



Relative and Absolute Cell References

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. 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.

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**.

	A	B	C	D	E
3	MENU ITEM	UNIT PRICE	QUANTITY	LINE TOTAL	
4	Empanadas: Beef Picadillo	\$2.99	15		
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. 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.



D4 X ✓ fx =B4*C4

	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.

NETWORK... X ✓ fx =B8*C8

	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					



3. Absolute references

There may be a time when you don't want a cell reference to change when copied to other 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 (\$)**. It can precede the column reference, the row reference, or both.

\$A\$2	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 generally use the **\$A\$2** format when creating formulas that contain absolute references. The other two formats are used much less frequently.

When writing a formula, you can press the **F4** key on your keyboard to switch between relative and absolute cell references.



To create and copy a formula using absolute references:

In the example below, we'll use cell E2 (which contains the tax rate of 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 \$E\$2 an absolute reference.

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

	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		\$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

- 2. Enter the formula to calculate the desired value. In our example, we'll type =(B4*C4)*\$E\$2, making \$E\$2 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	15	=(B4*C4)*\$E\$2	\$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

- 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**.

	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

- 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

- 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



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.

MENU ITEM	UNIT PRICE	QUANTITY	SALES TAX	LINE TOTAL
Empanadas: Beef Picadillo	\$2.99	15	\$3.36	\$48.21
Empanadas: Chipotle Shrimp	\$3.99	10	\$2.99	\$42.89
Tamales: Chicken Tinga	\$2.29	20	\$3.44	\$49.24
Tamales: Vegetable	\$2.29	30	\$5.15	\$73.85
Arepas: Carnitas	\$2.89		=(B8*C8)*\$E\$2	\$31.07
Arepas: Queso Blanco	\$2.49	20	\$3.74	\$53.54
Empanadas: Apple Cinnamon	\$3.19	40	\$9.57	\$137.17
Beverages: Horchata	\$1.89	25	\$3.54	\$50.79
Beverages: Lemonade	\$1.89	35	\$4.96	\$71.11
Beverages: Tamarindo	\$1.89	10	\$1.42	\$20.32
			TOTAL	\$578.19

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.

MENU ITEM	UNIT PRICE	QUANTITY	SALES TAX	LINE TOTAL
Empanadas: Beef Picadillo	\$2.99	15	\$3.36	\$48.21
Empanadas: Chipotle Shrimp	\$3.99	10	#VALUE!	#VALUE!
Tamales: Chicken Tinga	\$2.29	20	\$2,208.19	\$2,253.99
Tamales: Vegetable	\$2.29	30	#VALUE!	#VALUE!
Arepas: Carnitas	\$2.89		=(B8*C8)*E6	\$65,169.20
Arepas: Queso Blanco	\$2.49	20	#VALUE!	#VALUE!
Empanadas: Apple Cinnamon	\$3.19	40	#####	#####
Beverages: Horchata	\$1.89	25	#VALUE!	#VALUE!
Beverages: Lemonade	\$1.89	35	#####	#####
Beverages: Tamarindo	\$1.89	10	#VALUE!	#VALUE!
			TOTAL	#VALUE!



4. 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.



=SUM(E4:E13)					
	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

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

	SERVICE	DESCRIPTION	LINE TOTAL
4	Menu Order	Food & beverage	
5	Paper Goods	Plates, utensils, cups	\$110.87
6	Rental Equipment	Tables, chairs, linens	\$249.95
7	Service Fee	18% of food & beverage	\$0.00
8		TOTAL	\$360.82

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



	A	B	C
3	SERVICE	DESCRIPTION	LINE TOTAL
4	Menu Order	Food & beverage	+
5	Paper Goods	Plates, utensils, cups	\$110.87
6	Rental Equipment	Tables, chairs, linens	\$249.95
7	Service Fee	18% of food & beverage	\$0.00
8	TOTAL		\$360.82

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.

	A	B	C
3	SERVICE	DESCRIPTION	LINE TOTAL
4	Menu Order	Food & beverage	= 'Menu Order' !E14
5	Paper Goods	Plates, utensils, cups	\$110.87
6	Rental Equipment	Tables, chairs, linens	\$249.95
7	Service Fee	18% of food & beverage	\$104.07
8	TOTAL		\$1,043.08

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.

	A	B	C
3	SERVICE	DESCRIPTION	LINE TOTAL
4	Menu Order	Food & beverage	\$578.19
5	Paper Goods	Plates, utensils, cups	\$110.87
6	Rental Equipment	Tables, chairs, linens	\$249.95
7	Service Fee	18% of food & beverage	\$104.07
8	TOTAL		\$1,043.08



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**.

	A	B	C
3	SERVICE	DESCRIPTION	LINE TOTAL
4	Menu Order	Food & beverage	#REF!
5	Paper Goods	Plates, utensils, cups	
6	Rental Equipment	Tables, chairs, linens	
7	Service Fee	18% of food & beverage	
8		TO	
9			
10			