

Creating Formulas I

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Remember those joyous moments back in high school? You know, the one class we all looked forward to going to each day? I'm speaking about algebra, of course.

When I think of algebra (or math in general), I'm reminded of a line from the movie *Red Planet*. After a crash on Mars, the crew is trying to figure out which direction to travel to the outpost previously constructed on the planet. After much debate, one scientist (astronaut) says that it's quite simple, and that it all comes down to math. At which point, another astronaut replies: *Well, here it is: that time they told us about in high school when math would save our lives.*

Well, to dispel the myths about Excel, or any spreadsheet program for that matter, you don't have to have a Ph.D. in mathematics to work in it (or even become incredibly proficient).

The heart of Excel is its ability to crunch numbers. This, of course, requires the use of formulas. And like algebra, formulas in Excel are constructed much the same way.

The Equals Sign...

Everything starts with the equals sign.

Can you remember grade school math, and how the teacher taught you addition: $4+5=9$?

We were taught to put our numbers to add on the left, put the equals sign at the end, with the result, or answer, to the far right.

Then later in algebra, they flipped this routine on us! We learned to create our notation backwards: $9=4+5$. Then, of course, they started using those darn letters instead of numbers. No wonder a lot of people hate math: left, right, numbers, letters.

In Excel, and like algebra, formulas are constructed in like fashion. But in Excel, remember to start your formula with the equals sign.

Start Excel and we'll create our first formula. It's going to be simple, so don't get paranoid yet!

After Excel has started, move the cursor to (or click on) cell C5 (Figure 1).

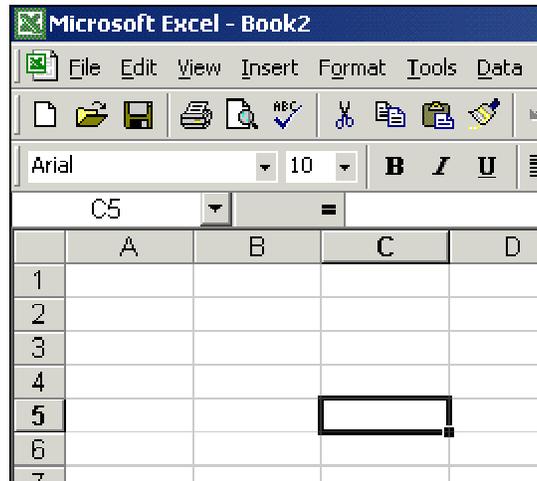


Figure 1

Cell C5 is where we will construct our formula. Think of it this way: in which ever cell you enter a formula, the answer will appear. If we were to mimic algebra, the formula would look like this (so far): C5=.

Once in cell C5, the first thing you do is enter the equals sign (from your keyboard). This single character tells Excel that you are entering a formula.

Now enter the number 4, the plus sign, then the number 5, and press the Enter key. Voila! Your formula displays the result (in cell C5) of nine.

You should notice that when you pressed the Enter key, the cursor (or active cell) is now C6. To view your formula in cell C5, simply click on cell C5 (or use the arrow up key). Look in the formula bar and you should see your formula (Figure 2).

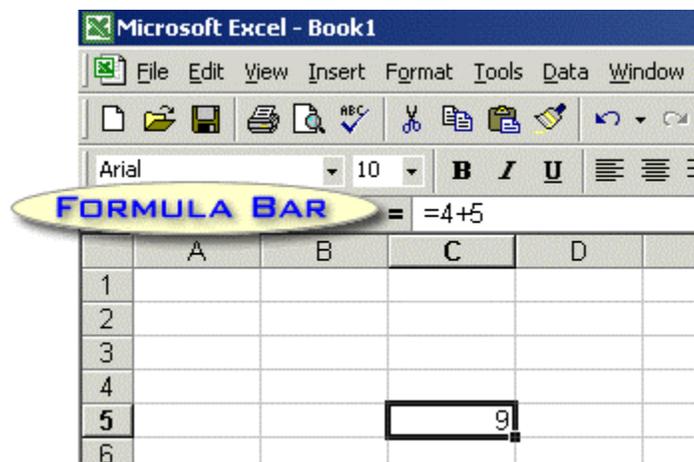


Figure 2

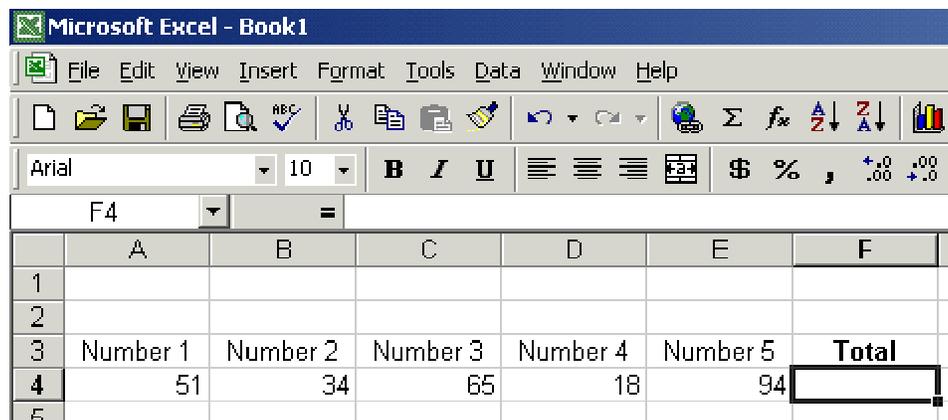
Review...

- To create a formula, you must press the equals sign first, then continue with the formula.
- Do not enter spaces into your formula.*
- Valid operators are: - (subtraction), + (addition), * (multiplication), / (division).**
- You can use parentheses to force order of operation (see Excel's help section).
- When creating formulas, letters or words you enter are not case sensitive.

Common Formulas...

Two of the most common uses of formulas are 1) adding numbers that are in adjacent cells (either vertically or horizontally) and 2) adding numbers that are located in different, non-adjacent cells in a worksheet.

Let's look at adding adjacent cells first (Figure 3)...



The screenshot shows the Microsoft Excel interface. The menu bar includes File, Edit, View, Insert, Format, Tools, Data, Window, and Help. The toolbar contains various icons for file operations and editing. The formula bar shows 'F4' and an equals sign. The worksheet has columns A through F and rows 1 through 5. The data in the worksheet is as follows:

	A	B	C	D	E	F
1						
2						
3	Number 1	Number 2	Number 3	Number 4	Number 5	Total
4	51	34	65	18	94	
5						

Figure 3

To add these numbers, you can use the SUM function. For our purposes, its syntax is:
`=SUM(FromCell:ToCell)`

The FromCell:ToCell is called a range. To add numbers within a range, the FromCell is the cell reference of the first cell to be included in the range (A4 in our example above). The ToCell is the last cell reference in the range. These two items are separated by a colon.

So, to construct our formula, we would enter it as: `=SUM(A4:E4)` in cell F4. Press the Enter key when you are done. The result should be 262 (Figure 4).

* Excel allows spaces in formulas, but it's a bad habit to develop.

** There are others as well. Consult Excel's help for more information.

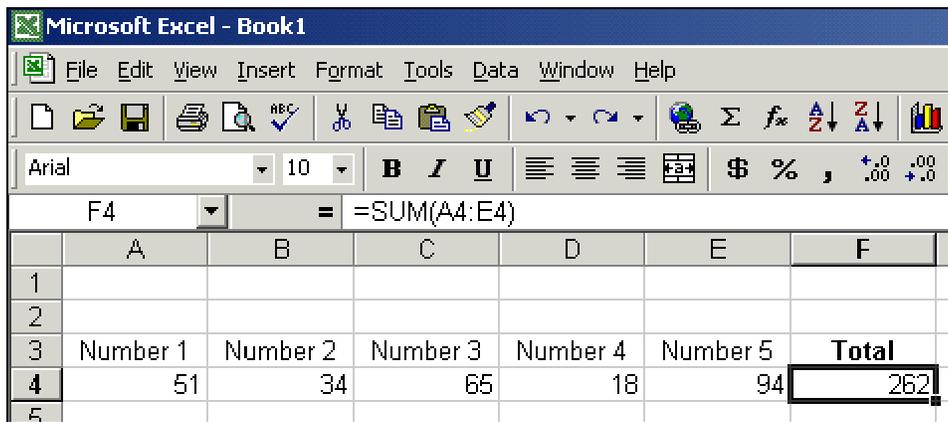


Figure 4

The Test...

To test or ensure the accuracy of your formulas, you should do the “test of ones” on them. This is a simple test that you do once you have built a formula.

In our example above, simply enter the number 1 in cells A4, B4, C4, D4, E4. The result from your formula should now be 5 (there are five items to total). If the result is anything other than 5, you know there’s a problem with your formula.

Do this test for all formulas that you create using cell references.

Now let’s look at the other formula, adding items from different areas of a worksheet (Figure 5).

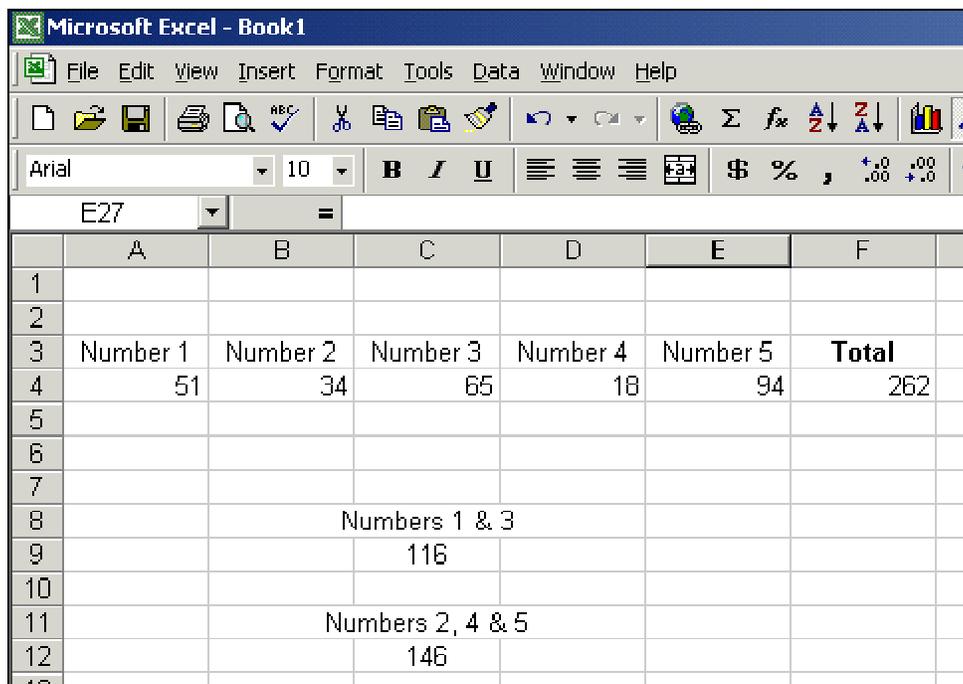


Figure 5

Place your cursor in cell C9 and create a formula that adds Numbers 1 and 3 (cells A4 and C4). The first thing we do is enter the equals sign, then the first cell reference (A4), the plus sign, then the second cell reference (C4).

The finished formula should look like this: =A4+C4.

Now create a formula to add the Numbers 2, 4 and 5 entries (the numbers that reside in row 4). Create your formula in cell C12. The answer should match that in Figure 5.

Having completed that, create your last formula to add the two totals you just created. Place your cursor in cell C14 and create a formula to add C9 and C12. The result should equal the same number in cell F4.

Summary...

With these two types of formulas under your belt, you can now build some pretty sophisticated worksheets. The example below uses the two types covered in this paper. See the last page for an explanation of the formulas.

Project Budget					
	Week 1	Week 2	Week 3	Week 4	Total
Widget 1	\$ 153.00	\$ 58.00	\$ 54.00	\$ 31.00	\$ 296.00
Widget 2	\$ 45.00	\$ 15.00	\$ 59.00	\$ 73.00	\$ 192.00
Sub Total	\$ 198.00	\$ 73.00	\$ 113.00	\$ 104.00	\$ 488.00
Widget 3	\$ 47.00	\$ 48.00	\$ 60.00	\$ 75.00	\$ 230.00
Widget 4	\$ 59.00	\$ 50.00	\$ 17.00	\$ 76.00	\$ 202.00
Widget 5	\$ 60.00	\$ 76.00	\$ 25.00	\$ 65.00	\$ 226.00
Sub Total	\$ 166.00	\$ 174.00	\$ 102.00	\$ 216.00	\$ 658.00
Widget 6	\$ 35.00	\$ 48.00	\$ 59.00	\$ 71.00	\$ 213.00
Widget 7	\$ 45.00	\$ 81.00	\$ 77.00	\$ 84.00	\$ 287.00
Sub Total	\$ 80.00	\$ 129.00	\$ 136.00	\$ 155.00	\$ 500.00
Total	\$ 444.00	\$ 376.00	\$ 351.00	\$ 475.00	\$ 1,646.00

Figure 6

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Arial 10 B I U

A22 =

Project Budget					
	Week 1	Week 2	Week 3	Week 4	Total
Widget 1	\$ 153.00	\$ 58.00	\$ 54.00	\$ 31.00	\$ 296.00
Widget 2	\$ 45.00	\$ 15.00	\$ 59.00	\$ 73.00	\$ 192.00
Sub Total	\$ 198.00	\$ 73.00	\$ 113.00	\$ 104.00	\$ 488.00
Widget 3	\$ 47.00	\$ 48.00	\$ 60.00	\$ 75.00	\$ 230.00
Widget 4	\$ 59.00	\$ 50.00	\$ 17.00	\$ 76.00	\$ 202.00
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Sub Total	\$ 80.00	\$ 129.00	\$ 136.00	\$ 155.00	\$ 500.00
Total	\$ 444.00	\$ 376.00	\$ 351.00	\$ 475.00	\$ 1,646.00

=C13+C14

=E13+E14

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Arial 10 B I U

A22 =

Project Budget					
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Widget 1	\$ 153.00	\$ 58.00	\$ 54.00	\$ 31.00	\$ 296.00
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=B6+B11+B15

=E6+E11+E15

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Arial 10 B I U \$ % , +.00 +.00

A22 =

Project Budget					
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Annotations:

- `=Sum (B4 : E 4)` points to the Total cell for Widget 1.
- `=Sum (B17 : E17)` points to the Total cell for Widget 7.

The formulas depicted in the above three examples are repeated in every cell indicated by the highlighted areas.