel window.



2. A **new blank worksheet** will appear.

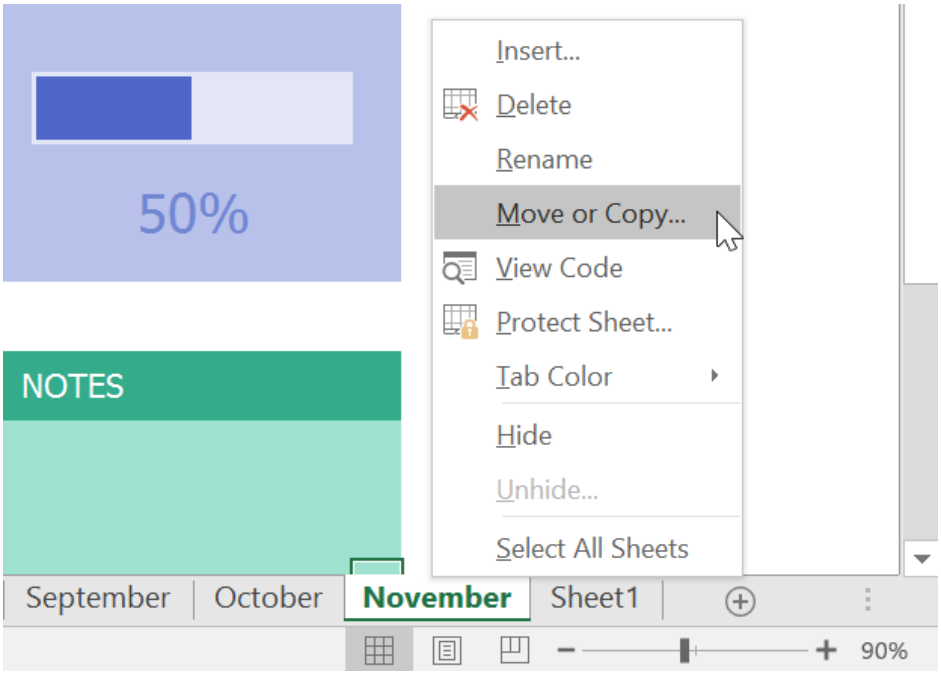


By default, any new workbook you create in Excel will contain one worksheet, called **Sheet1**. To change the **default number** of worksheets, navigate to **Backstage view**, click **Options**, then choose the desired number of worksheets to include in each new workbook.

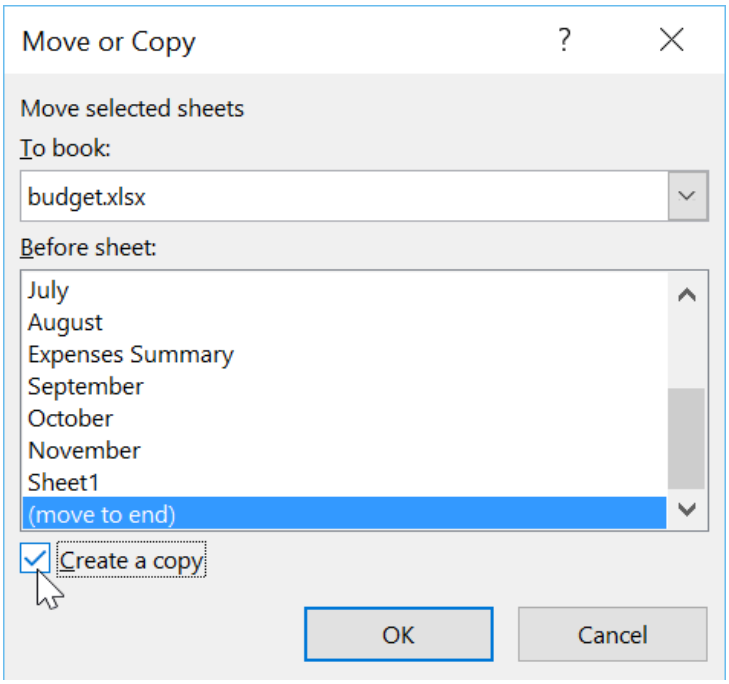
2.5.2. To copy a worksheet:

If you need to **duplicate** the content of one worksheet to another, Excel allows you to **copy** an existing worksheet.

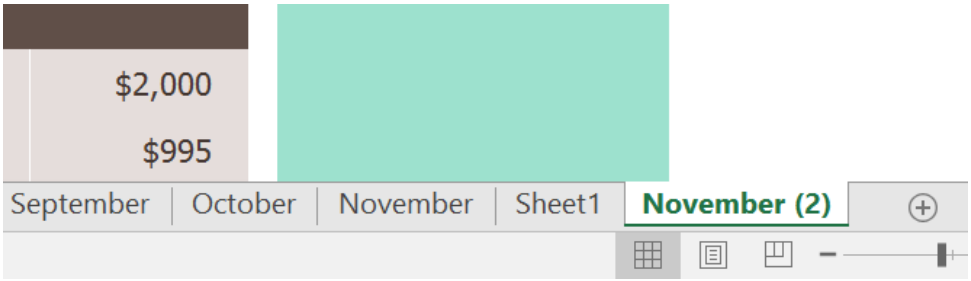
1. Right-click the worksheet you want to copy, then select **Move or Copy** from the worksheet menu.



2. The **Move or Copy** dialog box will appear. Choose where the sheet will appear in the **Before sheet:** field. In our example, we'll choose **(move to end)** to place the worksheet to the right of the existing worksheet.
3. **Check the box** next to **Create a copy**, then click **OK**.



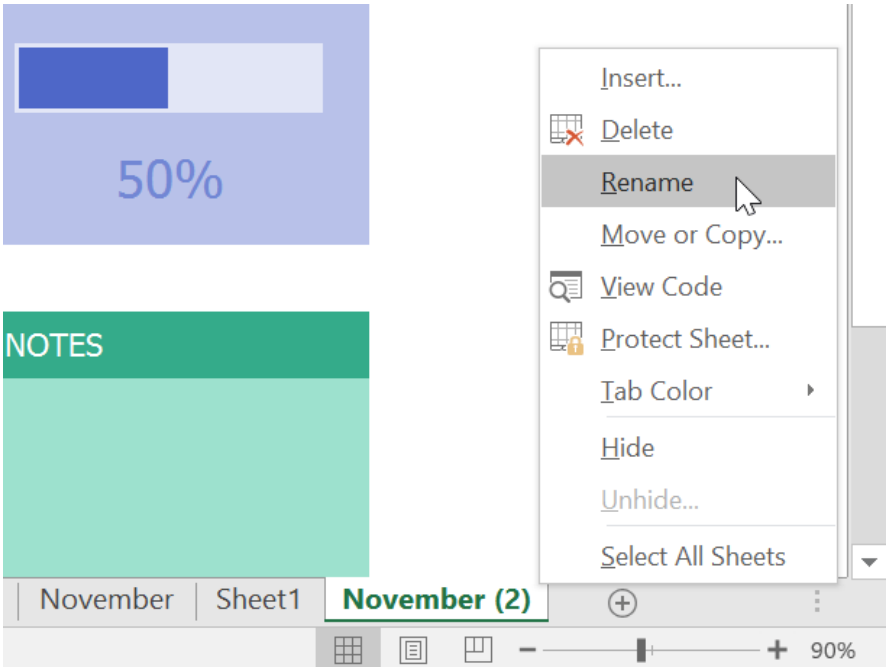
4. The worksheet will be **copied**. It will have the same title as the original worksheet, as well as a **version number**. In our example, we copied the **November** worksheet, so our new worksheet is named **November (2)**. All content from the November worksheet has also been copied to the new worksheet.



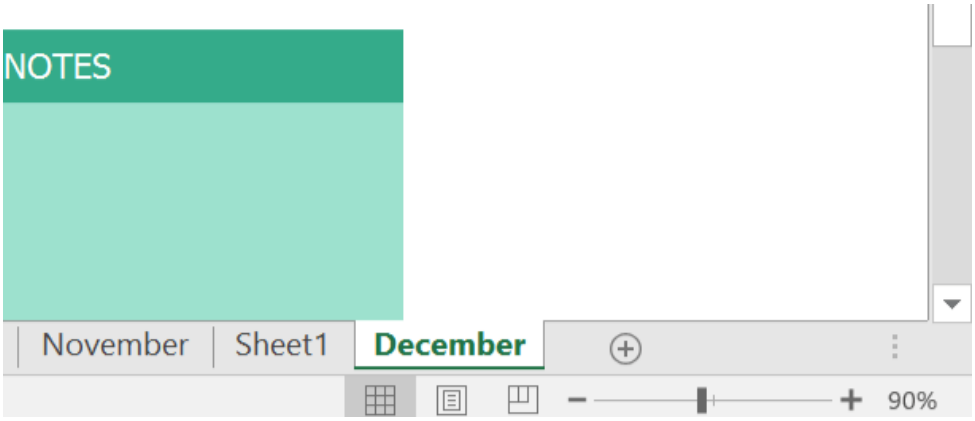
You can also copy a worksheet to an entirely different **workbook**. You can select any workbook that is currently open from the **To book:** drop-down menu.

2.5.2.1. To rename a worksheet:

1. Right-click the **worksheet** you want to rename, then select **Rename** from the worksheet menu.

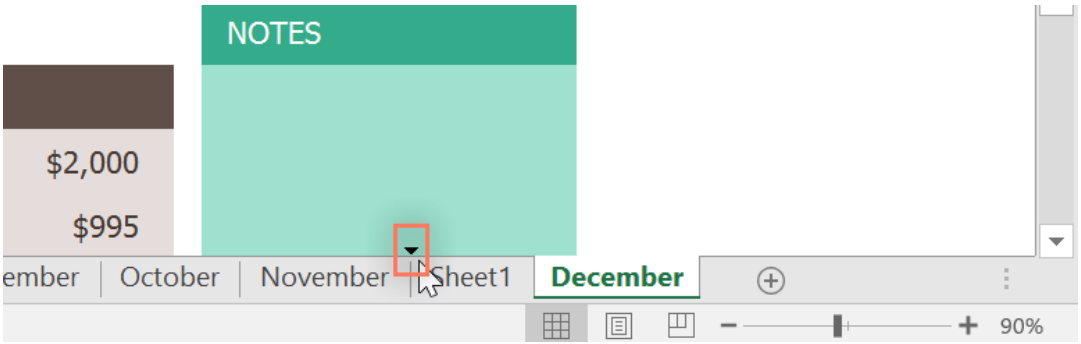


2. Type the **desired name** for the worksheet.
3. Click anywhere outside the worksheet tab, or press **Enter** on your keyboard. The worksheet will be **renamed**.

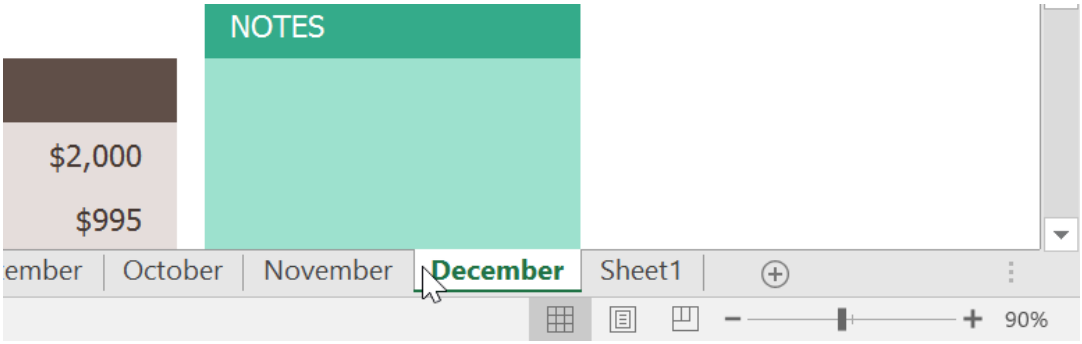


2.5.3. To move a worksheet:

1. Click and drag the worksheet you want to move until a **small black arrow** appears above the desired location.

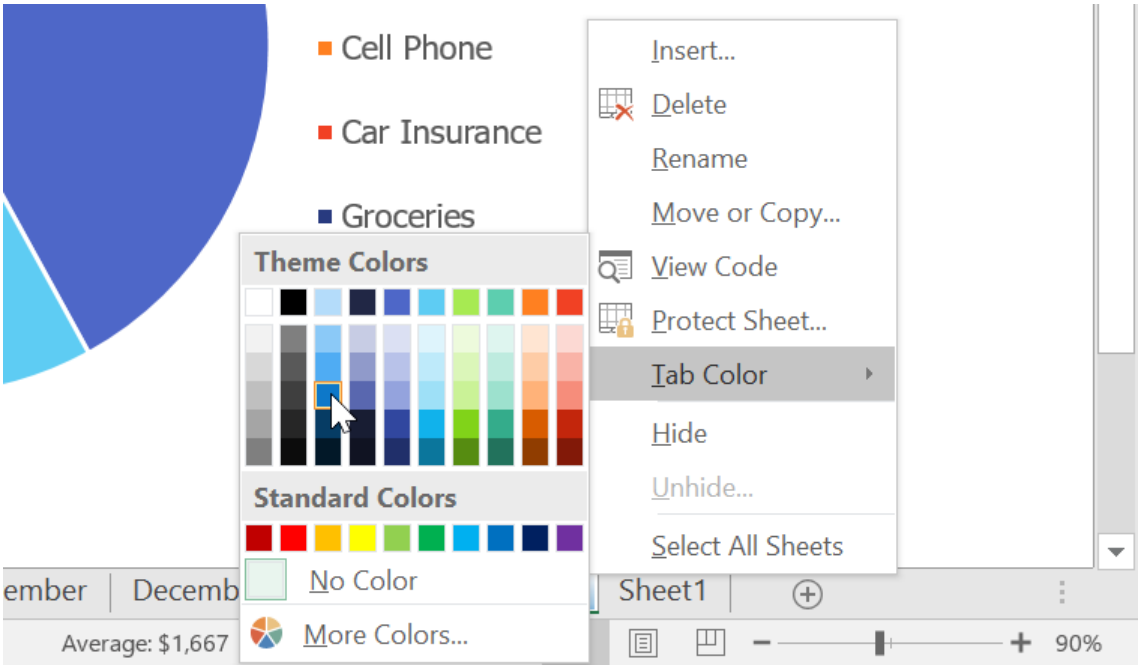


2. Release the mouse. The worksheet will be moved.

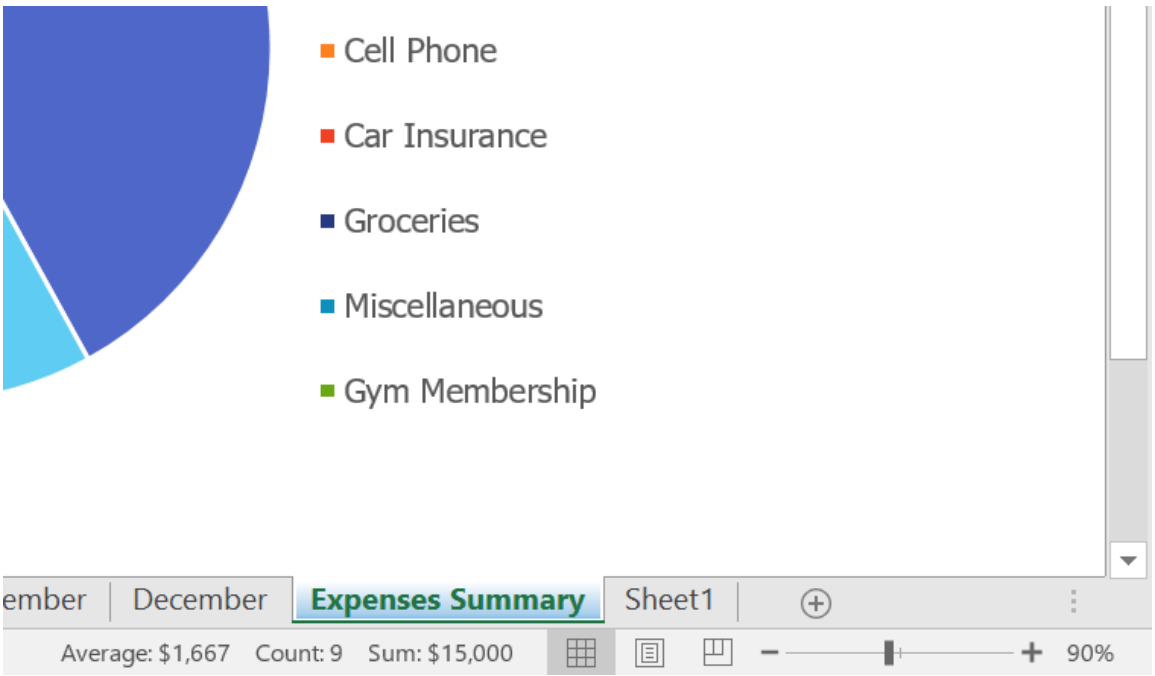


2.5.4. To change the worksheet tab color:

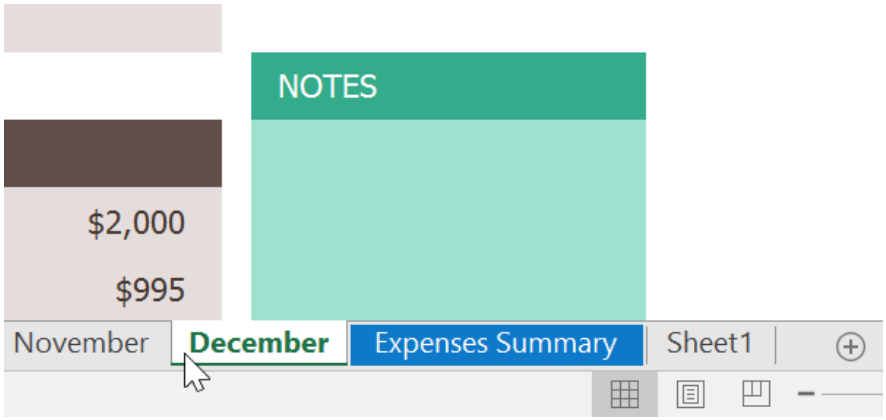
1. Right-click the desired worksheet tab, and hover the mouse over **Tab Color**. The **Color** menu will appear.
2. Select the desired **color**.



3. The worksheet tab color will be **changed**.

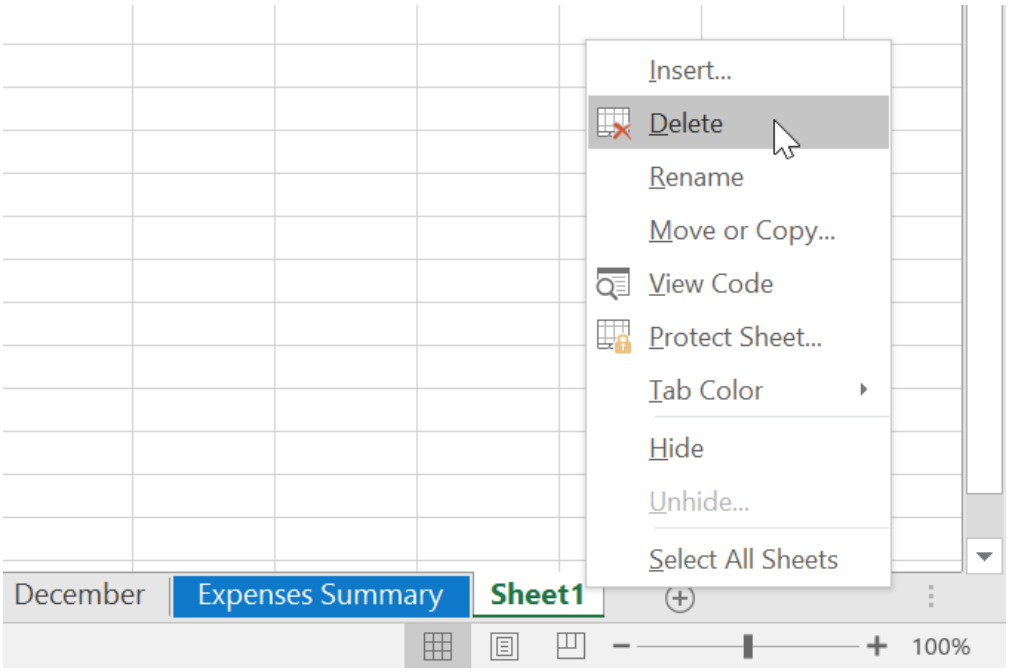


The worksheet tab color is considerably **less noticeable** when the worksheet is selected. Select another worksheet to see how the color will appear when the worksheet is not selected.

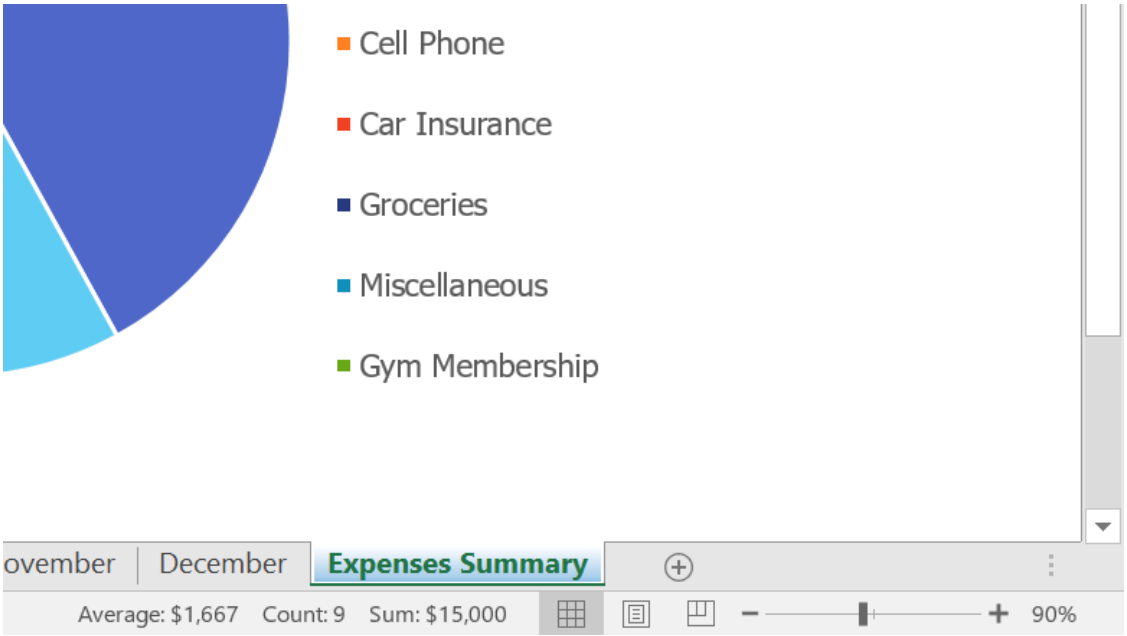


2.5.5. To delete a worksheet:

1. Right-click the **worksheet** you want to delete, then select **Delete** from the worksheet menu.



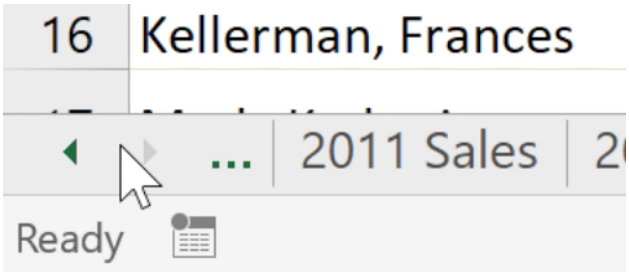
2. The worksheet will be **deleted** from your workbook.



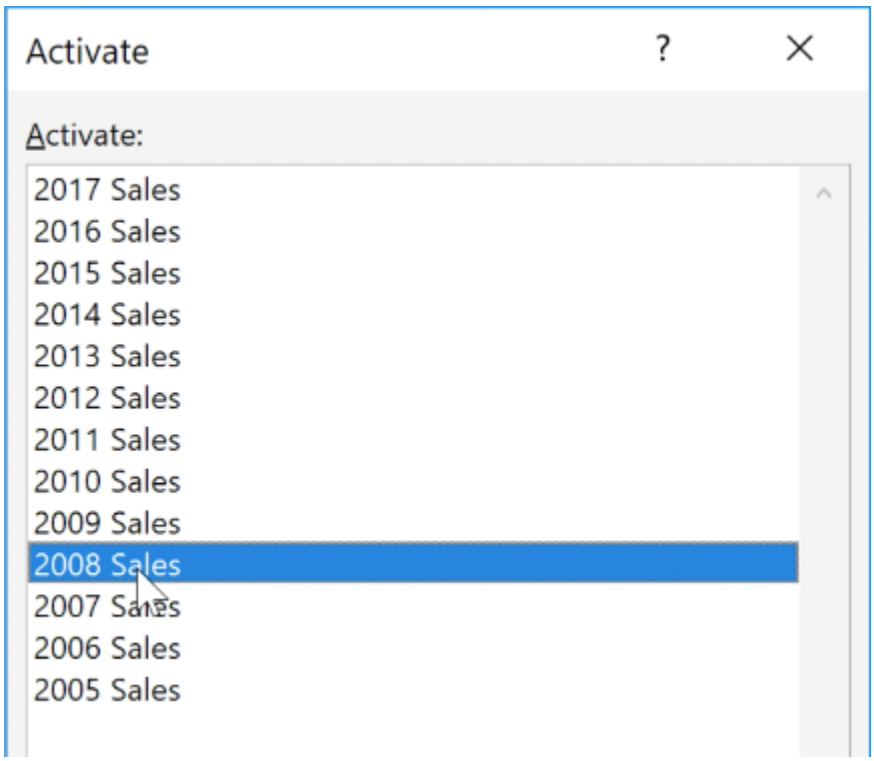
If you want to prevent specific worksheets from being edited or deleted, you can **protect them** by right-clicking the desired worksheet and selecting **Protect Sheet** from the worksheet menu.

2.5.6. Switching between worksheets

If you want to view a different worksheet, you can simply **click the tab** to switch to that worksheet. However, with larger workbooks this can sometimes become tedious, as it may require scrolling through all of the tabs to find the one you want. Instead, you can simply **right-click** the scroll arrows in the lower-left corner, as shown below.



A dialog box will appear with a list of all of the sheets in your workbook. You can then **double-click** the sheet you want to jump to.



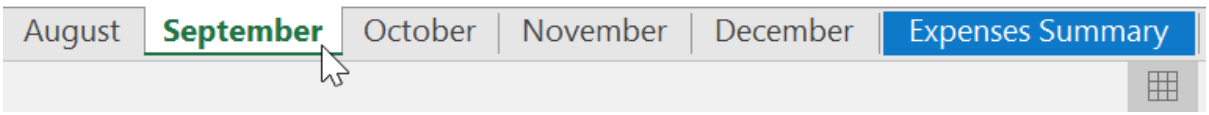
Watch the video below to see this shortcut in action.

2.5.7. Grouping and ungrouping worksheets

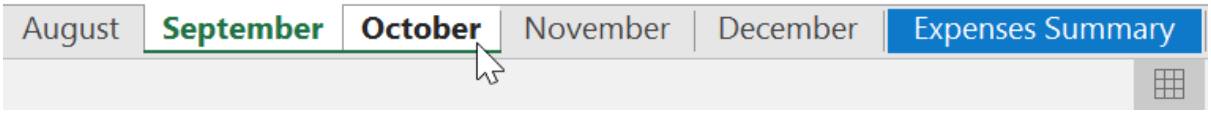
You can work with each worksheet **individually**, or you can work with multiple worksheets at the same time. Worksheets can be combined together into a **group**. Any changes made to one worksheet in a group will be made to **every worksheet** in the group.

2.5.8. To group worksheets:

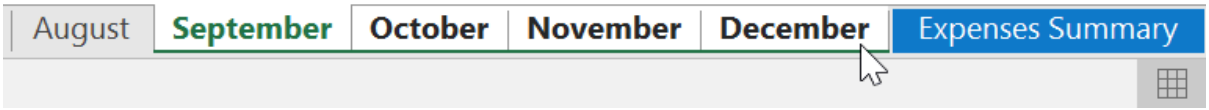
1. Select the **first worksheet** you want to include in the **worksheet group**.



2. Press and hold the **Ctrl** key on your keyboard. Select the **next worksheet** you want in the group.



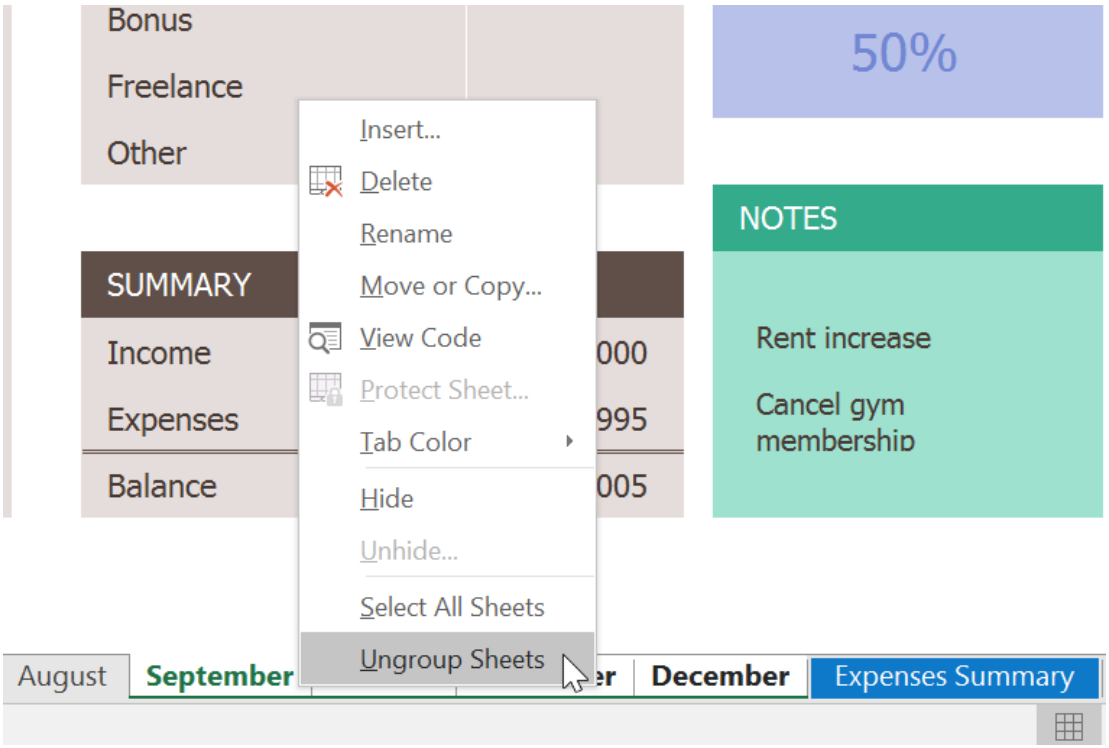
3. Continue to select worksheets until all of the worksheets you want to group are selected, then release the **Ctrl** key. The worksheets are now **grouped**.



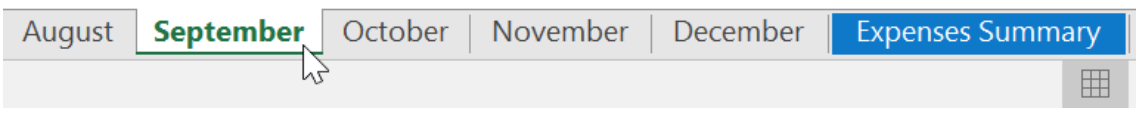
While worksheets are grouped, you can navigate to any worksheet within the group. Any **changes** made to one worksheet will appear on **every worksheet** in the group. However, if you select a worksheet that is not in the group, all of your worksheets will become **ungrouped**.

2.5.8.1. To ungroup worksheets:

1. Right-click a worksheet in the group, then select **Ungroup Sheets** from the worksheet menu.



2. The worksheets will be **ungrouped**. Alternatively, you can simply click any worksheet not included in the group to **ungroup all worksheets**.



2.6.Formulas and Functions

2.6.1. Intro to Formulas

One of the most powerful features in Excel is the ability to **calculate** numerical information using **formulas**. Just like a calculator, Excel can add, subtract, multiply, and divide. In this lesson, we'll show you how to use **cell references** to create simple formulas.

2.6.2. Mathematical operators

Excel uses standard operators for formulas, such as a **plus sign** for addition (+), a **minus sign** for subtraction (-), an **asterisk** for multiplication (*), a **forward slash** for division (/), and a **caret** (^) for exponents.

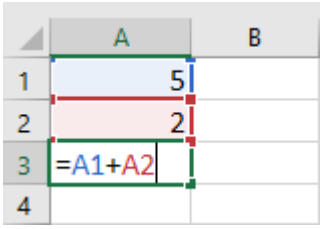
Addition	+
Subtraction	-
Multiplication	*
Division	/
Exponents	^

All formulas in Excel must begin with an **equals sign** (=). This is because the cell contains, or is equal to, the formula and the value it calculates.

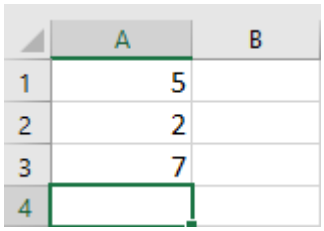
2.6.3. Understanding cell references

While you can create simple formulas in Excel using numbers (for example, **=2+2** or **=5*5**), most of the time you will use **cell addresses** to create a formula. This is known as making a **cell reference**. Using cell references will ensure that your formulas are always accurate because you can change the value of referenced cells without having to rewrite the formula.

In the formula below, cell A3 adds the values of cells A1 and A2 by making cell references:

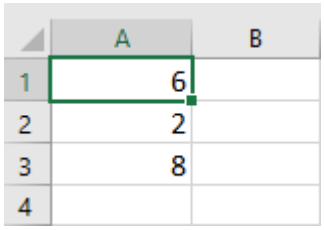


When you press Enter, the formula calculates and displays the answer in cell A3:



	A	B
1	5	
2	2	
3	7	
4		

If the values in the referenced cells change, the formula automatically recalculates:



	A	B
1	6	
2	2	
3	8	
4		

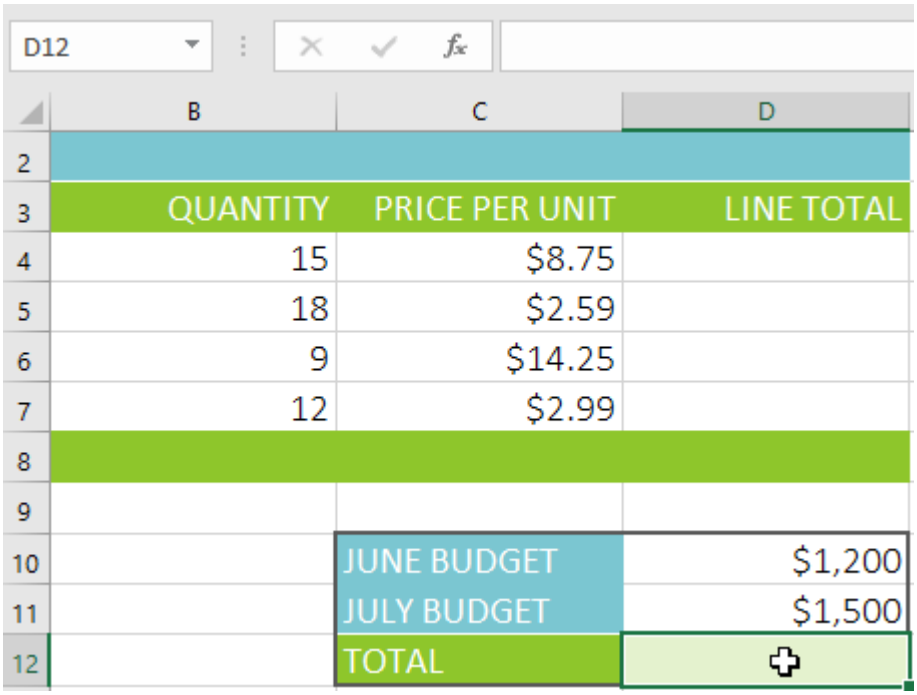
By combining a mathematical operator with cell references, you can create a variety of simple formulas in Excel. Formulas can also include a combination of cell references and numbers, as in the examples below:

=A1+A2	Adds cells A1 and A2
=C4-3	Subtracts 3 from cell C4
=E7/J4	Divides cell E7 by J4
=N10*1.05	Multiplies cell N10 by 1.05
=R5^2	Finds the square of cell R5

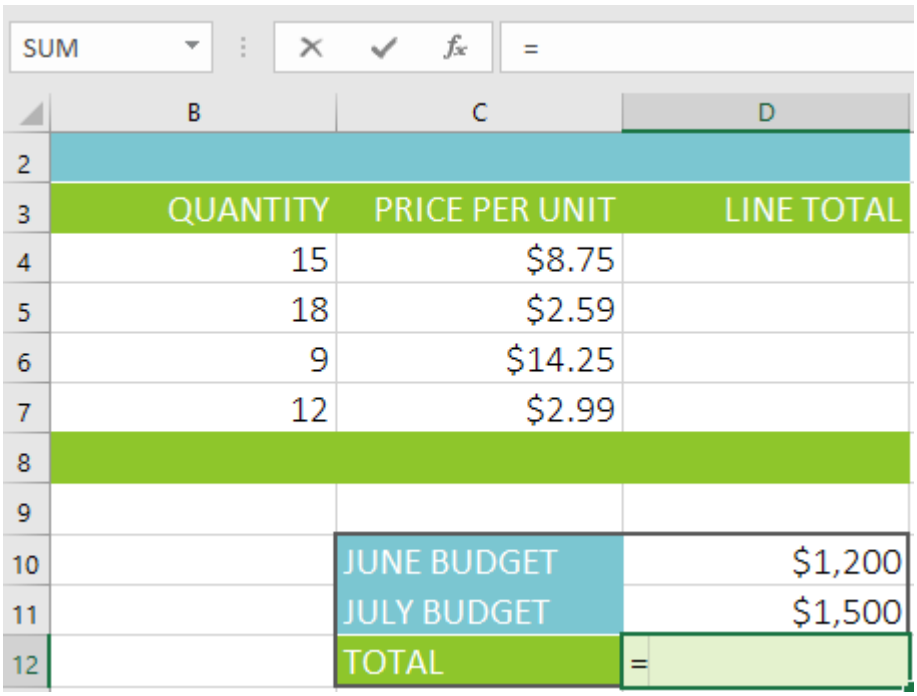
2.6.4. To create a formula:

In our example below, we'll use a simple formula and cell references to calculate a budget.

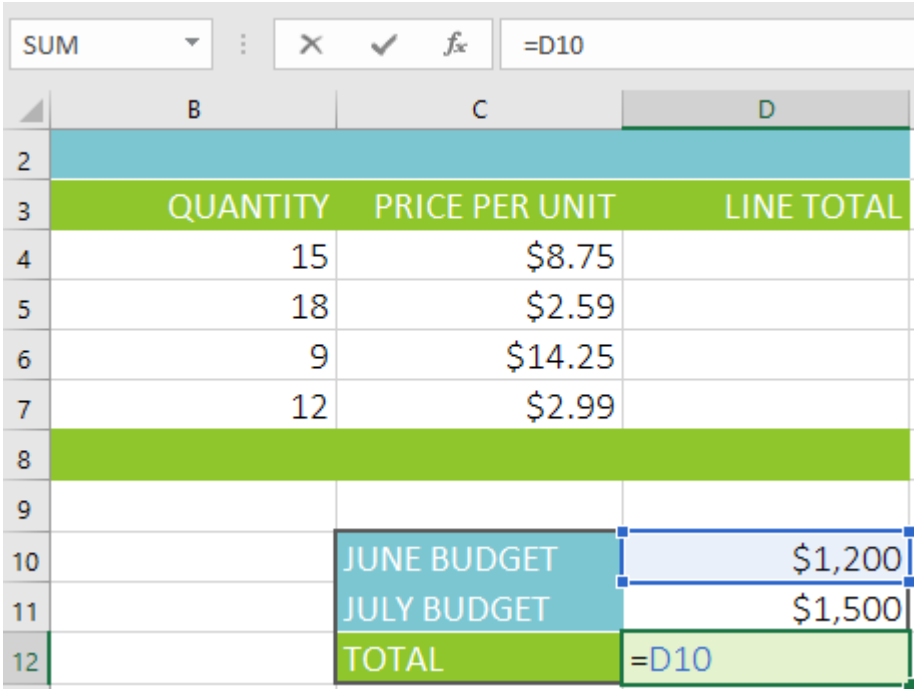
1. Select the **cell** that will contain the formula. In our example, we'll select cell **D12**.



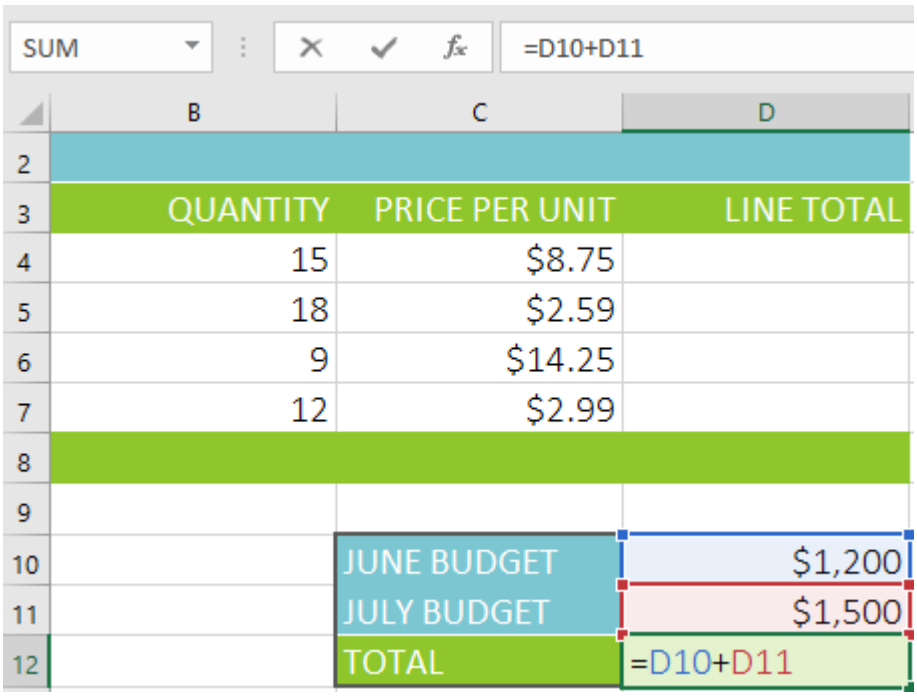
2. Type the **equals sign (=)**. Notice how it appears in both the **cell** and the **formula bar**.



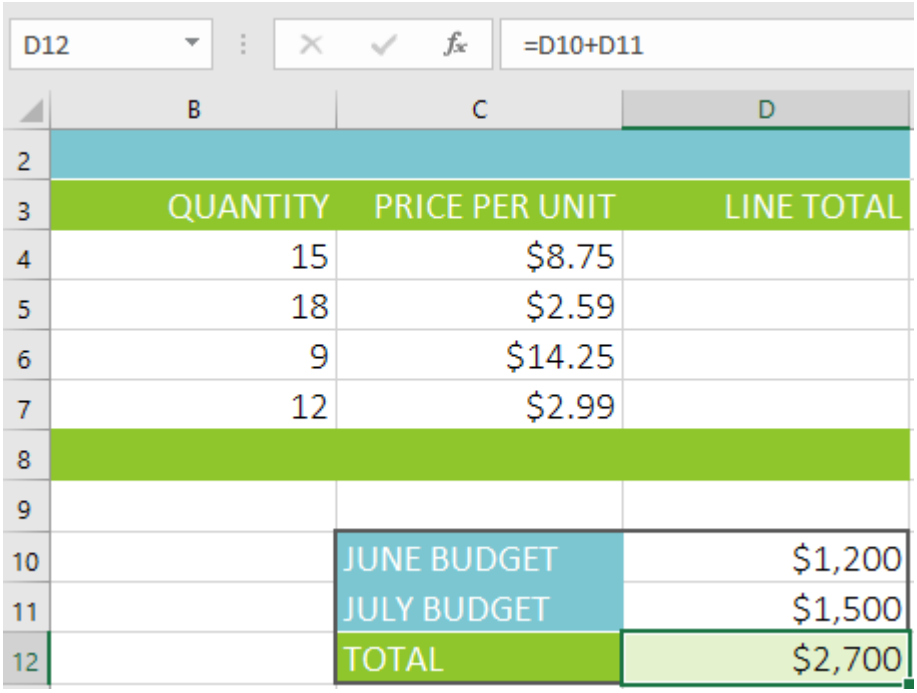
3. Type the **cell address** of the cell you want to reference first in the formula: cell **D10** in our example. A **blue border** will appear around the referenced cell.



4. Type the **mathematical operator** you want to use. In our example, we'll type the **addition sign** (+).
5. Type the **cell address** of the cell you want to reference second in the formula: cell **D11** in our example. A **red border** will appear around the referenced cell.



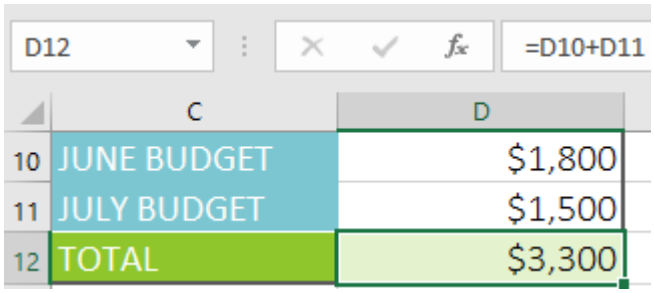
6. Press **Enter** on your keyboard. The formula will be **calculated**, and the **value** will be displayed in the cell. If you select the cell again, notice that the cell displays the result, while the formula bar displays the formula.



If the result of a formula is too large to be displayed in a cell, it may appear as **pound signs** (#######) instead of a value. This means the column is not wide enough to display the cell content. Simply **increase the column width** to show the cell content.

2.6.5. Modifying values with cell references

The true advantage of cell references is that they allow you to **update data** in your worksheet without having to rewrite formulas. In the example below, we've modified the value of cell D10 from $1,200 to $1,800. The formula in D12 will automatically recalculate and display the new value in cell D12.

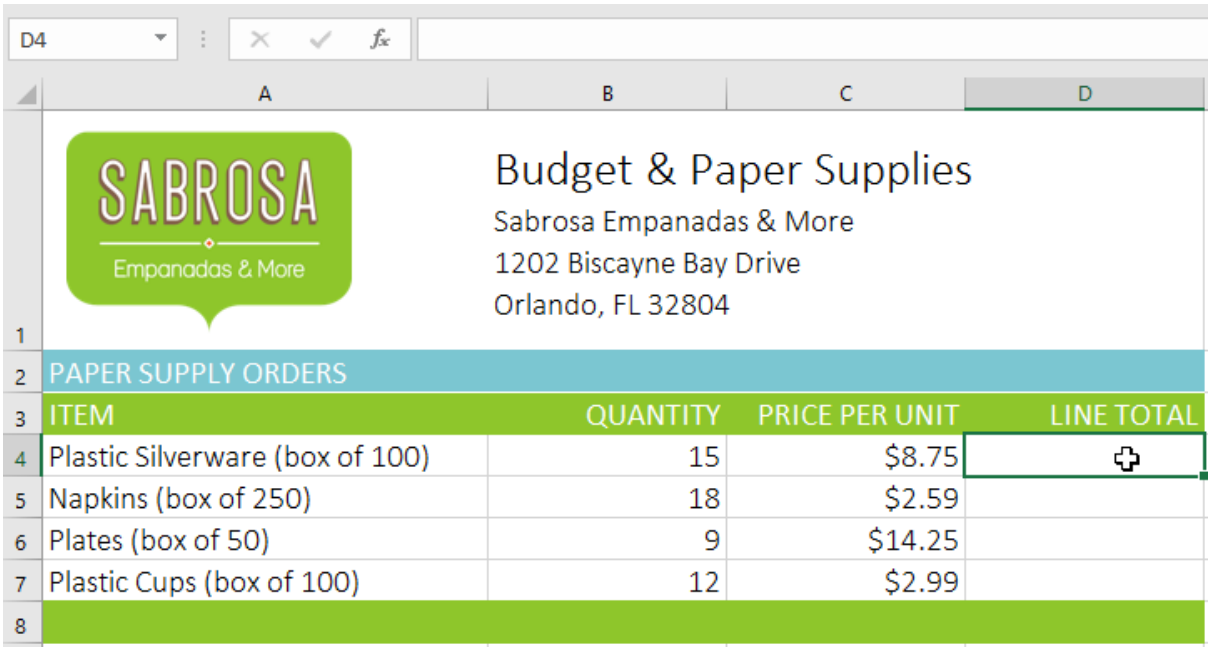


Excel **will not always tell you** if your formula contains an error, so it's up to you to check all of your formulas. To learn how to do this.

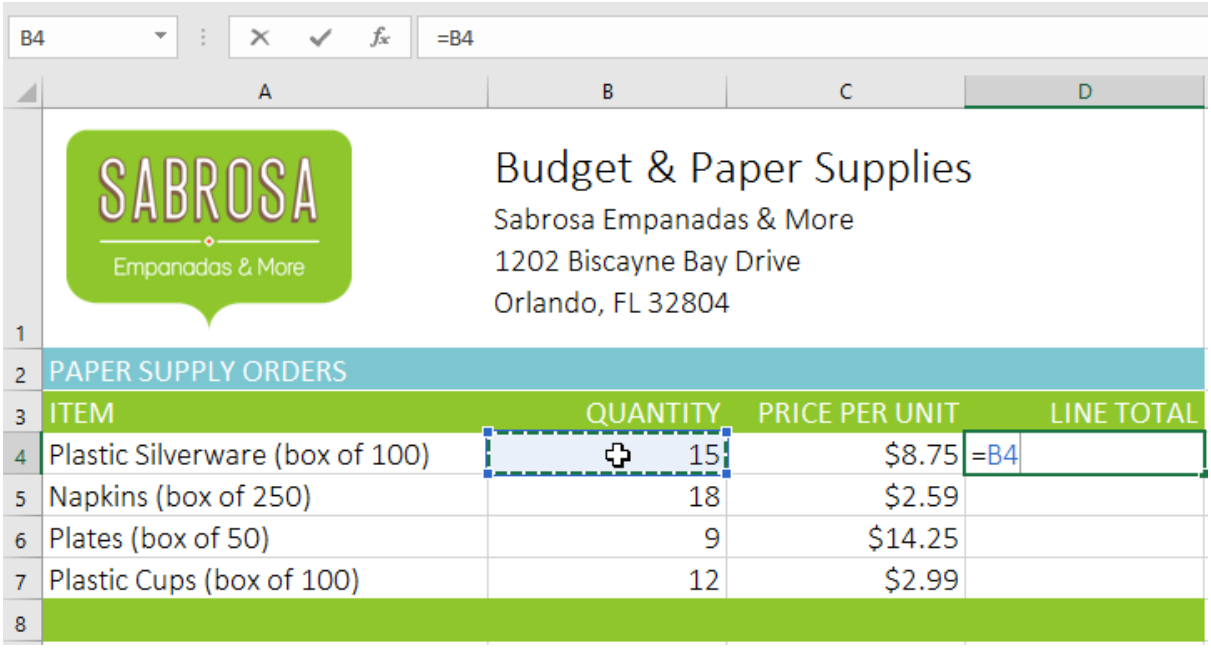
2.6.6. To create a formula using the point-and-click method:

Instead of typing cell addresses manually, you can **point and click** the cells you want to include in your formula. This method can save a lot of time and effort when creating formulas. In our example below, we'll create a formula to calculate the cost of ordering several boxes of plastic silverware.

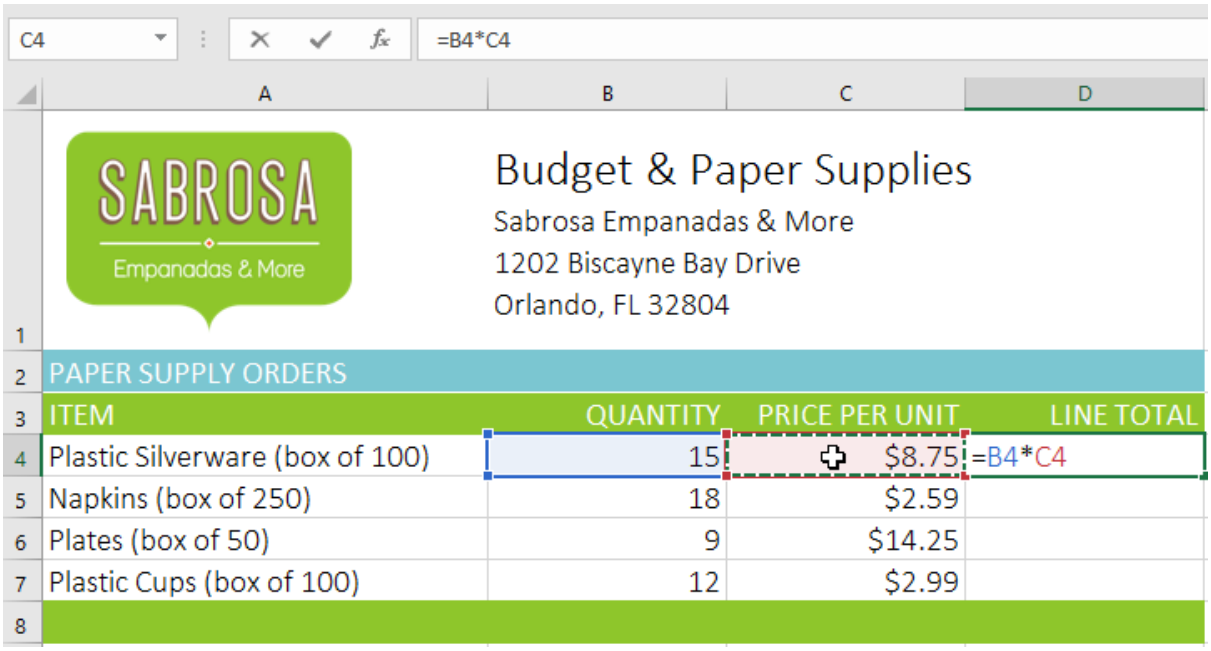
1. Select the **cell** that will contain the formula. In our example, we'll select cell **D4**.



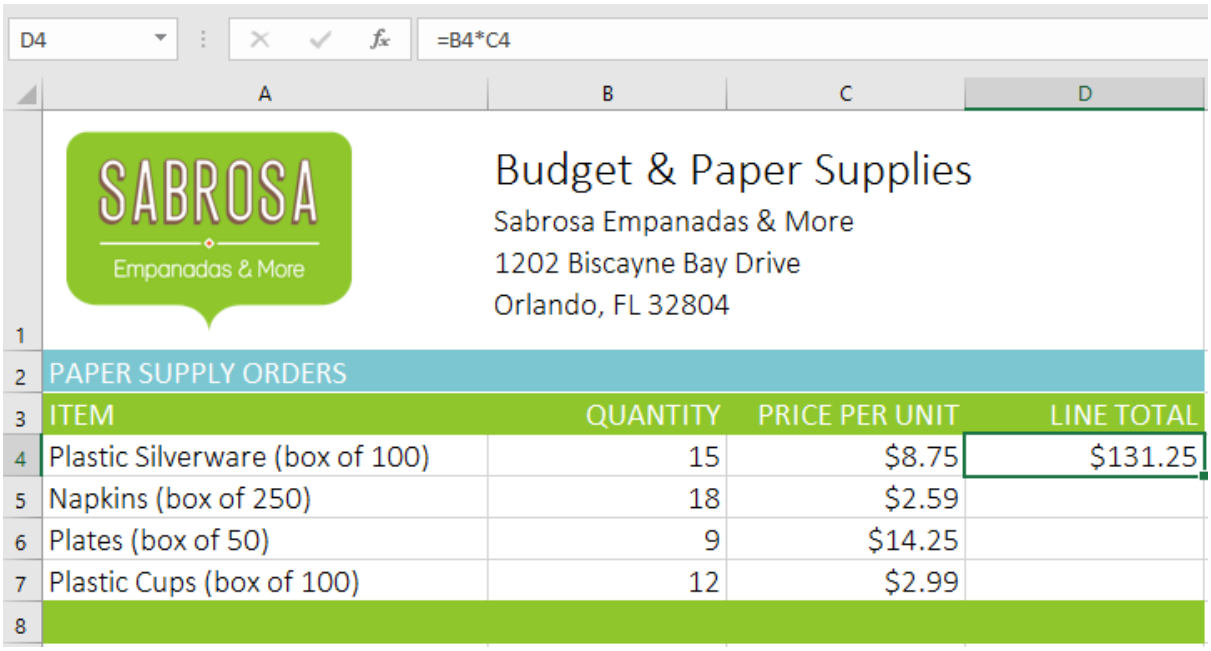
2. Type the **equals sign (=)**.
3. Select the **cell** you want to reference first in the formula: cell **B4** in our example. The **cell address** will appear in the formula.



4. Type the **mathematical operator** you want to use. In our example, we'll type the **multiplication sign (*)**.
5. Select the **cell** you want to reference second in the formula: cell **C4** in our example. The **cell address** will appear in the formula.



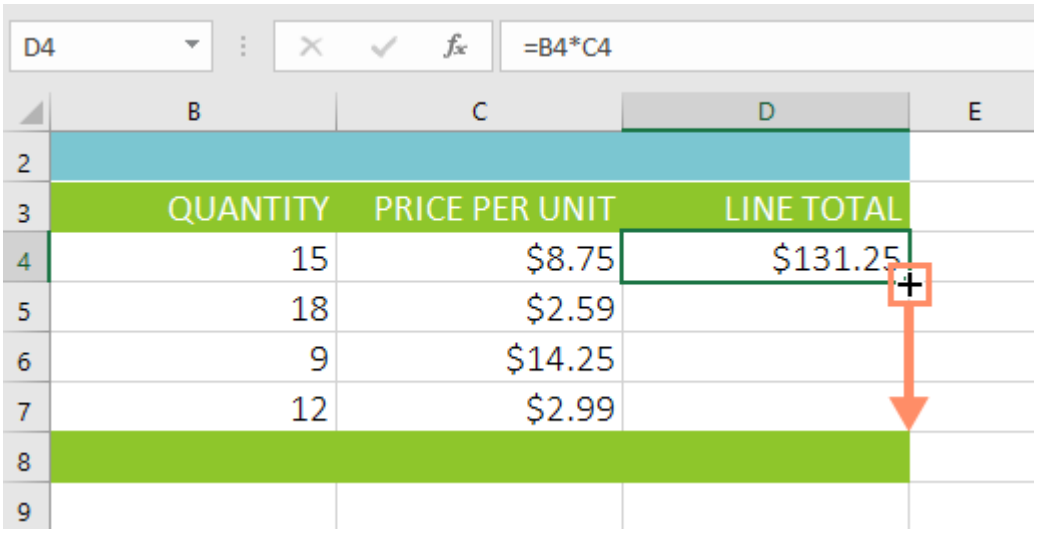
6. Press **Enter** on your keyboard. The formula will be **calculated**, and the **value** will be displayed in the cell.



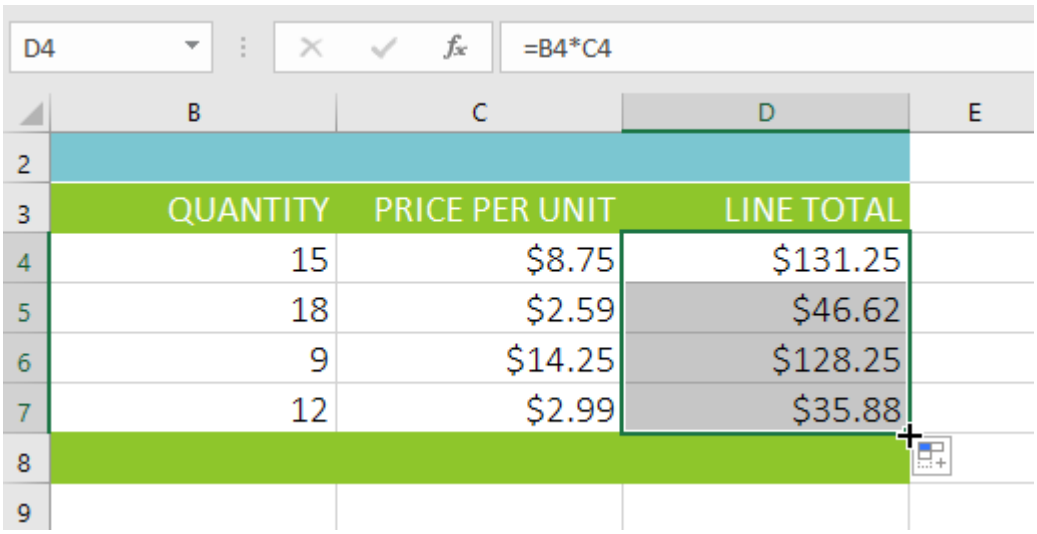
2.6.7. Copying formulas with the fill handle

Formulas can also be **copied** to adjacent cells with the **fill handle**, which can save a lot of time and effort if you need to perform the **same calculation** multiple times in a worksheet. The **fill handle** is the small square at the bottom-right corner of the selected cell(s).

1. Select the cell containing the formula you want to copy. Click and drag the **fill handle** over the cells you want to fill.



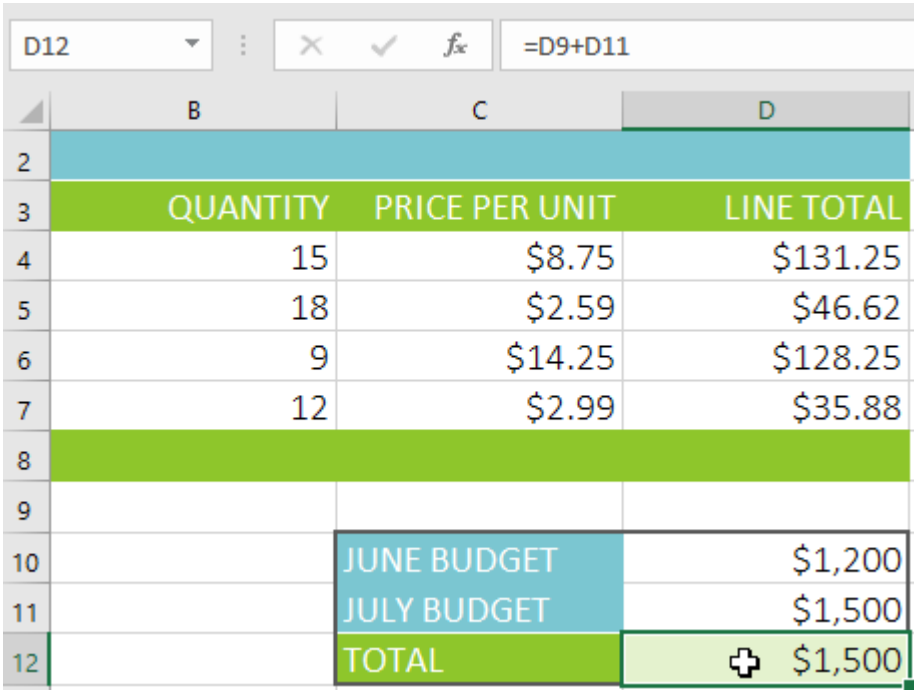
2. After you release the mouse, the formula will be copied to the selected cells.



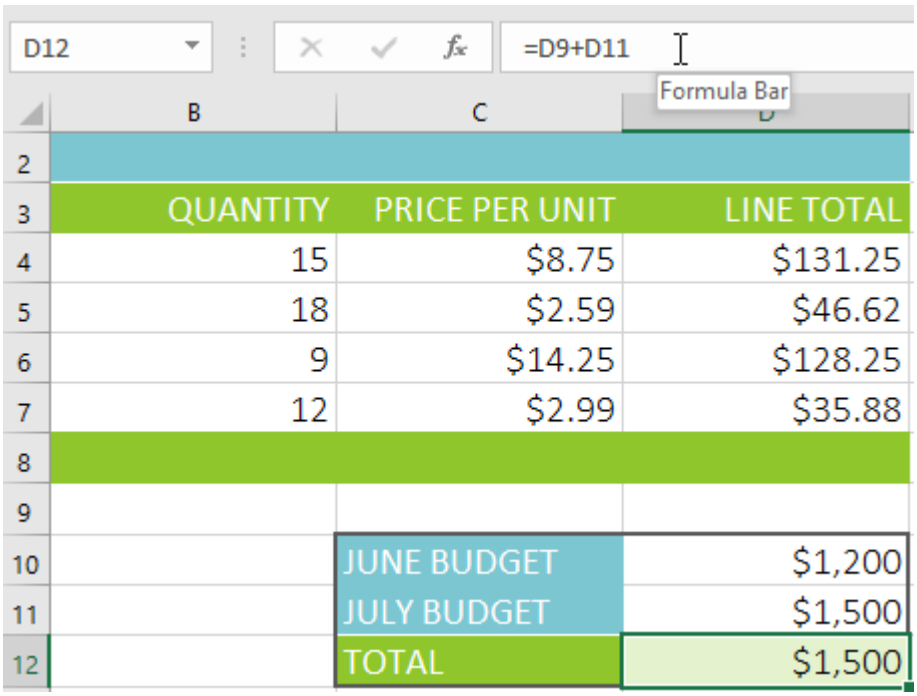
2.6.8. To edit a formula:

Sometimes you may want to modify an existing formula. In the example below, we've entered an incorrect cell address in our formula, so we'll need to correct it.

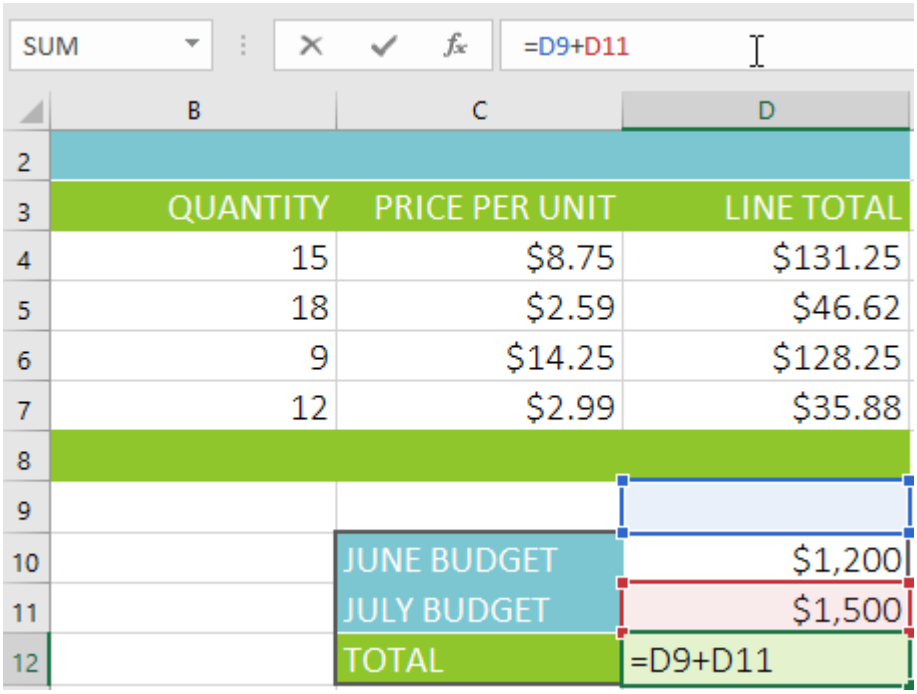
1. Select the **cell** containing the formula you want to edit. In our example, we'll select cell **D12**.



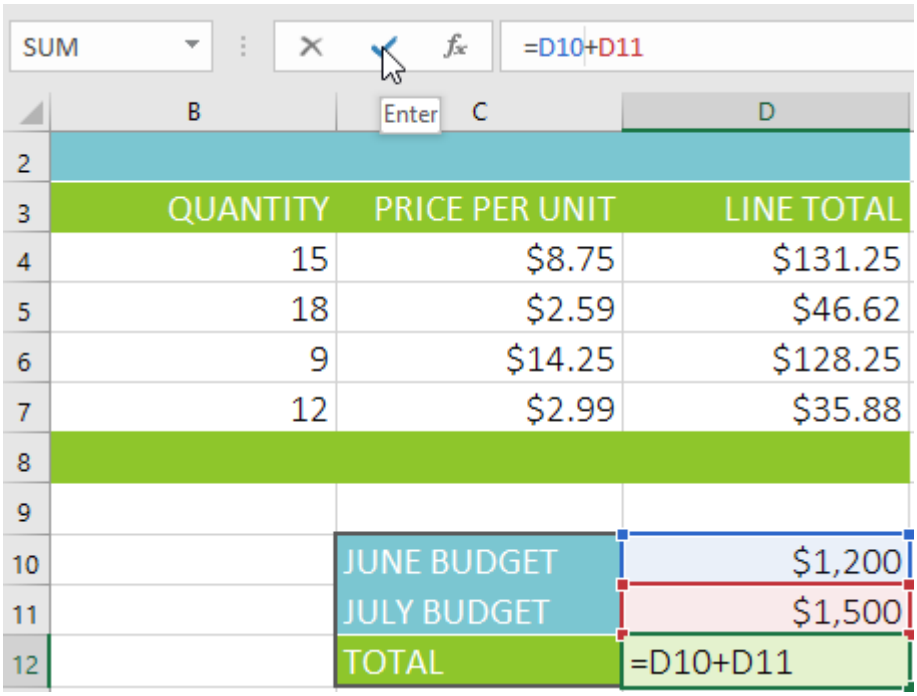
2. Click the **formula bar** to edit the formula. You can also **double-click** the cell to view and edit the formula directly within the cell.



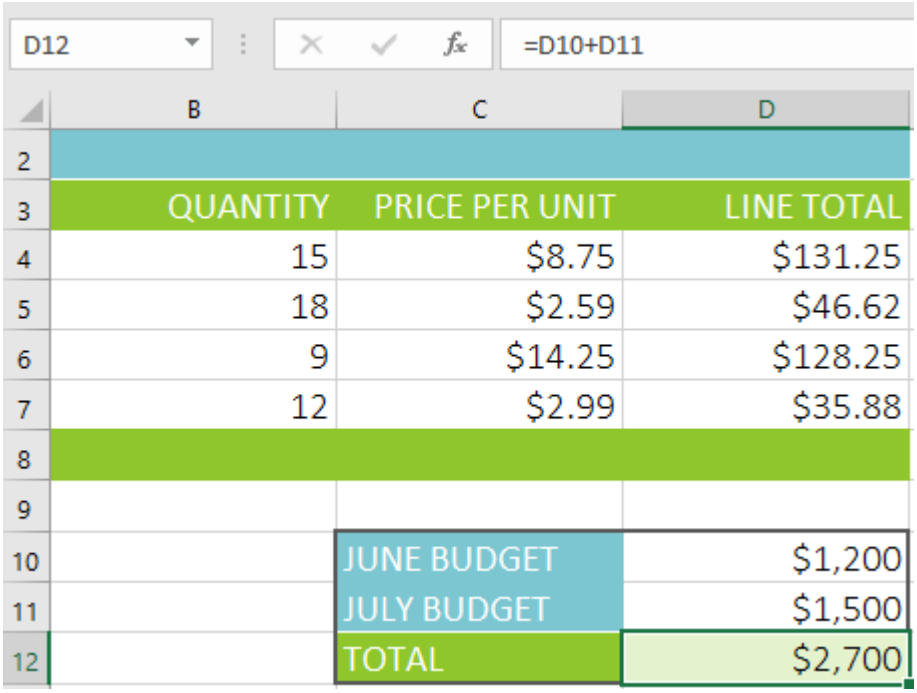
3. A **border** will appear around any referenced cells. In our example, we'll change the first part of the formula to reference cell **D10** instead of cell **D9**.



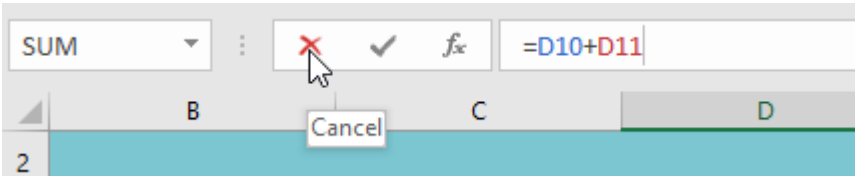
4. When you're finished, press **Enter** on your keyboard or select the **Enter** command in the formula bar.



5. The formula will be **updated**, and the **new value** will be displayed in the cell.



If you change your mind, you can press the **Esc** key on your keyboard or click the **Cancel** command in the formula bar to avoid accidentally making changes to your formula.



To show all of the formulas in a spreadsheet, you can hold the **Ctrl** key and press ` (grave accent). The grave accent key is usually located in the top-left corner of the keyboard. You can press **Ctrl**+` again to switch back to the normal view.

2.7.Creating More Complex Formulas

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 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.

2.7.1. The order of operations

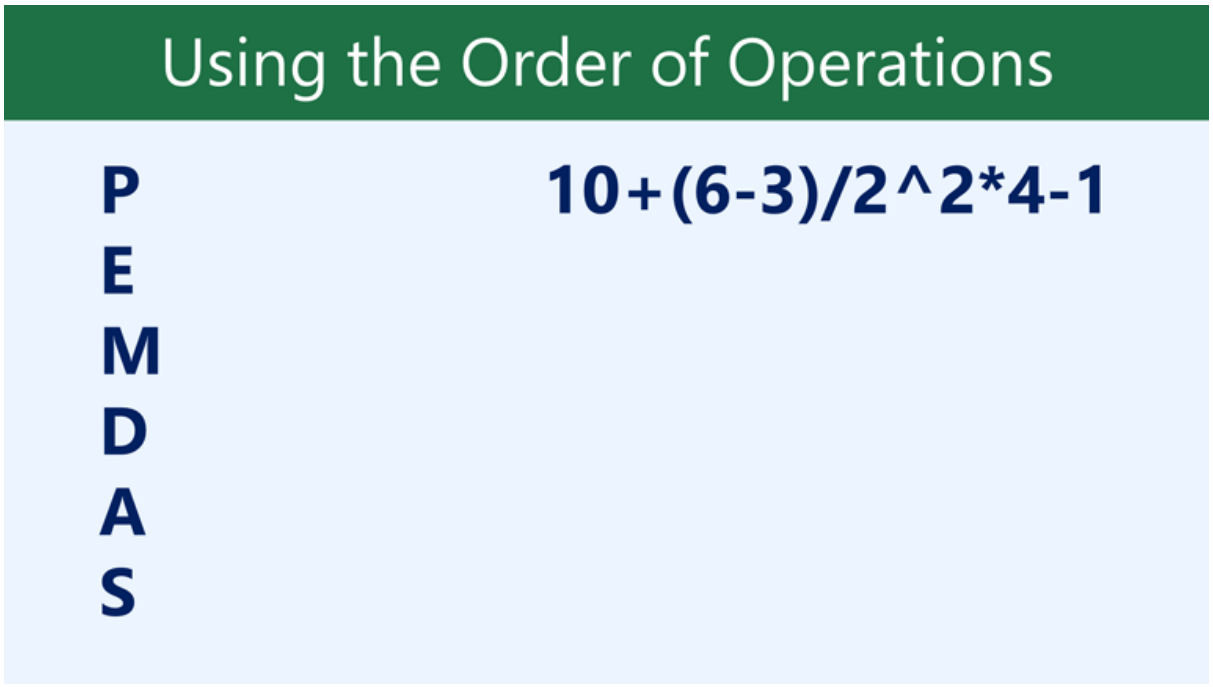
Excel calculates formulas based on the following **order of operations**:

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

A mnemonic that can help you remember the order is **PEMDAS**, or **P**lease **E**xcuse **M**y **D**ear **A**unt **S**ally.

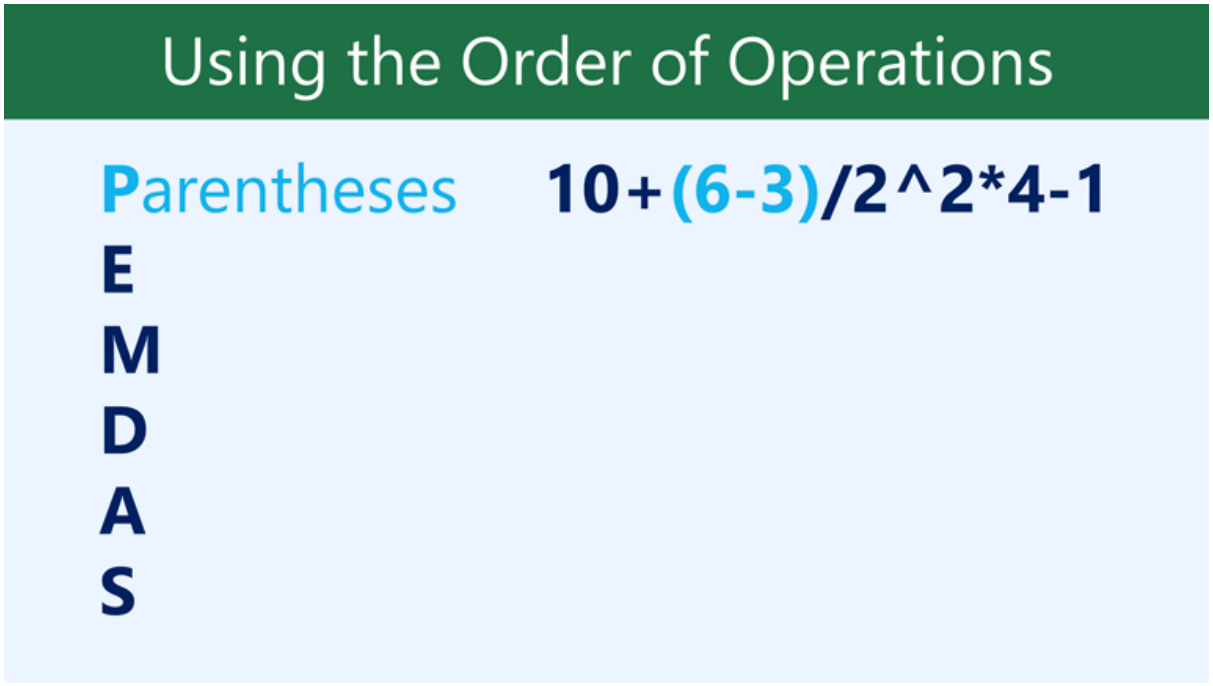
Click the arrows in the slideshow below to learn how the order of operations is used to calculate formulas in Excel.

•



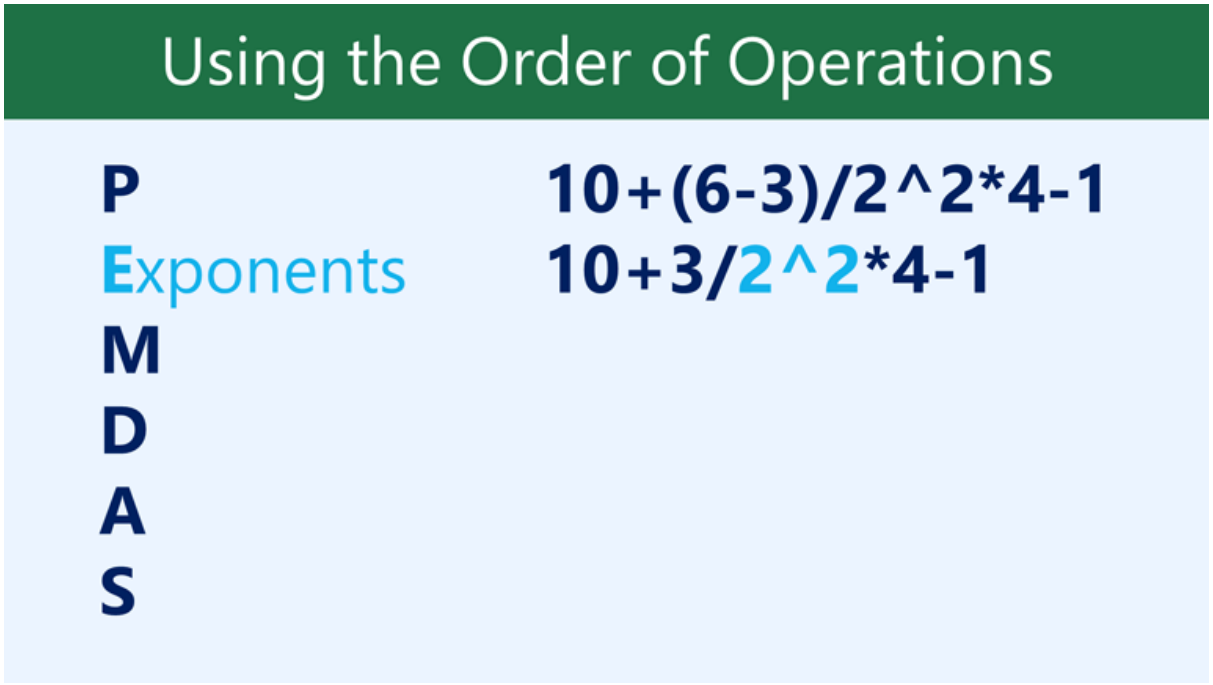
While this formula may look complicated, we can use the order of operations step by step to find the right answer.

•



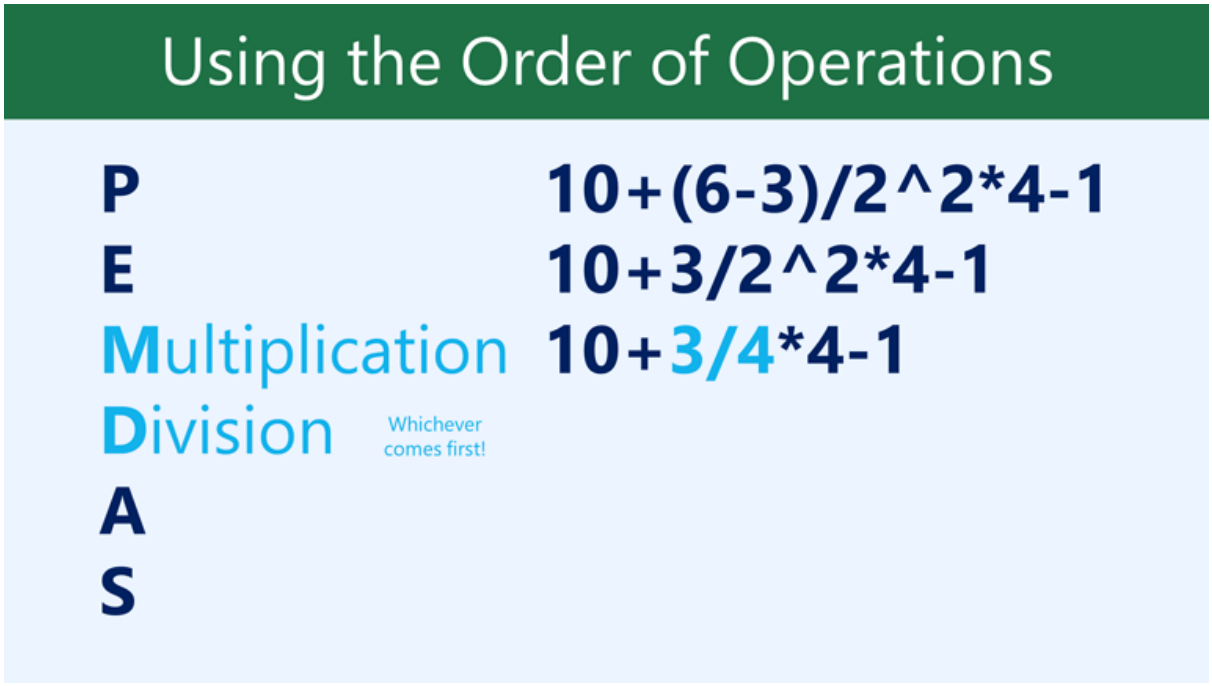
First, we'll start by calculating anything inside parentheses. In this case, there's only one thing we need to calculate: 6-3=3.

•



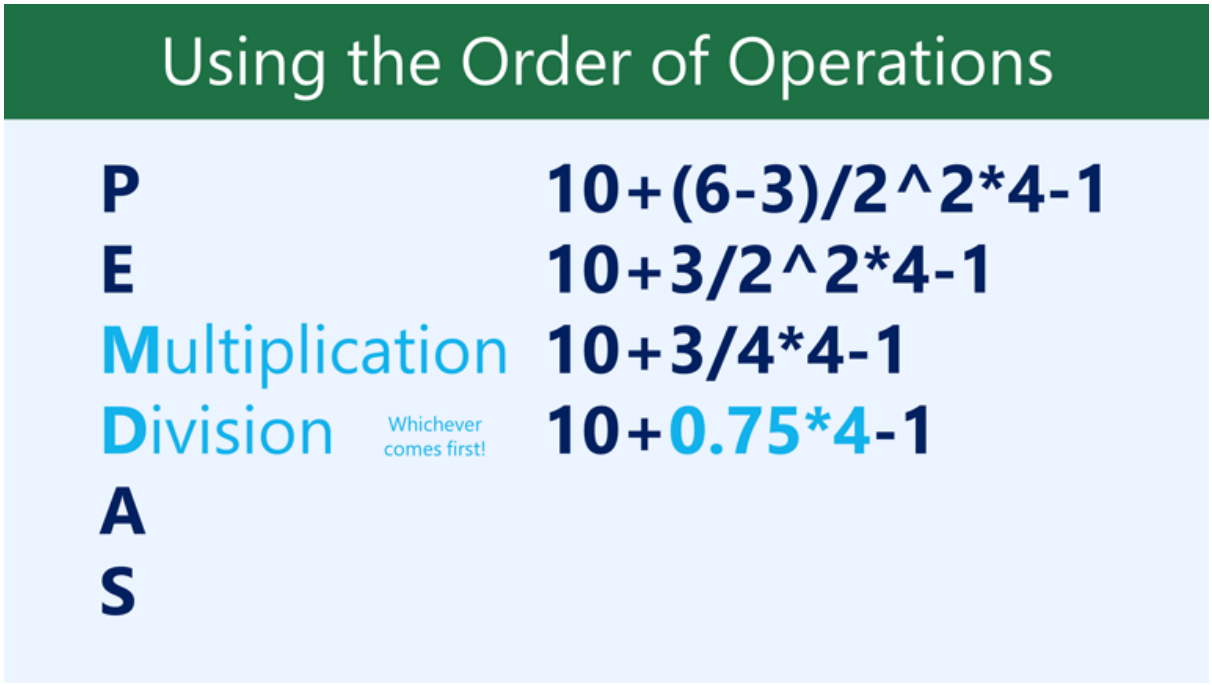
As you can see, the formula already looks simpler. Next, we'll look to see if there are any exponents. There is one: 2^2=4.

•



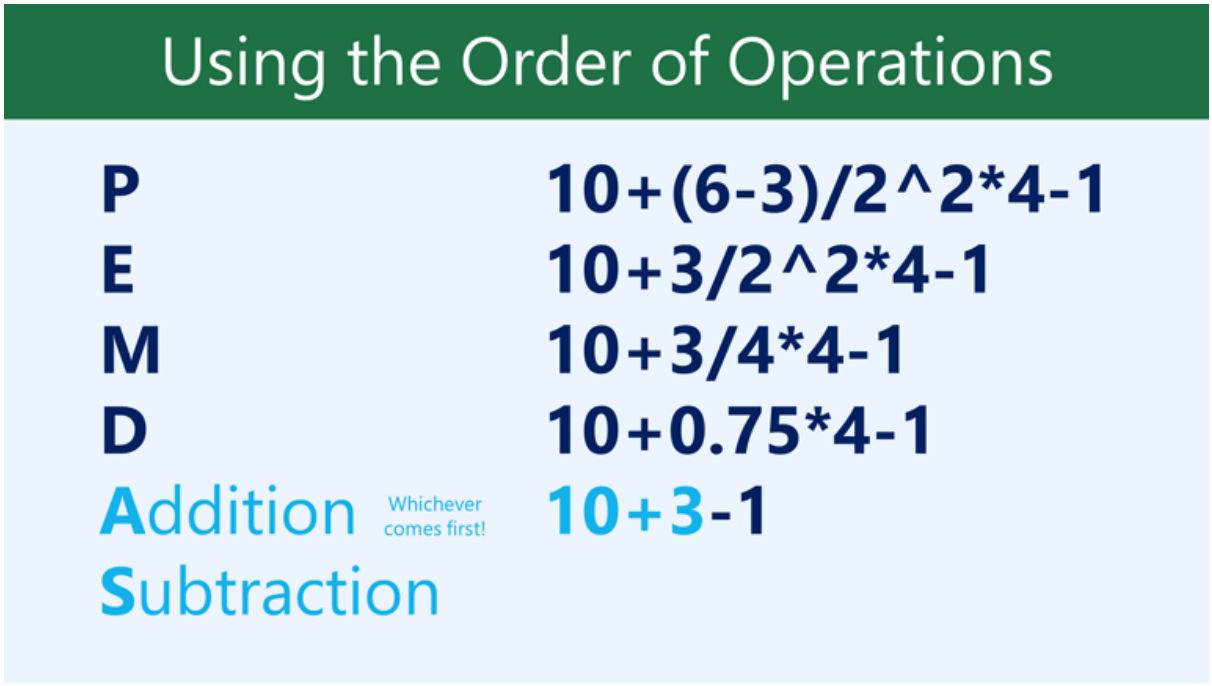
Next, we'll solve any multiplication and division, working from left to right. Because the division operation comes before the multiplication, it's calculated first: 3/4=0.75.

•



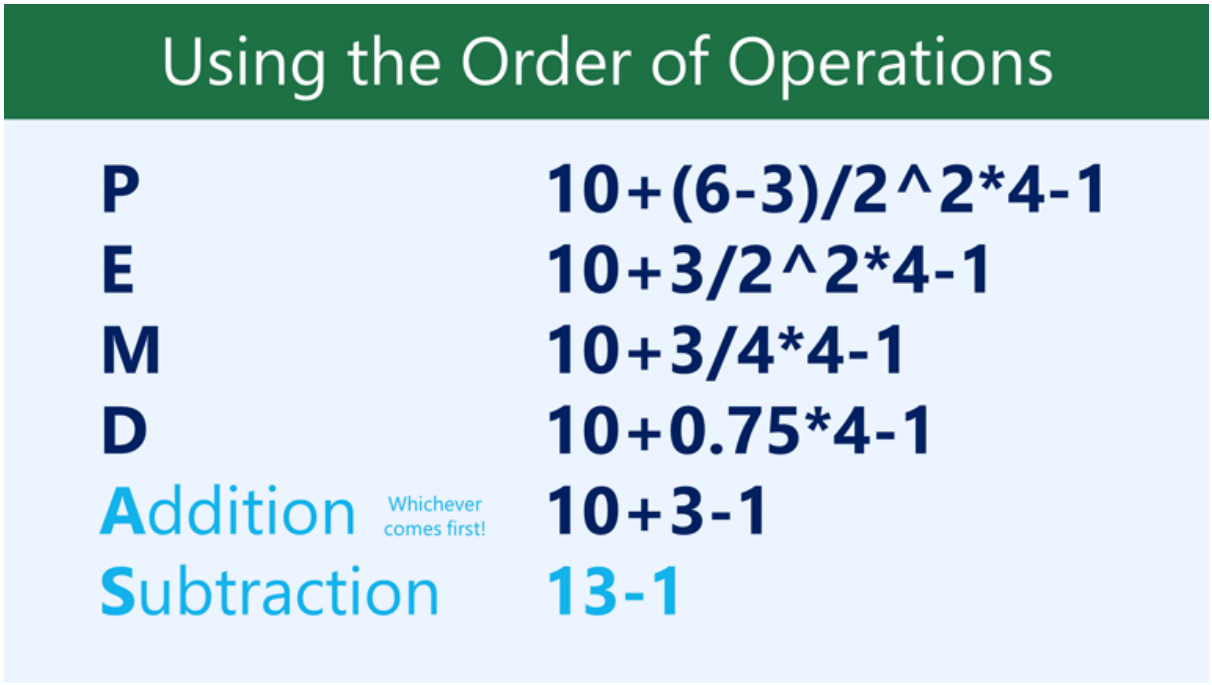
Now, we'll solve our remaining multiplication operation: 0.75*4=3.

•



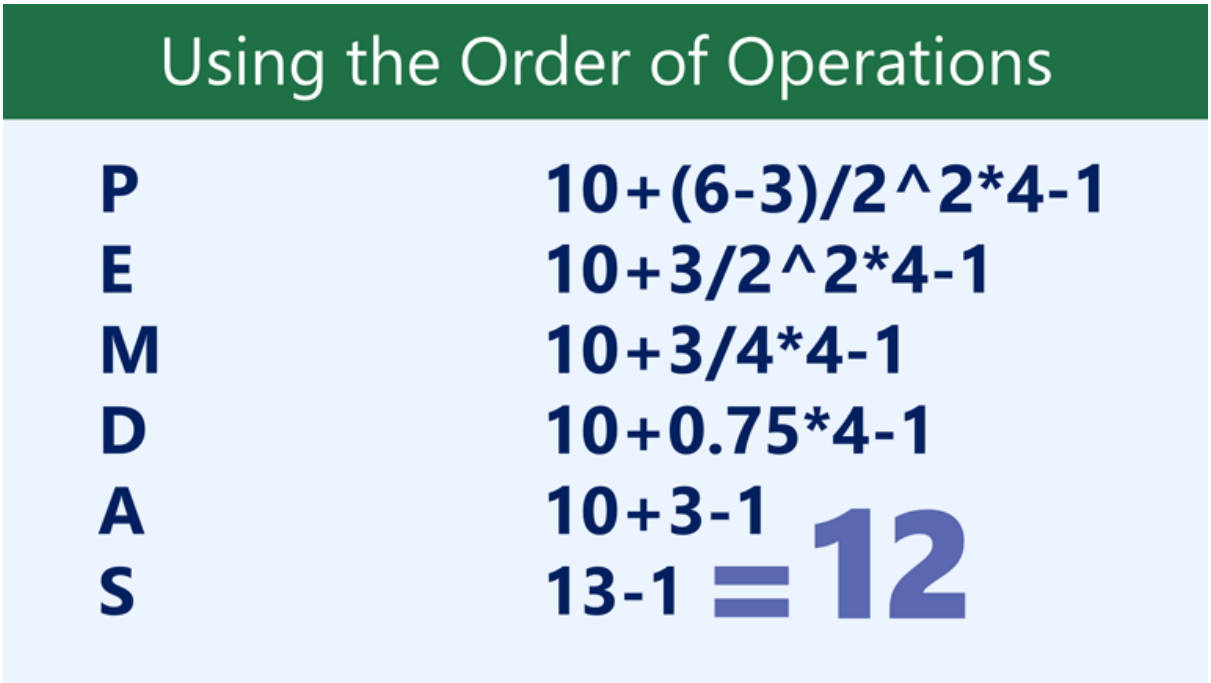
Next, we'll calculate any addition or subtraction, again working from left to right. Addition comes first: 10+3=13.

•



Finally, we have one remaining subtraction operation: 13-1=12.

•

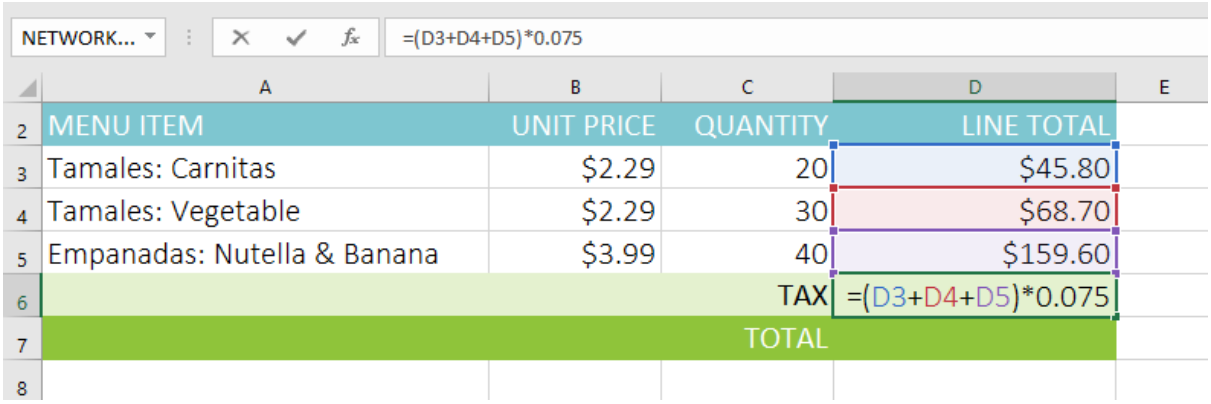


Now we have our answer: 12. And this is the exact same result you would get if you entered the formula into Excel.

•

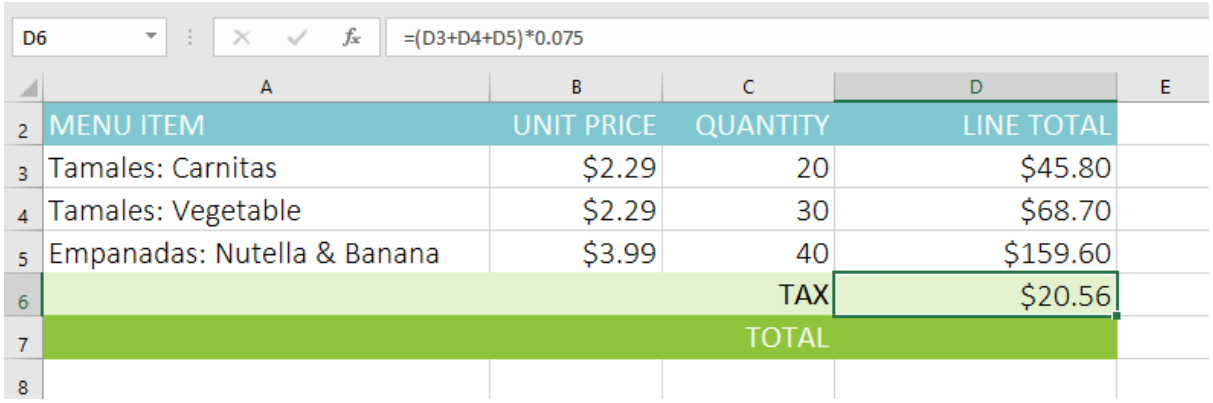
2.7.2. Creating complex formulas

In the example below, we'll demonstrate how Excel uses 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.

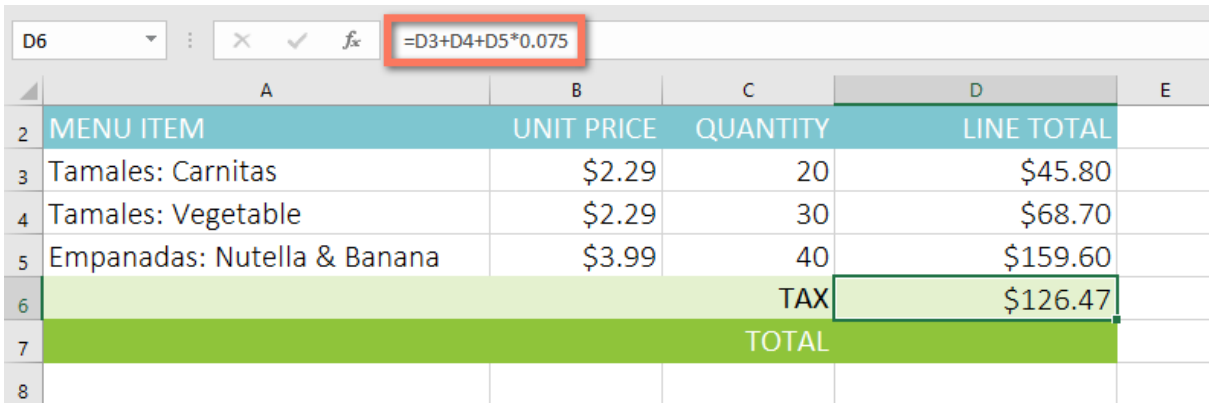


	A	B	C	D	E
2	MENU ITEM	UNIT PRICE	QUANTITY	LINE TOTAL	
3	Tamales: Carnitas	$2.29	20	$45.80	
4	Tamales: Vegetable	$2.29	30	$68.70	
5	Empanadas: Nutella & Banana	$3.99	40	$159.60	
6			TAX	=(D3+D4+D5)*0.075	
7			TOTAL		
8					

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**.



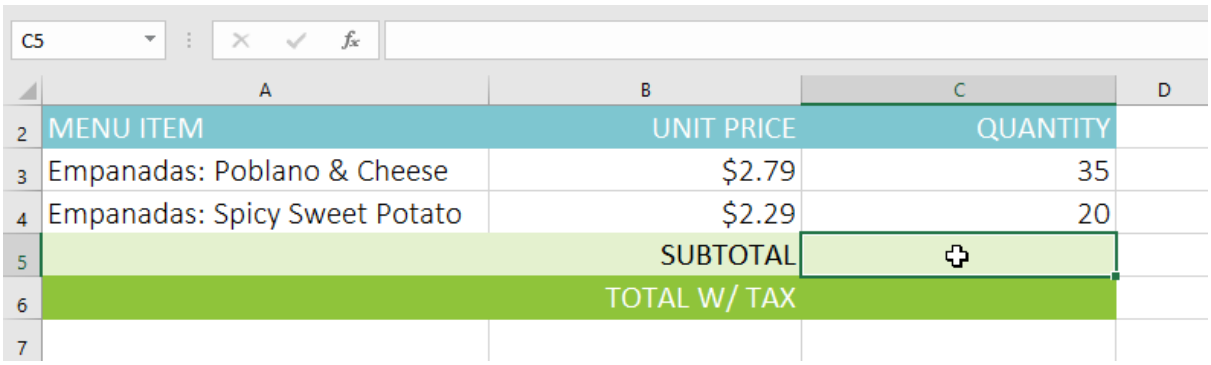
It's especially important to follow the order of operations when creating a formula. Otherwise, Excel won't calculate the results accurately. In our example, if the **parentheses** are not included, the multiplication is calculated first and the result is incorrect. Parentheses are often the best way to define which calculations will be performed first in Excel.



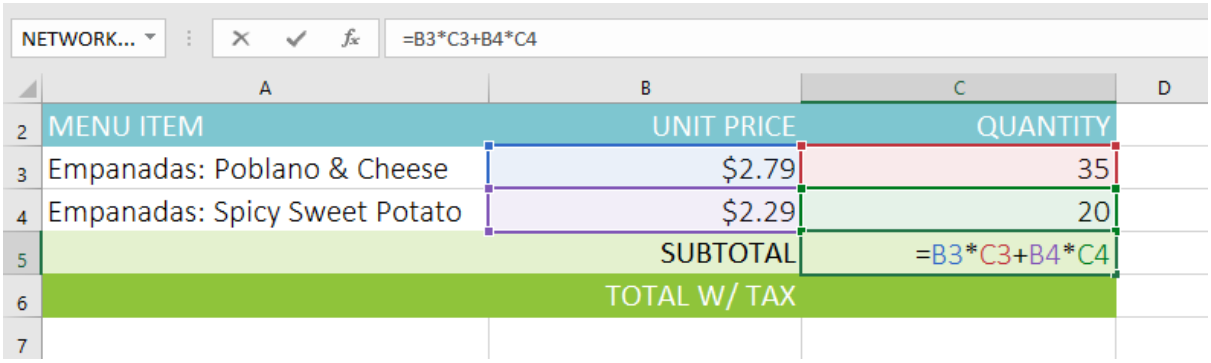
2.7.3. To create a complex formula using the order of operations:

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.

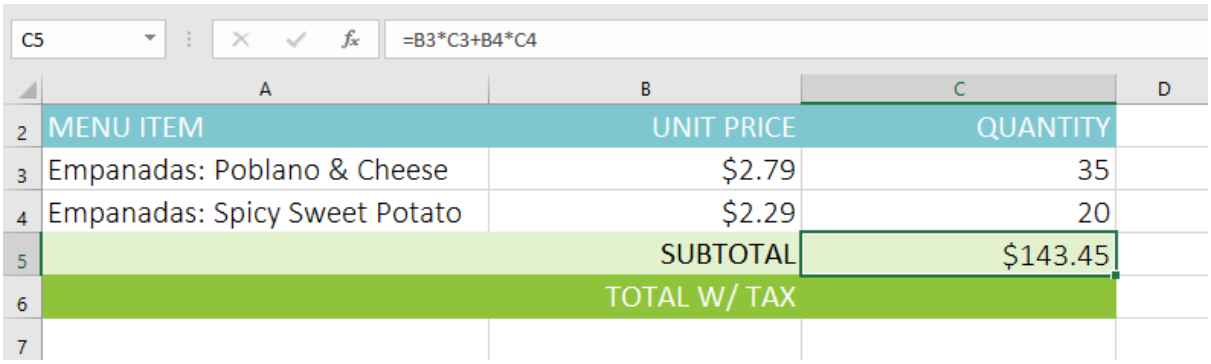
1. Select the **cell** that will contain the formula. In our example, we'll select cell **C5**.



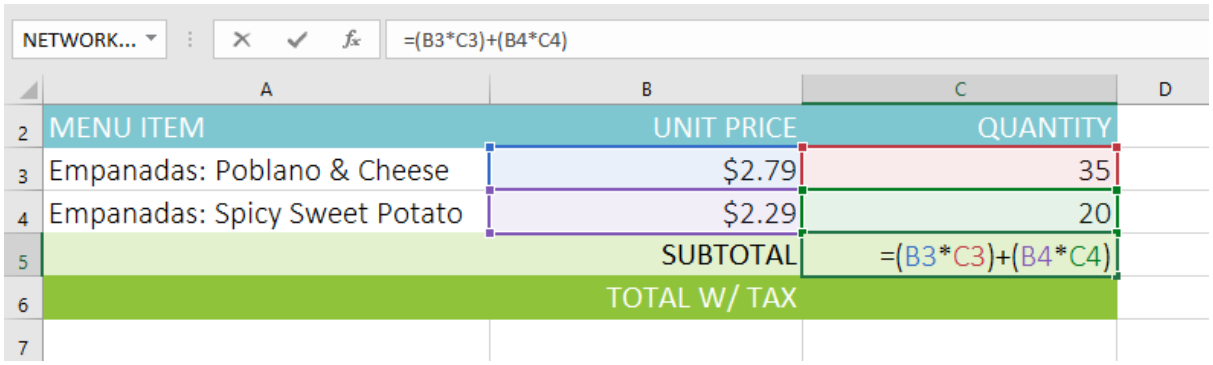
2. Enter your **formula**. In our example, we'll type **=B3*C3+B4*C4**. This formula will follow the order of operations, first performing the multiplication: **2.79*35 = 97.65** and **2.29*20 = 45.80**. It then will add these values to calculate the total: **97.65+45.80**.



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**.



You can add **parentheses** to any equation to make it easier to read. While it won't change the result of the formula in this example, we could enclose the multiplication operations within parentheses to clarify that they will be calculated before the addition.



Excel **will not always tell you** if your formula contains an error, so it's up to you to check all of your formulas. To learn how to do this.

2.8.Relative and Absolute Cell References

2.8.1. Introduction

There are two types of cell references: **relative** and **absolute**. Relative and absolute references behave differently when copied and filled to other cells. Relative references **change** when a formula is copied to another cell. Absolute references, on the other hand, remain **constant** no matter where they are copied.

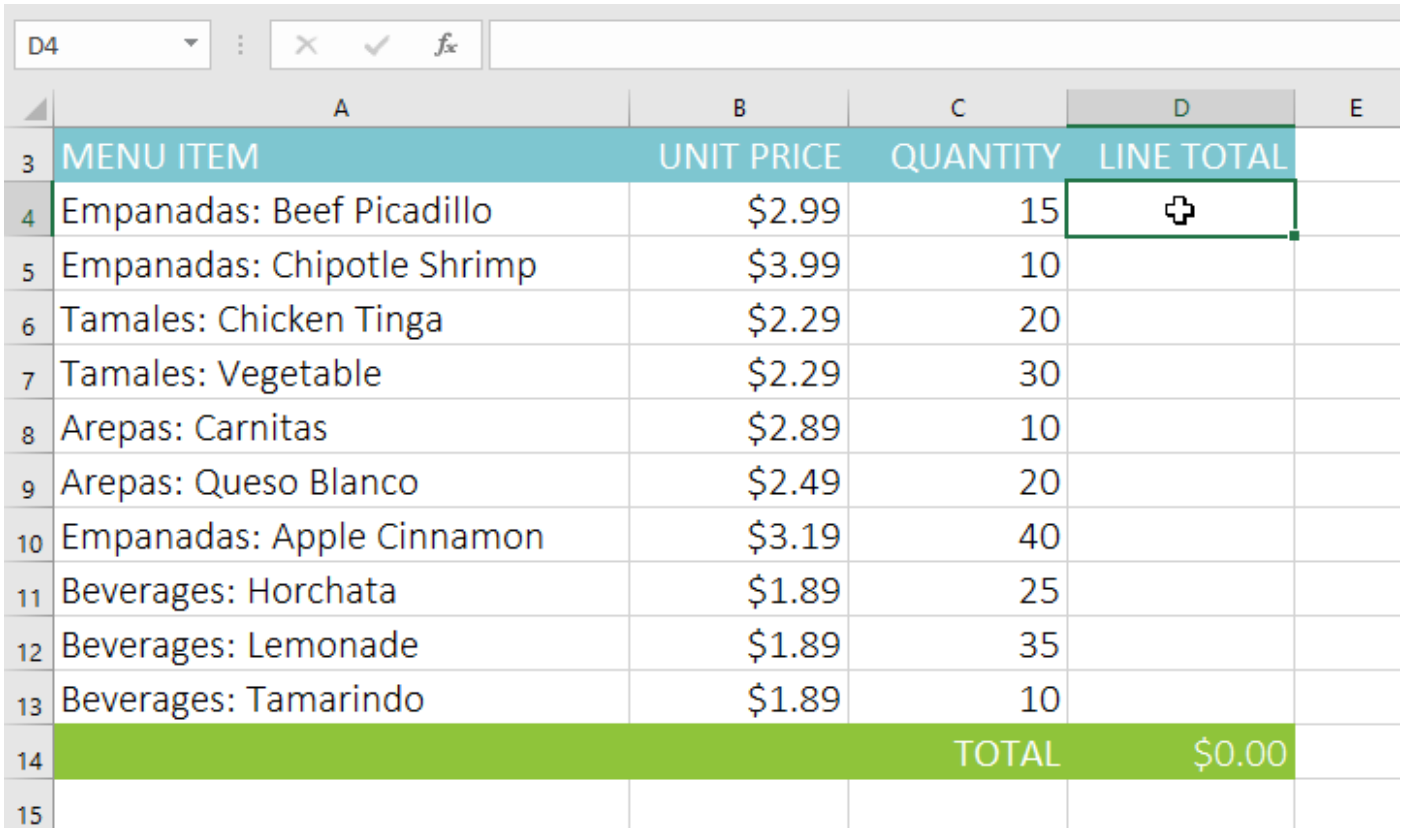
2.8.2. Relative references

By default, all cell references are **relative references**. When copied across multiple cells, they change based on the relative position of rows and columns. For example, if you copy the formula **=A1+B1** from row 1 to row 2, the formula will become **=A2+B2**. Relative references are especially convenient whenever you need to repeat the same calculation across multiple rows or columns.

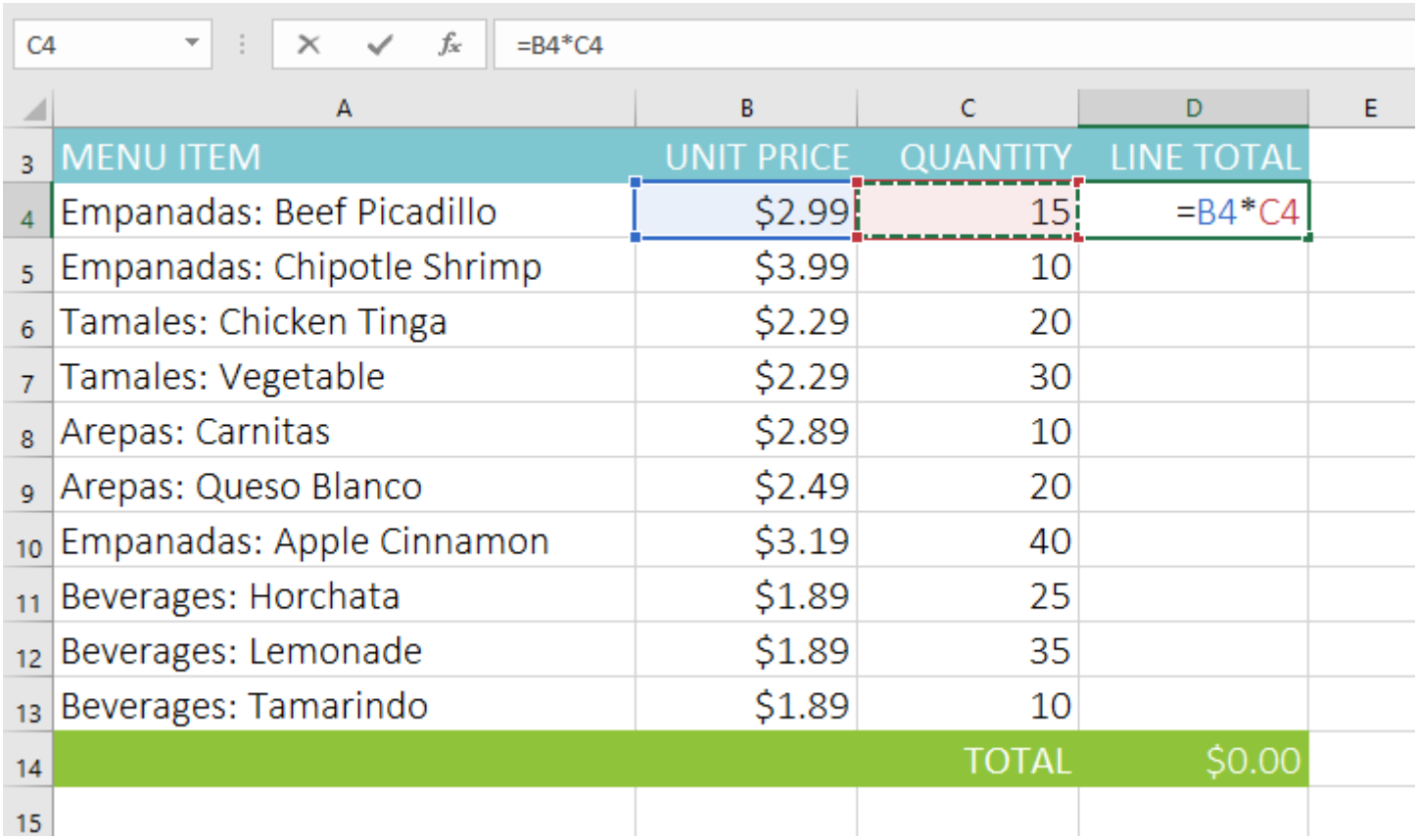
2.8.3. To create and copy a formula using relative references:

In the following example, we want to create a formula that will multiply each item's **price** by the **quantity**. Instead of creating a new formula for each row, we can create a single formula in cell **D4** and then copy it to the other rows. We'll use relative references so the formula calculates the total for each item correctly.

1. Select the **cell** that will contain the formula. In our example, we'll select cell **D4**.

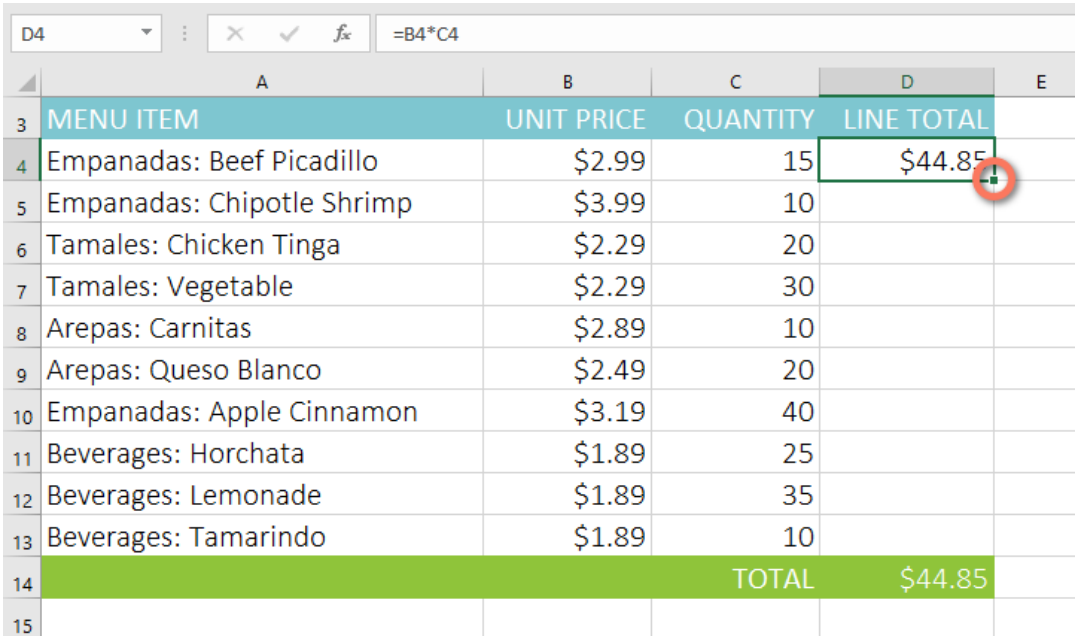


2. Enter the **formula** to calculate the desired value. In our example, we'll type **=B4*C4**.



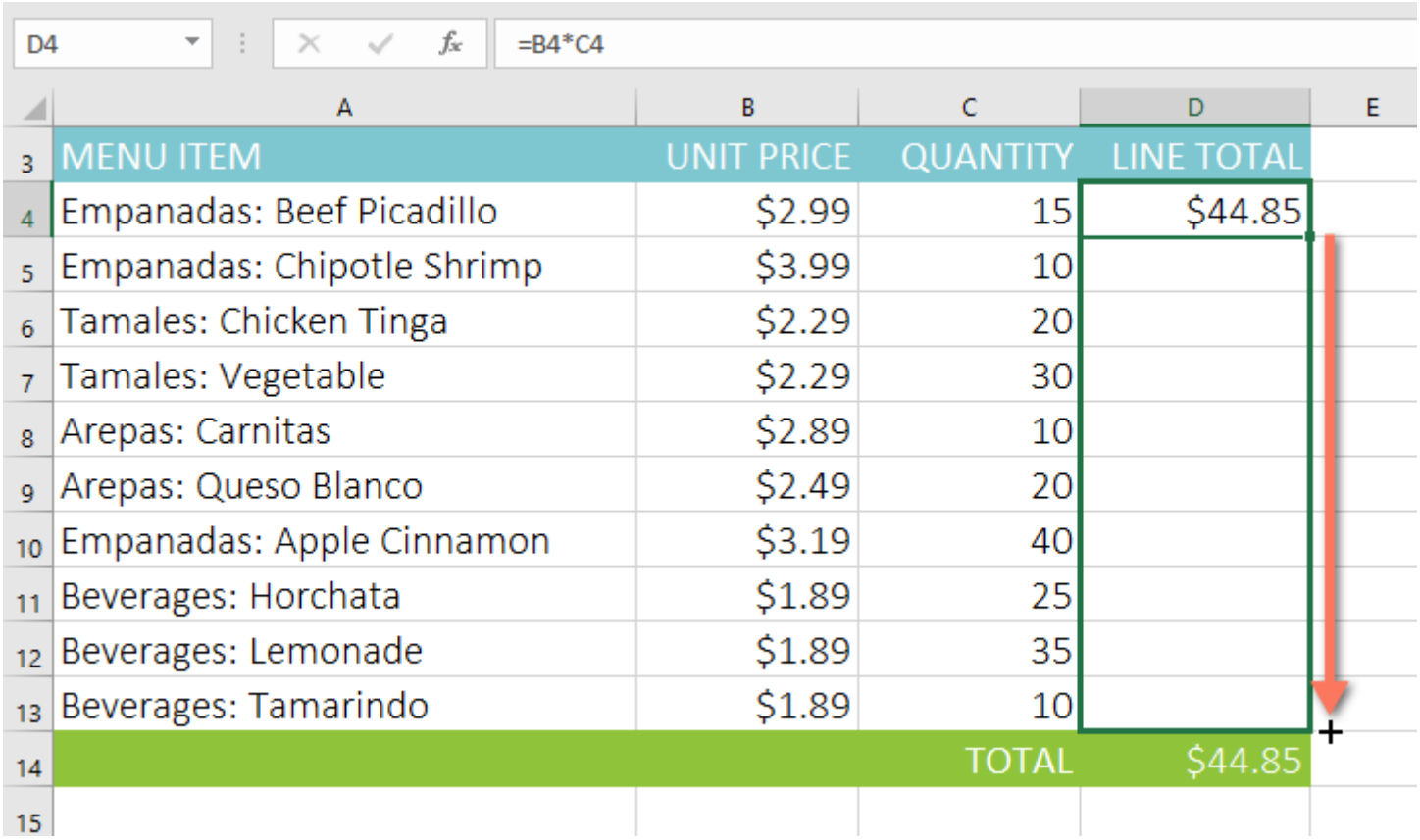
	A	B	C	D	E
3	MENU ITEM	UNIT PRICE	QUANTITY	LINE TOTAL	
4	Empanadas: Beef Picadillo	$2.99	15	=B4*C4	
5	Empanadas: Chipotle Shrimp	$3.99	10		
6	Tamales: Chicken Tinga	$2.29	20		
7	Tamales: Vegetable	$2.29	30		
8	Arepas: Carnitas	$2.89	10		
9	Arepas: Queso Blanco	$2.49	20		
10	Empanadas: Apple Cinnamon	$3.19	40		
11	Beverages: Horchata	$1.89	25		
12	Beverages: Lemonade	$1.89	35		
13	Beverages: Tamarindo	$1.89	10		
14			TOTAL	$0.00	
15					

3. Press **Enter** on your keyboard. The formula will be calculated, and the result will be displayed in the cell.
4. Locate the **fill handle** in the bottom-right corner of the desired cell. In our example, we'll locate the fill handle for cell **D4**.



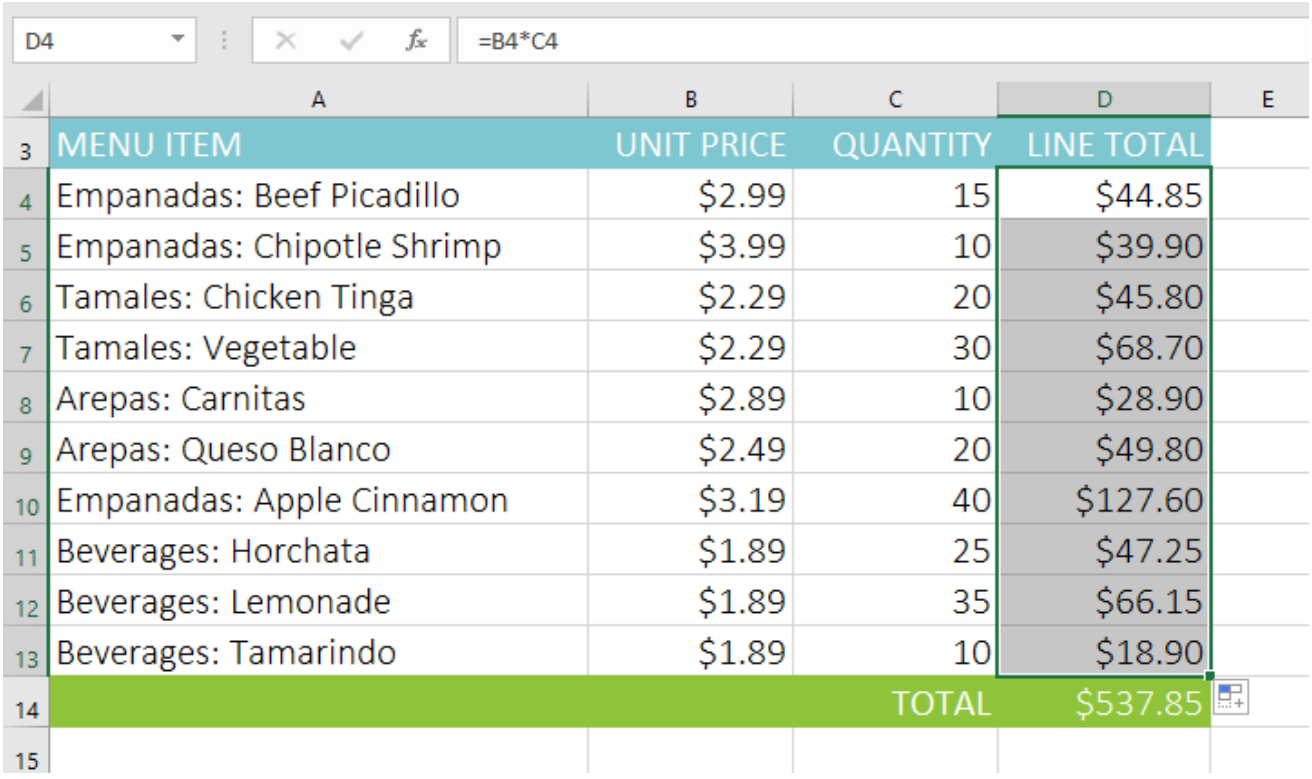
	A	B	C	D	E
3	MENU ITEM	UNIT PRICE	QUANTITY	LINE TOTAL	
4	Empanadas: Beef Picadillo	$2.99	15	$44.85	
5	Empanadas: Chipotle Shrimp	$3.99	10		
6	Tamales: Chicken Tinga	$2.29	20		
7	Tamales: Vegetable	$2.29	30		
8	Arepas: Carnitas	$2.89	10		
9	Arepas: Queso Blanco	$2.49	20		
10	Empanadas: Apple Cinnamon	$3.19	40		
11	Beverages: Horchata	$1.89	25		
12	Beverages: Lemonade	$1.89	35		
13	Beverages: Tamarindo	$1.89	10		
14			TOTAL	$44.85	
15					

5. Click and drag the **fill handle** over the cells you want to fill. In our example, we'll select cells **D5:D13**.



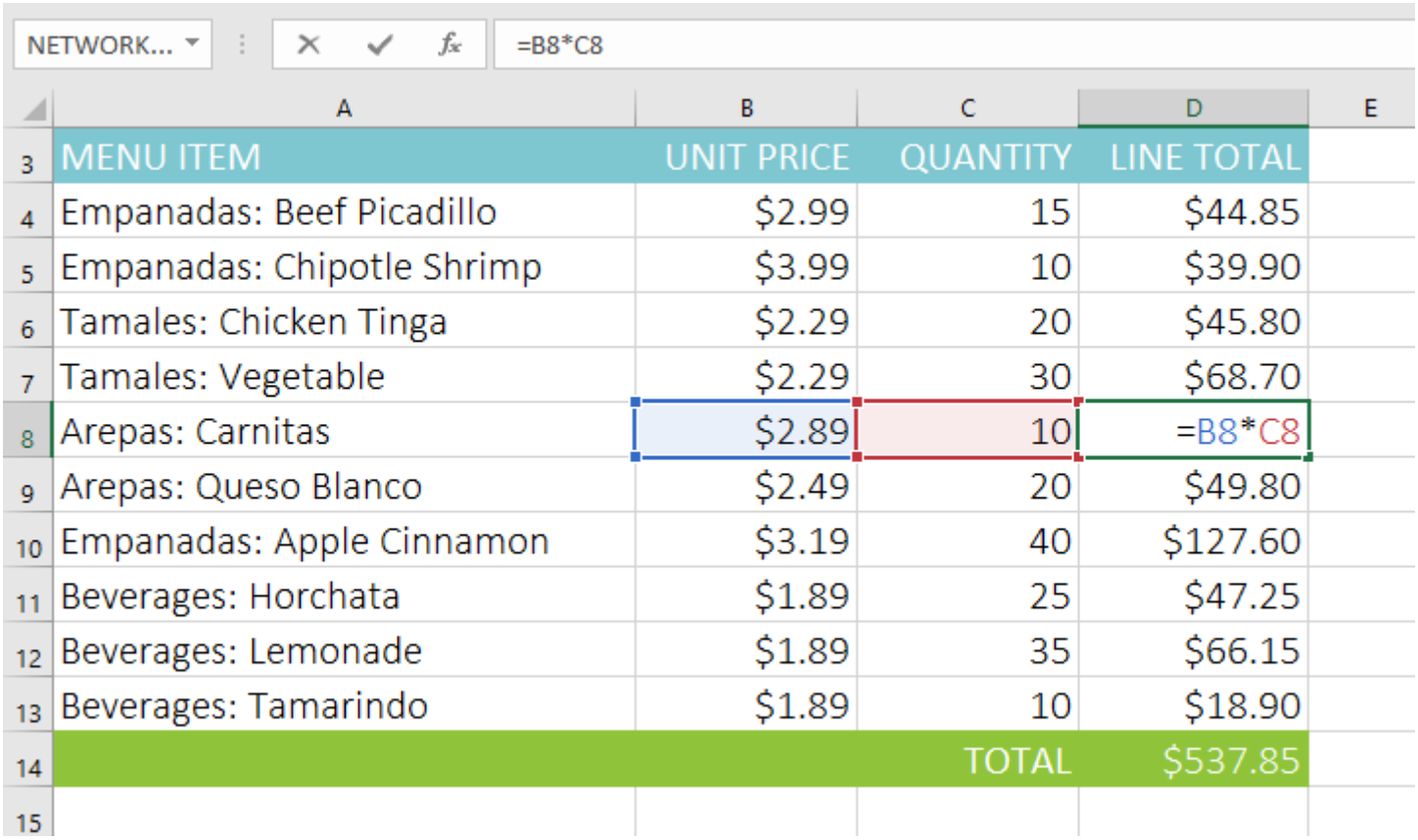
	A	B	C	D	E
3	MENU ITEM	UNIT PRICE	QUANTITY	LINE TOTAL	
4	Empanadas: Beef Picadillo	$2.99	15	$44.85	
5	Empanadas: Chipotle Shrimp	$3.99	10		
6	Tamales: Chicken Tinga	$2.29	20		
7	Tamales: Vegetable	$2.29	30		
8	Arepas: Carnitas	$2.89	10		
9	Arepas: Queso Blanco	$2.49	20		
10	Empanadas: Apple Cinnamon	$3.19	40		
11	Beverages: Horchata	$1.89	25		
12	Beverages: Lemonade	$1.89	35		
13	Beverages: Tamarindo	$1.89	10		
14			TOTAL	$44.85	
15					

6. Release the mouse. The formula will be **copied** to the selected cells with **relative references**, displaying the result in each cell.



	A	B	C	D	E
3	MENU ITEM	UNIT PRICE	QUANTITY	LINE TOTAL	
4	Empanadas: Beef Picadillo	$2.99	15	$44.85	
5	Empanadas: Chipotle Shrimp	$3.99	10	$39.90	
6	Tamales: Chicken Tinga	$2.29	20	$45.80	
7	Tamales: Vegetable	$2.29	30	$68.70	
8	Arepas: Carnitas	$2.89	10	$28.90	
9	Arepas: Queso Blanco	$2.49	20	$49.80	
10	Empanadas: Apple Cinnamon	$3.19	40	$127.60	
11	Beverages: Horchata	$1.89	25	$47.25	
12	Beverages: Lemonade	$1.89	35	$66.15	
13	Beverages: Tamarindo	$1.89	10	$18.90	
14			TOTAL	$537.85	
15					

You can double-click the **filled cells** to check their formulas for accuracy. The relative cell references should be different for each cell, depending on their rows.



	A	B	C	D	E
3	MENU ITEM	UNIT PRICE	QUANTITY	LINE TOTAL	
4	Empanadas: Beef Picadillo	$2.99	15	$44.85	
5	Empanadas: Chipotle Shrimp	$3.99	10	$39.90	
6	Tamales: Chicken Tinga	$2.29	20	$45.80	
7	Tamales: Vegetable	$2.29	30	$68.70	
8	Arepas: Carnitas	$2.89	10	=B8*C8	
9	Arepas: Queso Blanco	$2.49	20	$49.80	
10	Empanadas: Apple Cinnamon	$3.19	40	$127.60	
11	Beverages: Horchata	$1.89	25	$47.25	
12	Beverages: Lemonade	$1.89	35	$66.15	
13	Beverages: Tamarindo	$1.89	10	$18.90	
14			TOTAL	$537.85	
15					

2.8.4. Absolute references

There may be times when you do not want a cell reference to change when filling cells. Unlike relative references, **absolute references** do not change when copied or filled. You can use an absolute reference to keep a row and/or column **constant**.

An absolute reference is designated in a formula by the addition of a **dollar sign ($)** before the column and row. If it precedes the column or row (but not both), it's known as a **mixed reference**.

A2	The column and the row do not change when copied
A$2	The row does not change when copied
$A2	The column does not change when copied

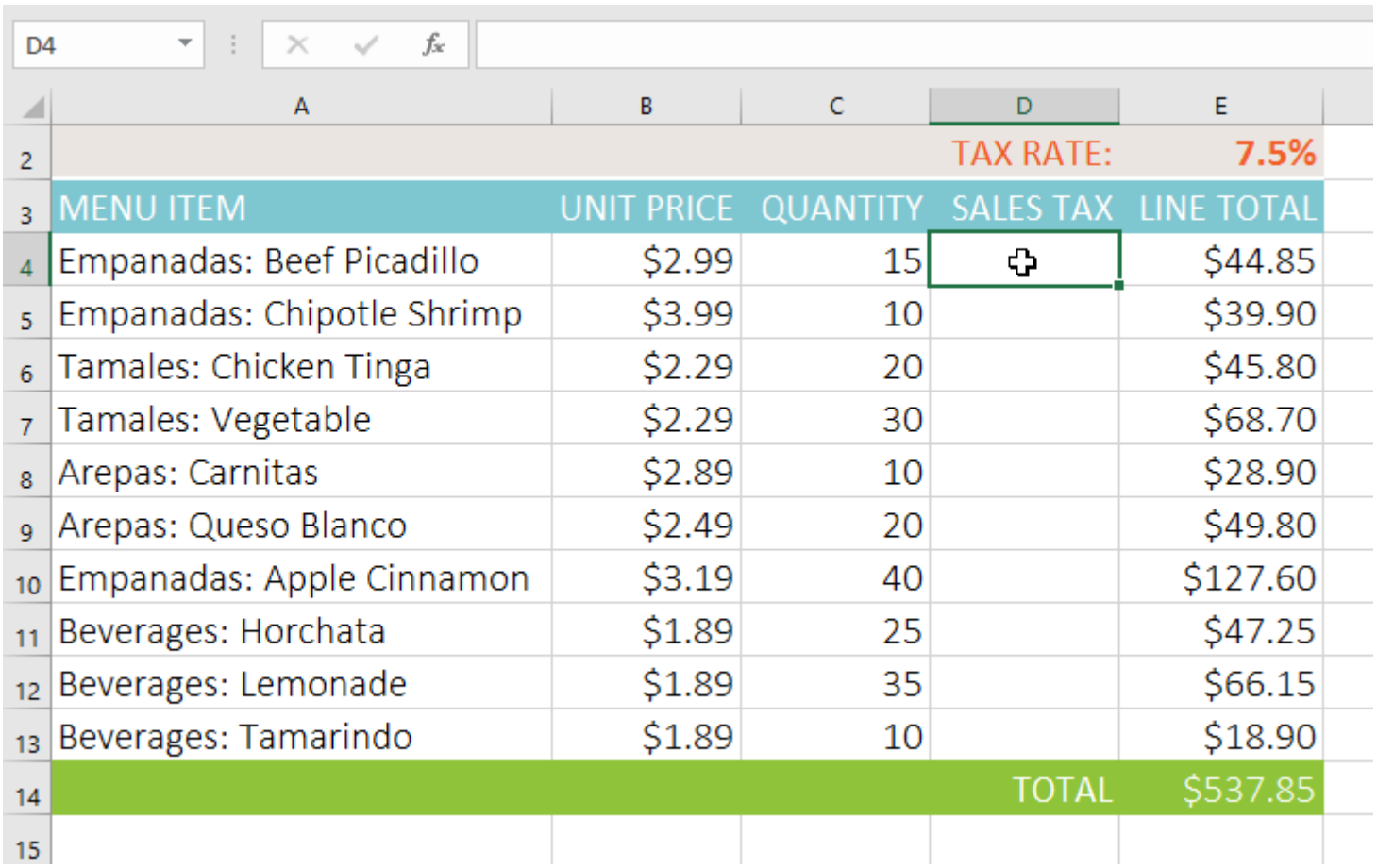
You will use the relative (**A2**) and absolute (**A2**) formats in most formulas. Mixed references are used less frequently.

When writing a formula in Microsoft Excel, you can press the **F4** key on your keyboard to switch between relative, absolute, and mixed cell references, as shown in the video below. This is an easy way to quickly insert an absolute reference.

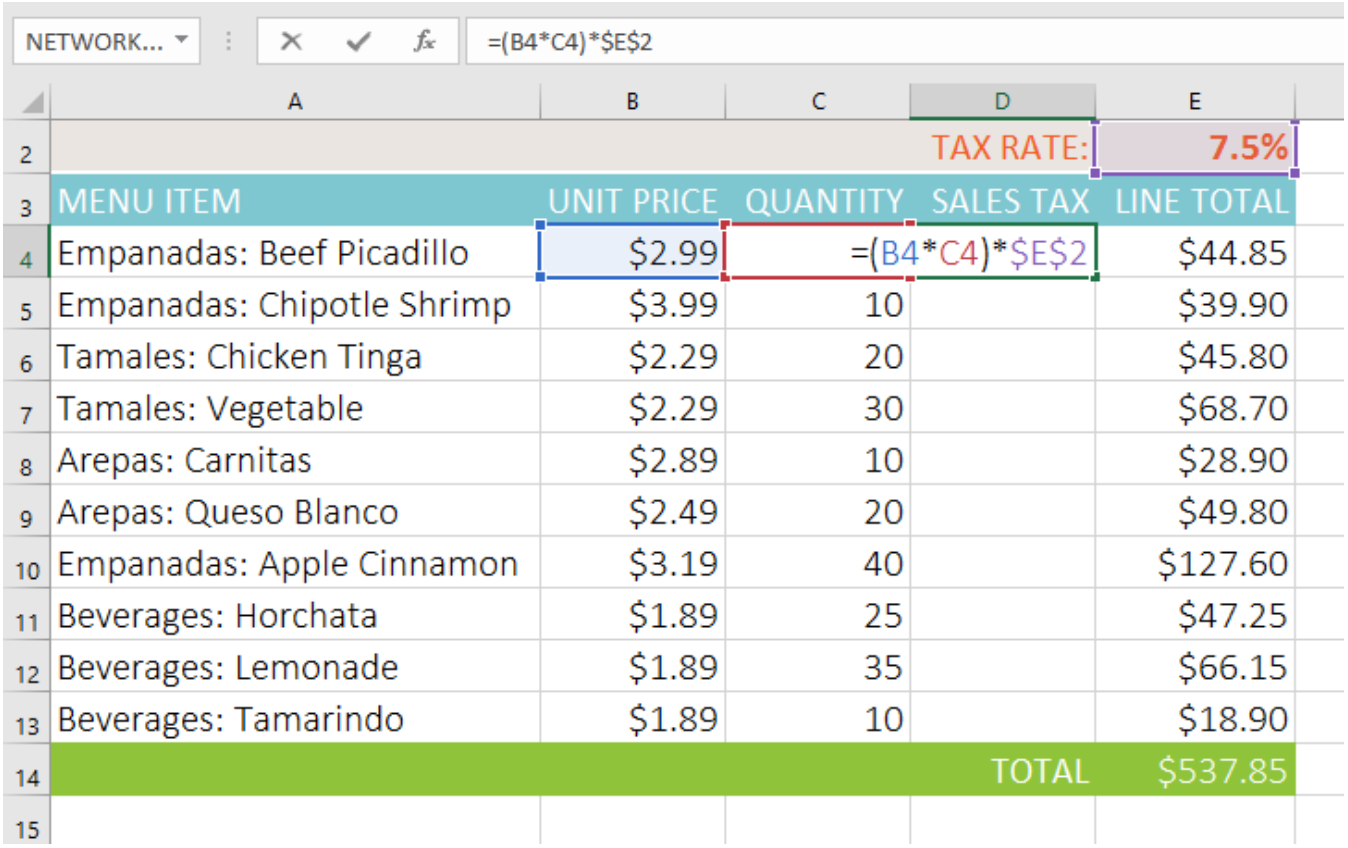
2.8.5. To create and copy a formula using absolute references:

In the example below, we're going to use cell **E2** (which contains the tax rate at 7.5%) to calculate the sales tax for each item in **column D**. To make sure the reference to the tax rate stays constant—even when the formula is copied and filled to other cells—we'll need to make cell **E2** an absolute reference.

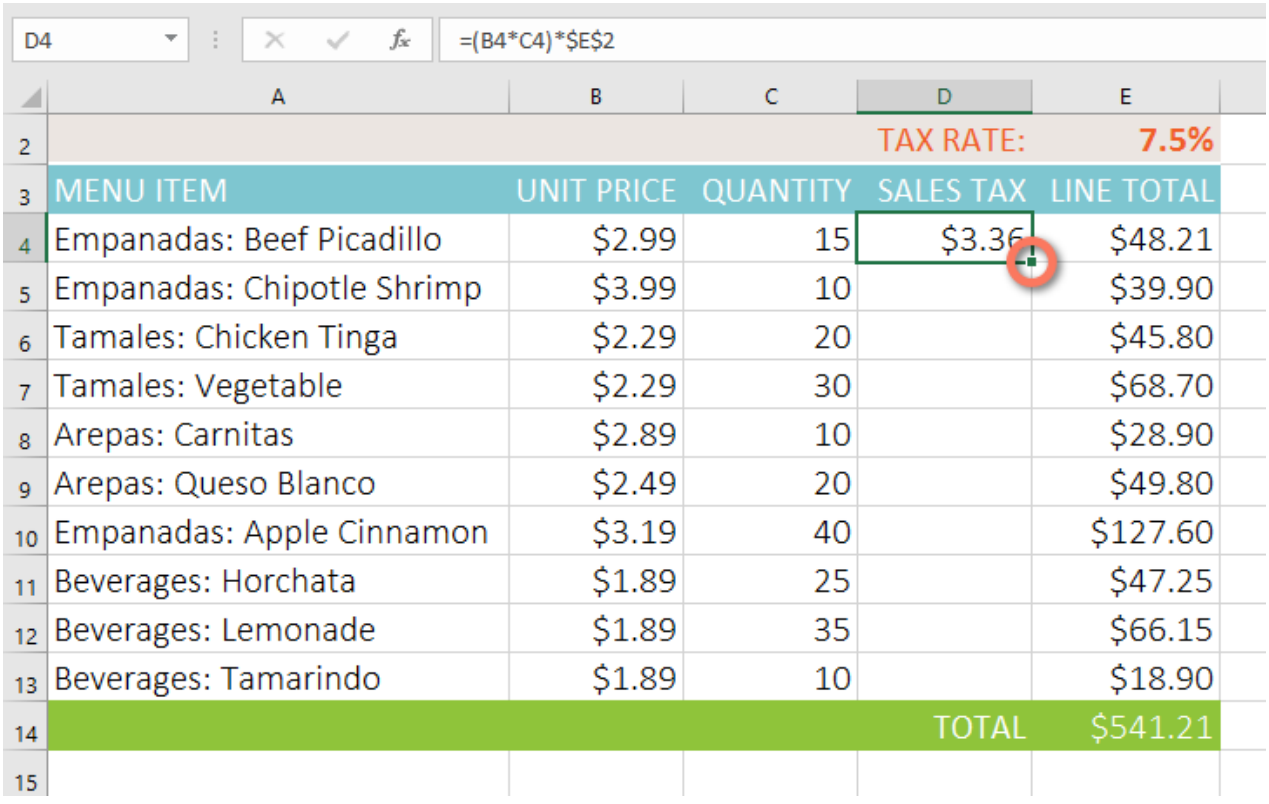
1. Select the **cell** that will contain the formula. In our example, we'll select cell **D4**.



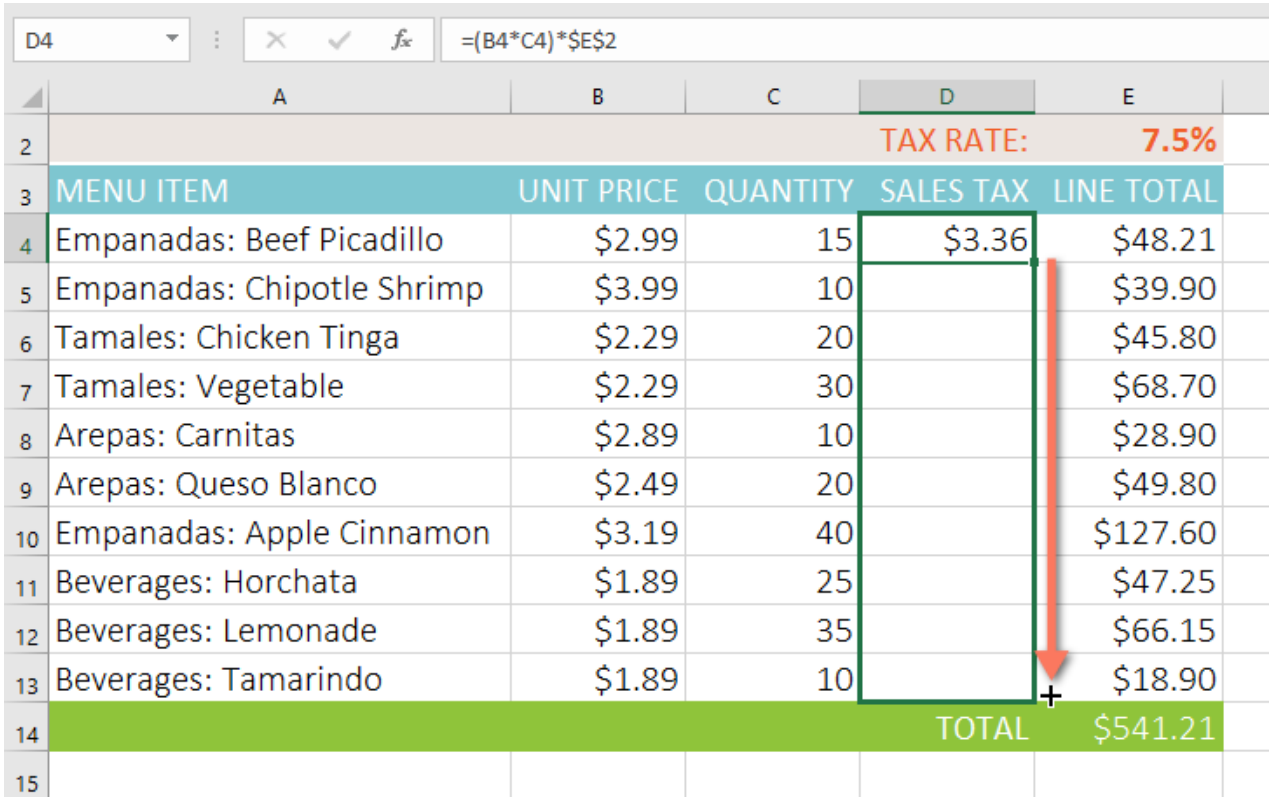
2. Enter the **formula** to calculate the desired value. In our example, we'll type =**(B4*C4)*E2**, making **E2** an absolute reference.



3. Press **Enter** on your keyboard. The formula will calculate, and the result will display in the cell.
4. Locate the **fill handle** in the bottom-right corner of the desired cell. In our example, we'll locate the fill handle for cell **D4**.

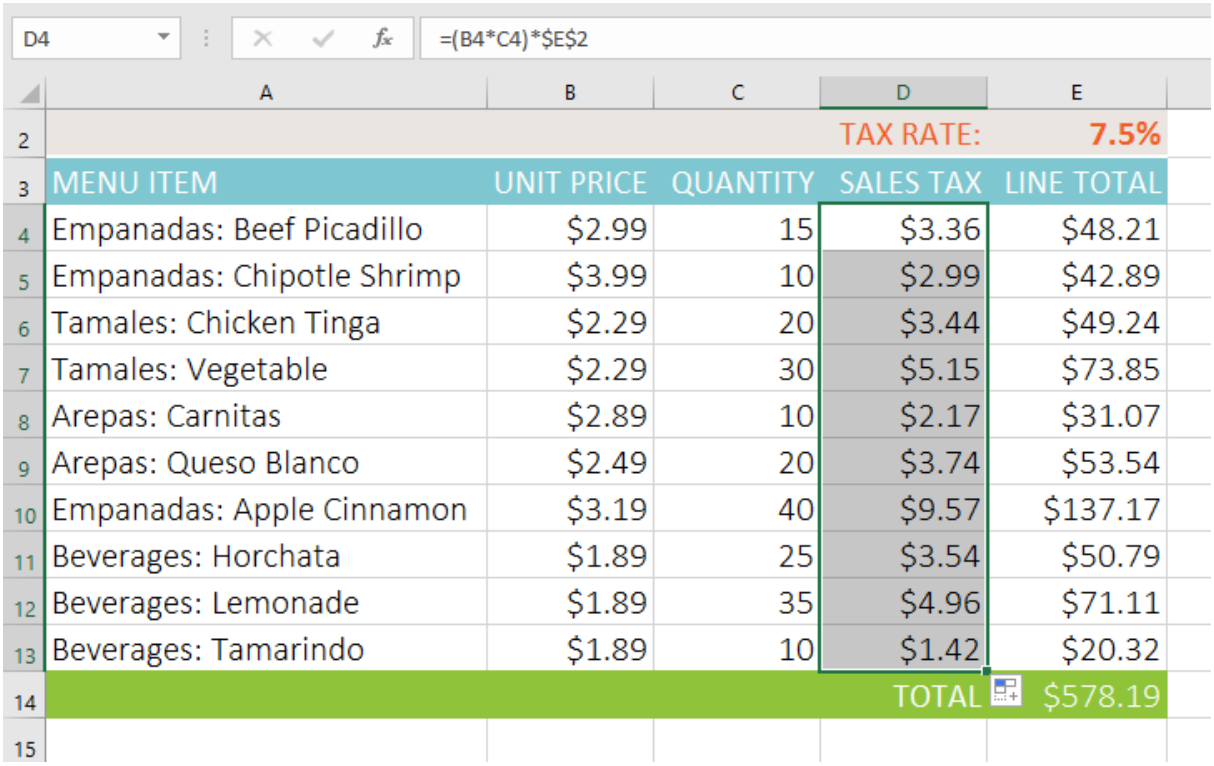


5. Click and drag the **fill handle** over the cells you want to fill (cells **D5:D13** in our example).



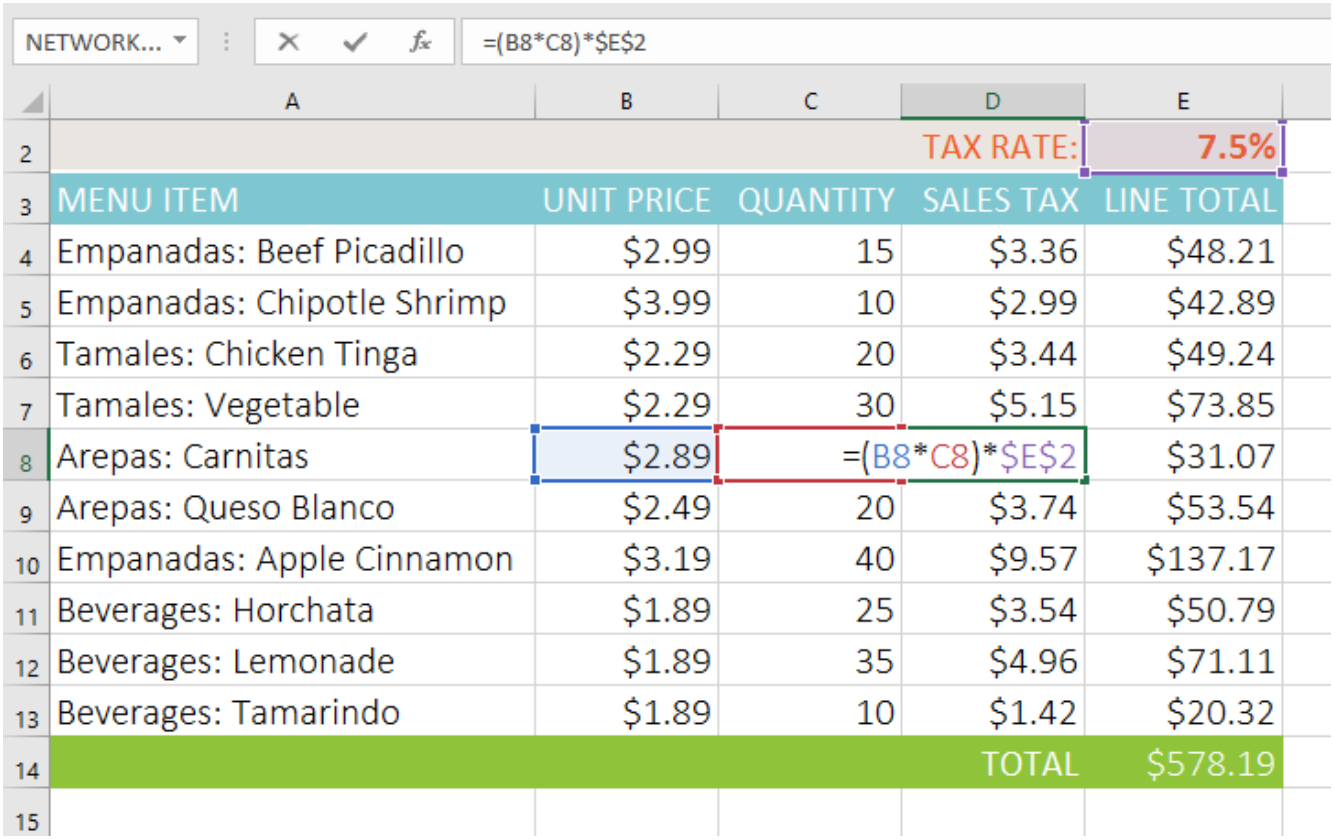
	A	B	C	D	E
2				TAX RATE:	7.5%
3	MENU ITEM	UNIT PRICE	QUANTITY	SALES TAX	LINE TOTAL
4	Empanadas: Beef Picadillo	$2.99	15	$3.36	$48.21
5	Empanadas: Chipotle Shrimp	$3.99	10		$39.90
6	Tamales: Chicken Tinga	$2.29	20		$45.80
7	Tamales: Vegetable	$2.29	30		$68.70
8	Arepas: Carnitas	$2.89	10		$28.90
9	Arepas: Queso Blanco	$2.49	20		$49.80
10	Empanadas: Apple Cinnamon	$3.19	40		$127.60
11	Beverages: Horchata	$1.89	25		$47.25
12	Beverages: Lemonade	$1.89	35		$66.15
13	Beverages: Tamarindo	$1.89	10		$18.90
14				TOTAL	$541.21
15					

6. Release the mouse. The formula will be **copied** to the selected cells with an **absolute reference**, and the values will be calculated in each cell.



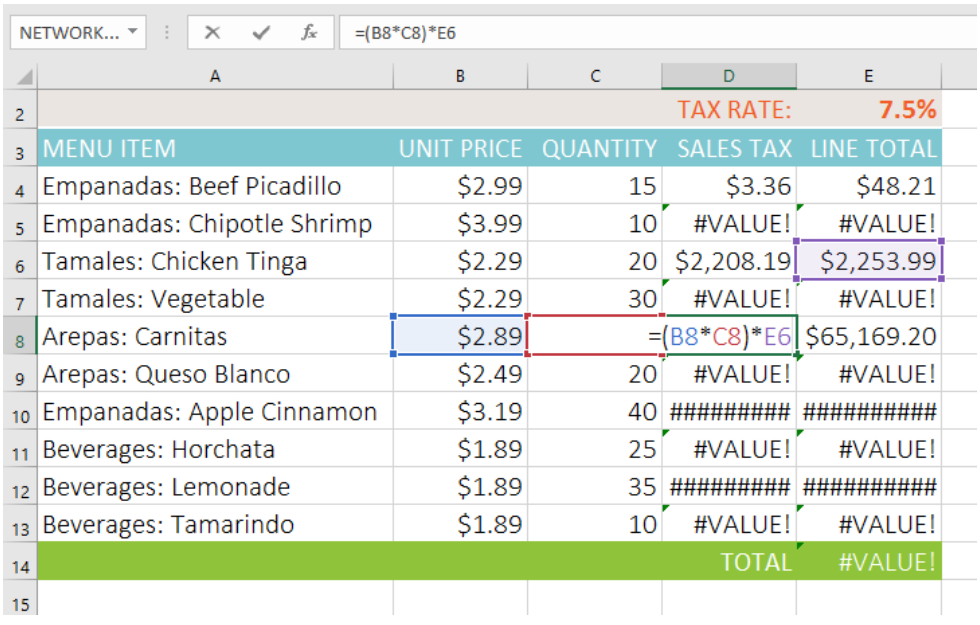
	A	B	C	D	E
2				TAX RATE:	7.5%
3	MENU ITEM	UNIT PRICE	QUANTITY	SALES TAX	LINE TOTAL
4	Empanadas: Beef Picadillo	$2.99	15	$3.36	$48.21
5	Empanadas: Chipotle Shrimp	$3.99	10	$2.99	$42.89
6	Tamales: Chicken Tinga	$2.29	20	$3.44	$49.24
7	Tamales: Vegetable	$2.29	30	$5.15	$73.85
8	Arepas: Carnitas	$2.89	10	$2.17	$31.07
9	Arepas: Queso Blanco	$2.49	20	$3.74	$53.54
10	Empanadas: Apple Cinnamon	$3.19	40	$9.57	$137.17
11	Beverages: Horchata	$1.89	25	$3.54	$50.79
12	Beverages: Lemonade	$1.89	35	$4.96	$71.11
13	Beverages: Tamarindo	$1.89	10	$1.42	$20.32
14				TOTAL	$578.19
15					

You can double-click the **filled cells** to check their formulas for accuracy. The absolute reference should be the same for each cell, while the other references are relative to the cell's row.



	A	B	C	D	E
2				TAX RATE:	7.5%
3	MENU ITEM	UNIT PRICE	QUANTITY	SALES TAX	LINE TOTAL
4	Empanadas: Beef Picadillo	$2.99	15	$3.36	$48.21
5	Empanadas: Chipotle Shrimp	$3.99	10	$2.99	$42.89
6	Tamales: Chicken Tinga	$2.29	20	$3.44	$49.24
7	Tamales: Vegetable	$2.29	30	$5.15	$73.85
8	Arepas: Carnitas	$2.89	=(B8*C8)*E2		$31.07
9	Arepas: Queso Blanco	$2.49	20	$3.74	$53.54
10	Empanadas: Apple Cinnamon	$3.19	40	$9.57	$137.17
11	Beverages: Horchata	$1.89	25	$3.54	$50.79
12	Beverages: Lemonade	$1.89	35	$4.96	$71.11
13	Beverages: Tamarindo	$1.89	10	$1.42	$20.32
14				TOTAL	$578.19
15					

Be sure to include the **dollar sign ($)** whenever you're making an absolute reference across multiple cells. The dollar signs were omitted in the example below. This caused Excel to interpret it as a **relative reference**, producing an incorrect result when copied to other cells.



	A	B	C	D	E
2				TAX RATE:	7.5%
3	MENU ITEM	UNIT PRICE	QUANTITY	SALES TAX	LINE TOTAL
4	Empanadas: Beef Picadillo	$2.99	15	$3.36	$48.21
5	Empanadas: Chipotle Shrimp	$3.99	10	#VALUE!	#VALUE!
6	Tamales: Chicken Tinga	$2.29	20	$2,208.19	$2,253.99
7	Tamales: Vegetable	$2.29	30	#VALUE!	#VALUE!
8	Arepas: Carnitas	$2.89	=(B8*C8)*E6		$65,169.20
9	Arepas: Queso Blanco	$2.49	20	#VALUE!	#VALUE!
10	Empanadas: Apple Cinnamon	$3.19	40	##########	##########
11	Beverages: Horchata	$1.89	25	#VALUE!	#VALUE!
12	Beverages: Lemonade	$1.89	35	##########	##########
13	Beverages: Tamarindo	$1.89	10	#VALUE!	#VALUE!
14				TOTAL	#VALUE!
15					

2.8.6. Using cell references with multiple worksheets

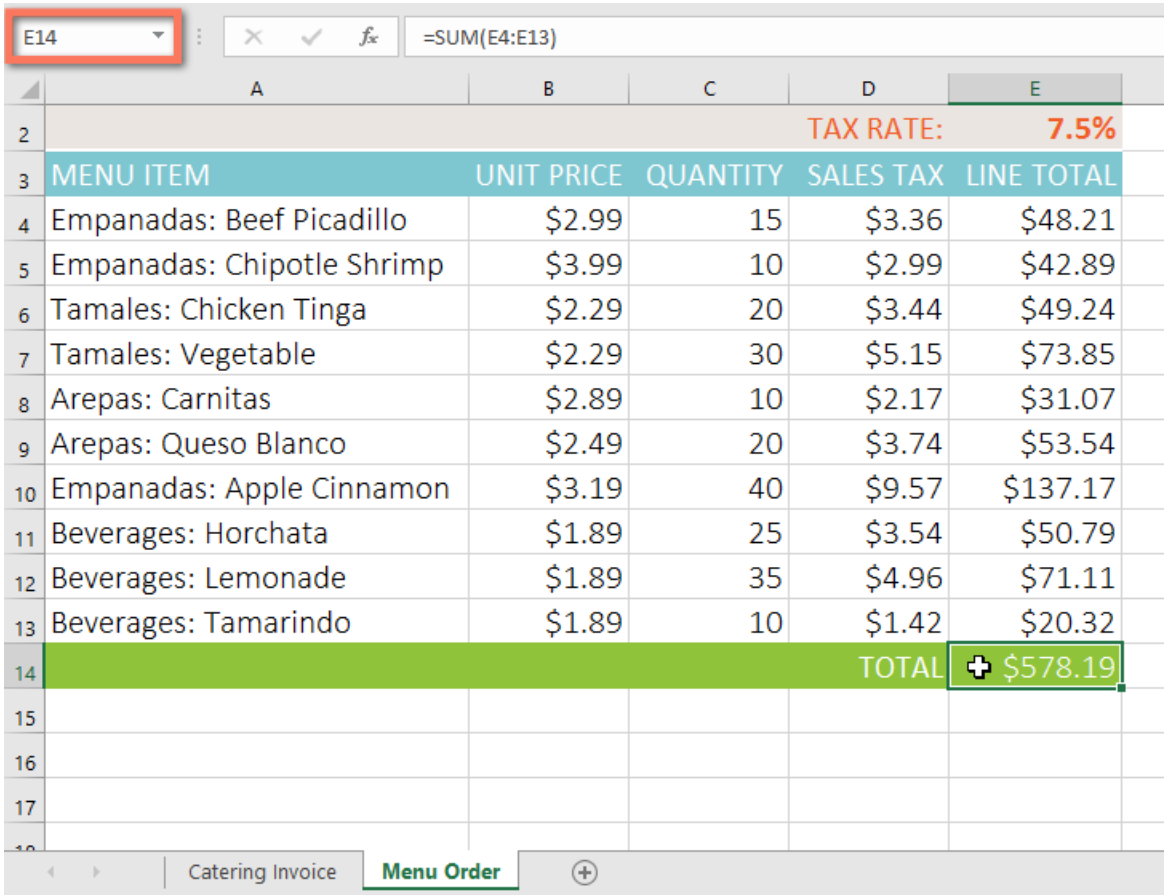
Excel allows you to refer to any cell on any **worksheet**, which can be especially helpful if you want to reference a specific value from one worksheet to another. To do this, you'll simply need to begin the cell reference with the **worksheet name** followed by an **exclamation point (!)**. For example, if you wanted to reference cell **A1** on **Sheet1**, its cell reference would be **Sheet1!A1**.

Note that if a worksheet name contains a **space**, you'll need to include **single quotation marks (' ')** around the name. For example, if you wanted to reference cell **A1** on a worksheet named **July Budget**, its cell reference would be **'July Budget'!A1**.

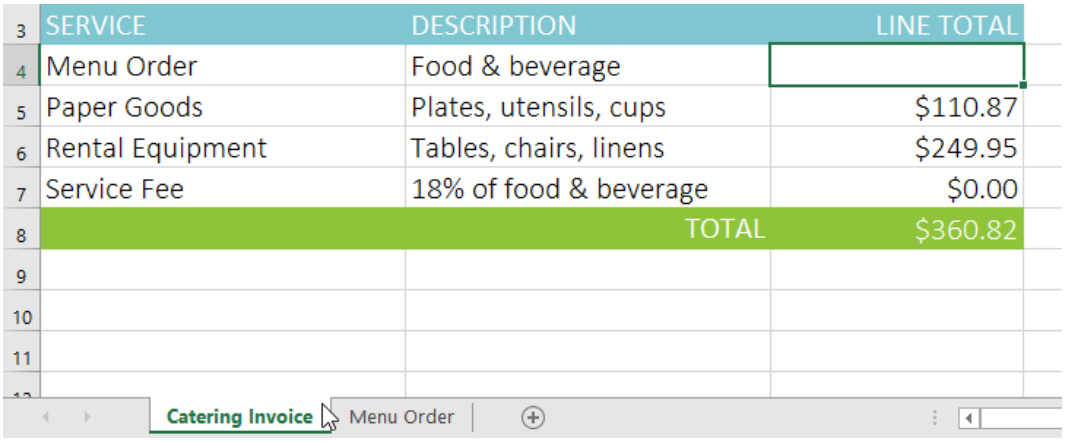
2.8.7. To reference cells across worksheets:

In our example below, we'll refer to a cell with a calculated value between two worksheets. This will allow us to use the **exact same value** on two different worksheets without rewriting the formula or copying data.

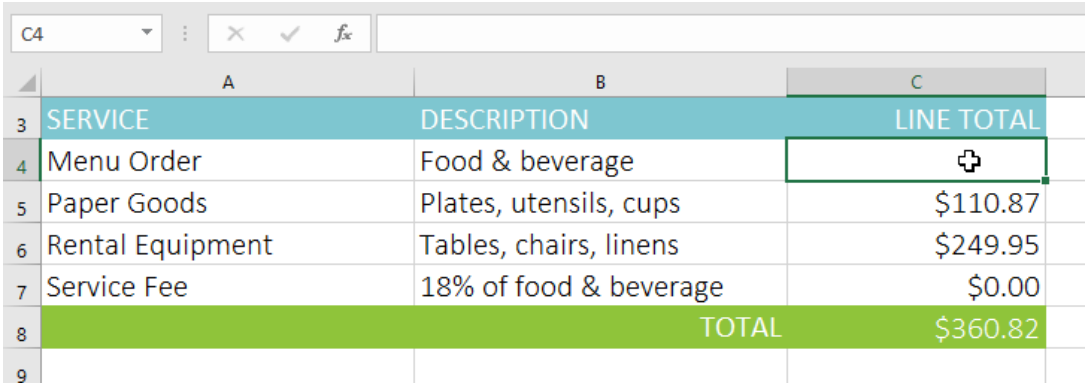
1. Locate the cell you want to reference, and note its worksheet. In our example, we want to reference cell **E14** on the **Menu Order** worksheet.



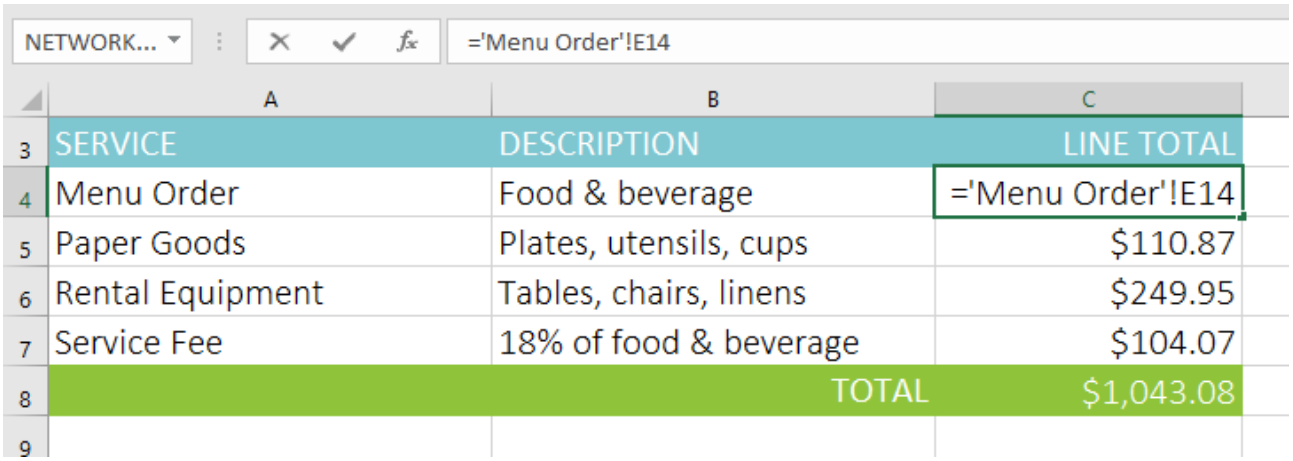
2. Navigate to the desired **worksheet**. In our example, we'll select the **Catering Invoice** worksheet.



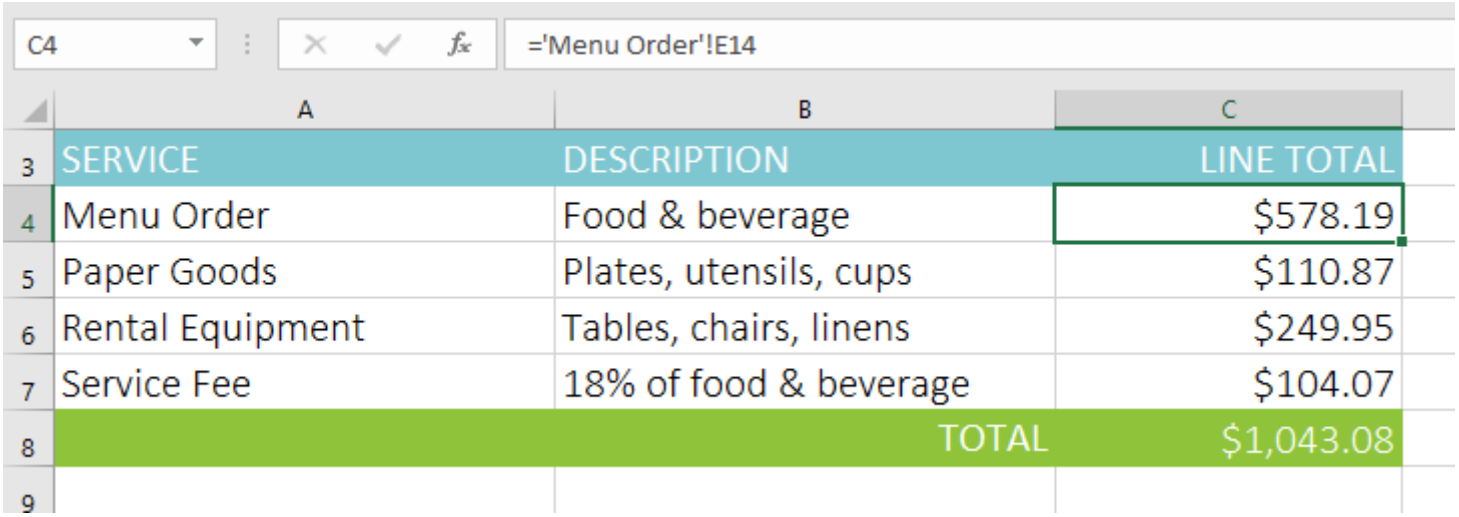
3. Locate and select the **cell** where you want the value to appear. In our example, we'll select cell **C4**.



4. Type the **equals sign (=)**, the **sheet name** followed by an **exclamation point (!)**, and the **cell address**. In our example, we'll type **='Menu Order'!E14**.



5. Press **Enter** on your keyboard. The **value** of the referenced cell will appear. Now, if the value of cell E14 changes on the Menu Order worksheet, it will be updated automatically on the Catering Invoice worksheet.



If you **rename** your worksheet at a later point, the cell reference will be updated automatically to reflect the new worksheet name.

If you enter a worksheet name incorrectly, the **#REF!** error will appear in the cell. In our example below, we've mistyped the name of the worksheet. To edit, ignore, or investigate the error, click the **Error** button beside the cell and choose an option from the **menu**.