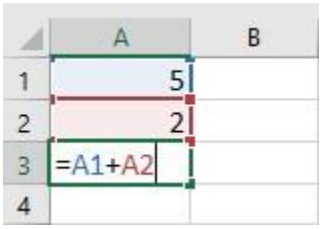
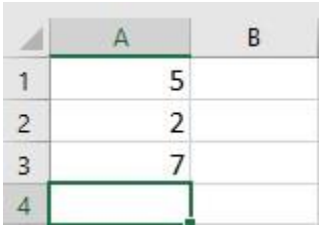
Understanding cell references

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.

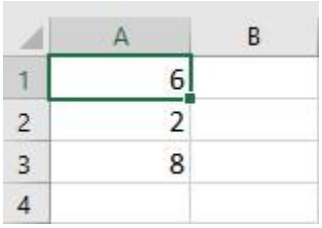
In the formula below, cell A3 adds the values of cells A1 and A2 by making cell references:



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



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

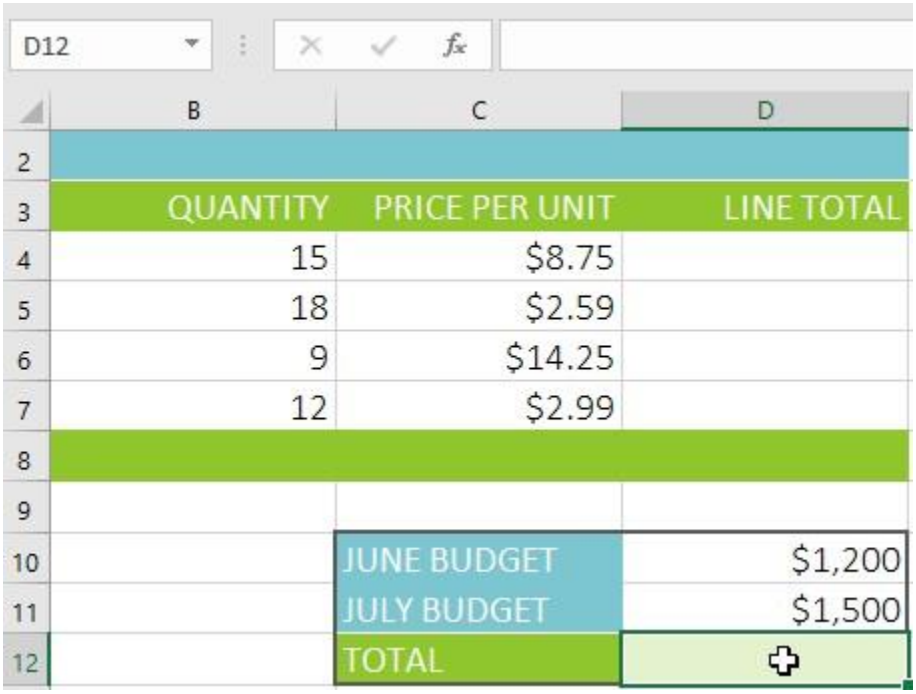


=A1+A2	Adds cells A1 and A2
=C4-3	Subtracts 3 from cell C4
=E7/J4	Divides cell E7 by J4
=N10*1.05	Multiplies cell N10 by 1.05
=R5^2	Finds the square of cell R5

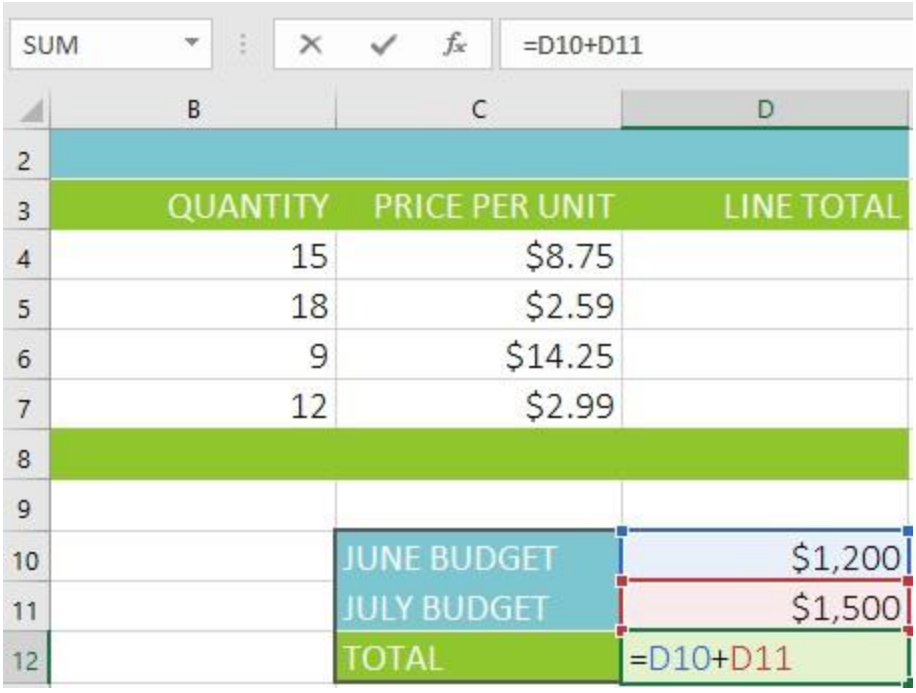
To create a formula:

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

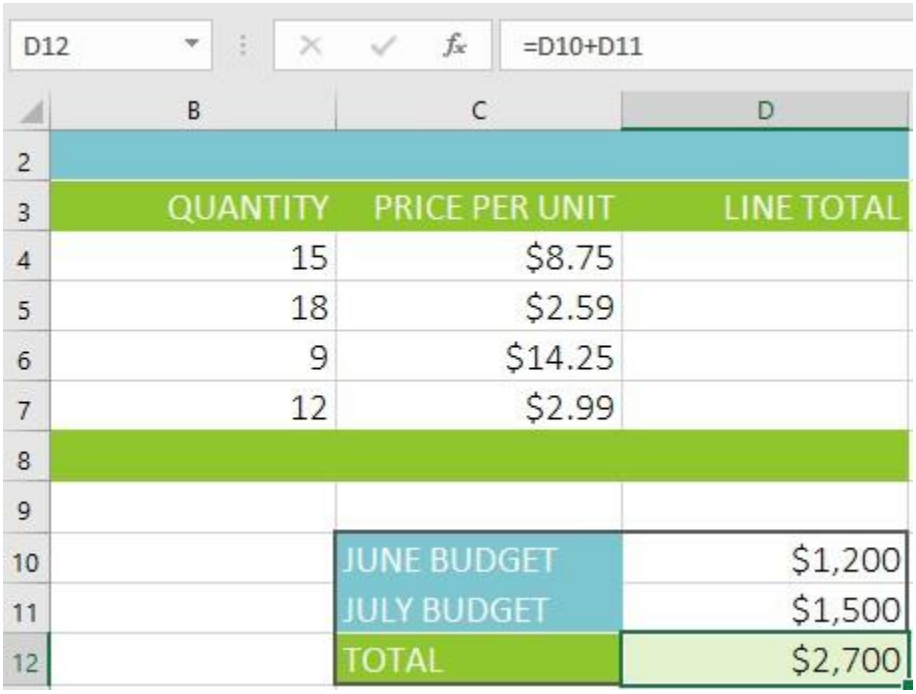
1. Select the **cell** that will contain the formula. In our example, we'll select cell **D12**.



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



3. 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.

If a formula is too complicated to check, try breaking it up into **several smaller formulas**. This way, you can check each formula for accuracy, and if there are any problems you will know exactly where they are.

	A	B
1		ITEM PRICE
2	Ceramic bowl	28.97
3	Scented candle	8.95
4	Greeting card	4.99
5	SUBTOTAL	=SUM(B2:B4)
6	TAX	=B5*0.075
7	TOTAL	=B5+B6

Question 1

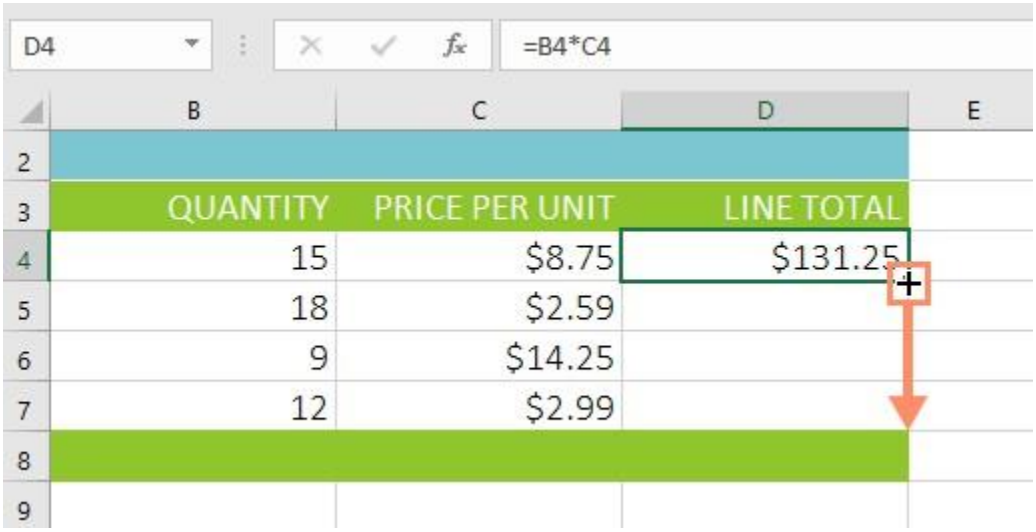
Someone is trying to find the average profit amount between January and July, using the formula in cell B9.

What mistake did this person make?

	A	B
1	Month	Profit Amount
2	January	$54,024
3	February	$23,467
4	March	$64,789
5	April	$58,915
6	May	$32,679
7	June	$45,216
8	July	$97,658
9	Average Profits:	=AVERAGE(B2:B7)

Answer : Using the incorrect range

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



Relative and Absolute Cell References

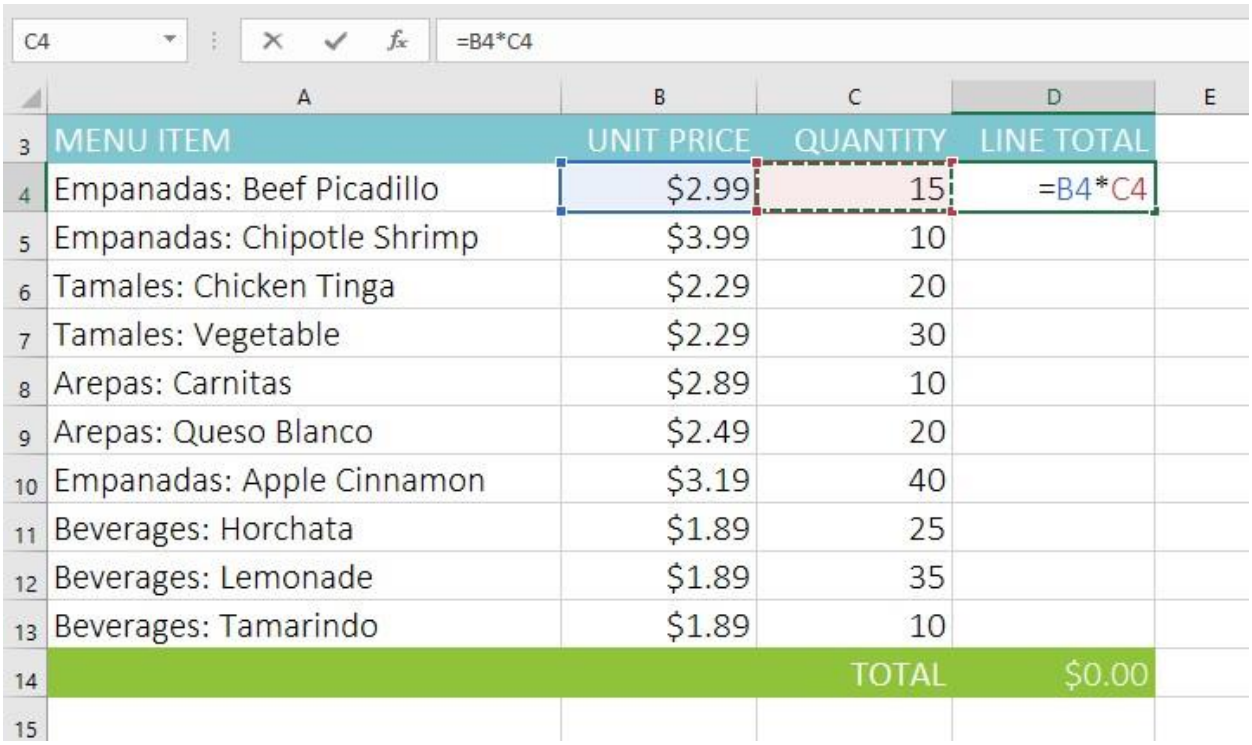
Introduction

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.

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.

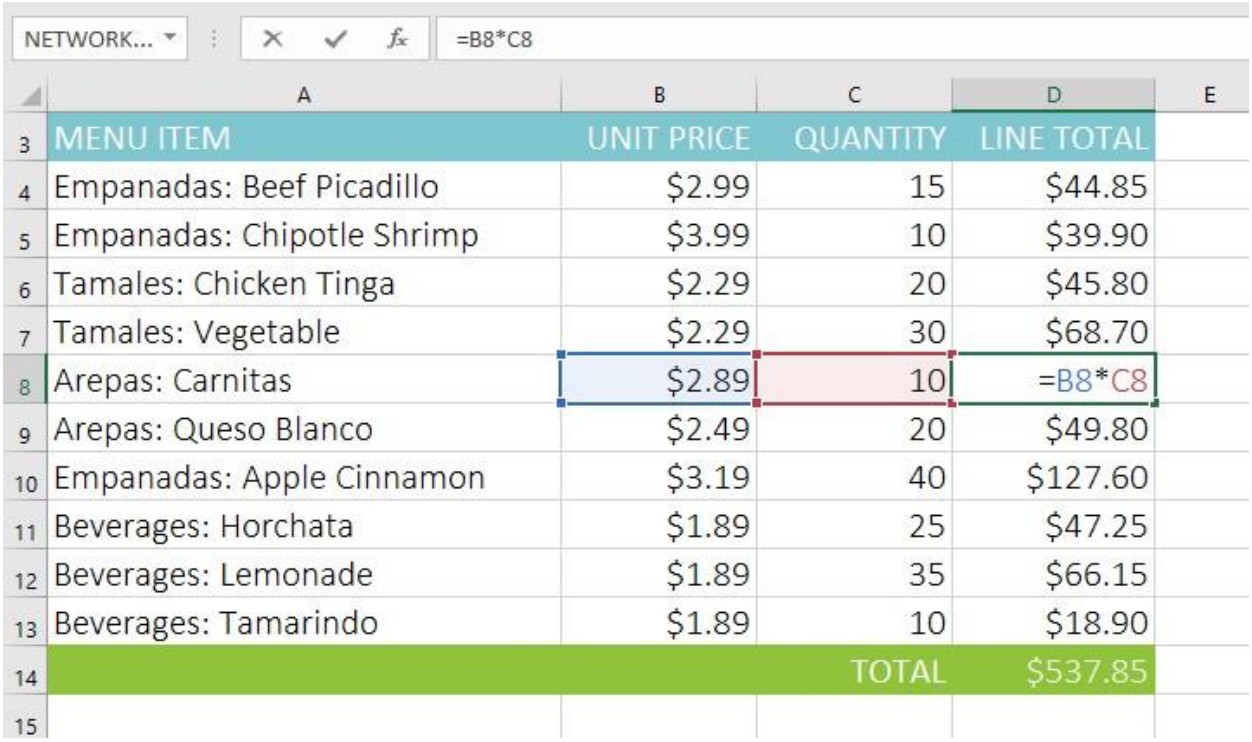
1. Enter the **formula** to calculate the desired value. In our example, we'll type **=B4*C4**.



	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					

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

3. 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					

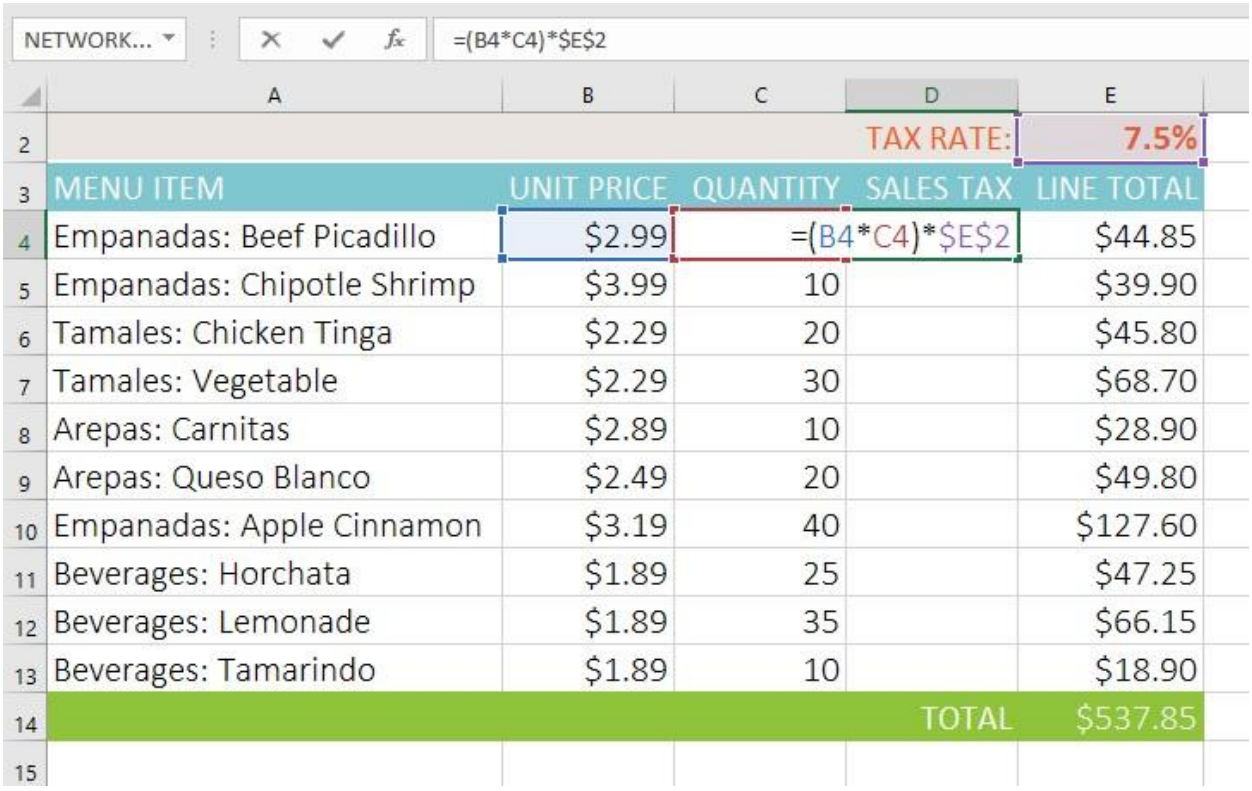
Absolute references

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**.

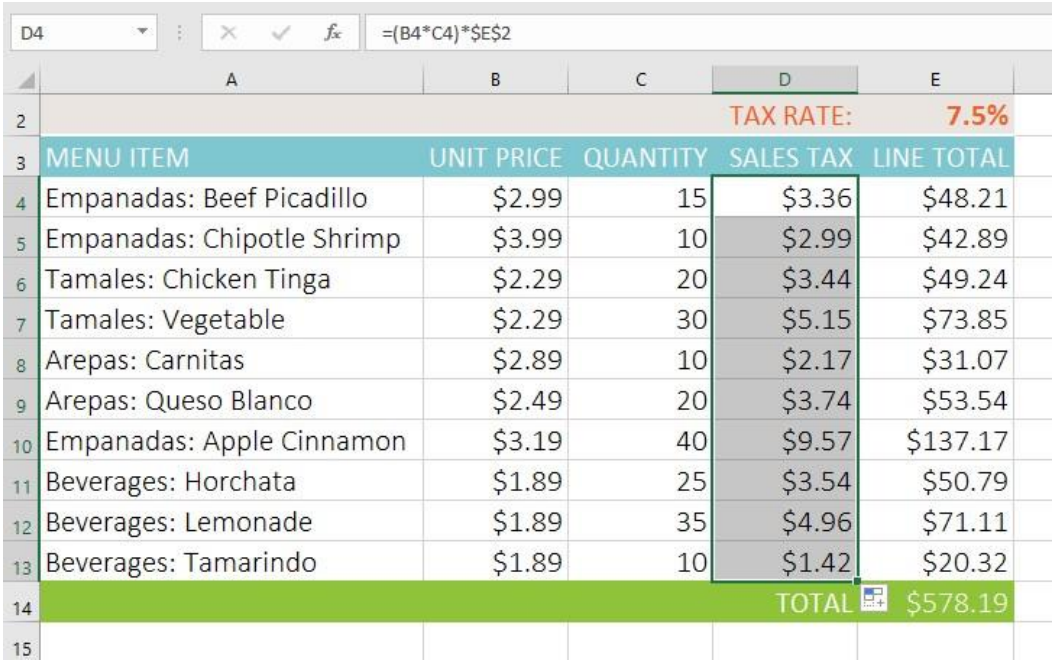
A2	**The column and the row do not change when copied**
A$2	**The row does not change when copied**
$A2	**The column does not change when copied**

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



	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	=(B4*C4)*E2		$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 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	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					

Using cell references with multiple worksheets

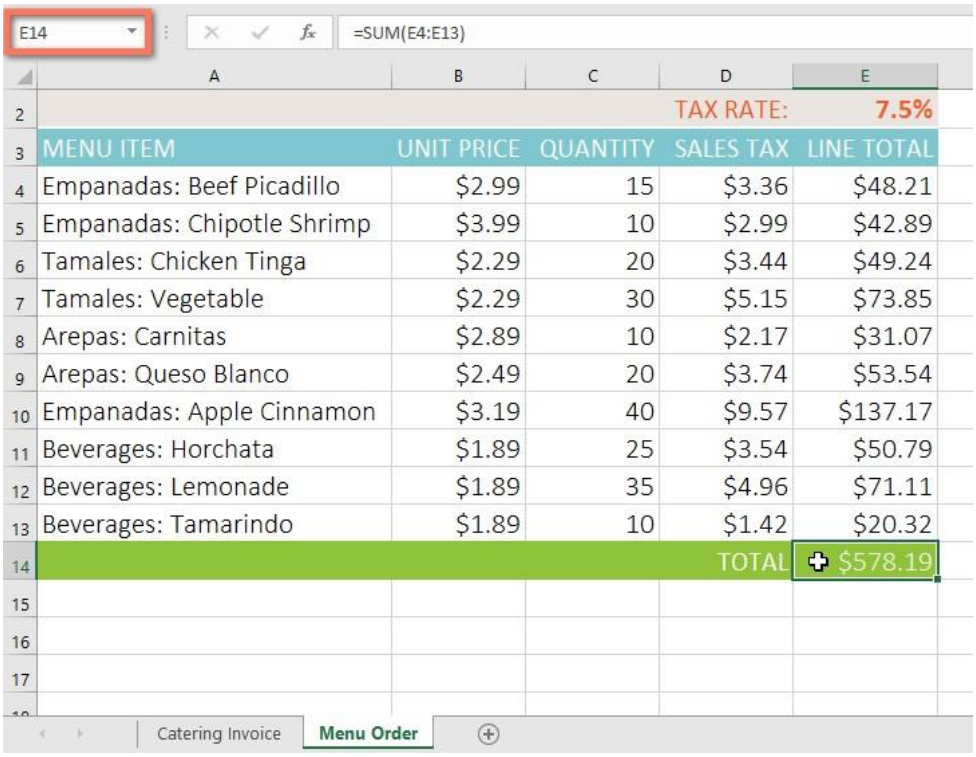
Excel allows you to refer to any cell on any **worksheet**, which can be especially helpful if you want to reference a specific value from one worksheet to another. To do this, you'll simply need to begin the cell reference with the **worksheet name** followed by an **exclamation point (!)**. For example,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

To reference cells across worksheets:

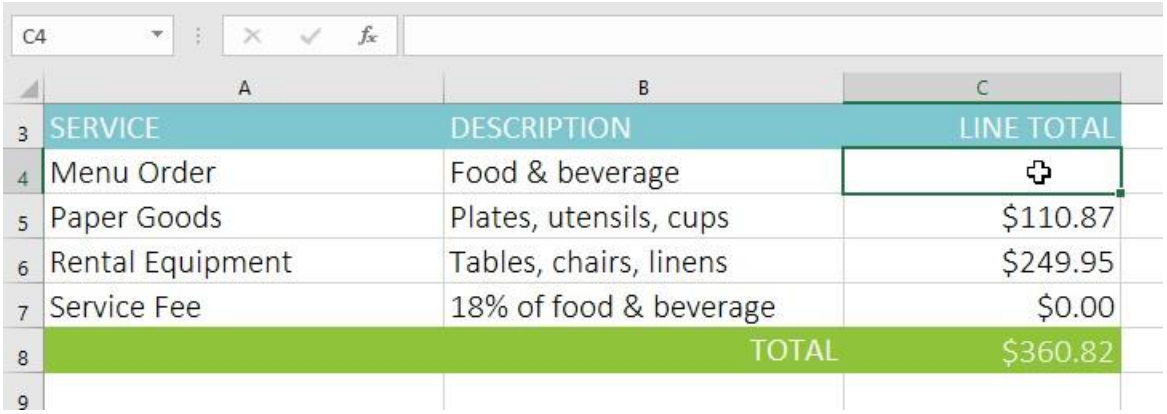
In our example below, we'll refer to a cell with a calculated value between two worksheets. This will allow us to use the **exact same value** on two different worksheets without rewriting the formula or copying data.

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.

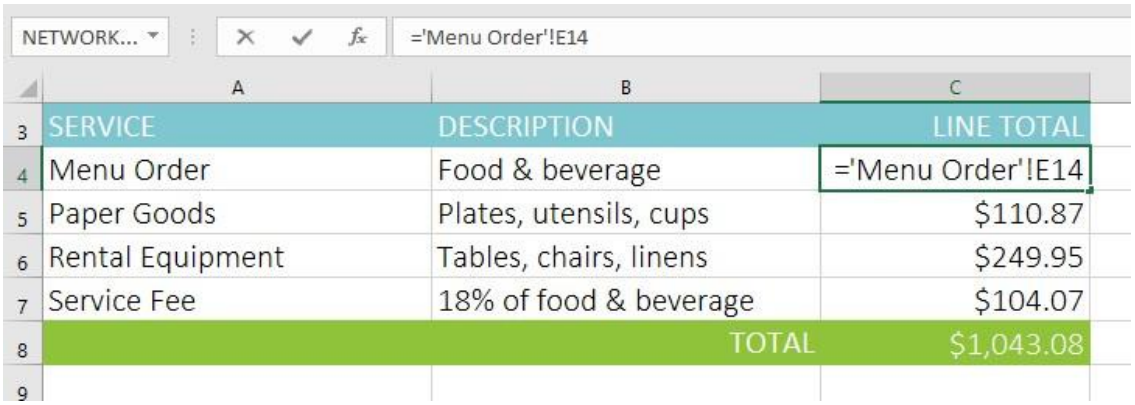


2. Navigate to the desired **worksheet**. In our example, we'll select the **Catering Invoice** worksheet.

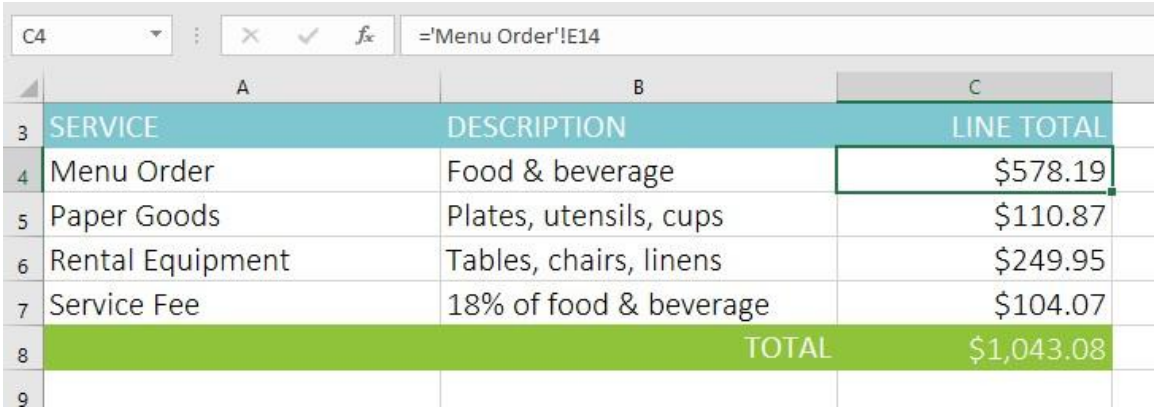
3. Locate and select the **cell** where you want the value to appear. In our example, we'll select cell **C4**.



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**.