Step-by-Step: Functions 101

This reading outlines the steps the instructor performs in the next video, Functions 101. In the video, the instructor demonstrates how to use spreadsheet functions to perform calculations.
Keep this step-by-step guide open as you watch the video. It can serve as a helpful reference if you need additional context or clarification while following the video steps. This is not a graded activity, but you can complete these steps to practice the skills demonstrated in the video.

What you'll need

If you'd like to access the other spreadsheet the instructor uses in this video, click the link to the dataset to create a copy. If you don't have a Google account, you may download the data directly from the attachments below.
Link to sales data: Monthly sales - Functions 101
OR
Monthly Sales - Functions 101
XLSX File

Example: Start with total sales

Use the `SUM` function to calculate the total value of a range of cells.

1. Open the Monthly sales - Functions 101 spreadsheet.
2. Select cell **F2**.
3. Enter `=SUM(B2:E2)` and press **Enter** to calculate the total sales for this time frame.

Note: The colon (:) between **B2** and **E2** in the formula indicates that you are specifying a range. In this case, it's the range of cells from **B2** to **E2**. The `SUM` function will add up the values in these cells to calculate the total sales for the specified time frame.

Example: Copy functions using the fill handle

Use the fill handle to quickly copy a function to many cells.

1. In the **Monthly Sales** spreadsheet, select cell **F2** and click and hold the fill handle with your cursor. **Note:** The instructor refers to the fill handle as a "little box," but in newer versions or interfaces, it is a circle.
2. Drag the fill handle to include cells **F3** and **F4** and release the fill handle.
3. The total sales for 2018 and 2019 are in the reference cells **F3** and **F4**, respectively. This happens because dragging the fill handle automatically updates the formula to account for the change in row, ensuring that the calculation remains accurate for each row you fill.
4. Click on cell **F3** to display its formula in the formula bar. This is a toolbar that shows information contained in a cell. It allows you to inspect the formula and ensure the formula is updated when it is copied from cell **F2** to cell **F3**.

Example: Find the average sale

Use the `AVERAGE` function to find the average sale for each year.

1. In the **Monthly Sales** spreadsheet, select cell **G2**.
2. Enter `=AVERAGE(B2:E2)` and press **Enter** to calculate the average sales for 2017.

3. Use the fill handle or copy and paste the function from cell **G2** to cells **G3** and **G4** to calculate the average sales for 2018 and 2019, respectively.

Example: Use formulas for special cases

Some calculations may not have dedicated functions. For example, to calculate the percent change from June to July, you'll need to use the percent change formula you used earlier in the course.

1. In the **Monthly Sales** spreadsheet, select cell **H2** and enter `=(E2-D2)/D2`. Press **Enter** to calculate the percent change from June to July 2017.
2. Copy the function from cell **H2** and paste it to cells **H3** and **H4** to calculate the percent change from June to July of 2018 and 2019, respectively.
3. Select reference cells **H2**, **H3**, and **H4** and press the percentage (`%`) button to show the changes in percentages.

Example: Find the lowest and highest sales

To find the lowest monthly sales (`MIN` function):

1. In the **Monthly Sales** spreadsheet, select cell **I1** and enter `Lowest Monthly Sales`.
2. Select cell **I2** and enter `=MIN(` , then use your cursor to select the values from all three rows, **B2:E4**, and then enter `)` to close the parenthetical. To select a block of cells:
    a. a. Click and hold your cursor on cell **B2**.
    b. b. While holding the cursor, drag it across all the values you want to include in the calculation (in this case, from **B2** to **E4**).
    c. c. Release the cursor to select all the values and enter `)` . Your spreadsheet will automatically fill in the cell references for you.
3. This may be important information for your stakeholders, so fill the cell with a color to make it stand out:
    a. a. Select cell **D2**.
    b. From the toolbar, choose the paint bucket icon.
    c. Select a color of your choice from the color palette that appears. That color will then fill cell **D2**.

To find the highest monthly sales (`MAX` function):

1. Select cell **J1** and enter `Highest Monthly Sales`.
2. Select cell **J2** and enter `=MAX(` , then use your cursor to select the values from all three rows, **B2:E4**, and then enter `)` to close the parenthetical.
3. This may be important information for your stakeholders, so select cell **E4** and fill the cell with a color of your choice to make it stand out.
    a. Select cell **E4**.
    b. From the toolbar, choose the paint bucket icon.
    c. Select a color of your choice from the color palette that appears. That color will fill cell **E4**.

Example: Fix errors

When you encounter errors, be sure to troubleshoot the format of your functions and formulas in the formula bar.

Quick Reference: Functions in spreadsheets

As a quick refresher, a function is a preset command that automatically performs a specific process or task using the data in a spreadsheet. Functions give data analysts the ability to do calculations, which can be anything from simple arithmetic to complex equations. Use this reading to help you keep track of some of the most useful options.

Functions

The basics

- Just like formulas, start all of your functions with an equal sign; for example `=SUM`. The equal sign tells the spreadsheet that what follows is part of a function, not just a word or number in a cell.
- After you enter the equal sign, most spreadsheet applications will display an autocomplete menu that lists valid functions, names, and text strings. This is a great way to create and edit functions while avoiding typing and syntax errors.
- A fun way to learn new functions is by simply typing an equal sign and a single letter of the alphabet. Choose one of the options that pops up and learn what that function does.

Difference between formulas and functions

- A formula is a set of instructions used to perform a calculation using the data in a spreadsheet.
- A function is a preset command that automatically performs a specific process or task using the data in a spreadsheet.

Popular functions

A lot of people don't realize that keyboard shortcuts like cut, save, and find are actually functions. These functions are built into an application and are amazing time-savers. Using shortcuts lets you do more with less effort. They can make you more efficient and productive because you are not constantly reaching for the mouse and navigating menus. Use these links to discover the most popular shortcuts, for Chromebook, PC, and Mac.

Auto-filling

The lower-right corner of each cell has a fill handle. It is a small green square in Microsoft Excel and a small blue circle in Google Sheets.

- Click the fill handle for a cell and drag it down a column to auto-fill other cells in the column with the same formula or function used in that cell.
- Click the fill handle for a cell and drag it across a row to auto-fill other cells in the row with the same formula or function used in that cell.

Relative, absolute, and mixed references

- Relative references (cells referenced without a dollar sign, like **A2**) will change when you copy and paste the function into a different cell. With relative references, the location of the cell that contains the function determines the cells used by the function.

- Absolute references (cells fully referenced with a dollar sign, like **A2**) will not change when you copy and paste the function into a different cell. With absolute references, the cells referenced always remain the same.
- Mixed references (cells partially referenced with a dollar sign, like **$A2** or **A$2**) will change when you copy and paste the function into a different cell. With mixed references, the location of the cell that contains the function determines the cells used by the function, but only the row or column is relative (not both).
- In spreadsheets, you can press the **F4** key to toggle between relative, absolute, and mixed references in a function. Click the cell containing the function, highlight the referenced cells in the formula bar, and then press **F4** to toggle between and select relative, absolute, or mixed referencing.

Data ranges

- When you click a cell that contains a function, colored data ranges in the formula bar indicate which cells are being used in the spreadsheet. There are different colors for each unique range in a function.
- Colored data ranges help prevent you from getting lost in complex functions.
- In spreadsheets, you can press the **F2** key to highlight the range of data used by a function. Click the cell containing the function, highlight the range of data used by the function in the formula bar, and then press **F2**. The spreadsheet will go to and highlight the cells specified by the range.

Data ranges evaluated for a condition

`COUNTIF` is an example of a function that returns a value based on a condition that the data range is evaluated for. The function counts the number of cells that meet the criteria. For example, in an expense spreadsheet, use `COUNTIF` to count the number of cells that contain a reimbursement for "airfare."
For more information, refer to:

- Microsoft Support's page for COUNTIF
- Google Help Center's documentation for COUNTIF where you can copy a sheet with COUNTIF examples (click "Use Template" if you click the COUNTIF link provided on this page)

Key takeaways

There are a lot more functions that can help you make the most of your data. This is just the start. You can keep learning how to use functions to help you solve complex problems efficiently and accurately throughout your entire career.