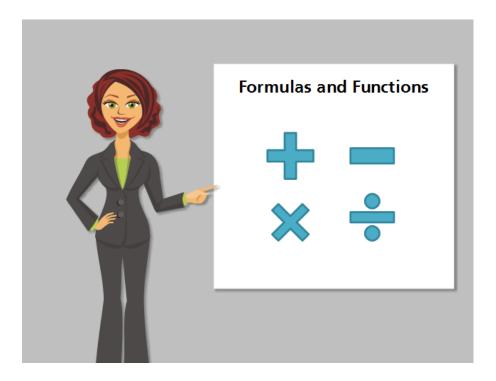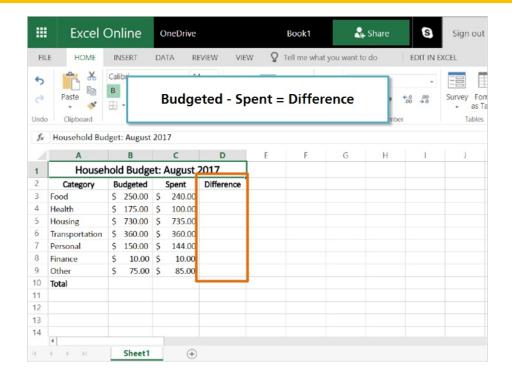# Formulas and Functions

Formulas and functions are ways to make calculations in Excel. A formula can be any math problem that you type out, like addition, subtraction, multiplication, or division. Functions can do even more specialized calculations. They include the name of the function, such as "sum" for addition, and a range of cells in parenthesis. We will look at both in this lesson.
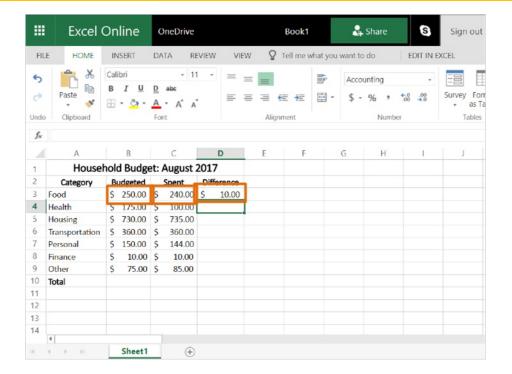
First, let's use a formula to find out the difference between what we budgeted and how much we actually spent for each category. This will tell us how much over or under we were with our spending.

Budgeted – Spent = Difference
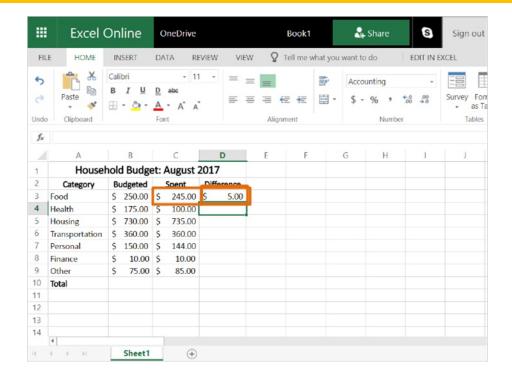
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To calculate the difference in column D, we need to subtract the number in column C from the number in column B.

To enter the formula, I click in the cell in column D and type an "Equals" sign. This is how all formulas and functions begin.

Now we can enter the formula to subtract. Instead of typing the dollar amount, we can type the Cell Reference, which is made up of the row letter and column number. I'll type B3, the minus sign, then C3.
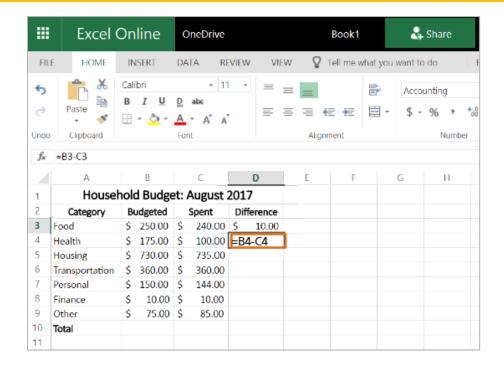
I press Enter to see the result. We are ten dollars under budget in this category.

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Formulas make calculations automatically. If the cells included in the formula are edited, the final amount will also be updated.
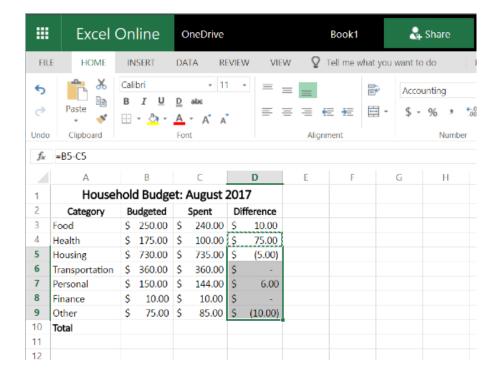
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See if you can enter the formula for the next category!

First, click in cell D4. Then type "Equals B4 - C4". Press Enter to see the result.
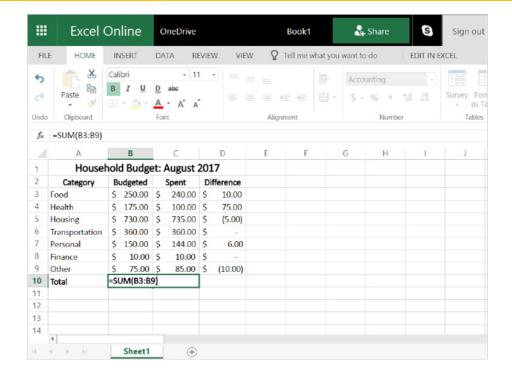
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Great! We can see that this category is under budget by 75 dollars.

I can quickly fill in the formulas for the remaining rows by copying and pasting. I select the cell with the formula I would like to use and click on the icon for Copy. Then I'll select the other cells and click on "Paste." The formula is automatically converted to match the cells for each row it has been copied into.

The amounts that appear in parentheses are over budget. The cells with a dash are exactly the same as the budgeted amount.
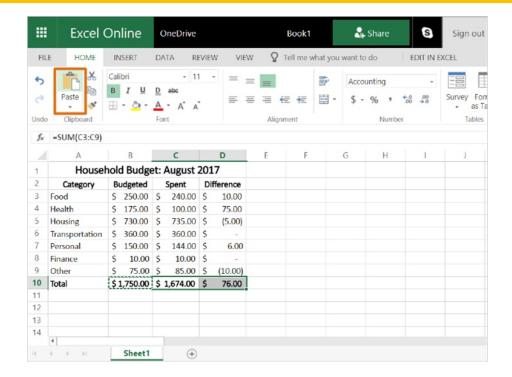
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We can add up the total of how much we budgeted by using a Sum Function in this cell. We'll also be able to copy that function to add up the total of how much we spent, and what difference remains.

Just like formulas, functions start with an Equals sign, then the name of the function. In this case, the function is called "Sum" and we are going to add a range of cells from the same column.

I add a left parenthesis to mark the range of cells. Next I type the range starting with the first cell, a colon, and then the last cell, like this. Then I type a right parenthesis to complete the function.
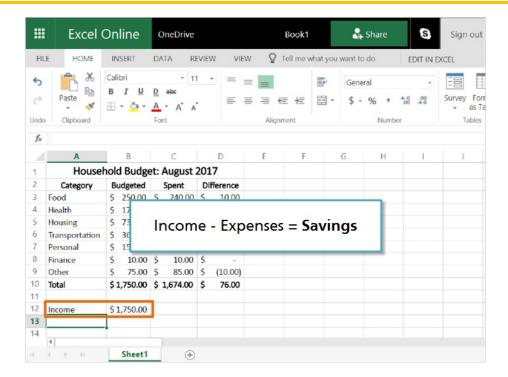
=SUM(B3:B9)

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Press enter to see the sum. Do you remember how to copy this function into the next cells? I'll select the cell, click on copy, then select the blank cells and click on "Paste."
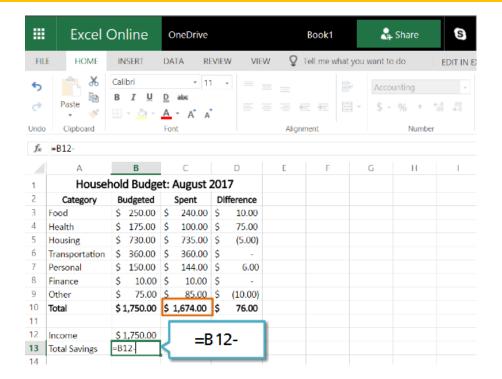
The budget is almost complete. The last thing we need to add is how much income we made. Then we can subtract the expenses to find out if we saved any money. I'll add the income and press Enter to move down.
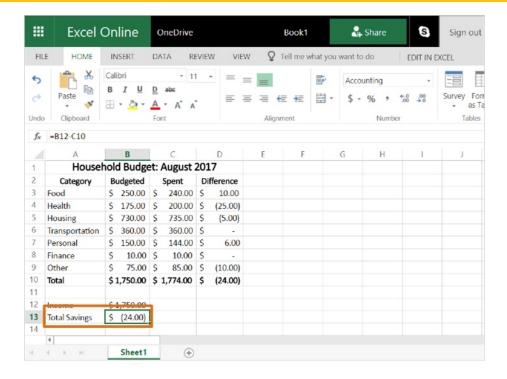
Income – Expenses = **Savings**

We'll calculate the Total Savings in this cell. The Total Savings equals the amount of income minus the amount spent. I'll start the formula by typing "equals B12" for the income, and a minus sign.

What cell should we enter to subtract the amount spent? Go ahead and click on it now.

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Great, our formulas is ready.

> **=B12-C10**

I will press Enter to show the result.

It looks like we saved some money this month, so we can carry that amount over into the next month. We could also put it in a savings account, or pay off debt. If we look at a different example and the number is negative, this means we spent more than we earned. We might have had to borrow money or use our savings to pay the extra expenses, and we should look for ways to save money next month.

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