

## How to Set up a Budget — Advanced Excel

A budget is probably the most important spreadsheet you can create. A good budget will keep you focused on your ultimate financial goal and help you avoid pitfalls like that adorable timeshare on Aruba. Budgets are surprisingly popular among rich people. You would think that wealthy people have so much money that they do not need a budget. But according to the book *The Millionaire Next Door* by Thomas J. Stanley and William D. Danko, most wealthy people in fact do have budgets, which may be part of the reason why they are rich in the first place.



In this project, we are going to set up not only a budget, but also a ledger to keep track of expenses and a budget report to show how our actual expenditures compared with our budget. This project presents an ideal case for taking advantage of some of the more advanced features of Excel. If you do this project, not only will you learn how to use some amazingly powerful features of Excel, you will also create an extremely useful spreadsheet, indeed one that may save you a lot of money in the future.

This project is divided into four parts: The Budget itself, a Ledger for keeping track of expenses, a Pivot Table for analyzing expenses, and a Budget Report for comparing actual expenses with the budgeted amounts. Although the parts build on each other, they can be done independently. You can skip a part if you want. Some advanced users may skip the first part, as it reviews a number of the more basic skills in Excel. Of course, if you are in a hurry, you can skip all the parts and simply use the budget file as a budget template. Just use the worksheets with the suffix “2”.

This project is designed for the latest version of Excel 2016 (Windows) under the Office 365 rental program as of July 2017. Most if not all the features used in this project are available, although the exact directions for their use may vary, especially on the Macintosh versions.

I hope you enjoy, learn from, and/or take advantage of the material here. If you spot a mistake or notice a possible improvement, please let me know.

— Rich Malloy

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## A. Set up a Budget

In this first part of our Advanced Budget Project, we are going to set up the actual budget. A budget is simply a plan, in this case a plan for getting and spending money. Like all plans, budgets do not fare extremely well when they come up against reality. But that may not entirely be the point. President and five-star general Dwight D. Eisenhower once said, “In preparing for battle I have always found that plans are useless, but planning is indispensable.”

Most budgets usually entail a whole year. To save space we are setting up a simple budget that covers only six months and a just handful of expense categories. For your own personal budgets, you can easily add additional months and categories to match your own needs.

### Skills Used:

- AutoFill
- AutoSum
- Apply Cell Styles
- Modify Cell Styles
- Format as Table
- Absolute Cell References
- Goal Seek

### Procedure:

#### Prepare the Budget File:

- Open the file: [advbudget.xlsx](#)
- Go to the **Budget** sheet.

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	A	B	C	D	E	F	G	H	I
1	Allen Family Annual Budget - 2017								
2									
3	<b>Income</b>								
4	<b>Person</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Total</b>	<b>% of Total</b>
5	Rachael	2,600	2,600	2,600	2,600	2,600	2,600	15,600	59.1%
6	Jeremy	1,700	1,700	1,700	1,700	1,700	2,300	10,800	40.9%
7	<b>Total</b>	<b>4,300</b>	<b>4,300</b>	<b>4,300</b>	<b>4,300</b>	<b>4,300</b>	<b>4,900</b>	<b>26,400</b>	<b>100.0%</b>
8									
9	<b>Expenses</b>								
10	<b>Category</b>	<b>Jan</b>						<b>Total</b>	
11	Rent	2000	2000	2000	2000	2000	2000		
12	Auto Loan	300	300	300	300	300	300		
13	Utilities	250	250	250	200	150	150		
14	Groceries	900	900	900	1100	900	900		
15	TV	150	150	150	150	150	150		
16	Misc	250	250	400	500	200	400		
17									

As you can see, much of the budget is already done. I've included some sample categories and data, and you can easily substitute this material with your own categories and data.

To complete our budget, we will review some basic skills in Excel. One of the skills we will use is the formatted Excel table. Not only will this make our data look really nice, but it will also provide some additional depth will be very handy.

If you would prefer to skip these steps, go to **Part B: The Ledger**.

### Add the Additional Month Names:

- Click the cell containing **Jan**.
- Locate the **Fill** handle at the lower right corner of the active cell.
- Drag the **Fill** handle to the right, across the five adjacent cells to fill in the subsequent months.

Expenses									
Category	Jan							Total	
Rent	2000	2000	2000	2000	2000	2000	2000		
Auto Loan	300	300	300	300	300	300	300		

- Those five cells will be filled with the months **Feb** through **Jun**.

### Calculate the Totals:

- Select all of the cells in the Total column by clicking in the middle of cell H11 and dragging down to cell H16.
- Click the **AutoSum** button on the right side of the **Home** tab.
- Sums will appear in the **Total** column.

### Format Using Cell Styles:

- Click cell **A1**.
- In the **Home** tab, display the cell styles gallery by clicking the **More** button (  ) at the right of the **Styles** group. (On smaller screens, click the button **Cell Styles**.)

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- In the **Sale Styles** gallery, click **Title**.
- Click the cell containing the label **Expenses**.
- In the **Sale Styles** gallery, click **Heading 1**.
- Right-click the **Heading 1** Cell Style and change the format to **Italic**.

### Set the Expense Budget Range as a Formatted Table:

A formatted Excel Table not only looks good, but it also has special powers that make certain tasks easier. Creating a Table is often very easy: Just click any cell in the table range. In this case, however, we have two rows of labels at the top. To keep Excel from being confused by this slightly complex structure, we will manually select the cells for the table.

- Click cell **A10** and drag to select the range **A10:H16**.
- Click: **Home > Format as Table**.
  - A gallery of table formats will appear.
- Choose a desirable format in the **Medium** group.
- To remove the unnecessary filter buttons in the column header cells, click the **Data** tab and then click the **Filter** button to toggle the filters off.
- Click the **Table Tools Design** tab, which appears whenever you select a cell in a formatted table.
- On the left side of the **Table Tools Design** tab, change the **Table Name** to **ExpBudget**.

### Add a Total Row to a Formatted Table

One of the several nice features of an Excel formatted table is the ability to create a total row.

- Click any cell in the expense budget table.
- Click the tab for **Table Tools Design**.
- Click the checkbox for **Total Row**.
- A new row will appear at the bottom of the budget with the label **Total**.
- Click the **Total** cell in the **Jan** column.
- A list button will appear at the right.
- Click the list button and choose **Sum**.
- A total will appear in the **Jan** column.
- Click the **Fill** button in the **Jan** Total cell and drag it to the right to fill the other cells in the Total row.
- Of course, now that we have our total expenses as well as our total income, we must calculate our Net Income.
- Click the **Jan** cell in the **Net Income** row.
- Type: =
- Click the cell containing the total income for **Jan**.
- Type: -
- Click this cell containing the total expenses for **Jan**.
- Press the **Enter** key.
- Use the **Fill** handle to copy this formula to the other cells in this row.

- Note that the formula we created referred to the names of the cells, rather than explicit references, such as **B7**. This is another benefit of using formatted Excel Tables.

### Add a Column to Calculate % of Total.

Although not usually necessary for a budget, it could be useful to see how the total of each category compares with the total of all expenses.

- Click cell **I10** (to the right of the cell that reads **Total**).
- Enter: **% of Total**
  - Note that a new formatted column appears. (Yet another benefit of, well, you know what.)
- Click cell **I11**.
- Type: **=**
- Click cell **H11**.
- Type: **/**
- Click cell **H17**
- Press Enter.
  - Note again that Excel used names for the selected cells in the formula.
  - Also note that the formula is automatically copied to the rest of the cells in the column — and we didn't have to use an absolute reference in the formula. Because Excel used named cells, and absolute reference was unnecessary.
- Select and format all the cells as percentages using the **%** button in the **Home** tab.
- Copy the Total in cell **H17** to cell **I17**.

### Insert a Row for Savings.

We are going to add a new category for Savings for two reasons: First, it is always good to set aside some money for a rainy day. And second, watch how a formatted Excel Table handles insertions and absolute cell references.

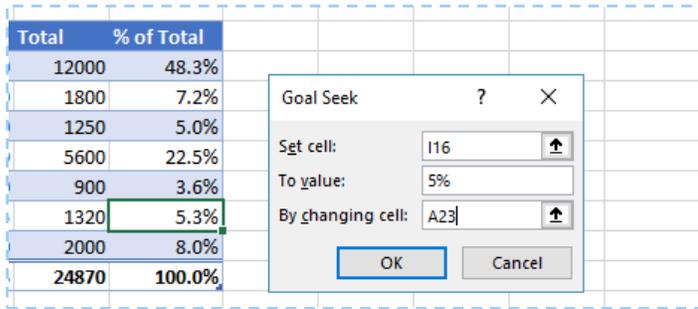
- Right-click the row label **16** and choose Insert.
- Note that a new row appears and the banding adjusts automatically.
- In cell **A16** enter the label: **Savings**
- Create a formula in cell **B16** to calculate the savings amount based on the percentage in cell **A23** and the **Total Income** in cell **B7**:
  - **= \$A\$23 \* B7**
- Copy the formula to the cells for the other months (excluding columns **H** and **I**).
- If necessary, copy the formulas in cells **H15** and **I15** to the cells in row 16.

### Use Goal Seek to Fine-Tune the Savings Amount:

We have arbitrarily set our savings target as 5% of our total income. What if we wanted to change that slightly so that our target savings rate would be 5% of total *expenses*? That would be a difficult calculation, requiring several trials and errors. But we can easily make this calculation using Excel's powerful **Goal Seek** tool.

- Select cell **I16**.
- Click the **Data** tab.
- Click the button: **What If Analysis**
- Click: **Goal Seek...**
- Click the box for **To value**:
- Type: **5%**

- Click the box labeled: **By changing cell:**
- Type **A23**



- Click **OK**
- Note that the cell **A23** changes to a value slightly lower than 5%.

That’s it! Our budget is finished. The only thing left is to adjust all the number formats as desired. Speaking of numbers, be patient with me while we use these sample numbers and expense categories. When we are all finished, you can start again with your actual expense categories and amounts, and then you’ll be on the way to Millionaire Land, or at least to some rational monetary management.

After you are finished, take a close look at your budget and compare it with the sheet **Budget 2**.

In the next part of the project, we will create a Ledger to keep track of our actual expenses.

## B. The Ledger

Having a budget is a great first step. Now we must follow the budget, or at least try to. This means categorizing and adding up perhaps hundreds of expenses throughout the year. As we shall see later, Excel has special functions that will make categorizing and adding a breeze. But first we have to record all the expense data into a table we call the Ledger.

A Ledger is simply a record of all income and expenses. In this project, we will create a ledger for expenses. Later the fun will begin when we conjure up some special magic in Excel to see if we are on — or off — budget.

### Skills Used:

- Format as Table
- Data Validation with a List
- The SUBTOTAL function
- Slicers

### Procedure:

#### Open the Spreadsheet:

- If it is not open already, open the file: [advbudget.xlsx](#)
- Go to the **Ledger** sheet.

#### Set the Ledger Range as a Formatted Table.

- Click any cell in the ledger range of cells.
- Click: **Home > Format as Table**.

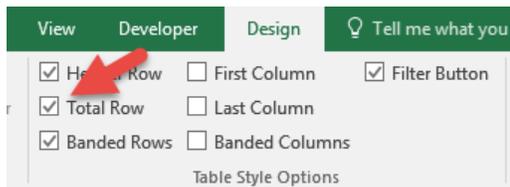
- A gallery of table formats will appear. Again, note that on some large displays, one row of the gallery will already be displayed. You can then display the whole gallery by clicking the More button at the bottom right of the table format buttons.
- Choose a desired format in the Medium group.
- Click the **Table Tools Design** tab.
- On the left side of the **Table Tools Design** tab, change the **Table Name** to **ExpLedger**.

### Format the Dates and Dollar Amounts

- Select all the date cells in column **A**.
  - Shortcut: Click the first cell. Then press Ctrl + Shift + ▼ (the down arrow key).
- Right-click one of the cells and choose **Format Cells...**
- In the **Format Cells** dialog box, be sure the **Number** tab is selected.
- Choose the **Date** category and the format: **3/14**.
- Select all the number cells in column **D**.
- Right-click one of the cells and choose **Format Cells...**
- In the **Format Cells** dialog box, be sure the **Number** tab is selected.
- Choose the **Number** category.
- Set the format with 2 decimal places and use the 1000 separator.

### Add a Total Row.

- Click the **Table Tools Design** tab.
- Click the check box for **Total Row**.



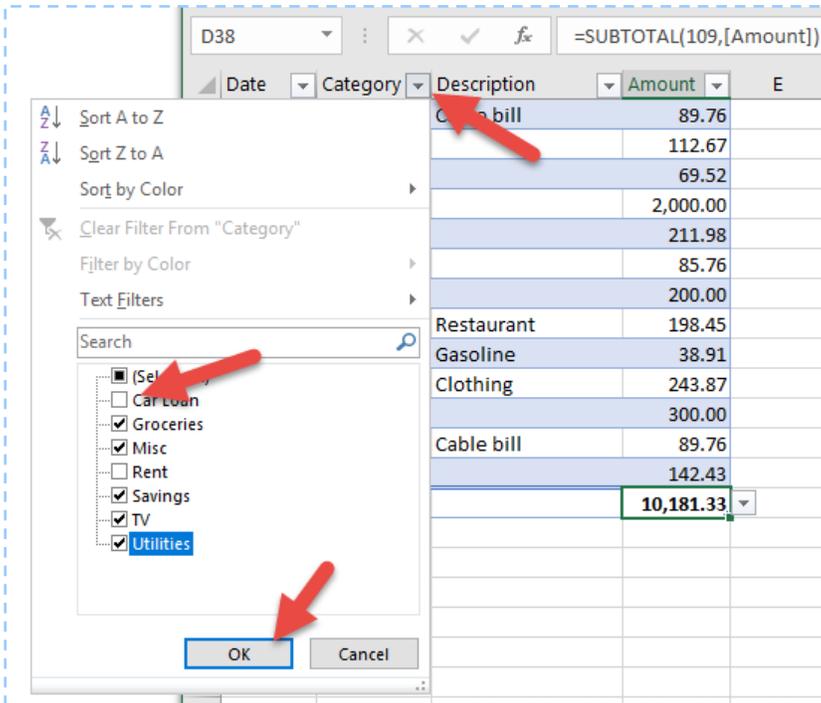
- A cell with a **Sum** formula should appear at the bottom of the **Amount** column.

3/27 TV	Cable bill	89.76
3/14 Groceries		142.43
<b>Total</b>		<b>10,181.33</b>

### Filter the Table by Category and Date.

- Unlike the case with our Budget, the filter buttons in our Ledger actually do serve a purpose.
- Click the filter button for **Category**.
- Clear some of the **Category** check boxes and click **OK**.

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- Note how the **Total** changes.
- Click the filter button for **Category** again.
- Click the check box for **Select All** and click **OK**.

### Add New Entries at the Bottom of the Table.

The Total row is handy, but it makes it difficult to add new rows to the bottom of the table. As we spend more money throughout the year, we will unfortunately be adding quite a few more rows to our table. We certainly want to make that process as easy as possible, which means we must remove the Total row. But, we can replace it with something better.

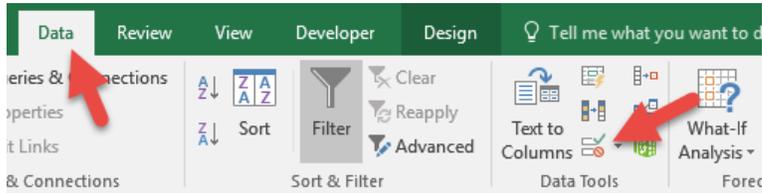
- Click the **Table Tools Design** tab.
- Clear the check box for **Total Row**.
- Click the empty cell under the last date in the table.
- Type the date **4/15** and press **Tab**.
- Note that a new formatted row appears at the bottom of the table.

### Use Data Validation to Make it Easy to Add Categories:

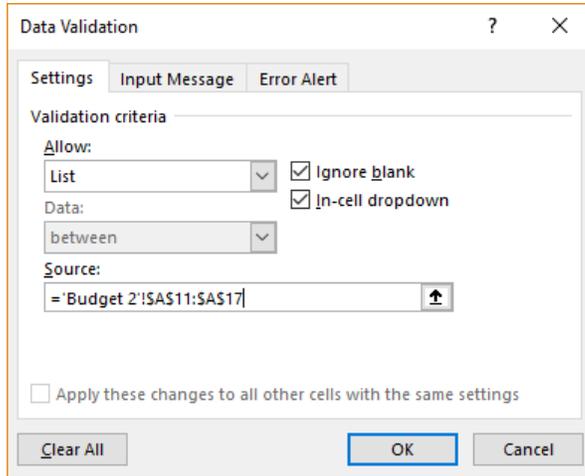
Now it is easy to add an expense to your table, but if you accidentally misspell a category, it could cause problems later in our Budget Report. To keep that from happening—and to make it much easier to enter categories—we are going to use a secret Excel tool called Data Validation. With this tool, you can enter a category simply by choosing it from a drop-down list.

- Select all the cells in the **Category** column (excluding the column header at the top).
  - Shortcut: Click the first cell. Then press **Ctrl + Shift + ▼** (the down arrow key).
- In the **Data** tab, click the **Data Validation** button.

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- In the **Allow** box, click the list arrow and choose **List**.
- Click in the **Source:** box, and then click the **Budget 2** sheet tab.
- Select the expense category names in column A (excluding the column header at the top and the “Total” at the bottom).



- Click **OK**.
- Click the **Category** cell in the new row you added.
- A drop-down list should appear.
- Click any of the options in the list.

### Use a Dynamic List with Data Validation:

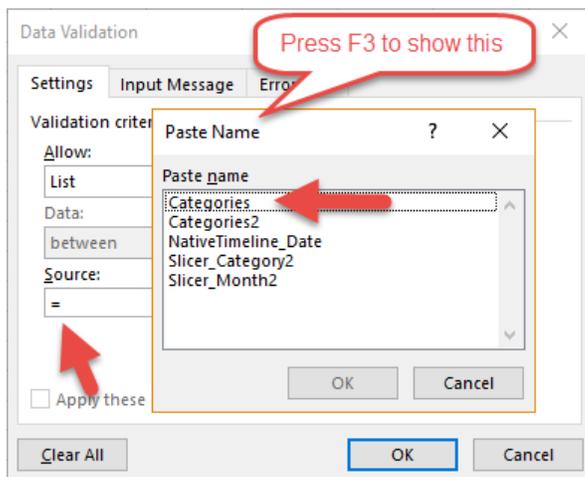
The list we just created with Data Validation is fantastic, but it is static. It simply refers to explicit cell references, A11:A17. If we later add a new category at the bottom of our budget, that new category might be outside this cell range, and then might not automatically appear in our data validation list. But, don't worry. One of the great things about formatted Excel tables is that they are dynamic. We can make use of this by creating a dynamic named range, which we can then use in our data validation list.

- Click the **Budget 2** sheet tab.
- In column **A** select the category names, excluding the column header at the top in the Total label at the bottom.
- In the **Name Box** at the upper left, type **Categories**

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Category	Jan	Feb	Mar	Apr	May	Jun	Total	% of Total
Rent	2,000	2,000	2,000	2,000	2,000	2,000	12,000	48.4%
Auto Loan	300	300	300	300	300	300	1,800	7.3%
Utilities	250	250	250	200	150	150	1,250	5.0%
Groceries	900	900	900	1,100	900	900	5,600	22.6%
TV	150	150	150	150	150	150	900	3.6%
Savings	202	202	202	202	202	230	1,239	5.0%
Misc	250	250	400	500	200	400	2,000	8.1%
<b>Total</b>	<b>4,052</b>	<b>4,052</b>	<b>4,202</b>	<b>4,452</b>	<b>3,902</b>	<b>4,130</b>	<b>24,789</b>	<b>100.0%</b>

- The name **Categories** now refers to the dynamic range in the Expense Budget table. As new categories are added to the budget, they will automatically be included in the named range **Categories**.
- Click the tab for the **Ledger** sheet.
- Select all the categories in the **Category** column, excluding the column header.
- In the **Data** tab, click the **Data Validation** button.
- In the **Allow** box, click the list arrow and choose **List**.
- Click in the **Source:** box, type = and then press the **F3** key.
- A list of names will appear.



- Click **Categories**.
- Click **OK**.

Now when you click in any of the Category cells, a list arrow will appear at the right. If you click the arrow, you can choose from all the allowable categories.

### Add SUM and SUBTOTAL Formulas above the Table.

Instead of putting a total row at the bottom of our table, it is sometimes better to put the total at the top of our table, where it is easier to see.

- Insert three blank rows at the top of the table.
  - Right-click the row label **3** and choose **Insert**.
  - Press the function key **F4**.

- Press the **F4** key again to repeat the action once more.
- In cell **C4** enter a label: **Grand Total**
- in cell **D4** enter a formula that will sum up all amounts.
  - Formula: **= SUM(ExpLedger[Amount])**
  - Note that as you type the names, Excel will automatically complete the names.
- In cell **C3** enter a label: **Filtered Total**.
- In cell **D3** enter a formula that will add up the displayed amounts.
  - Formula: **= SUBTOTAL(109, ExpenseLedger[Amount])**
  - The code **109** tells Excel to do a conditional **SUM**, adding up only those numbers that are displayed by any filters that happen to be in place. [Click here to see all the possible codes.](#)
- Use the Format Painter button to copy the format from cell D4 to D3.
- Use the filter buttons to filter the table by **Category** and notice how the totals change.

2				
3			Filtered Total	4,181.33
4			Grand Total	10,181.33
5				
6	Date	Category	Description	Amount
8	1/4	Groceries		87.95
9	1/7	Misc	Clothing	67.32
10	1/10	Utilities		221.21

### Add a Column at the Right to Show the Month Name.

To see if we are “on budget” we will need to filter our data not just by Category but also by month. The easiest way to do that is to add another column to our ledger table that will display the month of each expenditure.

- Click the cell to the right of the column header **Amount**.
- Type: **Month**
- Click the cell below the label **Month**.
- Type: **= text(**
- Click the cell containing the date in that same row.
- Enter: **, "mmm")**
- The code **mmm** instructs **Excel** TEXT function to display the three-letter abbreviation of each month.

5					
6	Date	Category	Description	Amount	Month
8	1/4	Groceries		87.95	=text([@Date],"mmm")
9	1/7	Misc	Clothing	67.32	
10	1/10	Utilities		221.21	

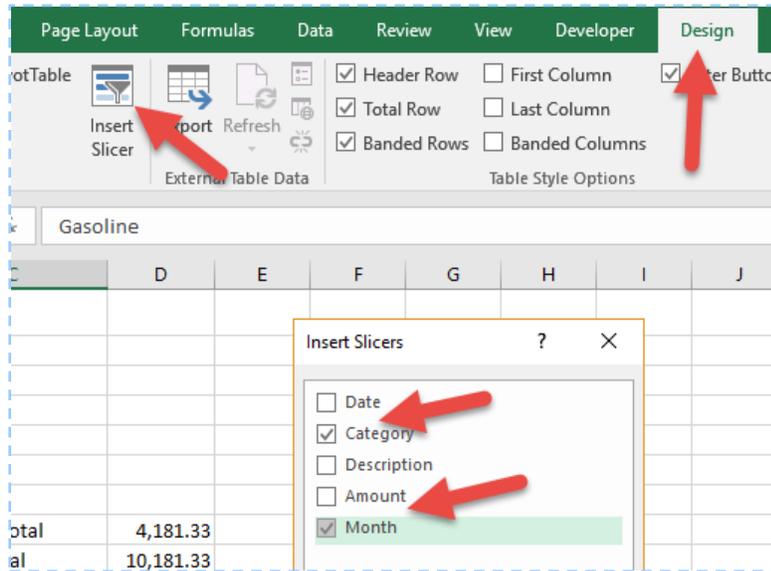
### Add Slicers to Filter the Table.

Filter buttons are nice, but Microsoft has recently provided an amazing feature that makes filtering data immeasurably easier: Slicers.

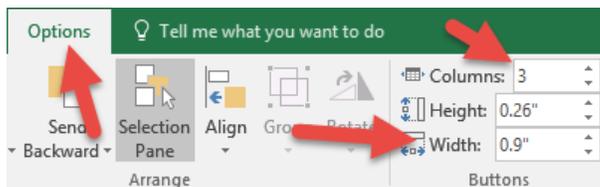
- Right-click the row label **3**.
- Choose: **Insert**
- Use the **F4** key to repeat the above 5 times.
- Add a **Slicer** for **Category** and **Month**.
  - Click any cell in the Expense Ledger table.

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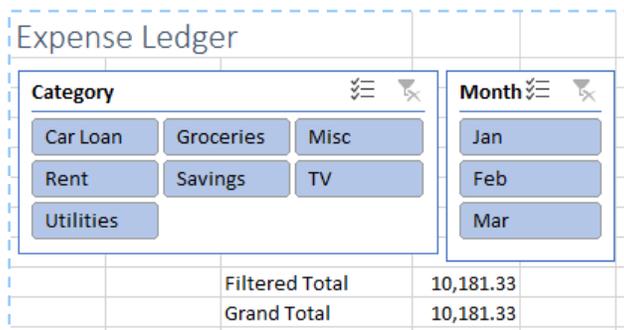
- In the **Table Tools Design** tab, click **Insert Slicer**
- Click the checkboxes for **Category** and **Month**.



- Two rectangles will appear on the spreadsheet.
- Use the sizing handles of the **Month** Slicer to adjust the size so that it is only large enough to display the three buttons in the names of the months.
- Click the **Category** Slicer.
- Click the **Slicer Tools Options** tab.
- Click the **Columns** box and type **3**
- Adjust the width of the buttons to **0.9 inch**.



- Use the sizing handles of the **Category** Slicer to remove any wasted space. Drag the slicers to the empty space above the table.



- Click one of the **Category** buttons and one of the **Month** buttons.
- Note how the display and the total changes. Use the **Control** and **Shift** keys to display more than one **Category** or **Month**.

That's it! Our Ledger is done. It should look pretty much like the ledger on the sheet Ledger 2. Now comes the hard part: recording all of our expenditures. The job will be a lot easier knowing that we are taking advantage of some really powerful Excel features!

## C. Use a PivotTable to Summarize Data

In the first two parts of our Advanced Budget Project for Excel 2016 in Windows, we set up the Budget itself and then created a Ledger table to keep track of our expenses. In the Ledger table, we set up filters using Excel's Slicers so that we could see the total expenditures for each expense category and each month. The Slicer buttons are slick, but it will be tedious to use them to examine every single category and every month. There must be a better way.

And there is, of course. The fastest and easiest way to summarize a table is to use Excel's Pivot Tables. This amazing feature has somehow obtained the reputation of being difficult, but I will let you in on a secret: Even though Pivot Tables are incredibly powerful, they are also surprisingly easy.

In this third part of our Advanced Budget project, we will set up a Pivot Table to see how the expenditures in our Expense Ledger are doing. In just a handful of mouse clicks, we'll be able to peruse a summary of total expenses for *all* categories and months at the same time. We'll also use two Excel features to give us a visual summary of our expenditures. Sparklines will show us a basic look at how our expenditures vary month to month, while a Pivot Chart will give us a much more detailed look.

Once you create a Pivot Table, you will be amazed at how easy it was. But don't tell anyone. Let everyone continue to believe that this feature is too difficult for most people. And, of course, they will all be very impressed when you create them so quickly.

### Skills Used:

- Creating a Pivot Table
- Formatting a Pivot Table
- Using Sparklines
- Creating a Pivot Chart

### Procedure:

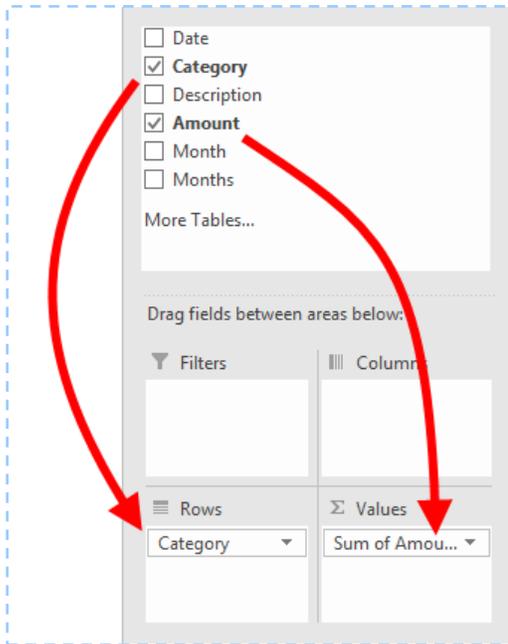
#### Open the Spreadsheet:

- If it is not open already, open the file: [advbudget.xlsx](#)
- Go to the **Ledger 2** sheet.

#### Insert a Pivot Table:

Okay, here we go. Watch how easy it is to create a Pivot Table:

- Click somewhere in the Ledger table.
- Click **Insert > Pivot Table**.
- Click the **OK** button to set the Pivot Table on a new sheet.
- A new sheet will appear, with a strange design on the left hand and a list of column headers (or fields) on the right. Below the fields, are four boxes. All we need to do now is to move the right field into the right box.
- Drag **Category** into the **Rows** box.
- Drag **Amount** into the **Values** box.



- There you have it! You've create a Pivot Table. Now let's make it even better.
- Drag **Month** into the **Columns** box.

	A	B	C	D	E
1					
2					
3	Sum of Amount	Column Labels			
4	Row Labels	January	February	March	Grand Total
5	Auto Loan	300	300	300	900
6	Groceries	303.72	202.51	410.38	916.61
7	Misc	106.23	226.34	481.23	813.8
8	Rent	2000	2000	2000	6000
9	Savings	200	250	200	650
10	TV	89.76	89.76	89.76	269.28
11	Utilities	221.21	198.45	211.98	631.64
12	<b>Grand Total</b>	<b>3220.92</b>	<b>3267.06</b>	<b>3693.35</b>	<b>10181.33</b>
13					

- Let's stop and admire what we have done here: With a few mouse clicks we have sliced and diced our Ledger data by two different criteria. Amazing.

### Format the PivotTable:

We need to make some cosmetic improvements:

- Click any of the number cells in the Pivot Table.
- Click the **PivotTable Tools Analyze** tab.
- On the left of the ribbon, click **Field Settings**.
- Click the button **Number Format**.
- Select a **Number** format, with **0 Decimal places** and a **1000 Separator**.
- Click **OK** twice.
- Click the **PivotTable Tools Design** tab.
- Click: **Report Layout**.
- Click: **Show in Outline Format**.
- The PivotTable now shows titles for the table axes.

Sum of Amount	Month			
Category	January	February	March	Grand Total
Auto Loan	300	300	300	900
Groceries	304	203	410	917
Misc	106	226	481	814
Rent	2,000	2,000	2,000	6,000
Savings	200	250	200	650
TV	90	90	90	269
Utilities	221	198	212	632
<b>Grand Total</b>	<b>3,221</b>	<b>3,267</b>	<b>3,693</b>	<b>10,181</b>

**Update the PivotTable:**

A Pivot Table is great, but does it immediately respond to new data?

- Rename the sheet tab for your Pivot Table as, well, **Pivot Table**
- Click the tab for **Ledger 2** (*not* **Ledger**).
- Add a new expense entry to the bottom of the Expense Ledger.
- Click the tab for the **Pivot Table**.
- Note that the Pivot Table does not automatically recalculate.
- Right-click any cell in the Pivot Table and choose **Refresh**.
- The table will now update itself.

**Insert Sparklines to Analyze Data:**

Sparklines are tiny graphs that reside inside individual cells. They can give you a quick visual cue of trends in your data.

- Click cell **F4**.
- Enter: **Trend**
- With **Format Painter**, copy the format from **E3:E4** to **F3**.
- Click cell **F5**.
- In the **Sparklines** group on the **Insert** tab, click the button: **Column**
- In the **Data Range** box that appears, type **B5:D5**
- Click **OK**.
- Copy cell **F5** down to the cells below it.
- With **Format Painter**, copy the format of cell **E12** to **F12**.

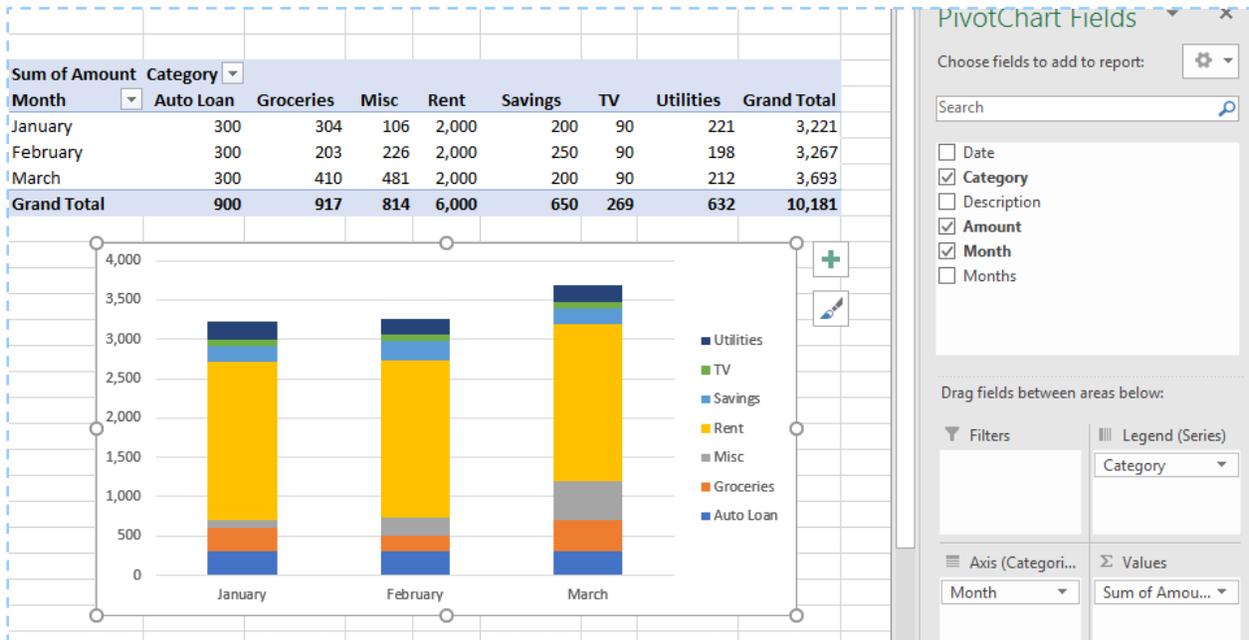
Sum of Amount	Month				
Category	January	February	March	Grand Total	Trend
Auto Loan	300	300	300	900	
Groceries	304	203	410	917	
Misc	106	226	481	814	
Rent	2,000	2,000	2,000	6,000	
Savings	200	250	200	650	
TV	90	90	90	269	
Utilities	221	198	212	632	
<b>Grand Total</b>	<b>3,221</b>	<b>3,267</b>	<b>3,693</b>	<b>10,181</b>	

- With the Sparklines, you can quickly see that there were big jumps in March for the Groceries and Misc. categories.

**Insert a Pivot Chart (Stacked Column) to Analyze the Data More Precisely:**

One of the advantages of a Pivot Table is that you can quickly and easily create a chart. Yes, it is unlikely that you will ever need to create a chart of your expenses, but if this were a table of business expenses, it might prove useful.

- When we create a chart, the Sparklines will be unnecessary, and they might get in the way. So, let's remove them by deleting column F.
- Click any of the cells in the Pivot Table.
- Click the **PivotTable Tools Analyze** tab.
- On the right of the ribbon, click **PivotChart**.
- Choose a **Stacked Column Chart**.
- In our chart, the Months are listed in the Legend. But chronological data is usually placed on the horizontal axes. Let's fix it.
- Drag the **Category** field from the **Legend (Series)** box to the **Axis (Categories)** box.
- Drag the **Month** field from the **Axis (Categories)** box to the **Legend (Series)** box.
- You have just pivoted the table (and the chart) with two mouse clicks! That's why they call it a Pivot Table. Now the chart shows the data chronologically by month.
- Move the chart below the Pivot Table and resize it to fit the space.
- In the **PivotChart Tools Analyze** tab, click the button on the right: **Field Buttons**
  - This removes the headings above the two axes and the legend.



Your Pivot Table is finished. If you've done everything right, it should look like the table in the worksheet PivotTable 2. The table provides an excellent summary of our expenses for the last three months. With the pivot table, the Sparklines, and/or the pivot chart you can quickly analyze the category expenses month to month or with the other expenses.

The next step, obviously, is to compare these actual expenses with our budget. Unfortunately, the Pivot Table now presents us with two problems.

First, unlike Excel formulas, Excel charts, and pretty much everything else in Excel, Pivot Tables do not automatically recalculate when the underlying data change. You can verify this yourself: Just add a new expenditure to the bottom of the Expense Ledger and then look back at the Pivot Table. Incredibly, there is no change. Pivot Tables keep a static version of the data, which is a fancy way of saying that they are taking a nap. To wake the Pivot Table up, as it were, you need to Refresh it. Just right-click any cell in the table and choose Refresh. That is not too difficult,

but the likelihood of forgetting to Refresh is too real, which could cause you to miss sudden pattern changes in your expenditures.

The second problem is that the structure of the Pivot Table is too rigid to be used in our Budget Report. To compare actual expenditures with our budgeted amounts, we want to be able to intersperse our actual columns with our budget columns. So, let's try it: Insert a column in the Pivot Table. Excel won't let you. But Excel does provide us with an excellent alternative, which we will explore in the next part of our Advanced Budget project.

## D. Create a Budget Report

Now we are at the last part of our four-part Advanced Budget Project. This is the crucial part where we find out how we are doing relative to our budget. In the first three parts, we created the Budget itself, a Ledger to keep track of our expenditures, and a Pivot Table to summarize our actual expenditures.

In this part, we will set up the all-important Budget Report, that is, a comparison of budgeted versus actual expenses. After going through the trouble of recording all of our expenses, this Budget Report will tell us if we are on budget or not. The pivot table we created in the last part already gives us a good summary of our expenditures. Ideally, we would like to insert some columns into the pivot table where we could display the budget estimates right next the actual expenses. Unfortunately, pivot tables are too inflexible for this. We could copy the pivot table values into a second table that would be more flexible, but this starts getting complicated real fast. Fortunately, there is much more direct way.

If we want to compare our actual expenditures with our budget, we need to summarize our actual amounts, and the best way to do that is with an Excel function called SUMIFS. You may already be familiar with the SUMIF function, which is handy for adding up numbers that meet a certain condition. And yes, if all we wanted was to find the total expenses in each category and did not care about the month, the simple SUMIF function would be fine.

But for our summary, we want to add up the expenses based on *two* conditions, Category and Month. For example, we want to see the total Groceries expenses for each individual month: Jan, Feb, and Mar. The SUMIFS function is perfect for this. Unlike the simple SUMIF function, it can add up items according to any number of different conditions. And unlike the pivot table, the SUMIFS function updates itself automatically. Think of that last “S” in SUMIFS as standing for “Super”.

Because of space considerations, we will do a Budget Report only for the first quarter of the year. The procedures for the other quarters are exactly the same.

### Skills Used:

- The SUMIFS function
- Linking cells to other sheets using a formatted table
- Conditional Formatting
- Cell Styles

### Procedure:

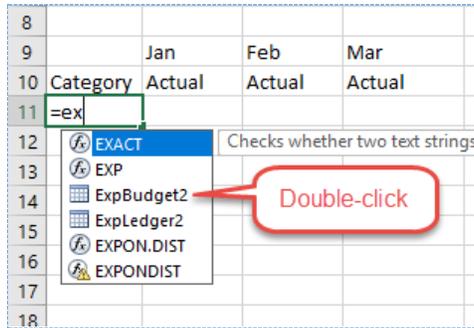
#### Open the Spreadsheet:

- If it is not open already, open the file: [advbudget.xlsx](#)
- Go to the **1Q Report** sheet.

#### Set up the Report Worksheet.

All we have in the **1Q Report** are a few labels in rows 9 and 10. The first thing we need to do is to add the budget categories to column A. Instead of copying and pasting the categories from the Budget sheet, we'll use a formula to link the cells to the Budget sheet. And, because we used a formatted Excel table on our Budget sheet, we can use meaningful range names in our formulas rather than cryptic explicit references such as “Budget 2!A11”. Note, however, that for these formulas to work, the items in the budget report sheet have to be on the same rows as they are in the Budget sheet. (That explains why the mystery of why there are so many empty rows above our budget report.)

- Click cell **A11**.
- Type: **=ex**
- In the drop-down list, double-click **ExpBudget2**



- Type: **[c**
- In the drop-down list, **Category** should be selected.
- Press: **Tab**
- *Note that you can select an item in a drop-down list either by double-clicking it, or single-clicking it and pressing the **Tab** key.*
- Type: **]**
  - The formula should be: **=ExpBudget2[Category]**
- Press: **Enter**
- Copy the contents of **A11** to cells **A12** through **A17**.

8				
9		Jan	Feb	Mar
10	Category	Actual	Actual	Actual
11	Rent			
12	Auto Loan			
13	Utilities			
14	Groceries			
15	TV			
16	Savings			
17	Misc			
18				

*Note that the formula in each of the cells A11:A17 is the same. Excel determines which label to put in a cell by examining the formula's row number and finding the same row in the Budget sheet..*

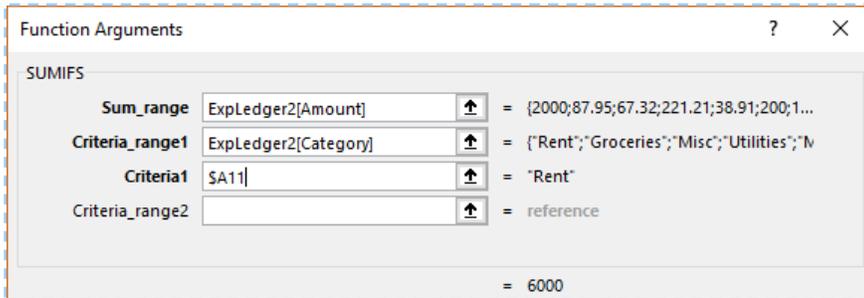
### Use the SUMIFS Function to Add up Expenses for Each Category.

Now we need to get a summary of our actual expenses from our Ledger sheet. In the previous section of this project, we used a Pivot Table to do this. The Pivot Table was quick to set up, but not flexible enough for our budget report. So, instead of a Pivot Table we will use the SUMIFS function, a super powerful relative of the SUMIF function.

Let's ease into the SUMIFS function. This powerful function can add up amounts based on several criteria. But in our first test run with it, we will use only one criterion.

- Click cell **B11**.
- Type: **=sum**
- In the list of functions that appears, double-click **SUMIFS**.

- Click the **Insert Function** button (*fx*).
- Click the box **Sum\_range**.
- Click the tab **Ledger 2**.
- Select all the cells in the **Amount** column, excluding the column header.
  - Shortcut: Click the first cell. Then press **Ctrl + Shift + ▼** (the down arrow key).
- Click the box **Criteria\_range1**.
- Click the tab **Ledger 2**.
- Select all the cells in the Category column, again excluding the column header.
- Click the box **Criteria1**.
- In the Report sheet, click cell **A11**.
- Press the function key **F4** three times to insert a **\$** in front of the **A** (as in **\$A6**).



- Click **OK**.
  - The formula should be:  
**=SUMIFS(ExpLedger2[Amount], ExpLedger2[Category], \$A11)**
- Click and drag down the fill handle of cell **B11** to fill the other cells in the column down to **B17**.

8				
9		Jan	Feb	Mar
10	Category	Actual	Actual	Actual
11	Rent	12045		
12	Auto Loan	900		
13	Utilities	631.64		
14	Groceries	916.61		
15	TV	459		
16	Savings	650		
17	Misc	813.8		
18				

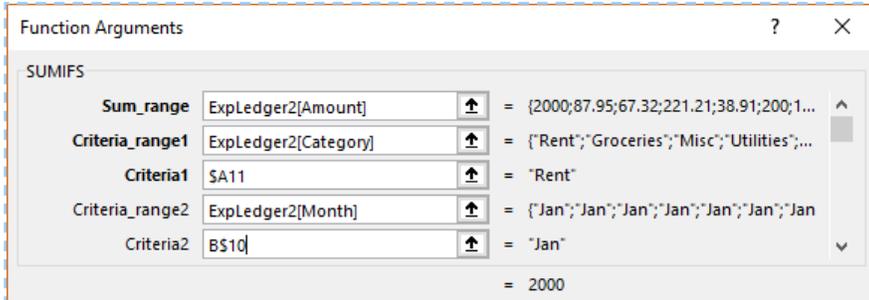
The **Jan** column now shows total actual expenses for each category — and for *all* months.

### Modify the SUMIFS Function to Add up Expenses for Each Category *and* Each Month:

As you can see, the SUMIFS function in the Jan column does a good job of adding up the expenses for *all* the months. Now let's adjust the function so that it adds up the expenses only for Jan.

- Click cell **B11**.
- Click the **Insert Function** button (*fx*).
- Click the box **Criteria1**.
- A new optional box will appear.
- Click the box **Criteria\_range2**.

- Click the tab **Ledger 2**.
- Select all the cells in the **Month** column, excluding the column header.
  - Shortcut: Click the first cell. Then press **Ctrl + Shift + ▼** (the down arrow key).
- Click the box **Criteria1**.
- In the **1Q Report** sheet, click cell **B10**.
- Press the function key **F4** twice to insert a **\$** in front of the **4** (as in **B\$10**).



- Click **OK**
  - The formula should be:
 

```
=SUMIFS(ExpLedger2[Amount], ExpLedger2[Category], $A11, ExpLedger2[Month], B$9)
```
- Click and drag down the fill handle of cell **B11** to fill the other cells in the column.
- The **Jan** column now shows the summary of expenses for January.
- Copy the formulas in the **Jan** column and Paste them into the **Feb** and **Mar** columns.
  - **Important Note:** Do NOT use the **Fill** button to copy the formulas to the other months. If you do, the cell references in the **Ledger 2** formatted table will shift to the right and will point to the wrong columns. Instead, if you copy and paste the formulas, the cell references will act as absolute references and will continue to point to the correct columns.

8				
9		Jan	Feb	Mar
10	Category	Actual	Actual	Actual
11	Rent	2001	2003	2005
12	Auto Loan	300	300	300
13	Utilities	221.21	198.45	211.98
14	Groceries	303.72	202.51	410.38
15	TV	151	153	155
16	Savings	200	250	200
17	Misc	106.23	226.34	481.23
18				

*Note that in the dummy data in this project I used slightly different amounts. See the Rent and TV categories, which would normally be constant for each month. This makes it easy to check that the right data is going into the right cells.*

### Link in the Budget Amounts for Comparison with the Actual Expenses:

Just as we did with a Pivot Table in the last part of this project, we now have a summary of expenses broken down by both Category and Month. But, with the SIMIFS function, we now have two advantages over a Pivot Table: First, the formulas update automatically as soon as the data in the Ledger changes. And second, we can now shift the columns so that we can easily compare the Actual expenses with the Budget for each month.

But first we have to bring in the budget amounts. Again, we are going to use a nice feature of formatted tables that makes it easy to link cells in one worksheet with similar cells in another worksheet. A while back we used this technique to import the Category labels from the Budget table. Now we will import the numbers. And, as we shall see later, this feature will also make it easy to modify our report so that a copy of it can be quickly modified for the second quarter (and third and fourth as well).

- Select cells **B9:D9**.
- To copy the cells, press: **Ctrl + C**
- Select cell **E9**
- Paste the cells by pressing: **Ctrl + V**
- Click cell **E10**.
- Type: **Budget**
- To enter the label without shifting to another cell, press **Ctrl + Enter**
- Copy cell **E10**.
- Select cells **D10:E11**.
- Paste the cells by pressing: **Ctrl + V**
- Click cell **E11**.
- Type: **=ex**
- In the drop-down list, double-click **ExpBudget2**
- Type: **[** and then **j**
- In the drop-down list, **Jan** should be selected.
- Press: **Tab**
- Type: **]**
  - The formula should be: **=ExpBudget2[Jan]**
- To copy the formula to the other cells in the column, double-click the Fill handle.
- Copy cells **E11:E17**.
- Select cells **F11:G11**
- Paste the cells by pressing **Ctrl + V**.
- Format the numbers by selecting cells **B11:G17**.
- Click the **Comma** button.
- Remove the decimal places by clicking the **Decrease Decimal** button twice.

8							
9		Jan	Feb	Mar	Jan	Feb	Mar
10	Category	Actual	Actual	Actual	Budget	Budget	Budget
11	Rent	2,001	2,003	2,005	2,002	2,002	2,002
12	Auto Loan	300	300	300	300	300	300
13	Utilities	221	198	212	250	250	250
14	Groceries	304	203	410	900	900	900
15	TV	151	153	155	152	152	152
16	Savings	200	250	200	202	202	202
17	Misc	106	226	481	250	250	250
18							

Now we can move the Budget cells close to their respective Actual cells. There are two ways we can move the cells: The first way involves holding down the Shift key.

- Select cells **E9:E17**.
- Hold down the **Shift** key.

## How to Set up a Budget — Advanced Excel

- Move the pointer over the left border of the selected range of cells until the pointer becomes a four-way arrow.

8							
9		Jan	Feb	Mar	Jan	Feb	Mar
10	Category	Actual	Actual	Actual	Budget		Budget
11	Rent	2,001	2,003	2,005	2,002		2,002
12	Auto Loan	300	300	300	300		300
13	Utilities	221	198	212	250	250	250
14	Groceries	304	203	410	900	900	900
15	TV	151	153	155	152	152	152
16	Savings	200	250	200	202	202	202
17	Misc	106	226	481	250	250	250
18							
19							

- Click and hold the left mouse button and drag the pointer to the left until a thick vertical line appears between columns **B** and **C**.

8							
9		Jan	Feb	Mar	Jan	Feb	Mar
10	Category	Actual	Actual	Actual	Budget	Budget	Budget
11	Rent	2,001	2,003	2,005	2,002	2,002	2,002
12	Auto Loan	300	300	300	300	300	300
13	Utilities	221	198	212	250	250	250
14	Groceries	304	203	410	900	900	900
15	TV	151	153	155	152	152	152
16	Savings	200	250	200	202	202	202
17	Misc	106	226	481	250	250	250
18							
19							

- Release the mouse button.

The Jan Budget cells will move to the right of the Jan Actual cells. Now let's try the second method, which involves the right mouse button and is a little easier:

- Select cells **F9:F17**.
- Cut the cells by pressing **Ctrl + X**
- Right-click cell **D9**.
- Choose: **Insert Cut Cells**

8							
9		Jan	Jan	Feb	Feb	Mar	Mar
10	Category	Actual	Budget	Actual	Budget	Actual	Budget
11	Rent	2,001	2,002	2,003	2,004	2,005	2,006
12	Auto Loan	300	300	300	300	300	300
13	Utilities	221	250	198	250	212	250
14	Groceries	304	900	203	900	410	900
15	TV	151	152	153	154	155	156
16	Savings	200	202	250	202	200	202
17	Misc	106	250	226	250	481	400
18							
19							

*Note that green error flags may appear, but these will soon disappear when Excel realizes what we are trying to do. Also note how the dummy data in the Budget and Ledger sheets makes it easy to see that the amounts are going into the proper cells for the Rent and TV categories.*

**Compare Actual and Budget Amounts with a Percentage:**

With the Budget and Actual amounts right next to each other, it is easy to compare the two. To make it even easier still, we should calculate the Actual amounts as a percent of Budget. And for the icing on the cake, we will use Conditional Formatting to highlight any categories over budget. But first, we’ll need to insert two more columns inside our table.

- Right-click the column label **F**.
- Choose: **Insert**.
- Right-click the column label **D**.
- Choose: **Insert**
- Click cell **D10**.
- Enter: **% of Budget**
- Click cell **D11**.
- Enter the formula: **=B11/C11**
- Copy the formula to cells **D12:D17**
- Select cells **D11:D17**.
- Click the **Percent Style** button (%).

**Highlight Over-Budget Categories with Conditional Formatting:**

Now let’s use Conditional Formatting to point out the over-budget items.

- With **D11:D17** selected, click: **Conditional Formatting**
- Choose: **Highlight Cell Rules > Greater Than ...**
- In the GREATER THAN box, type **100%**
- Click the arrow to the right of the format box (“Light red fill ...”).
- Choose: **More Formats...**
- Choose a style of **Bold**.
- Choose the Standard Color: **Dark Red**.
- Select cells **D10:D17**.
- Copy the selected cells.
- Click cell **G10**.
- Paste the cells.
- Click cell **J10**.
- Paste the cells.

9		Jan	Jan		Feb	Feb		Mar	Mar	
10	Category	Actual	Budget	% of Budg	Actual	Budget	% of Budg	Actual	Budget	% of Budget
11	Rent	2,001	2,002	100%	2,003	2,004	100%	2,005	2,006	100%
12	Auto Loan	300	300	100%	300	300	100%	300	300	100%
13	Utilities	221	250	88%	198	250	79%	212	250	85%
14	Groceries	304	900	34%	203	900	23%	410	900	46%
15	TV	151	152	99%	153	154	99%	155	156	99%
16	Savings	200	202	99%	250	202	<b>124%</b>	200	202	99%
17	Misc	106	250	42%	226	250	91%	481	400	<b>120%</b>
18										

**Calculate Monthly Totals with the SUM Function:**

Of course, it would be a good idea to use the SUM function to analyze the months as a whole:

- Click cell **A18**.

- Enter: **Total**
- Select cells **B18:C18**
- Click: **Home > Sum (Σ)**
- Copy cell: **D17**
- Paste into cell: **D18**
- Copy cells: **B18:D18**.
- Paste into cells: **E18:J18**.

15	TV	151	152	99%	153	154	99%	155	156	99%
16	Savings	200	202	99%	250	202	124%	200	202	99%
17	Misc	106	250	42%	226	250	91%	481	400	120%
18	Total	3,283	4,056	81%	3,333	4,060	82%	3,764	4,214	89%
19										

**Format the Column Headings with a Cell Style:**

Now let’s fix up our Budget Report so that it looks nice. First, we’ll fix up the Month labels and format the column headings:

- Select cells: **B9:D9**.
- Click: **Merge & Center**
- Click OK to confirm overwriting the label in **C9**.
- Select cells: **E9:G9**.
- Press the **F4** function key to repeat the previous action.
- Click **OK** to confirm overwriting the label in **C9**.
- Repeat the above for cells: **H9:J9**.
- Select cells: **A9:J10**.
- Click: **Home > Cell Styles**
  - On some large screens, the **Cells Styles** button will not appear. Instead, click the **More** button (≡) at the right of the Styles group to show the Styles gallery.
- Choose: **Accent 1** (usually white text on a dark blue fill color).
- With the cells still selected, click the **Bold** button.
- Widen the columns as needed to show the labels completely.
- Center the text in cells **B10:J10**.
- Select cells **B9:D10**.
- Click the arrow to the right of the **Borders** button.
- In the drop-down menu, choose: **More Borders...**
- In the dialog box under Style, select a medium thick solid line.
- Under Color, choose a very light gray.
- Under Border, click the buttons to apply the border to the right and left sides of the selected cells.
- Select cells **H9:J10**.
- Press the **F4** function key to repeat the above.

8										
9		Jan			Feb			Mar		
10	Category	Actual	Budget	% of Budget	Actual	Budget	% of Budget	Actual	Budget	% of Budget
11	Rent	2,001	2,002	100%	2,003	2,004	100%	2,005	2,006	100%
12	Auto Loan	300	300	100%	300	300	100%	300	300	100%
13	Utilities	221	250	88%	198	250	79%	212	250	85%

### Apply Banded Rows with Conditional Formatting

Note that we cannot simply use the Format as Table feature for this report. That feature requires all column headings to be unique, and our report repeats the labels Actual and Budget. But, we can use a special Conditional Formatting trick to make our table look like a formatted table. But first, let's fix up the Total row.

- Select cells **A18:J18**.
- Click: **Cell Styles**
  - Or, click the **More** button in the Styles group.
- Choose the style: **Total**
- Select cells: **A11:J17**.
- Click: **Conditional Formatting**
- Click: **New Rule**
- Click: **Use a formula to determine which cells to format**
- Click in the box under **Format** cells where this formula is true:
- Type: **= mod(row(), 2)**
  - This uses the MOD function to select the rows with a number not easily divided by 2; in other words, it selects every other row.
- Click the **Format** button.
- Click the **Fill** tab at the top.
- Choose a light blue color.
- Click **OK** twice.

		Jan			Feb			Mar		
	Category	Actual	Budget	% of Budget	Actual	Budget	% of Budget	Actual	Budget	% of Budget
11	Rent	2,001	2,002	100%	2,003	2,004	100%	2,005	2,006	100%
12	Auto Loan	300	300	100%	300	300	100%	300	300	100%
13	Utilities	221	250	88%	198	250	79%	212	250	85%
14	Groceries	304	900	34%	203	900	23%	410	900	46%
15	TV	151	152	99%	153	154	99%	155	156	99%
16	Savings	200	202	99%	250	202	124%	200	202	99%
17	Misc	106	250	42%	226	250	91%	481	400	120%
18	<b>Total</b>	<b>3,283</b>	<b>4,056</b>	<b>81%</b>	<b>3,333</b>	<b>4,060</b>	<b>82%</b>	<b>3,764</b>	<b>4,214</b>	<b>89%</b>
19										

### Create a Summary for the First Quarter:

Now that we have analyzed our Budget vs. Actual results for three months, it would be a simple task to have a summary for the whole quarter as well.

- Copy cells: **H9:J18**.
- Paste into cell **K9**.
- Select cell **K9**.
- Enter: **First Quarter**
- In cell **K11** enter the formula: **=sum(B11, E11, H11)**
- Use the **Fill Handle** to copy the formula to the rest of the cells in the column, excluding the Total cell.
- Copy the formulas in the **K** column to the **L** column.
- Copy cells **J11:J18** to cell **M11**.
- Widen column **M** as needed.

## How to Set up a Budget — Advanced Excel

8													
9		Jan			Feb			Mar			First Quarter		
10	Category	Actual	Budget	% of Budget	Actual	Budget	% of Budget	Actual	Budget	% of Budget	Actual	Budget	% of Budget
11	Rent	2,001	2,002	100%	2,003	2,004	100%	2,005	2,006	100%	6,009	6,012	100%
12	Auto Loan	300	300	100%	300	300	100%	300	300	100%	900	900	100%
13	Utilities	221	250	88%	198	250	79%	212	250	85%	632	750	84%
14	Groceries	304	900	34%	203	900	23%	410	900	46%	917	2,700	34%
15	TV	151	152	99%	153	154	99%	155	156	99%	459	462	99%
16	Savings	200	202	99%	250	202	124%	200	202	99%	650	606	107%
17	Misc	106	250	42%	226	250	91%	481	400	120%	814	900	90%
18	<b>Total</b>	<b>3,283</b>	<b>4,056</b>	<b>81%</b>	<b>3,333</b>	<b>4,060</b>	<b>82%</b>	<b>3,764</b>	<b>4,214</b>	<b>89%</b>	<b>10,380</b>	<b>12,330</b>	<b>84%</b>
19													

### A Warning About Deleting Rows

Someone may see all those empty rows above the Budget Report and decide to delete a few. If that happens, the row numbers on the Budget Report will no longer correspond with those in the Budget sheet, and the Budget amounts in the table will be altered. The safe way to reduce the white space above the table is to Hide the rows rather than deleting them.

It might be a very good idea to put a notice below the Budget Report:

**Warning:** Deleting rows above or inside the table will disrupt links with the Budget sheet.

### Create a Budget Report for the Second Quarter:

Wait! Don't go yet. This is much easier than it sounds.

- First, we can make a copy of the **1Q Report** and rename it **2Q Report**.
- Second, because our formulas refer to the month names Jan, Feb, and Mar instead of explicit cell references, all we need to do is use the Replace tool to replace all instances of **First** with **Second**, **Jan** with **Apr**, **Feb** with **May**, and **Mar** with **Jun**.
- Don't worry about getting 0's in the Actual columns—we don't yet have any expenses for the second quarter in our Ledger yet.

### Conclusion:

If you have followed parts A, B, and D of this project, you will have created a simple, yet powerful budget spreadsheet. Part C, the Pivot Table, is optional, but could be useful for analyzing spending habits.

Now, of course, comes the really hard part: inputting our actual expenses. Good luck, and let's hope this budgeting tool saves you a ton of money.

In the process of creating our budget, we've used several advanced Excel tools. Be sure to use them in other projects, as they can save you quite a bit of time.

If you have questions, problems, or even improvements, please be sure to let me know. I would be happy to hear from you.

— Rich Malloy

[End]