MICROSOFT EXCEL

Introduction to Formulas

Contents

Introduction

- 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.

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.

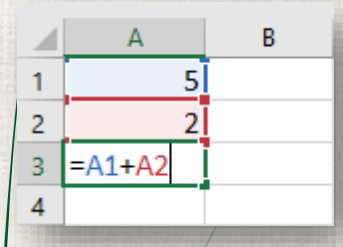
Addition	+
Subtraction	-
Multiplication	*
Division	/
Exponents	^

- 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.

Understanding cell references

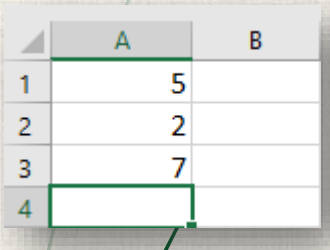
- While you can create simple formulas in Excel using numbers (for example, **=2+2** or **=5*5**), most of the time you will use **cell addresses** to create a formula. This is known as making a **cell reference**. Using cell references will ensure that your formulas are always accurate because you can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

Understanding cell references



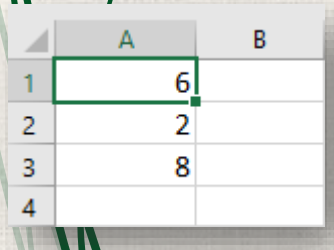
	A	B
1	5	
2	2	
3	=A1+A2	
4		

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



	A	B
1	5	
2	2	
3	7	
4		

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



	A	B
1	6	
2	2	
3	8	
4		

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

Understanding cell references

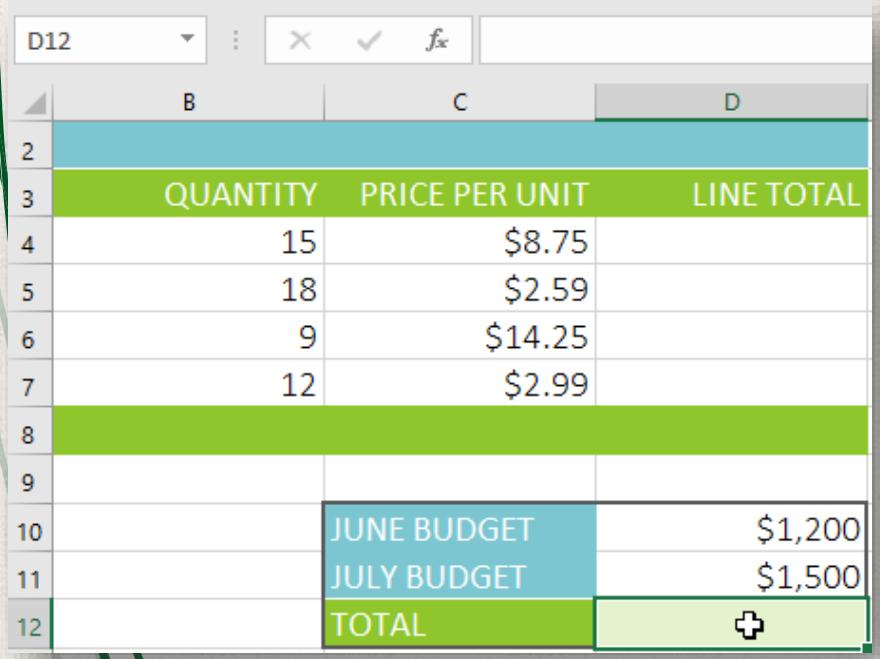
- By combining a mathematical operator with cell references, you can create a variety of simple formulas in Excel. Formulas can also include a combination of cell references and numbers, as in the examples below:

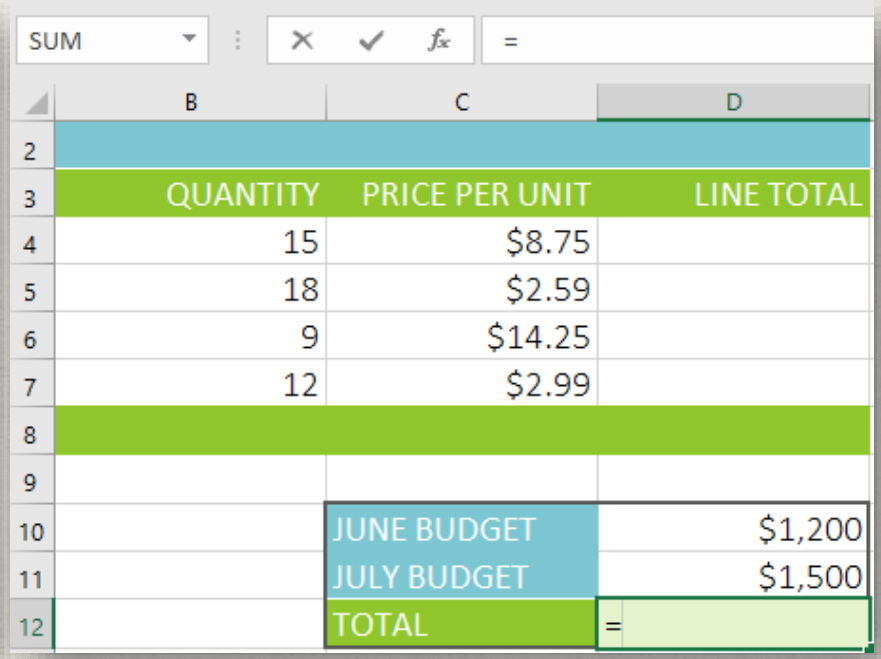
=A1+A2	Adds cells A1 and A2
=C4-3	Subtracts 3 from cell C4
=E7/J4	Divides cell E7 by J4
=N10*1.05	Multiplies cell N10 by 1.05
=R5^2	Finds the square of cell R5

Creating a formula

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

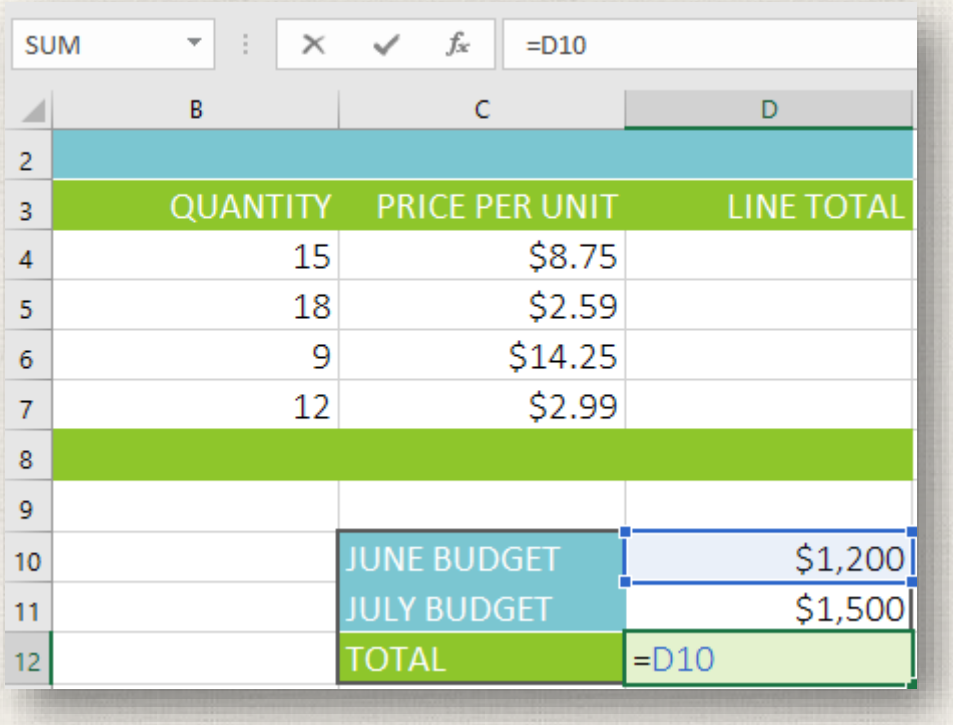
1. Select the **cell** that will contain the formula. In our example, we'll select cell **D12**.
2. Type the **equals sign (=)**. Notice how it appears in both the **cell** and the **formula bar**.





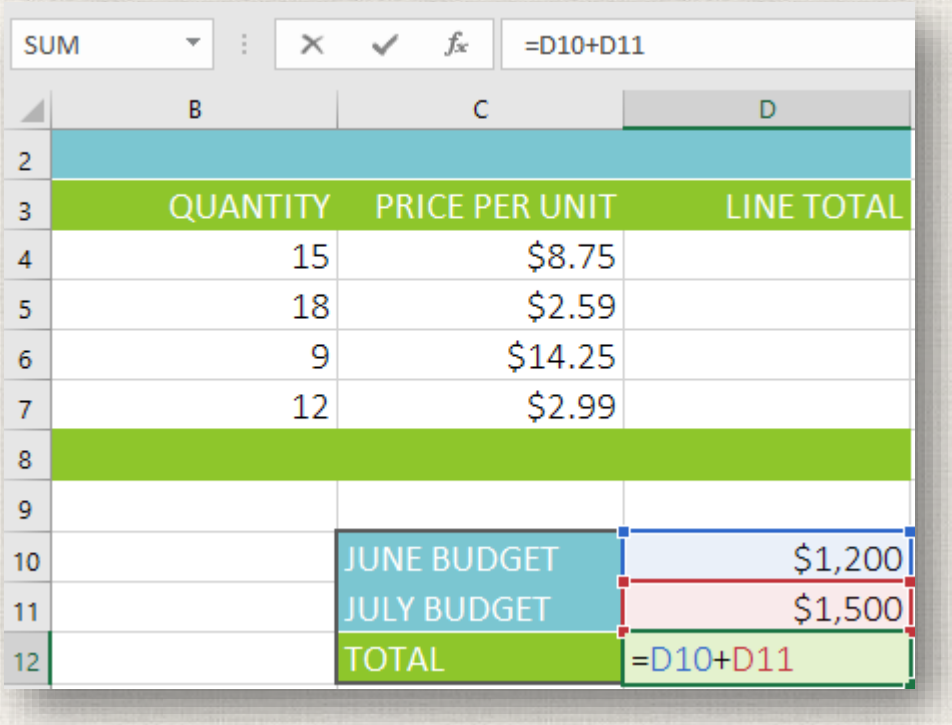
Creating a formula

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.



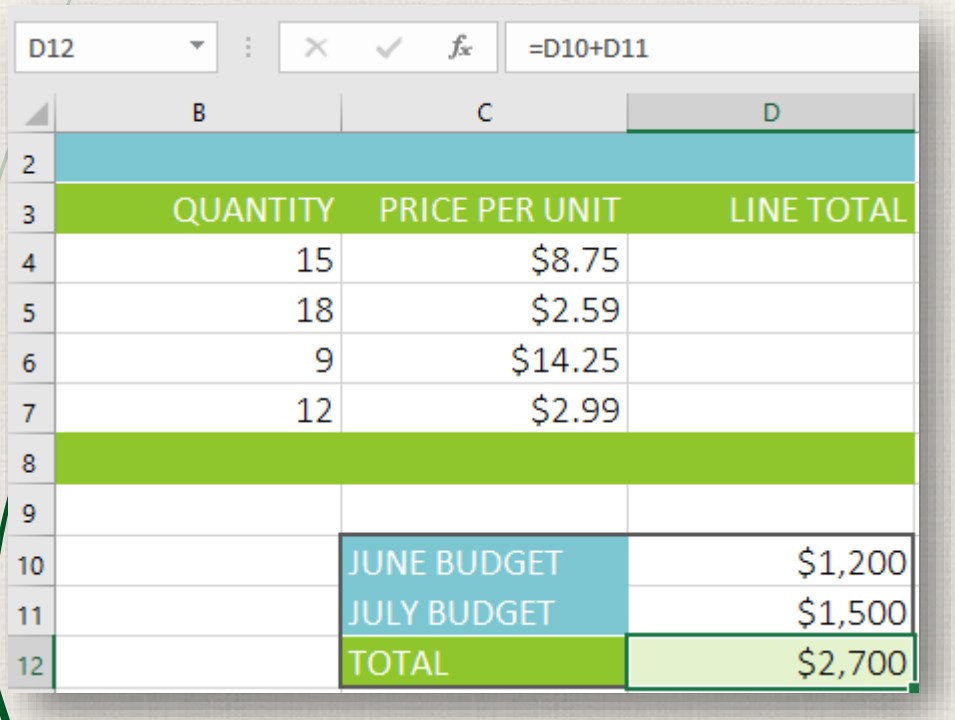
Creating a formula

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.



Creating a formula

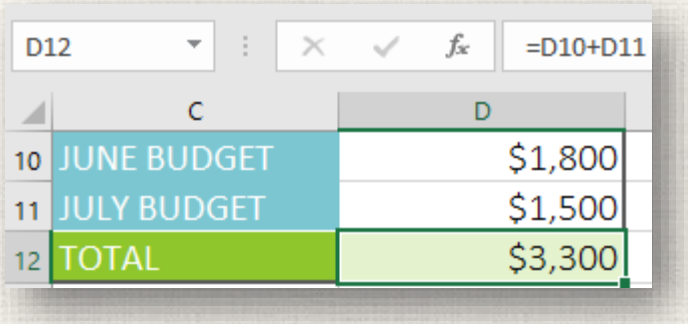
6. Press **Enter** on your keyboard. The formula will be **calculated**, and the **value** will be displayed in the cell. If you select the cell again, notice that the cell displays the result, while the formula bar displays the formula.



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.

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 D1 from $1,200 to $1,800. The formula in D3 will automatically recalculate and display the new value in cell D3.



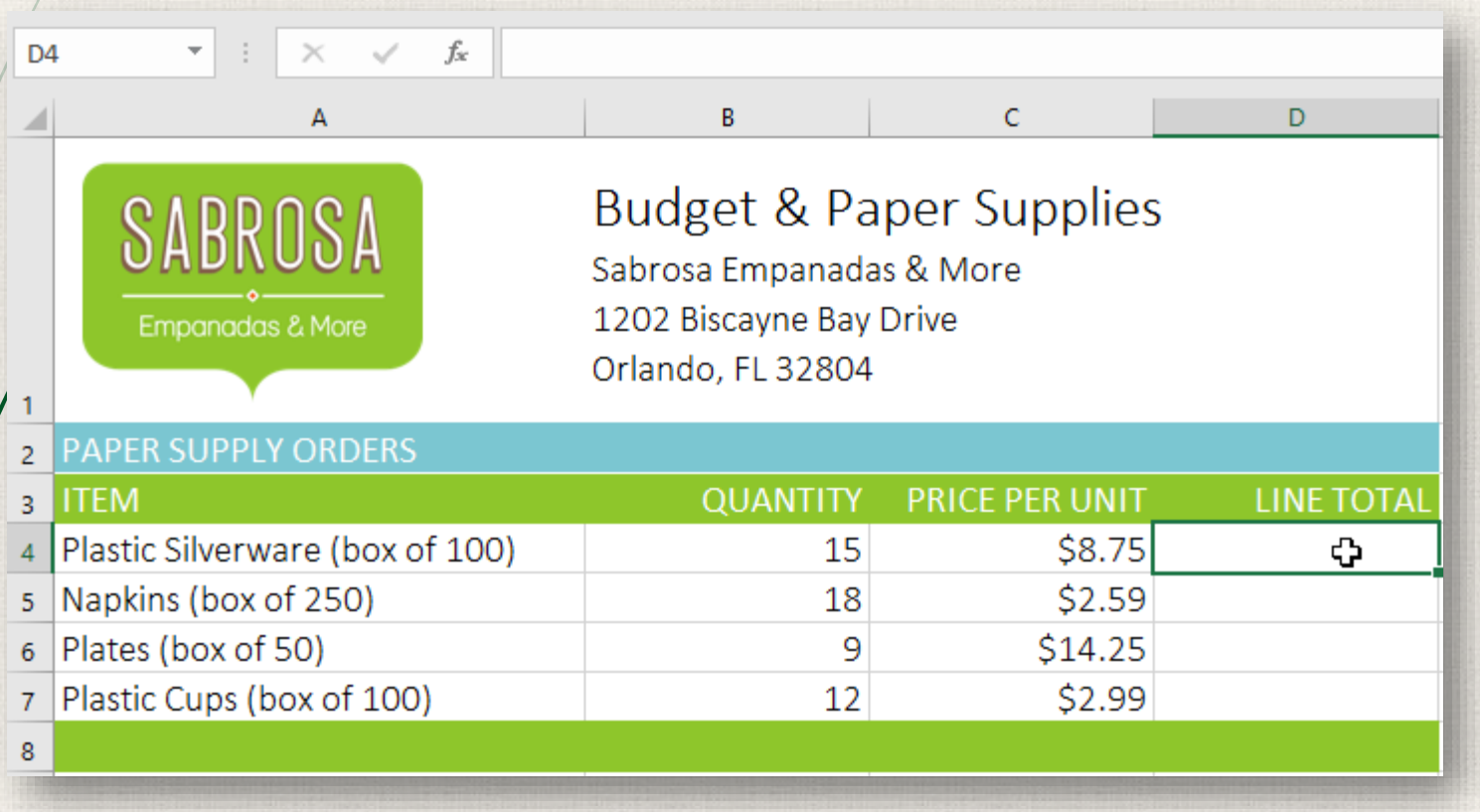
- Excel **will not always tell you** if your formula contains an error, so it's up to you to check all of your formulas.

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.

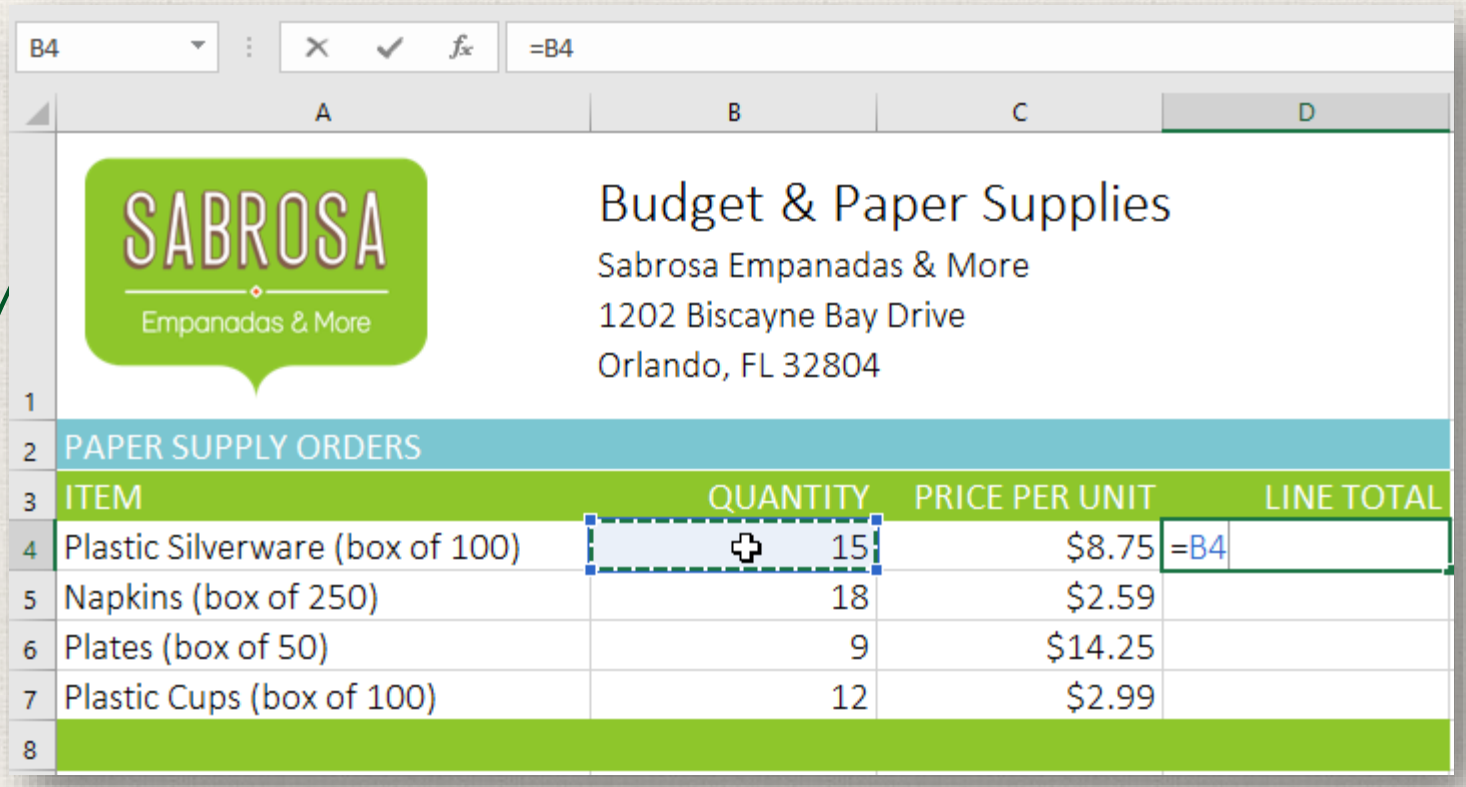
Using the point-and-click method

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



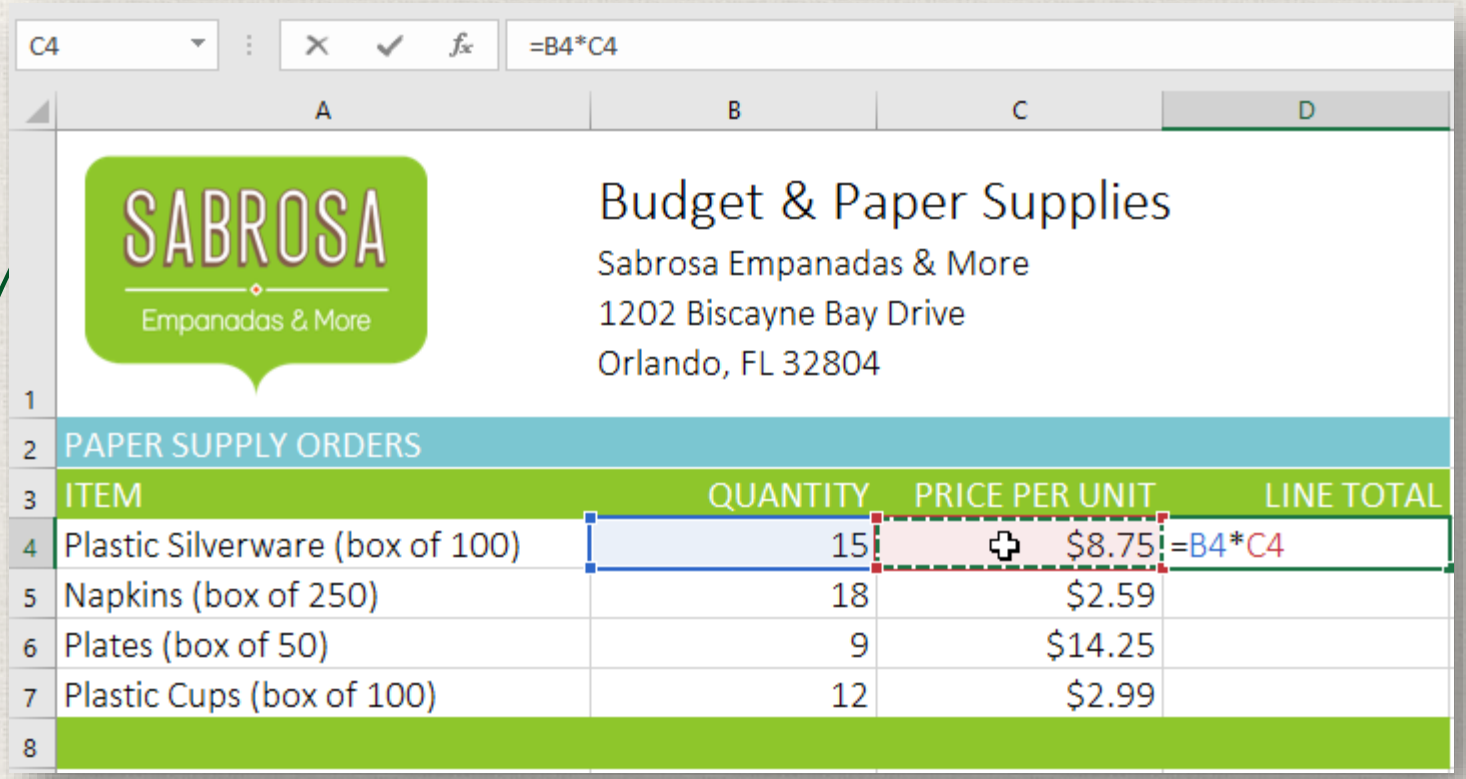
Using the point-and-click method

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.



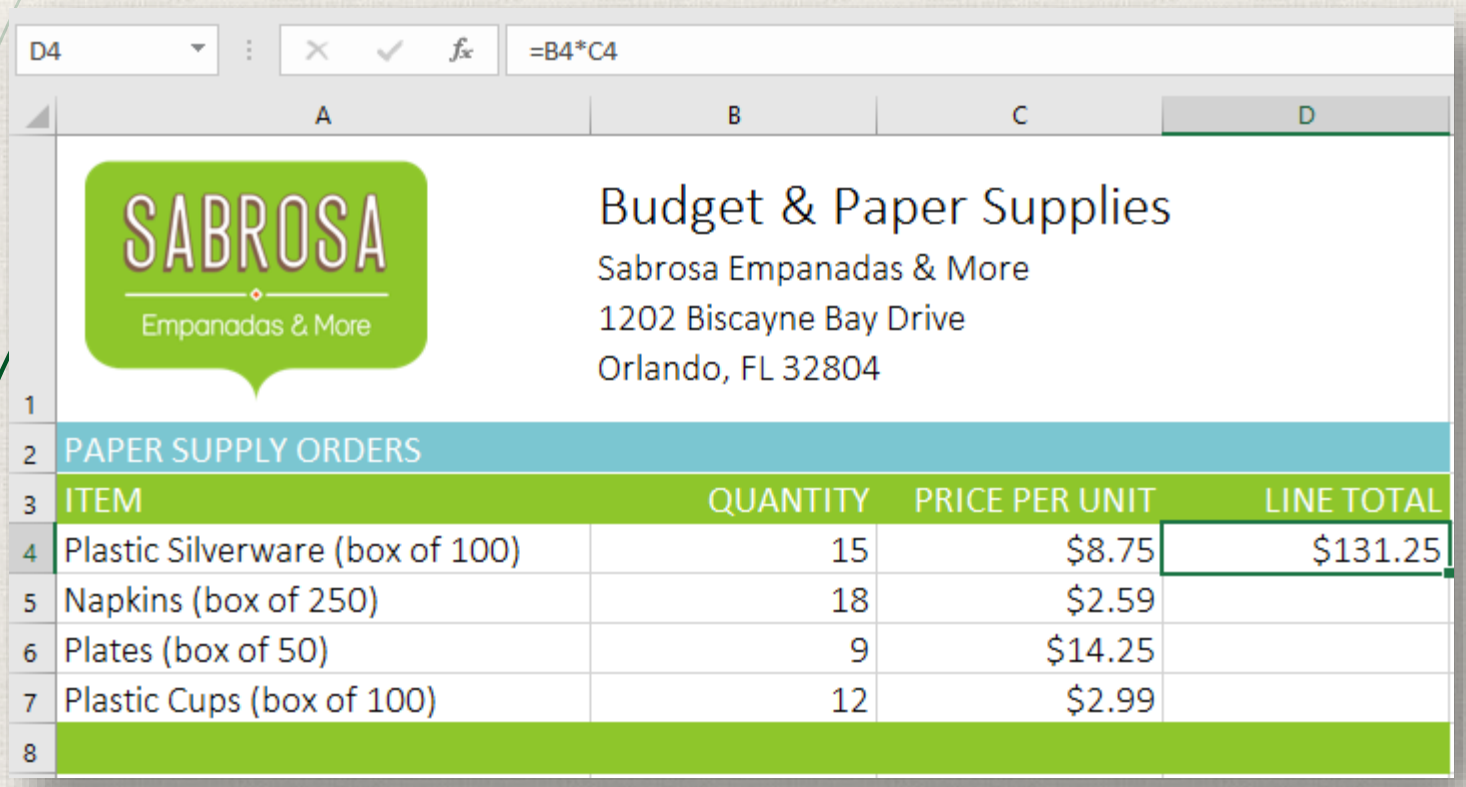
Using the point-and-click method

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.



Using the point-and-click method

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

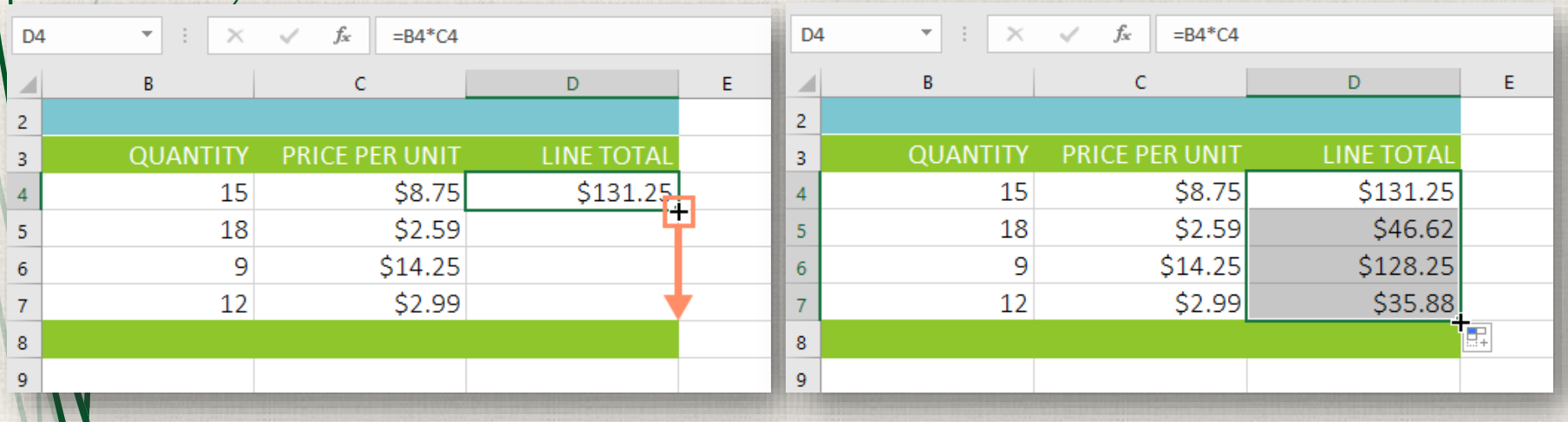


Copying formulas with the fill handle

- 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).

Copying formulas with the fill handle

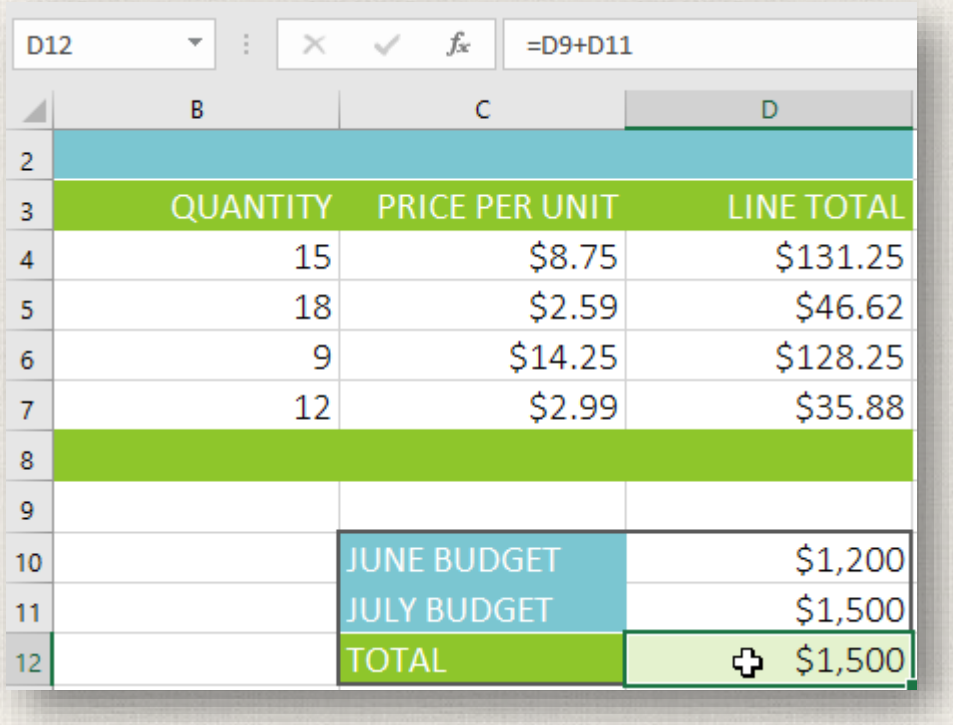
1. Select the cell containing the formula you want to copy. Click and drag the **fill handle** over the cells you want to fill.
2. After you release the mouse, the formula will be copied to the selected cells.



Editing a formula

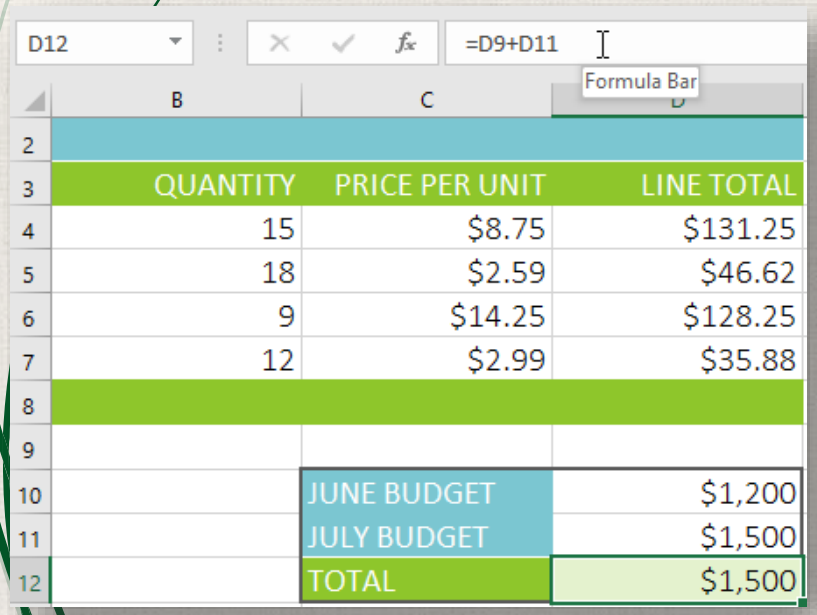
Sometimes you may want to modify an existing formula. In the example below, we've entered an incorrect cell address in our formula, so we'll need to correct it.

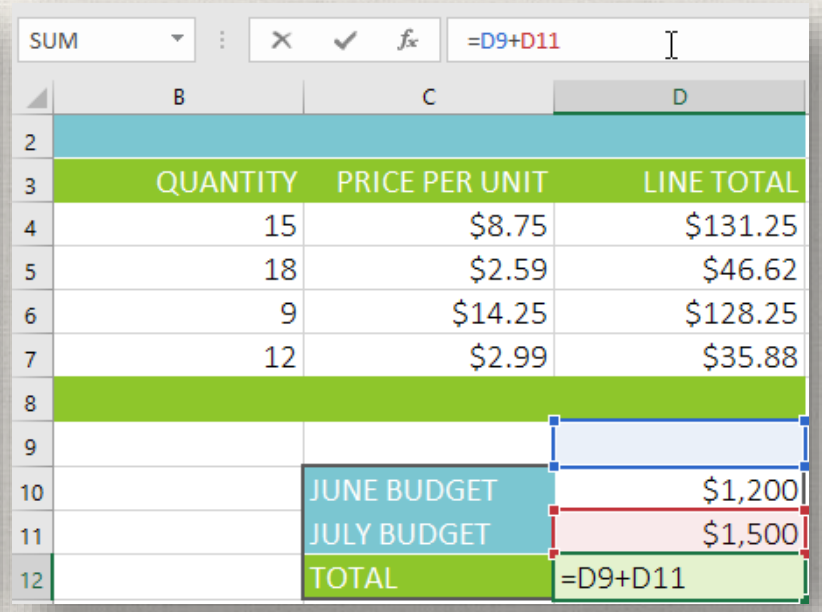
1. Select the **cell** containing the formula you want to edit. In our example, we'll select cell **D12**.



Editing a formula

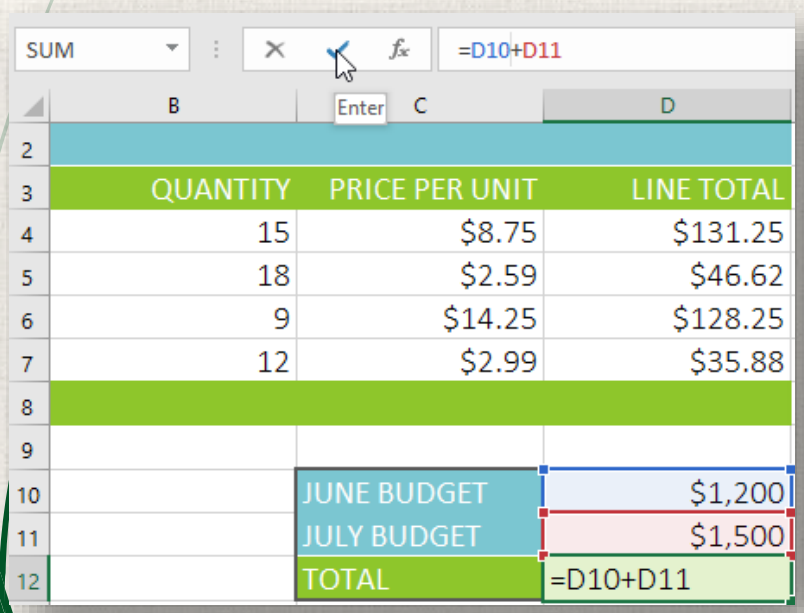
2. Click the **formula bar** to edit the formula. You can also **double-click** the cell to view and edit the formula directly within the cell.
3. A **border** will appear around any referenced cells. In our example, we'll change the first part of the formula to reference cell **D10** instead of cell **D9**.

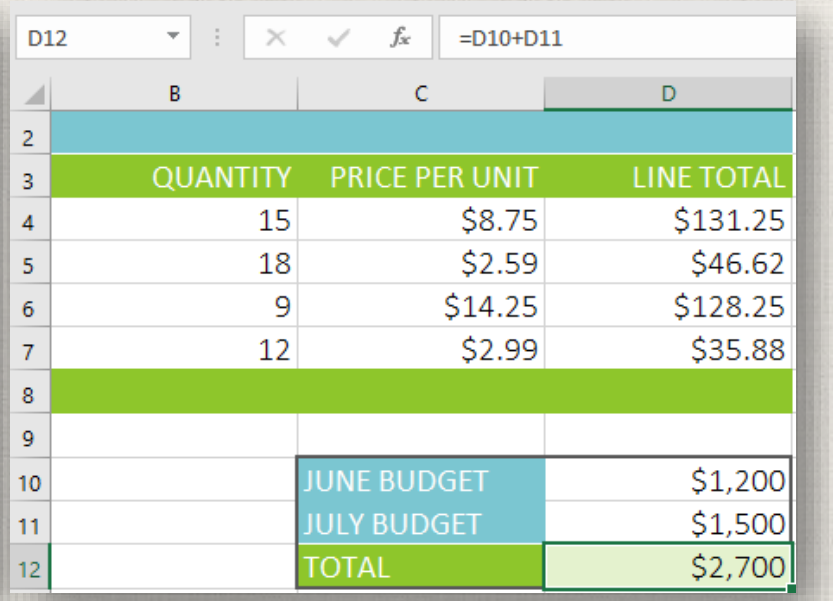




Editing a formula

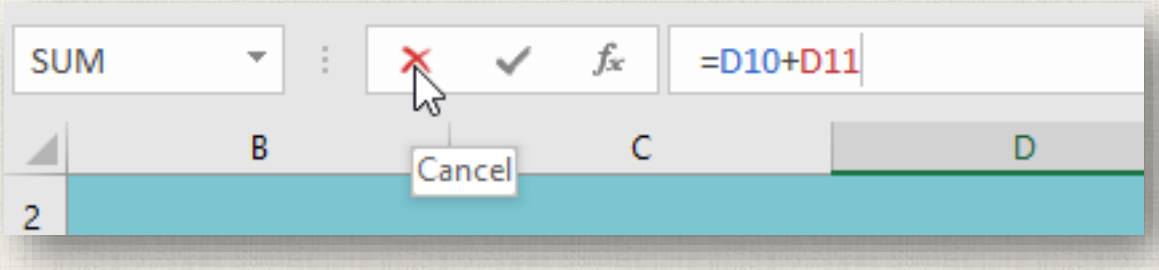
4. When you're finished, press **Enter** on your keyboard or select the **Enter** command in the formula bar.
5. The formula will be **updated**, and the **new value** will be displayed in the cell.





Editing a formula

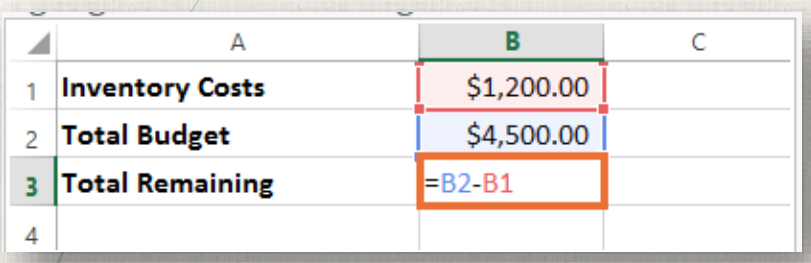
- If you change your mind, you can press the **Esc** key on your keyboard or click the **Cancel** command in the formula bar to avoid accidentally making changes to your formula.



- 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.

Exercise

- What is the highlighted formula doing?



	A	B	C
1	**Inventory Costs**	$1,200.00	
2	**Total Budget**	$4,500.00	
3	**Total Remaining**	=B2-B1	
4			

A. Finding the average budget total

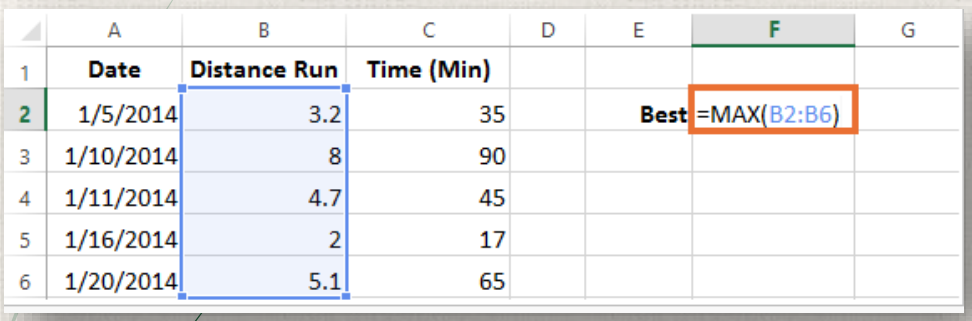
B. Multiplying inventory costs by the total budget

C. Subtracting inventory costs from the total budget

D. Subtracting the total budget from inventory costs

Exercise

- Why is the MAX function being used in this formula?



	A	B	C	D	E	F	G
1	Date	Distance Run	Time (Min)				
2	1/5/2014	3.2	35		Best	=MAX(B2:B6)	
3	1/10/2014	8	90				
4	1/11/2014	4.7	45				
5	1/16/2014	2	17				
6	1/20/2014	5.1	65				

A. To find the longest distance

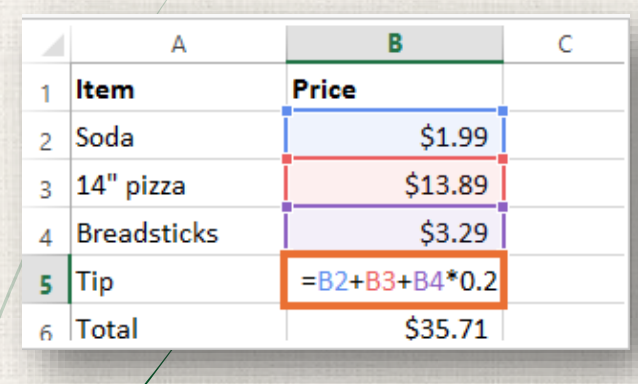
B. To find the total distance

C. To find the average distance

D. To find the shortest distance

Exercise

- What is wrong with this formula?



	A	B	C
1	**Item**	**Price**	
2	Soda	$1.99	
3	14" pizza	$13.89	
4	Breadsticks	$3.29	
5	Tip	=B2+B3+B4*0.2	
6	Total	$35.71	

A. It should use division instead of multiplication.

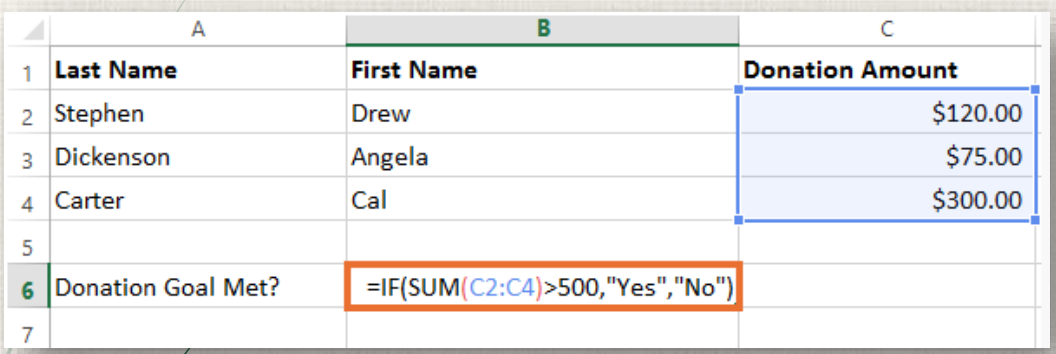
B. Nothing. This formula is correct.

C. Without parentheses, multiplication is performed by too early.

D. It should use subtraction instead of addition.

Exercise

- Which function will be performed first in this formula?



	A	B	C
1	**Last Name**	**First Name**	**Donation Amount**
2	Stephen	Drew	$120.00
3	Dickenson	Angela	$75.00
4	Carter	Cal	$300.00
5			
6	Donation Goal Met?	=IF(SUM(C2:C4)>500,"Yes","No")	
7			

A. IF

B. SUM

Exercise

- Select the formula that will subtract the inventory costs from the monthly budget.

	A	B	C
1	Expenses		
2	Inventory Costs	$2,400	
3	Monthly Budget	$4,000	
4			

A. =B2-B3

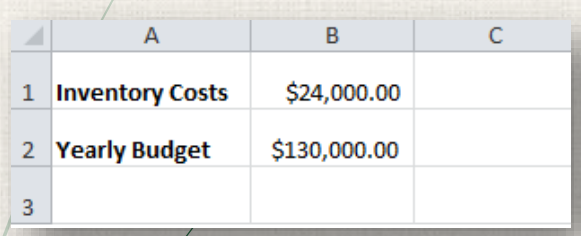
B. =B3-B2

C. =B3*B2

D. =B3/B2

Exercise

- Which formula will subtract the yearly inventory cost from the yearly budget and then divide by 12?.



	A	B	C
1	**Inventory Costs**	$24,000.00	
2	**Yearly Budget**	$130,000.00	
3			

A. =B2-(B1/12)

B. =(B1-B2)/12

C. =B2-B1/12

D. =(B2-B1)/12

Exercise

- Which formula could we use to find the fastest time for this running log?

	A	B	C	D
1	Distance (miles)	Time (minutes)	Date	
2	3	35	1-May	
3	3	32	4-May	
4	3	33	5-May	
5	3	38	8-May	
6	3	29	12-May	
7	3	25	14-May	
8	3	30	15-May	
9				

A. =AVERAGE(B2:B8)

B. =SUM(B2:B8)

C. =MAX(B2:B8)

D. =MIN(B2:B8)

Exercise

- Which formula could we use to find the average time for this running log?

	A	B	C	D
1	Distance (miles)	Time (minutes)	Date	
2	3	35	1-May	
3	3	32	4-May	
4	3	33	5-May	
5	3	38	8-May	
6	3	29	12-May	
7	3	25	14-May	
8	3	30	15-May	
9				

A. =AVERAGE(B2:B8)

B. =AVERAGE(B2:F2)

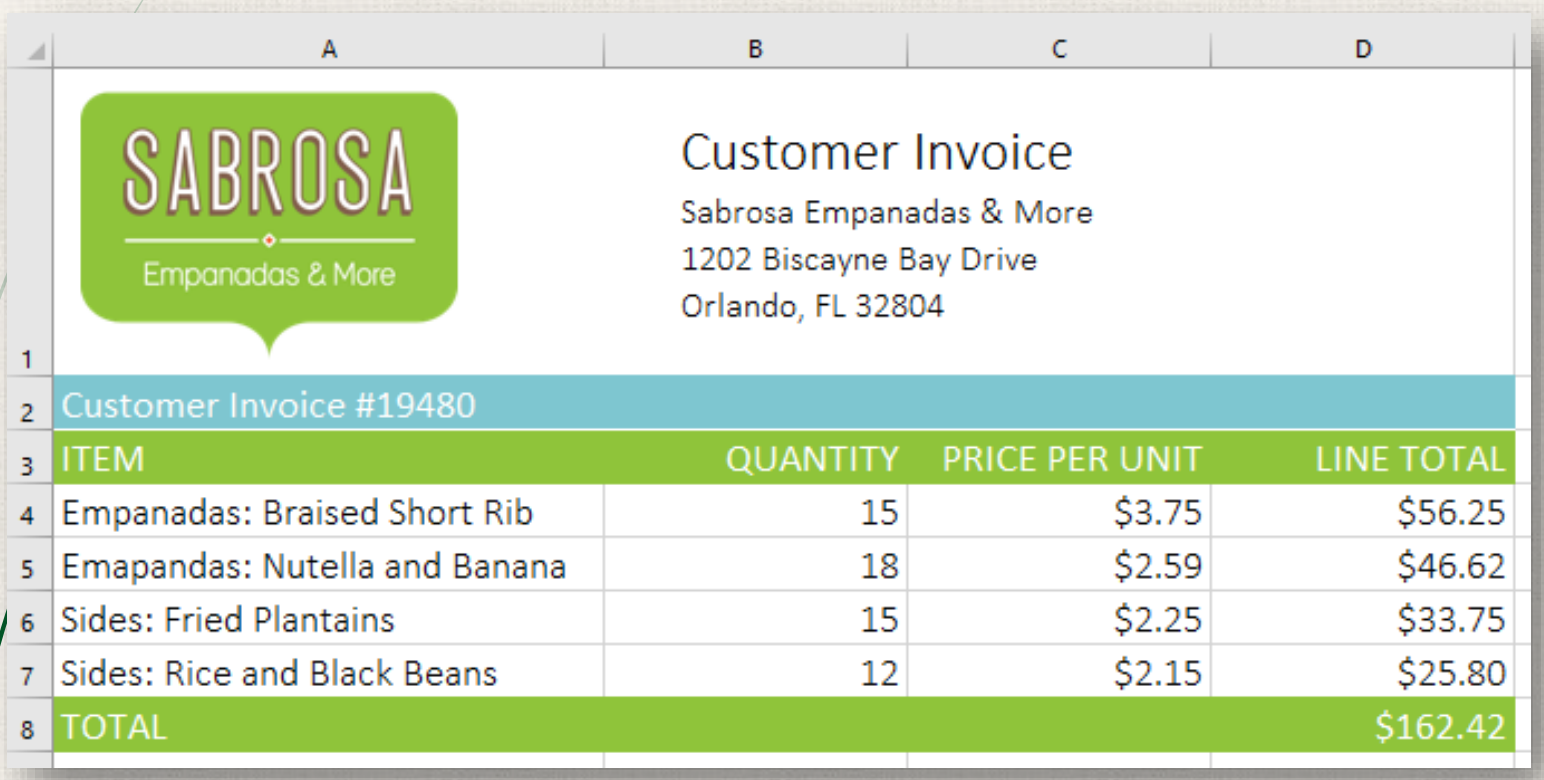
C. =AVERAGE(B2,B8)

D. =AVERAGE(B2:B7)

Practice

- Open our **practice workbook**.
- Click the **Challenge** tab in the bottom-left of the workbook.
- Create a formula in cell **D4** that multiplies the quantity in **B4** by the price per unit in cell **C4**.
- Use the **fill handle** to copy the formula in cell **D4** to cells **D5:D7**.
- Change the price per unit for the fried plantains in cell **C6** to $2.25. Notice that the line total automatically changes as well.
- Edit the formula for the total in cell **D8** so it also adds cell **D7**.

Solution



	A	B	C	D
1	SABROSA Empanadas & More		Customer Invoice Sabrosa Empanadas & More 1202 Biscayne Bay Drive Orlando, FL 32804	
2	Customer Invoice #19480			
3	ITEM	QUANTITY	PRICE PER UNIT	LINE TOTAL
4	Empanadas: Braised Short Rib	15	$3.75	$56.25
5	Emapandas: Nutella and Banana	18	$2.59	$46.62
6	Sides: Fried Plantains	15	$2.25	$33.75
7	Sides: Rice and Black Beans	12	$2.15	$25.80
8	TOTAL			$162.42

THE END