

**Spreadsheets: Absolute References**  
**Multiplication Table and Foreign Travel Budget as Examples**  
**Google Spreadsheets**  
**EDM310**

In this exercise we address the use of ABSOLUTE REFERENCES in functions/formulas. Absolute References are references to cells that are not to be changed by the computer in extending formulas through a RANGE of cells. Normally the computer uses RELATIVE REFERENCES and changes the formulas/functions you have entered to reflect the relative position on the spreadsheet. In other words, if you create a function to combine text on Row 2 and then extend that function down several rows, the computer will change the formula so that it combines the text cells on the row to which the formula has been extended thereby saving you the trouble of rewriting the formula every time you move to another row.

BUT in some circumstances this is NOT what you want the computer to do. For example take the case of a budget which you wish to develop showing two different currencies. You have an exchange rate which you will use in your conversion formula. It will always be in a certain cell. In that case you want the computer to ALWAYS refer to that cell and never change the reference. You are using an ABSOLUTE REFERENCE.

So you must learn to do two things:

1. Determine whether a cell to which you refer in a function or formula will ALWAYS BE THE SAME CELL in which case you are Using an ABSOLUTE REFERENCE.
2. Know how to change a Relative Reference (the default) to an ABSOLUTE REFERENCE. You do this by adding a \$ in front of the LETTER AND THE NUMBER of the cell in question. For example, if your currency exchange ratio were to be in cell B9 and it was always going to be in that cell you would put a \$ in front of the LETTER AND NUMBER and the cell reference would read \$B\$9.

**Multiplication Table**

We start by clicking in cell B1 and typing a number .. say 1. Then we hit the TAB key to move to the right and type 2, TAB, 3, TAB, 4, TAB, 5.

These are numbers we will use to multiply other numbers by (multiplicands).

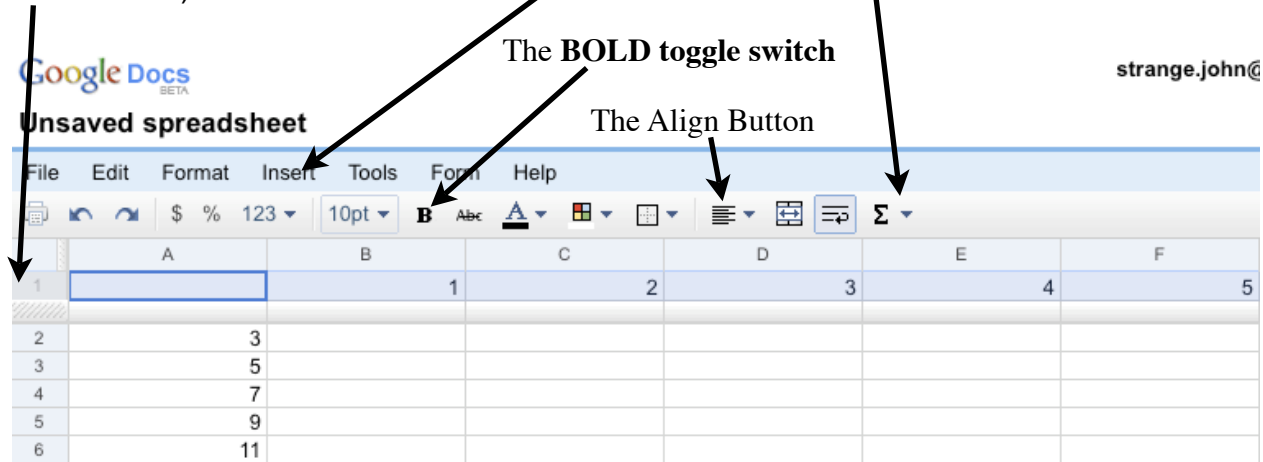
Now we set up the other multiplicands. Click in cell A2. We will use odd numbers starting with 3 in this example. Type 3, Enter (Return on a MAC), 5, Enter, 7, Enter, 9, Enter, 11.

Now we need to make these numbers distinctive so we will center them and make them bold. First, click on the number 1 designating Row 1. This will select the ENTIRE ROW 1. Click on the little arrow next to the element that is the align element. Click the center align icon. Click the BOLD button. Do the same for Column A. Note that you will have to click the BOLD button twice, first to clear the bold that has been set for A1 when you did Row 1, then to set the Bold for all of column 1.

Where you click to select all of Row 1 (for other rows, click on their number)

Where you click to select all of Column A (for other columns, click on their letter)

You can insert a formula/function by using the INSERT menu or the special  $\Sigma$  menu



The bold and centered numbers will be used in the formulas. NO OTHER NUMERS WILL BE USED. When inserting formulas you should ALWAYS CLICK ON THE CELL, not type its identification. This is to reduce the number of errors involved.

Now we are ready to construct our multiplication table. In cell B2 we want the product produced by multiplying the contents of cell B1 times the contents of cell A2. Then in cell B3 we want the product produced by multiplying the contents of cell B1 (NOTE: same as before so it will be an ABSOLUTE REFERENCE) by the contents of cell A3 (which is different and therefore a Relative Reference).

Click in cell B2.

Type an = sign because a function/formula ALWAYS STARTS WITH AN = SIGN.

CLICK on cell B1 Be sure you CLICK on the cell. DO NOT type it in to reduce the chance of errors!)

CLICK on cell A2 (These are the two numbers we are multiplying.) CLICK on the cell!

Because we have determined that B1 is an ABSOLUTE REFERENCE (see above), we must put a \$ sign in front of the B AND in front of the 1. Our formula now reads  $=\$B\$1*A2$

Hit Enter (Return on the MAC).

Click on cell B2 so we can extend its formula down the B column.

Move the cursor over the little blue box in the lower right corner of the box surrounding the cell. Be sure it changes into a CROSSHAIR then drag the little blue box as far down the column as

necessary. The cursor **MUST CHANGE TO A CROSSHAIR BEFORE YOU DRAG THE BLUE BOX DOWN!**

Now you cells should fill with the correct products.

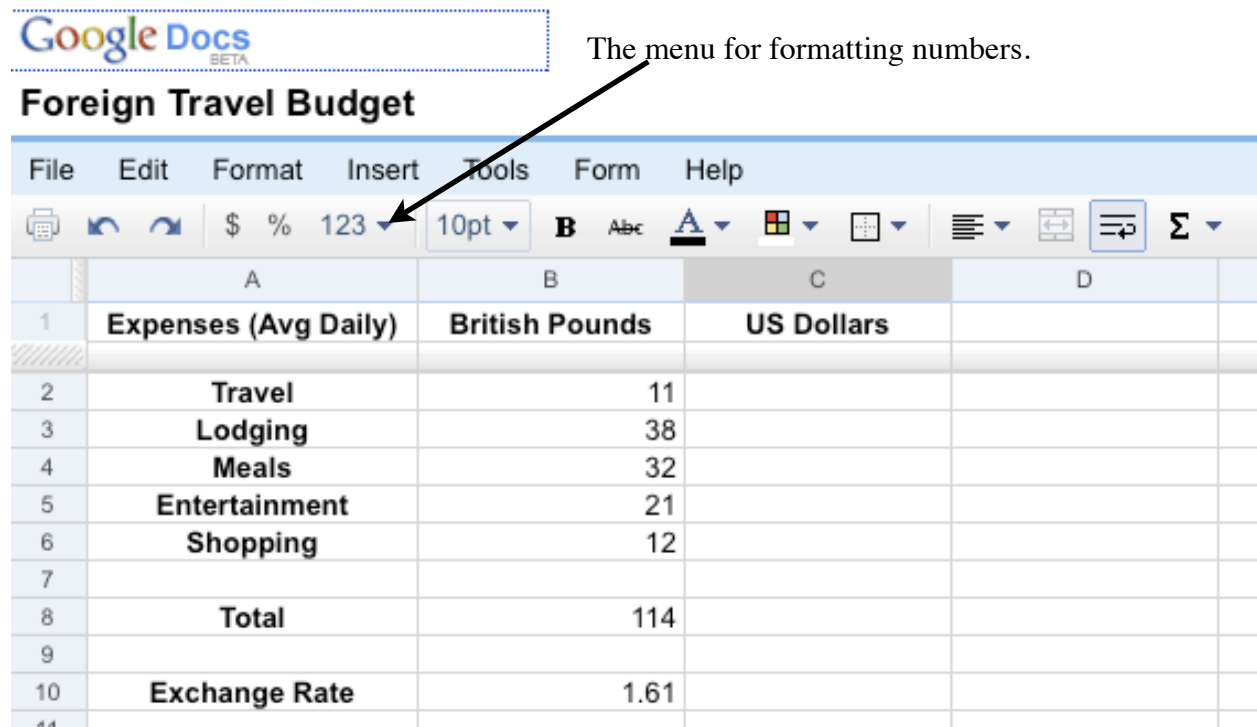
Repeat for the remaining columns.

You can test you table by changing any number in Row 1 or in Column A.

### Budget in Two Currencies

Now let's do another exercise in which we have to use an **ABSOLUTE REFERENCE**. Let's say we are going to England and want to set up a budget that will show the amounts in both US Dollars and the British Pound.

Set up the budget. Refer to the example shown below and change as necessary. You can place the budget on a spreadsheet by itself in any place on the spreadsheet that is workable. Only headings should be in Row 1. Note that Row 1 and Column A have been centered and made **BOLD** as in the Multiplication Table Example above.



The menu for formatting numbers.

	A	B	C	D
1	<b>Expenses (Avg Daily)</b>	<b>British Pounds</b>	<b>US Dollars</b>	
2	Travel	11		
3	Lodging	38		
4	Meals	32		
5	Entertainment	21		
6	Shopping	12		
7				
8	Total	114		
9				
10	Exchange Rate	1.61		

Now we are ready to convert the projected expenditures from British Pounds into US Dollars.

If your budget is located on the spreadsheet as is mine, click on cell C2.

Since 1 British Pound (£) is worth the number of US Dollars as shown in cell B10, we must multiply the number of British Pounds in each of the rows in our budget by the appropriate conversion rate. Now we must enter our formula.

Type = (Every formula/functions starts with an = sign)

Click on cell B2 (we are working on row 2). As we move down will we want the computer to use the contents of cells B3, B4, B5 etc? Yes, so these are Relative References and require no change in our formula.

Next type \* since we are multiplying.

Next CLICK on cell B10 since it contains the currency conversion ratio. Will the currency conversion ratio always be in this cell? YES. It is, therefore an ABSOLUTE REFERENCE and you must put \$ signs in front of the letter AND the number of the cell.

Our formula now reads: =B2\*\$B\$10

Hit Enter (Return)

Click on cell C2 where our formula we wish to extend down resides.

Make sure the cursor turns into a CROSSHAIR and drag the little blue box down as appropriate (in this example to cell C8).

Now let's insert the formula which will calculate the total. Click in cell B8. Insert a formula (see the multiplication table example for instructions). In this case we use the formula SUM.

When we insert the formula, the computer puts =SUM( into cell B10. We must now select the RANGE of cells to add. In this case we want to add cells B2 through B7. Yes, B7 is empty but we may want to use this row for another category of expenses (and, more importantly, to allow us to add any number of rows into our budget without having to change our formulas. Yes, the computer will make the appropriate change to the Absolute References you have used if you follow these instructions. The computer is *smart!*). Add adding nothing does not change our Total!

To select the range of cells to sum, click on cell B2 and drag down to cell B7. The computer adds B2:B7 to the formula. You must then complete the formula by adding the right parenthesis.

Our formula now reads =SUM(B2:B7).

Hit Enter (Return)

Our Total appears and the total dollars also appears.

Now let's format the cells with numbers in them.

First the numbers in cells B2 through B8. We need to select these numbers. The BEST METHOD for doing this is to use the CLICK/SHIFT CLICK method. Click in cell B2. Hold the SHIFT key down. Click in cell B8. The entire RANGE of cells (B2:B8) will be selected. Go to the menu item 123 as shown in the picture above. First click on the 2 decimals format (the third down). Then go down the list to find the More currencies selection. The British Pound (£) will be the second choice from the top in the More currencies sub menu.

The items in the US Dollar column will now have a £ in front of them because we have used British Pounds in our formula. We will change that soon. Click on cell B10 which holds the currency conversion ratio. This is what a single British Pound is worth in Dollars. So we need to format it as Dollars. Go back to the 123 menu. Go down until you find \$1,000.00 (dollar sign

and 2 decimals). Now the £ has disappeared from our US Dollar column and no symbol is there since our formula refers to a £ cell and a \$ cell. Select the RANGE of cells to format as dollars and format them as you did the currency conversion cell.

Now you can change the currency ratio and see what happens to your budget.

OR you can change the number of British Pounds in your budget to see what it would do to your \$ expenditures. YOU CANNOT change the amounts in the US Dollar column since they are CALCULATED AMOUNTS and you would destroy your formulas if you were to replace them with numbers.

**YOU MUST PRACTICE TO LEARN THESE PROCEDURES!**