Technical Institute of Administration

Business Administration

5. Microsoft Excel - Functions

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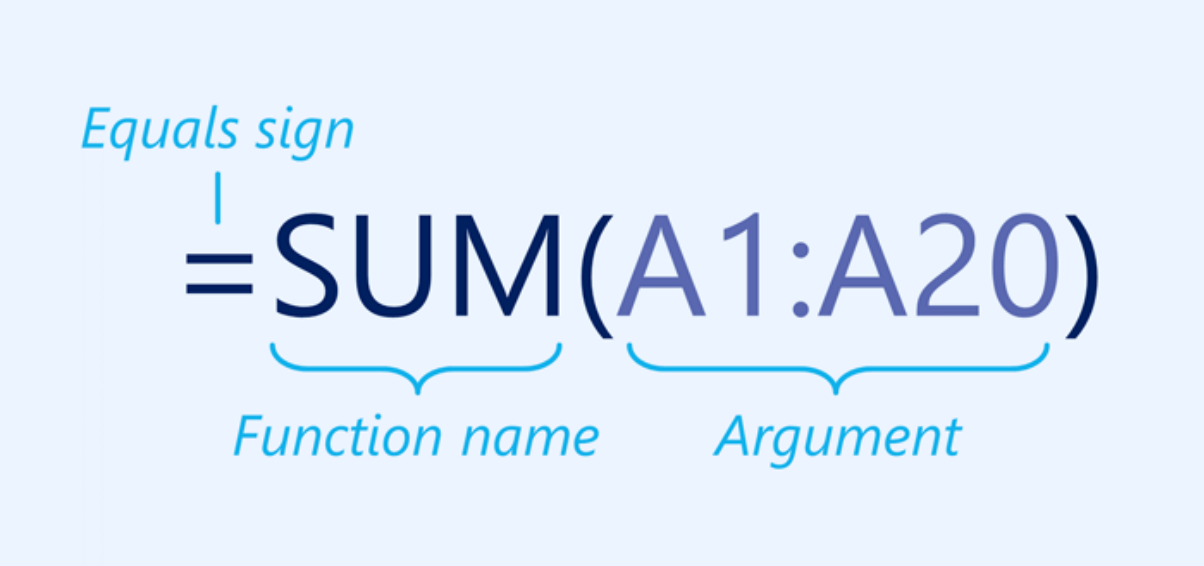
5. Functions

5.1. Introduction

A **function** is a **predefined formula** that performs calculations using specific values in a particular order. Excel includes many common functions that can be used to quickly find the **sum**, **average**, **count**, **maximum value**, and **minimum value** for a range of cells. In order to use functions correctly, you'll need to understand the different **parts of a function** and how to create **arguments** to calculate values and cell references.

5.1.1. The parts of a function

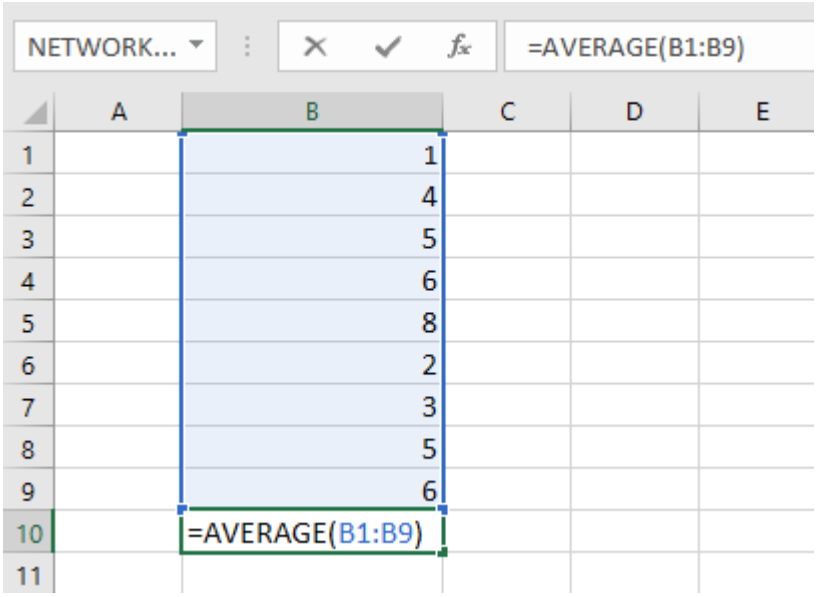
In order to work correctly, a function must be written a specific way, which is called the **syntax**. The basic syntax for a function is the **equals sign (=)**, the **function name** (SUM, for example), and one or more **arguments**. Arguments contain the information you want to calculate. The function in the example below would add the values of the cell range A1:A20.



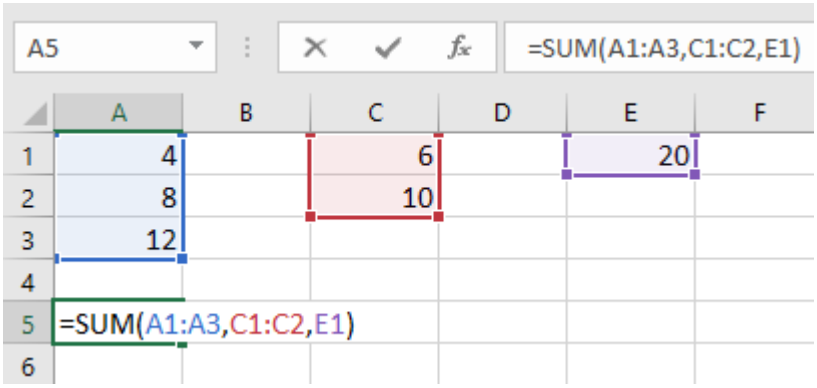
5.1.2. Working with arguments

Arguments can refer to both **individual cells** and **cell ranges** and must be enclosed within **parentheses**. You can include one argument or multiple arguments, depending on the syntax required for the function.

For example, the function **=AVERAGE(B1:B9)** would calculate the **average** of the values in the cell range B1:B9. This function contains only one argument.



Multiple arguments must be separated by a **comma**. For example, the function **=SUM(A1:A3, C1:C2, E1)** will **add** the values of all of the cells in the three arguments.



5.2.Creating a function

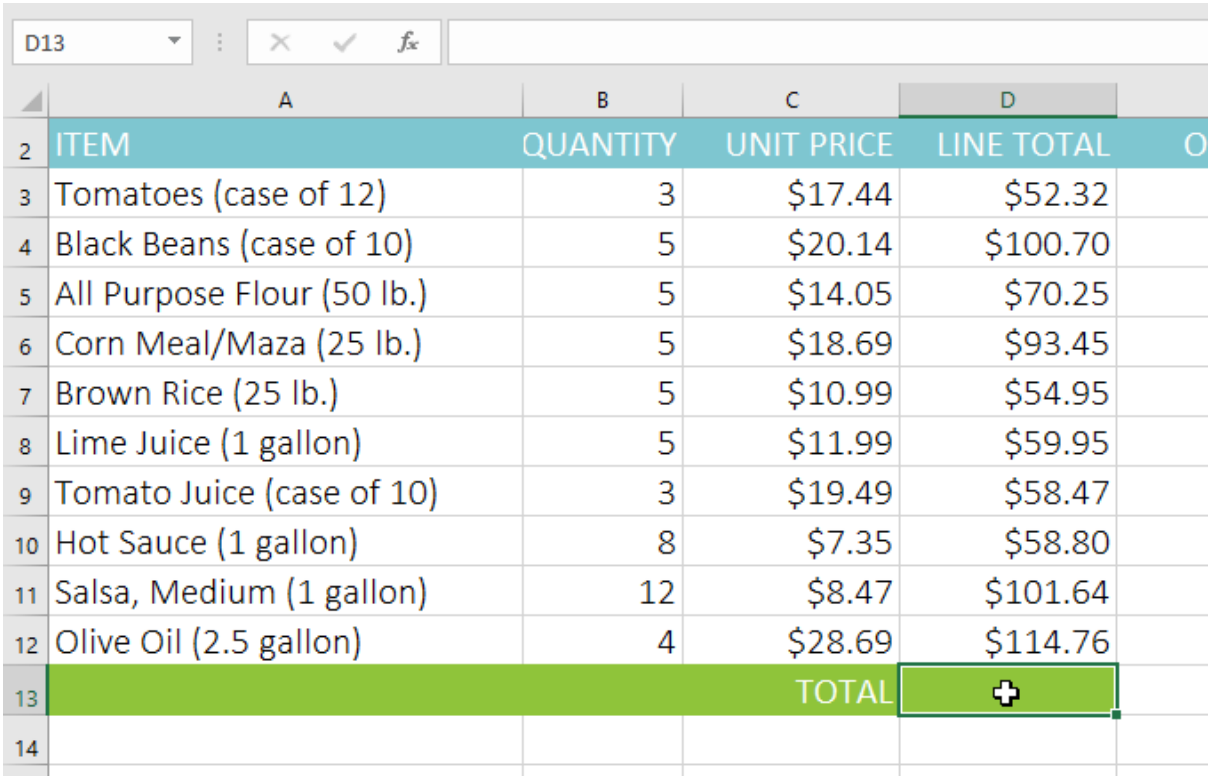
There are a variety of functions available in Excel. Here are some of the most common functions you'll use:

- **SUM**: This function **adds** all of the values of the cells in the argument.
- **AVERAGE**: This function determines the **average** of the values included in the argument. It calculates the sum of the cells and then divides that value by the number of cells in the argument.
- **COUNT**: This function **counts** the number of cells with numerical data in the argument. This function is useful for quickly counting items in a cell range.
- **MAX**: This function determines the **highest cell value** included in the argument.
- **MIN**: This function determines the **lowest cell value** included in the argument.

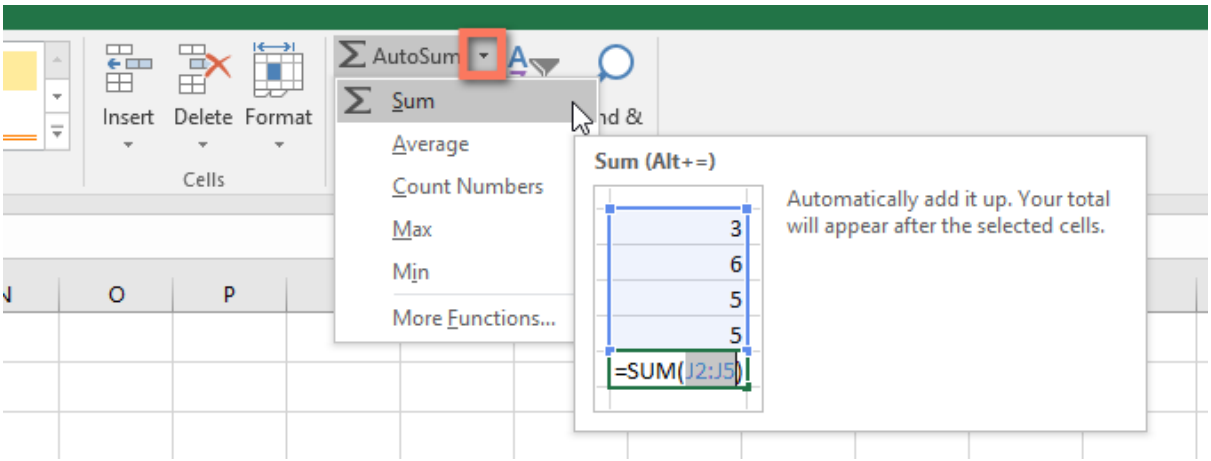
5.2.1. To create a function using the AutoSum command:

The **AutoSum** command allows you to automatically insert the most common functions into your formula, including SUM, AVERAGE, COUNT, MIN, and MAX. In the example below, we'll use the **SUM** function to calculate the **total cost** for a list of recently ordered items.

1. Select the **cell** that will contain the function. In our example, we'll select cell **D13**.

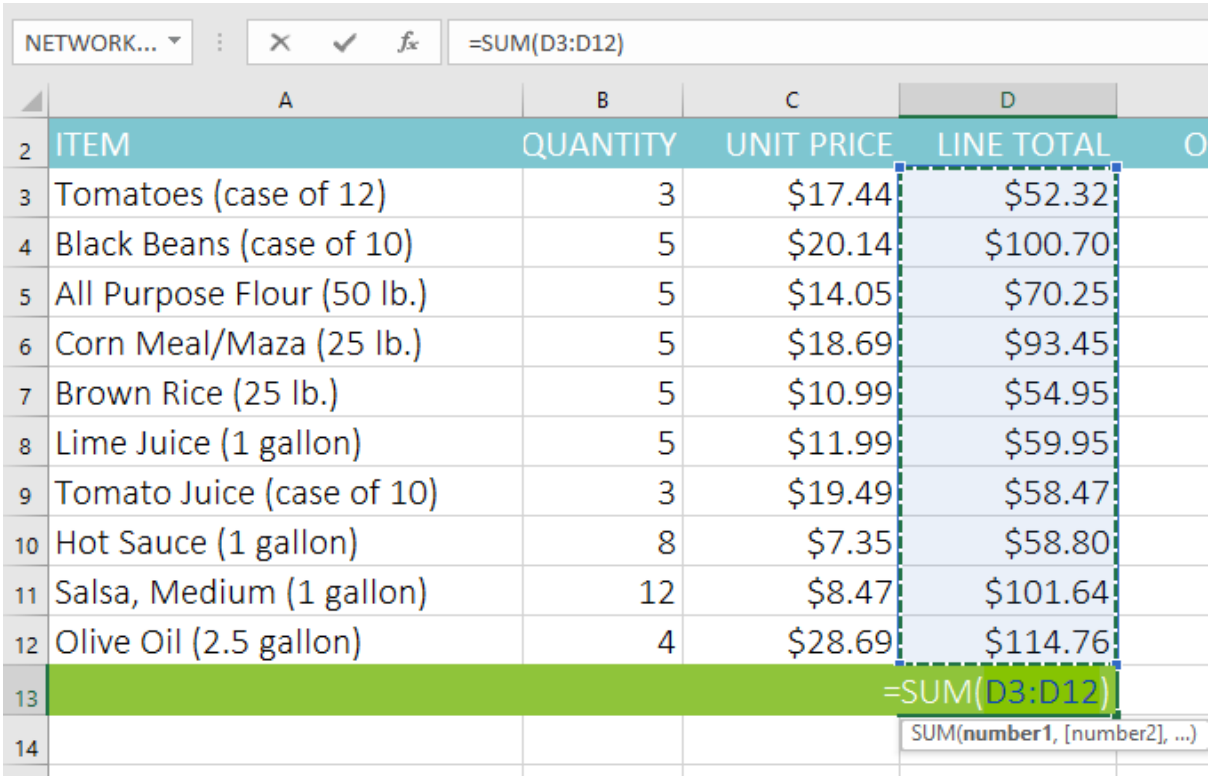


2. In the **Editing** group on the **Home** tab, click the **arrow** next to the **AutoSum** command. Next, choose the **desired function** from the drop-down menu. In our example, we'll select **Sum**.

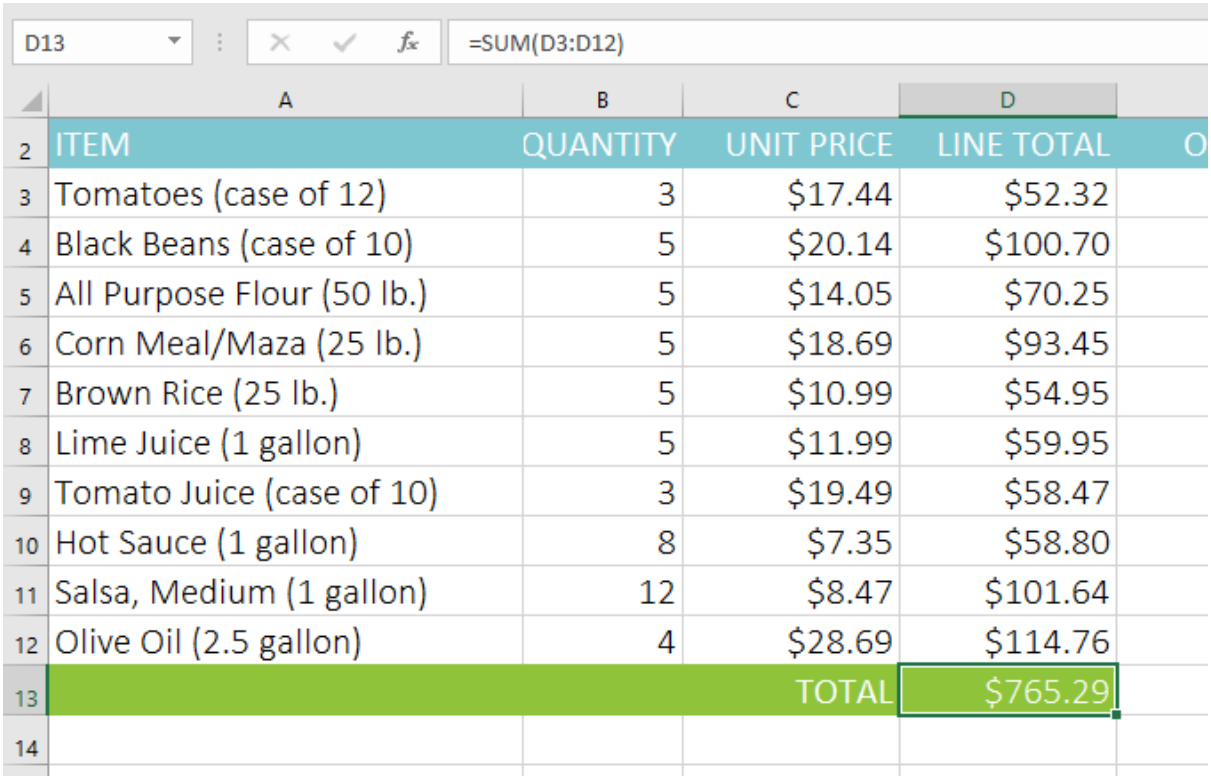


3. Excel will place the **function** in the cell and automatically select a **cell range** for the argument. In our example, cells **D3:D12** were selected automatically; their values will

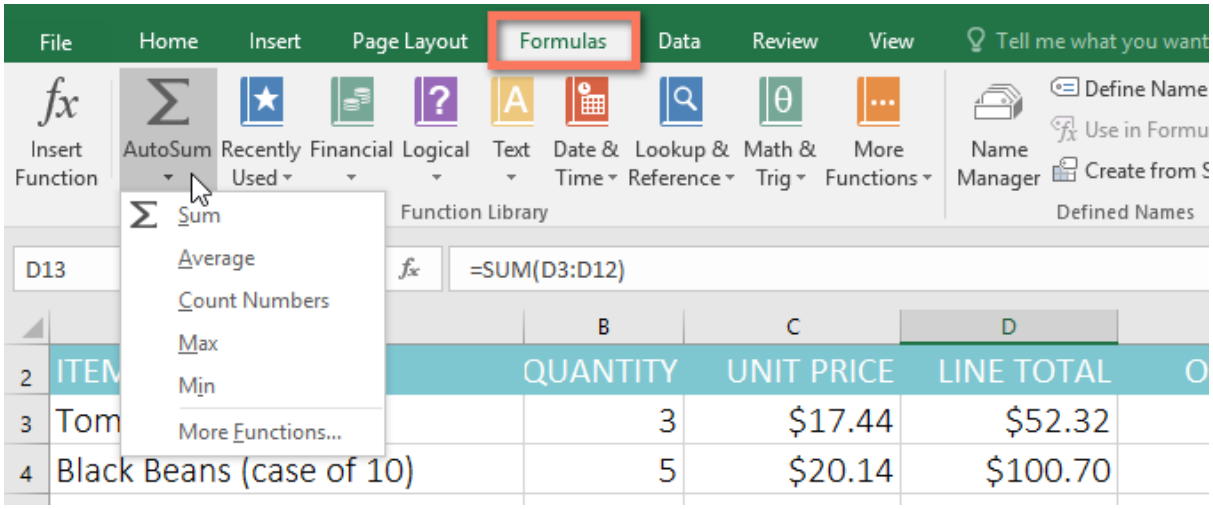
be **added** to calculate the total cost. If Excel selects the wrong cell range, you can manually enter the desired cells into the argument.



4. Press **Enter** on your keyboard. The function will be **calculated**, and the **result** will appear in the cell. In our example, the sum of D3:D12 is **$765.29**.



The **AutoSum** command can also be accessed from the **Formulas** tab on the **Ribbon**.



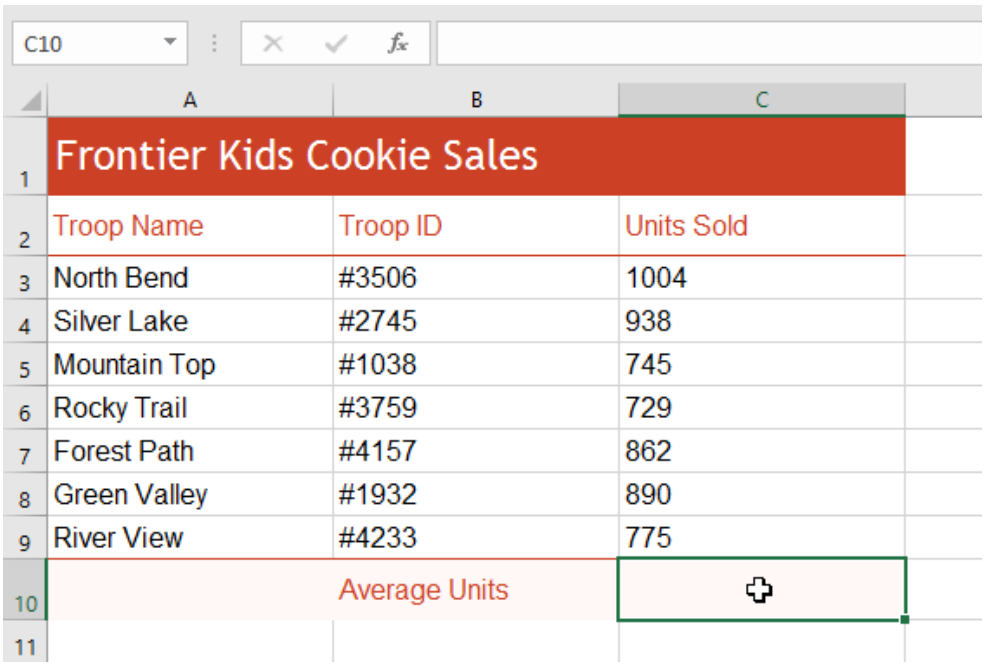
You can also use the **Alt+=** keyboard shortcut instead of the AutoSum command. To use this shortcut, hold down the **Alt** key and then press the **equals sign**.

Watch the video below to see this shortcut in action.

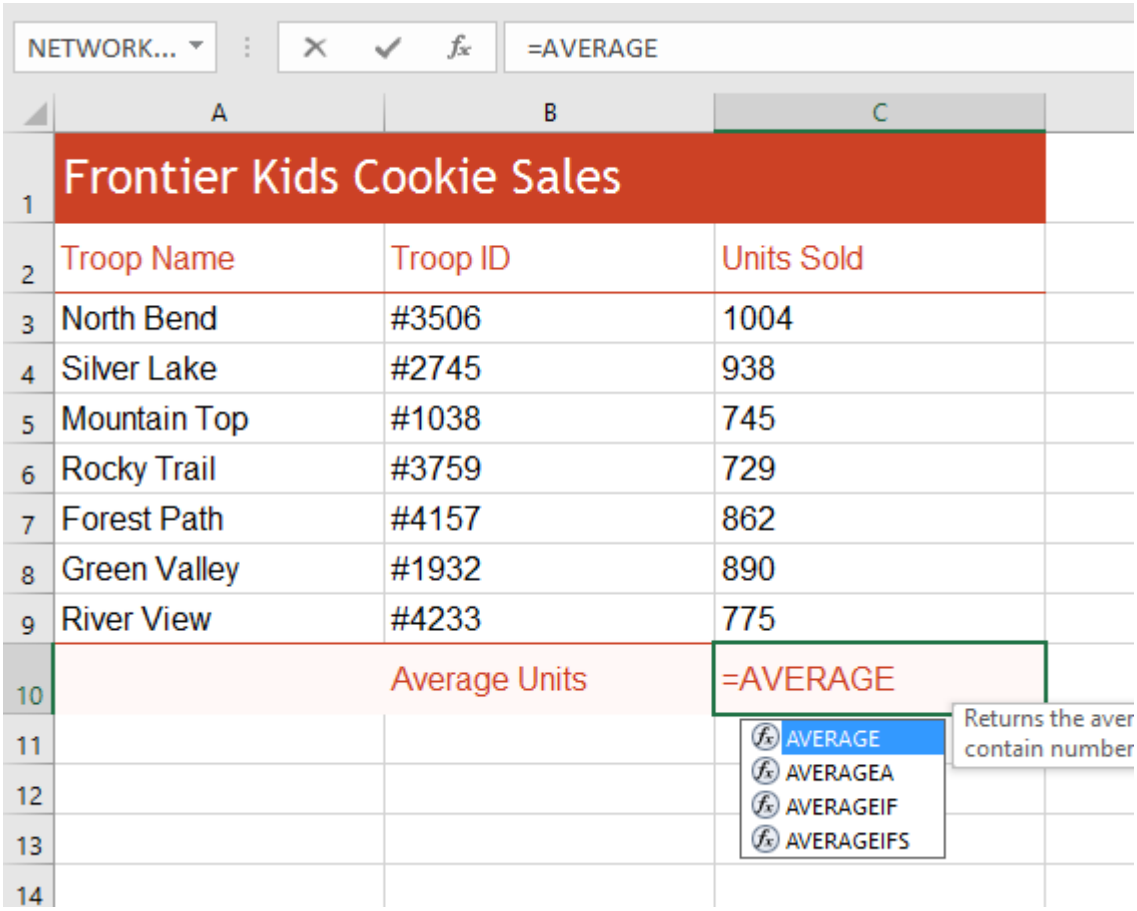
5.3. To enter a function manually:

If you already know the function name, you can easily type it yourself. In the example below (a tally of cookie sales), we'll use the **AVERAGE** function to calculate the **average number of units sold** by each troop.

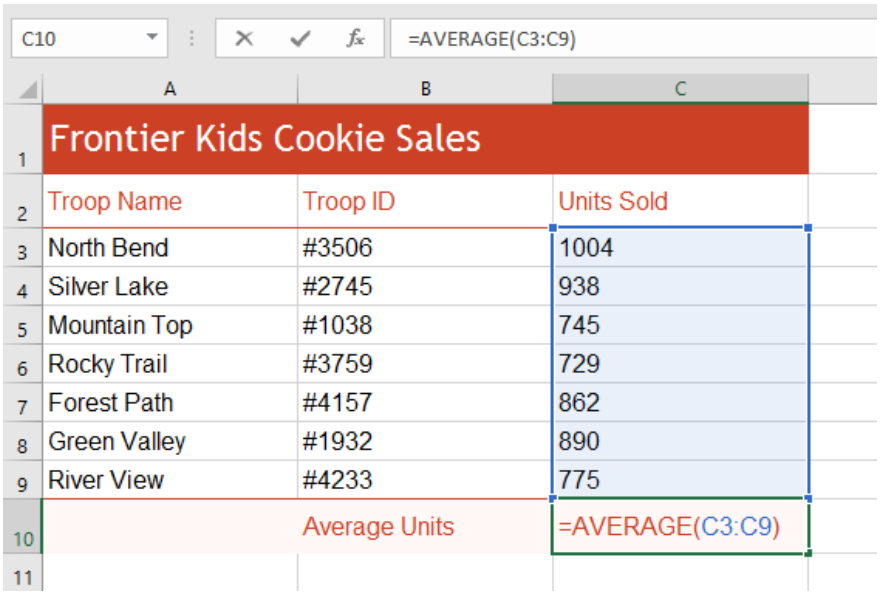
1. Select the **cell** that will contain the function. In our example, we'll select cell **C10**.



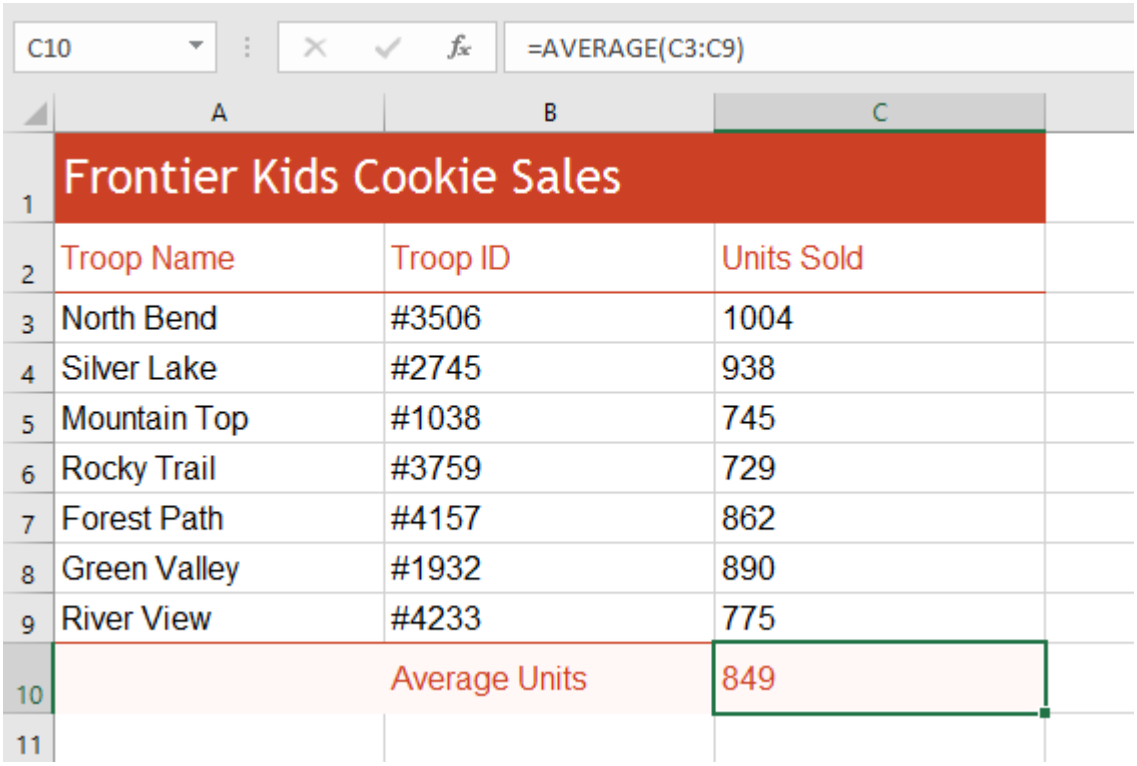
2. Type the **equals sign (=),** and enter the desired **function name**. You can also select the desired function from the list of **suggested functions** that appears below the cell as you type. In our example, we'll type **=AVERAGE**.



3. Enter the **cell range** for the argument inside **parentheses**. In our example, we'll type **(C3:C9)**. This formula will add the values of cells C3:C9, then divide that value by the total number of values in the range.



4. Press **Enter** on your keyboard. The function will be calculated, and the **result** will appear in the cell. In our example, the average number of units sold by each troop is **849**.



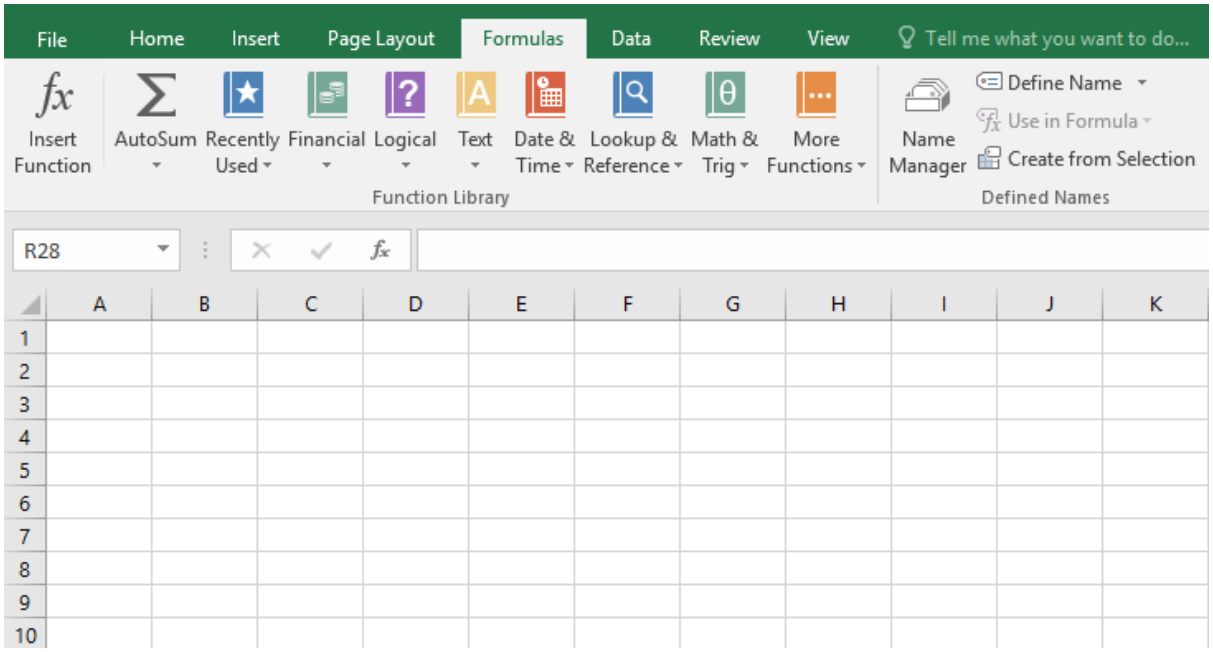
Excel **will not always tell you** if your formula contains an error, so it's up to you to check all of your formulas.

5.4. The Function Library

While there are hundreds of functions in Excel, the ones you'll use the most will depend on the **type of data** your workbooks contain. There's no need to learn every single function, but exploring some of the different **types** of functions will help you as you create new projects. You can even use the **Function Library** on the **Formulas** tab to browse functions by category, such as **Financial**, **Logical**, **Text**, and **Date & Time**.

To access the **Function Library**, select the **Formulas** tab on the **Ribbon**. Look for the **Function Library** group.

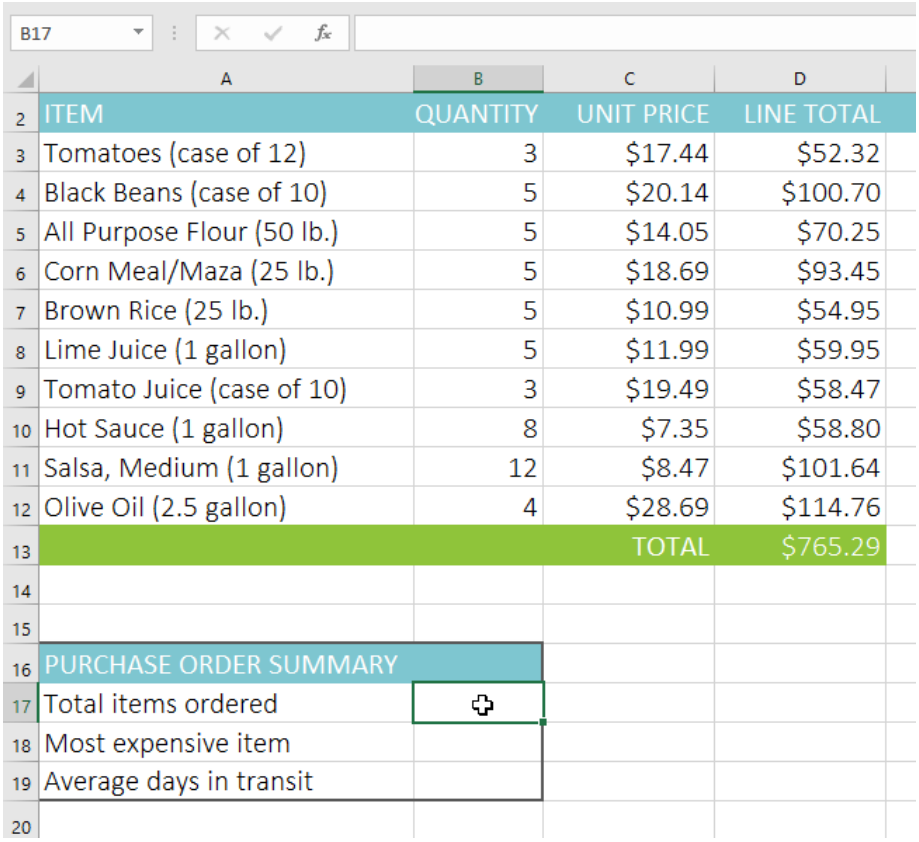
Click the buttons in the interactive below to learn more about the different types of functions in Excel.



5.4.1. To insert a function from the Function Library:

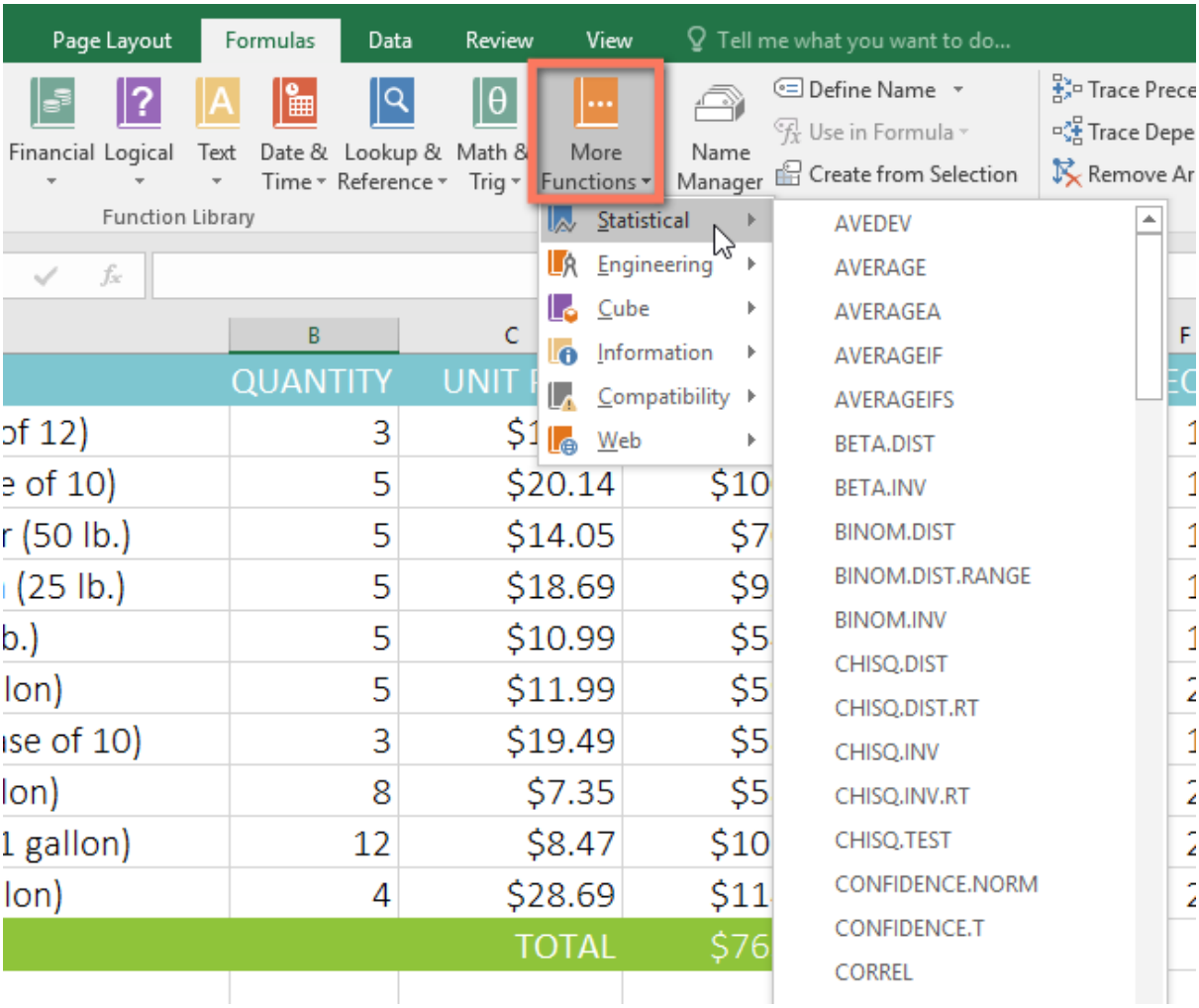
In the example below, we'll use the COUNTA function to count the total number of items in the **Items** column. Unlike COUNT, **COUNTA** can be used to tally cells that contain data of any kind, not just numerical data.

1. Select the **cell** that will contain the function. In our example, we'll select cell **B17**.

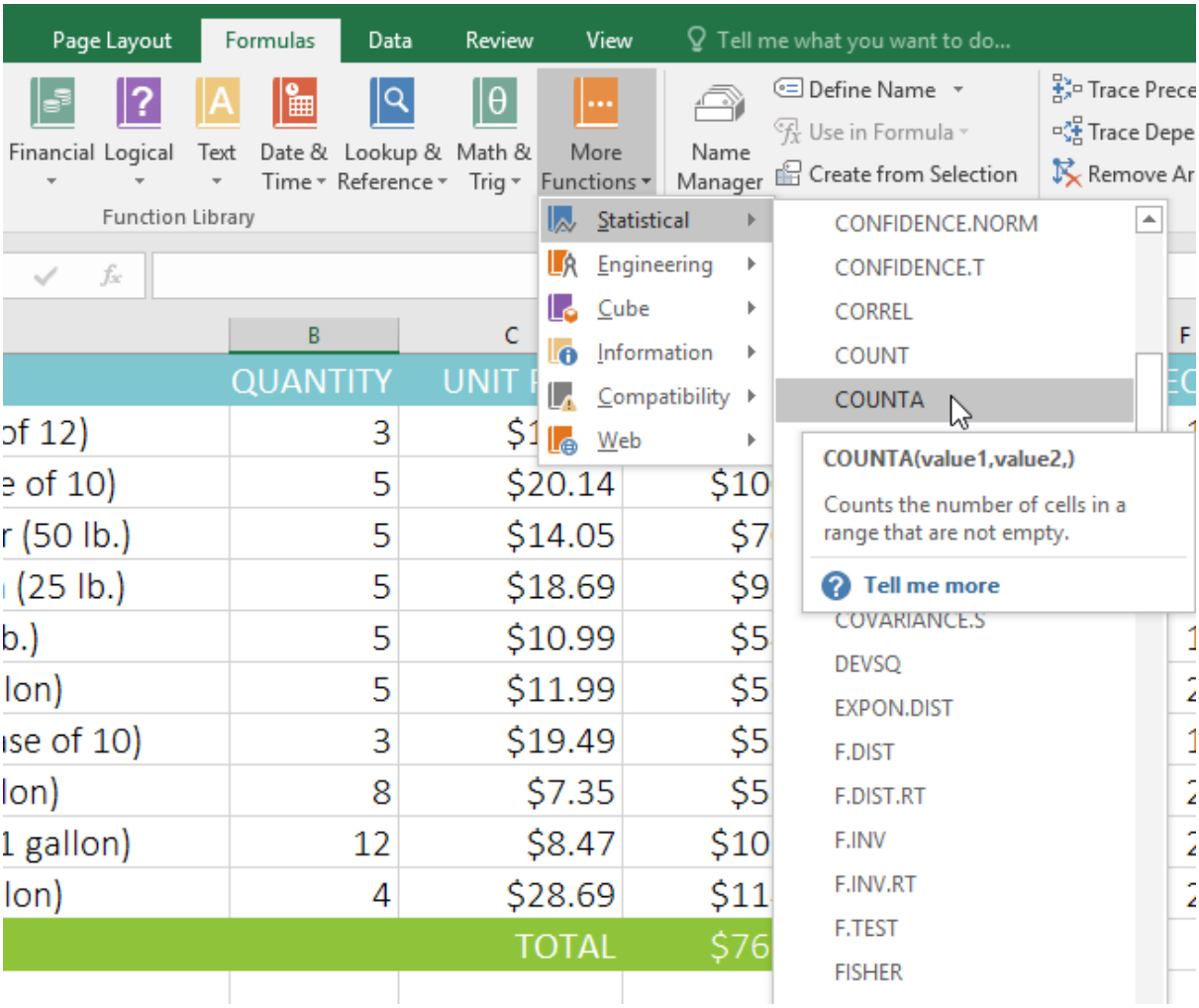


	A	B	C	D
2	ITEM	QUANTITY	UNIT PRICE	LINE TOTAL
3	Tomatoes (case of 12)	3	$17.44	$52.32
4	Black Beans (case of 10)	5	$20.14	$100.70
5	All Purpose Flour (50 lb.)	5	$14.05	$70.25
6	Corn Meal/Maza (25 lb.)	5	$18.69	$93.45
7	Brown Rice (25 lb.)	5	$10.99	$54.95
8	Lime Juice (1 gallon)	5	$11.99	$59.95
9	Tomato Juice (case of 10)	3	$19.49	$58.47
10	Hot Sauce (1 gallon)	8	$7.35	$58.80
11	Salsa, Medium (1 gallon)	12	$8.47	$101.64
12	Olive Oil (2.5 gallon)	4	$28.69	$114.76
13			TOTAL	$765.29
14				
15				
16	PURCHASE ORDER SUMMARY			
17	Total items ordered			
18	Most expensive item			
19	Average days in transit			
20				

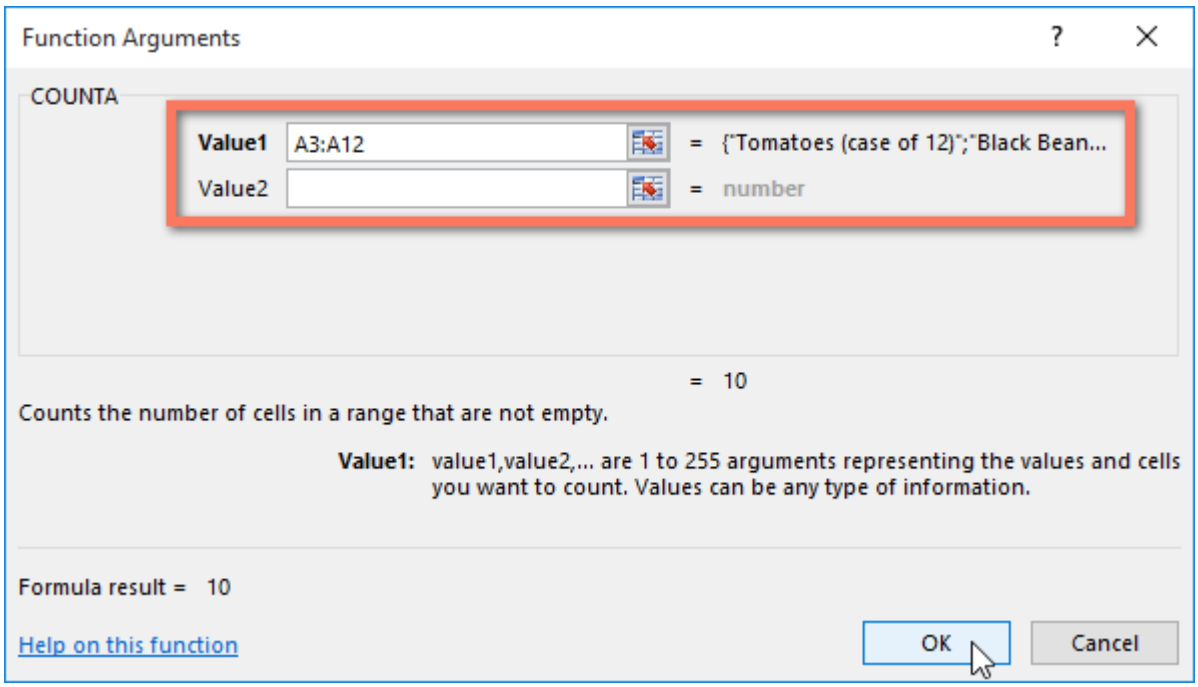
2. Click the **Formulas** tab on the **Ribbon** to access the **Function Library**.
3. From the **Function Library** group, select the desired **function category**. In our example, we'll choose **More Functions**, then hover the mouse over **Statistical**.



4. Select the **desired function** from the drop-down menu. In our example, we'll select the **COUNTA** function, which will count the number of cells in the **Items** column that are not empty.



5. The **Function Arguments** dialog box will appear. Select the **Value1** field, then enter or select the desired cells. In our example, we'll enter the cell range **A3:A12**. You may continue to add arguments in the **Value2** field, but in this case we only want to count the number of cells in the cell range **A3:A12**.
6. When you're satisfied, click **OK**.



7. The function will be **calculated**, and the **result** will appear in the cell. In our example, the result shows that a total of **10 items** were ordered.

	A	B	C	D
2	ITEM	QUANTITY	UNIT PRICE	LINE TOTAL
3	Tomatoes (case of 12)	3	$17.44	$52.32
4	Black Beans (case of 10)	5	$20.14	$100.70
5	All Purpose Flour (50 lb.)	5	$14.05	$70.25
6	Corn Meal/Maza (25 lb.)	5	$18.69	$93.45
7	Brown Rice (25 lb.)	5	$10.99	$54.95
8	Lime Juice (1 gallon)	5	$11.99	$59.95
9	Tomato Juice (case of 10)	3	$19.49	$58.47
10	Hot Sauce (1 gallon)	8	$7.35	$58.80
11	Salsa, Medium (1 gallon)	12	$8.47	$101.64
12	Olive Oil (2.5 gallon)	4	$28.69	$114.76
13			TOTAL	$765.29
14				
15				
16	PURCHASE ORDER SUMMARY			
17	Total items ordered	10		
18	Most expensive item			
19	Average days in transit			
20				

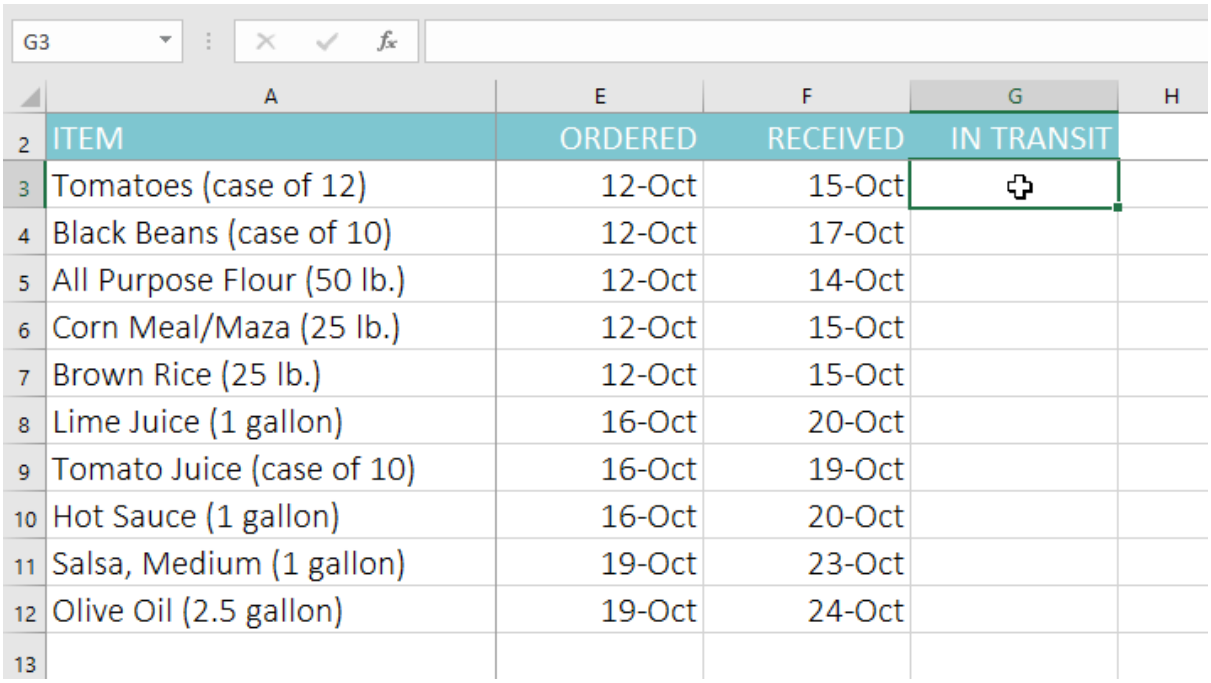
5.5. The Insert Function command

While the Function Library is a great place to browse for functions, sometimes you may prefer to **search** for one instead. You can do so using the **Insert Function** command. It may take some trial and error depending on the type of function you're looking for; however, with practice, the Insert Function command can be a powerful way to find a function quickly.

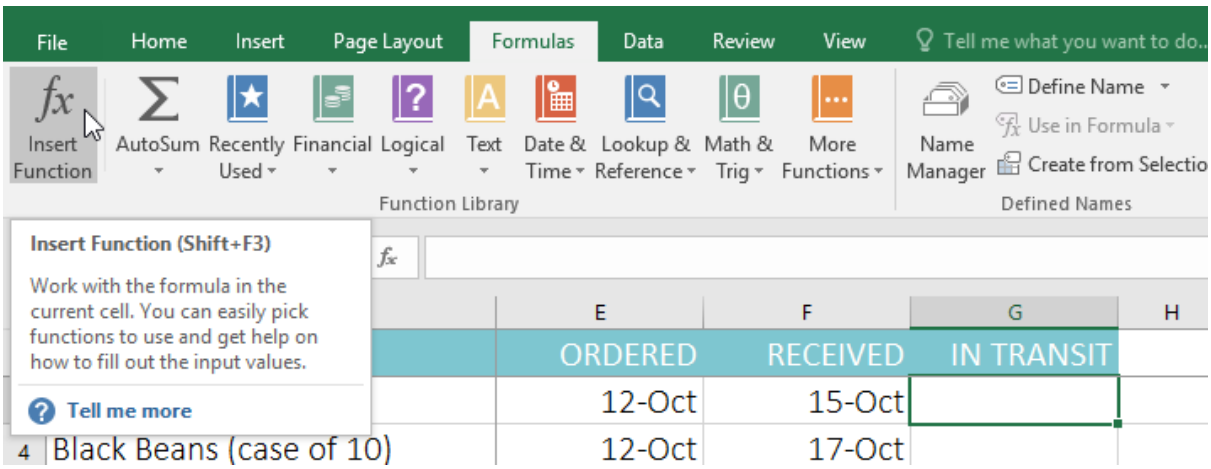
5.5.1. To use the Insert Function command:

In the example below, we want to find a function that will calculate the **number of business days** it took to receive items after they were ordered. We'll use the dates in columns **E** and **F** to calculate the delivery time in column **G**.

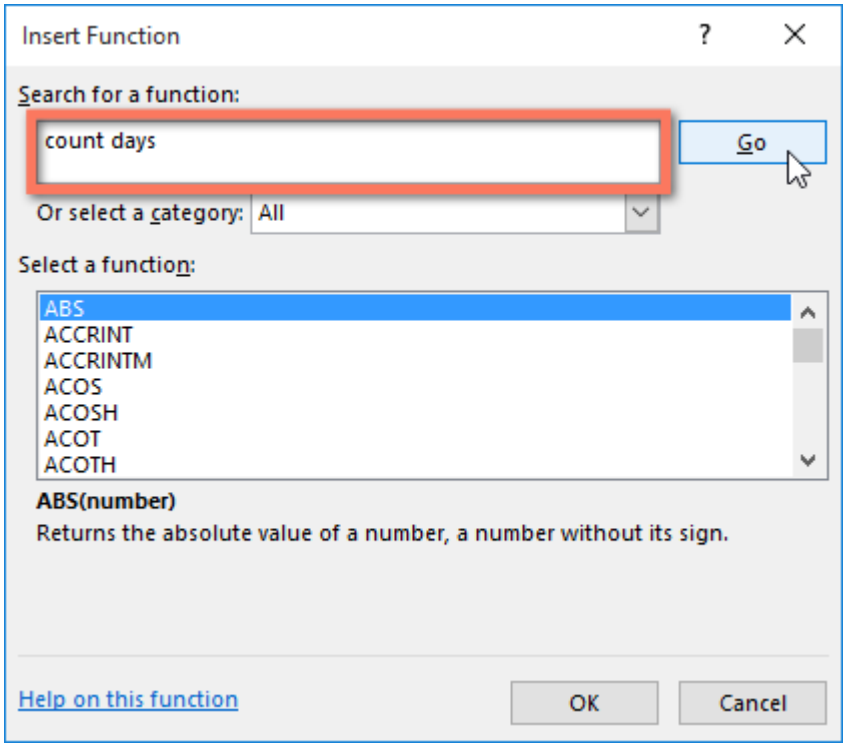
1. Select the **cell** that will contain the function. In our example, we'll select cell **G3**.



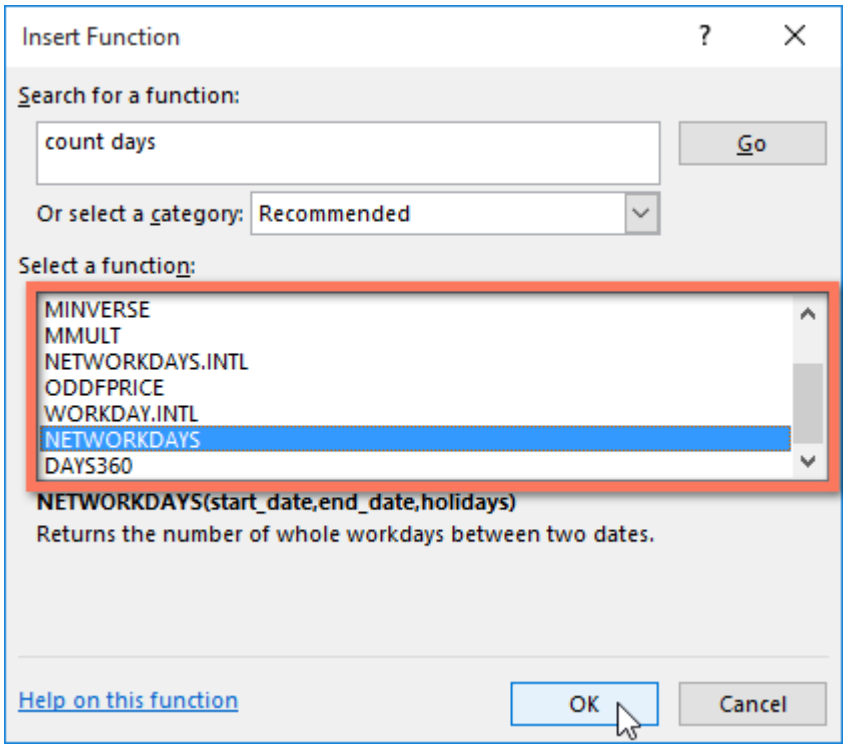
2. Click the **Formulas** tab on the **Ribbon**, then click the **Insert Function** command.



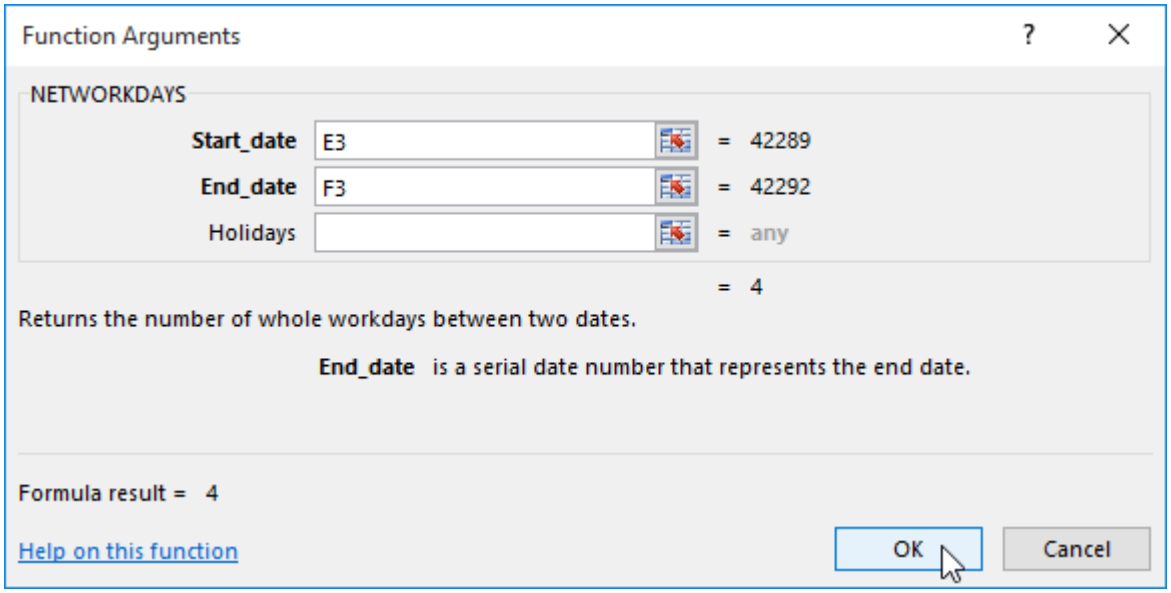
3. The **Insert Function** dialog box will appear.
4. Type a few **keywords** describing the calculation you want the function to perform, then click **Go**. In our example, we'll type **count days**, but you can also search by selecting a **category** from the drop-down list.



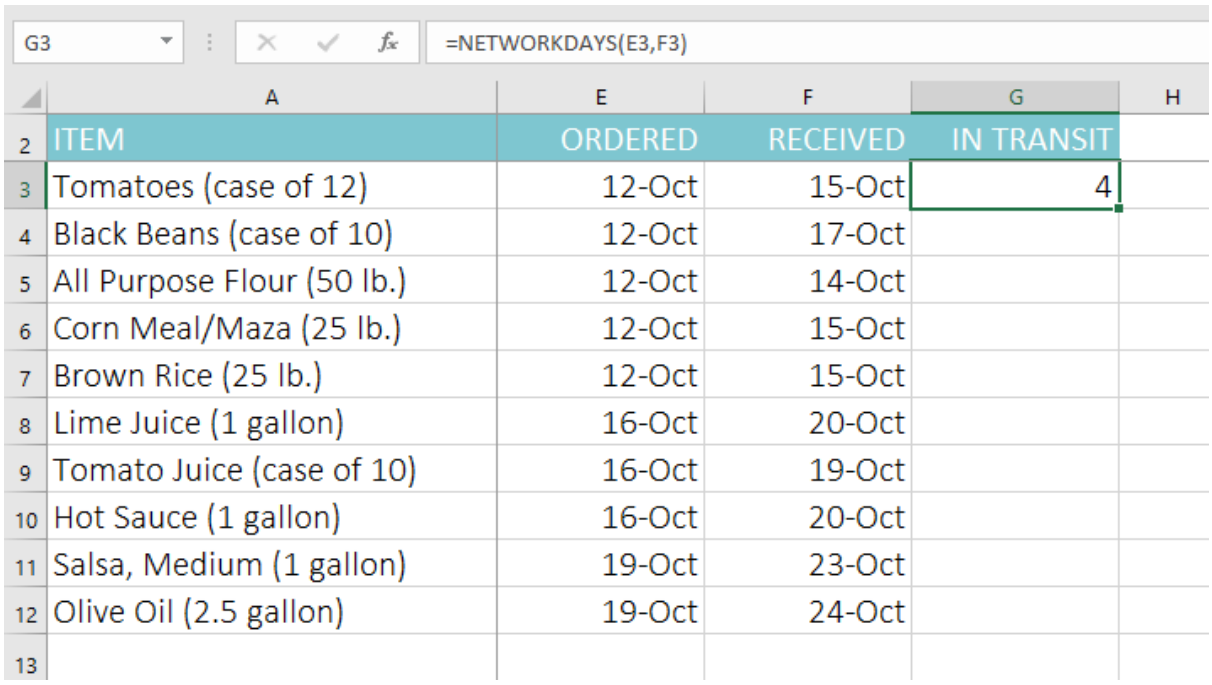
5. Review the **results** to find the desired function, then click **OK**. In our example, we'll choose **NETWORKDAYS**, which will count the number of business days between the ordered date and received date.



6. The **Function Arguments** dialog box will appear. From here, you'll be able to enter or select the cells that will make up the arguments in the function. In our example, we'll enter **E3** in the **Start_date** field and **F3** in the **End_date** field.
7. When you're satisfied, click **OK**.

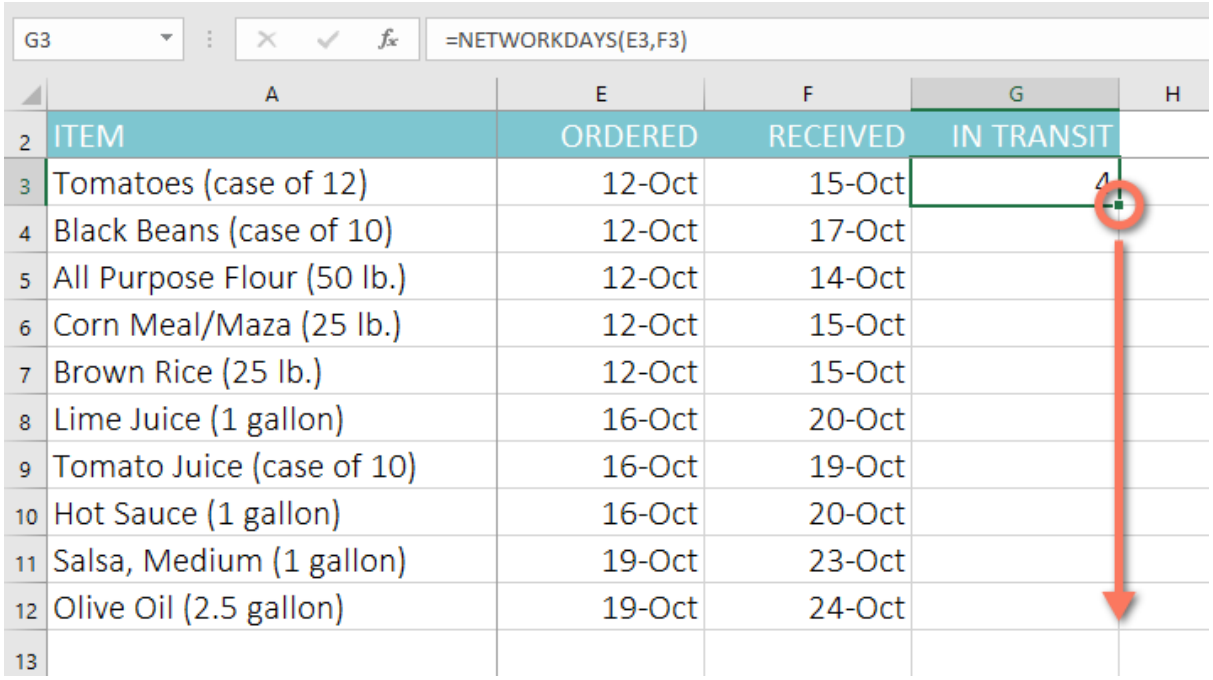


8. The function will be **calculated**, and the **result** will appear in the cell. In our example, the result shows that it took **four business days** to receive the order.



	A	E	F	G	H
2	ITEM	ORDERED	RECEIVED	IN TRANSIT	
3	Tomatoes (case of 12)	12-Oct	15-Oct	4	
4	Black Beans (case of 10)	12-Oct	17-Oct		
5	All Purpose Flour (50 lb.)	12-Oct	14-Oct		
6	Corn Meal/Maza (25 lb.)	12-Oct	15-Oct		
7	Brown Rice (25 lb.)	12-Oct	15-Oct		
8	Lime Juice (1 gallon)	16-Oct	20-Oct		
9	Tomato Juice (case of 10)	16-Oct	19-Oct		
10	Hot Sauce (1 gallon)	16-Oct	20-Oct		
11	Salsa, Medium (1 gallon)	19-Oct	23-Oct		
12	Olive Oil (2.5 gallon)	19-Oct	24-Oct		
13					

Like formulas, functions can be copied to adjacent cells. Simply select the **cell** that contains the function, then click and drag the **fill handle** over the cells you want to fill. The function will be copied, and values for those cells will be calculated relative to their rows or columns.



	A	E	F	G	H
2	ITEM	ORDERED	RECEIVED	IN TRANSIT	
3	Tomatoes (case of 12)	12-Oct	15-Oct	4	
4	Black Beans (case of 10)	12-Oct	17-Oct		
5	All Purpose Flour (50 lb.)	12-Oct	14-Oct		
6	Corn Meal/Maza (25 lb.)	12-Oct	15-Oct		
7	Brown Rice (25 lb.)	12-Oct	15-Oct		
8	Lime Juice (1 gallon)	16-Oct	20-Oct		
9	Tomato Juice (case of 10)	16-Oct	19-Oct		
10	Hot Sauce (1 gallon)	16-Oct	20-Oct		
11	Salsa, Medium (1 gallon)	19-Oct	23-Oct		
12	Olive Oil (2.5 gallon)	19-Oct	24-Oct		
13					