

Excel for Analysts

Session Two

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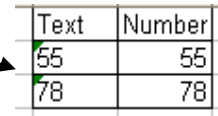
EXCEL TRAINING FOR ANALYSTS

ADVANCED SESSION

Convert numbers stored as text to numbers

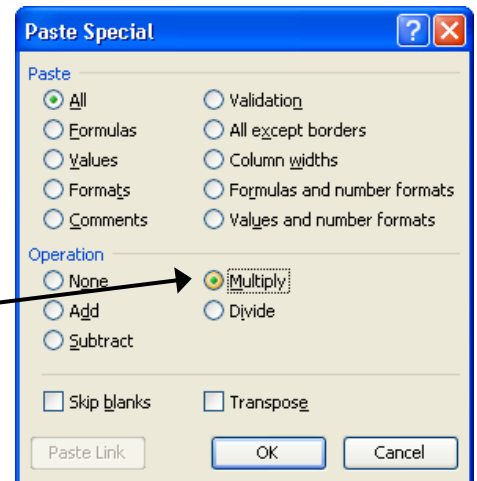
Occasionally, numbers may be formatted and stored in cells as text, which later can cause problems with calculations or produce confusing sort orders. For example, you may have typed a number in a cell that was formatted as text, or the data may have been imported or copied as text from an external data source.

Numbers that are formatted as text are left-aligned instead of right-aligned in the cell. With error checking turned on, they are also marked with an error indicator. You can convert them to numbers by using the following steps:



Text	Number
55	55
78	78

1. Select a blank cell that you know has the **General** number format.
2. In the cell, type **1**, and then press ENTER.
3. Select the cell, and then click **Copy** on the **Edit** menu.
4. Select the cells that contain the numbers stored as text that you want to convert.
5. On the **Edit** menu, click **Paste Special**.
6. Under **Operation**, click **Multiply**.
7. Click **OK**.



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Convert numbers stored as numbers to text

If you don't want numbers to be calculated, you can format them as text. A number that is formatted as text will be left-aligned instead of right-aligned. It will be stored as text and cannot be included in any calculation.

1. Select the cells that contain the numbers that you want to format as text.
2. On the **Format** menu, click **Cells**.
3. On the **Number** tab, click **Text** in the **Category** list, and then click **OK**.

Tip Alternately, you can apply the **Text** format to the empty cells and then type the numbers. To use decimal places in numbers that are stored as text, you must include the decimal points when you type the numbers.

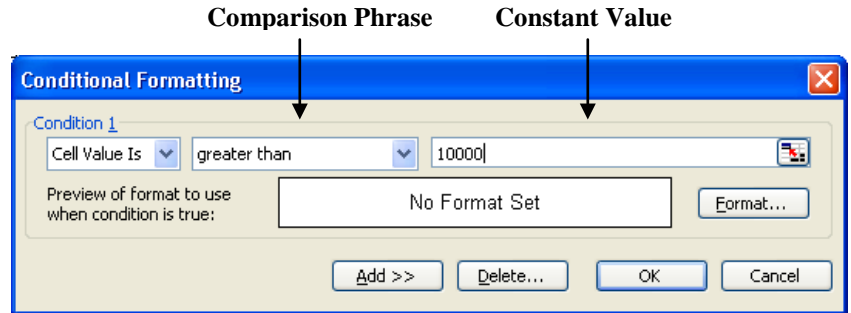
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Conditional Formatting

You can create conditional formats for selected cells using the following steps:

1. Select the cells that contain the numbers that you want to format as text.
2. On the **Format** menu, click **Conditional Formatting...**
3. To use values in the selected cells as the formatting criteria, click **Cell Value Is**, select the **Comparison Phrase** you want, and then type a constant or a formula.

4. Click **Format**.



5. Select the formatting you want to apply when the cell value meets the condition or the formula returns the value TRUE.

6. To add another condition, click **Add**, and then repeat steps 1 through 3.

You can specify up to three conditions. If none of the specified conditions are true, the cells keep their existing formats.

Note: Using multiple conditions If more than one specified condition is true, Microsoft Excel applies only the formats of the first true condition, even if more than one condition is true.

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“IF” Formulas

Syntax

IF(logical_test,value_if_true,value_if_false)

20	
21	=if(
22	IF(logical_test, [value_if_true], [value_if_false])
23	

Logical_test is any value or expression that can be evaluated to TRUE or FALSE. For example, A10=100 is a logical expression; if the value in cell A10 is equal to 100, the expression evaluates to TRUE. Otherwise, the expression evaluates to FALSE.

Value_if_true is the value that is returned if logical_test is TRUE. For example, in the above example if A10 does equal 100 and you enter “Equal to 100” in the Value_if_true argument, then the IF function displays the text "Equal to 100". If logical_test is TRUE and value_if_true is blank, this argument returns 0 (zero). To display the word TRUE, use the logical value TRUE for this argument. Value_if_true can be another formula.


Value_if_false is the value that is returned if logical_test is FALSE. For example, if A10 does not equal 100 and you entered “Not equal to 100” in the Value_if_false argument, then the IF function displays the text "Not equal to 100". If logical_test is FALSE and value_if_false is omitted, (that is, after value_if_true, there is no comma), then the logical value FALSE is returned. If logical_test is FALSE and value_if_false is blank (that is, after value_if_true, there is a comma followed by the closing parenthesis), then the value 0 (zero) is returned. Value_if_false can be another formula.

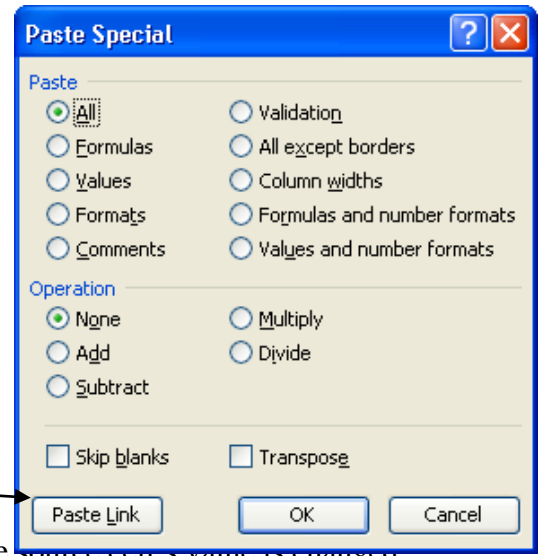
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--Examples

	A	B	C	D	E	F	G
	EE No	GENDER	SALARY	POS FTE	JOB TYPE	GRADE	BENFTS ELIG
1							
2	56849	M	25000	1*00	CL	18	Y
3	56853	M	26850	1*00	CL	13	Y
4	56855	M	12500	1*00	CL	15	Y
5	56865	F	45000	0*25	FN		N
6	56867	M	60000	0*25	FN		N
7	56885	M	58950	1*00	CL	18	Y
8	56897	F	22650	1*00	AP		Y
9	56903	F	1600	1*00	FT		Y
10	56905	M	22500	1*00	AP		Y
11							
12	Formula	Result	Formula Used	Definition			
13	IF	Yes	=IF(C2>20000,"Yes","No")	Determines if salary is greater than \$20,000			
14	IF(AND	Yes	=IF(AND(C2>20000,E2="CL"),"YES","NO")	Determines if salary is greater than \$20,000 AND employee is CL staff			
15	IF(OR	Non-Faculty	=IF(OR(E2="FN",E2="FT",E2="AP"),"Faculty","Non-Faculty")	Determines if employee is faculty or not			
16	Nested IF's	CLASS	=IF(E2="CL","CLASS",IF(E2="FT","TENTR","OTHER"))	Changes job type to a five letter abbreviation			
17	SUMIF	123300	=SUMIF(E2:E10,"CL",C2:C10)	Totals the salaries for CL staff			

Linking Cells

1. Click the cell that contains the data you want to link to, and then click **Copy**  on the Standard Toolbar
2. Click the cell you want to link from, and then under Format, click **Paste Special**.
3. Click **Paste Link**.



Note: The value in the linked cell will now change whenever the source cell's value is changed.

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Hyperlink Cells

1. In the source workbook, right-click the text or graphic you want to represent the hyperlink, and then click **Hyperlink** on the shortcut menu.
2. Do one of the following:
 - To link to a location in your current workbook, click **Place in this document** under **Link to**.
 - To link to a location in another workbook, click **Existing file or Web page** under **Link to**.
3. If you chose **Existing file or Web page**, locate and select the workbook you want to link to, and then click the **Bookmark** button.
4. Do one of the following:
 - In the list under **Cell Reference**, click the sheet you want to link to, and then type the cell reference in the **Type in the cell reference** box. Click **OK**.
 - In the list under **Defined Names**, click the name that represents the cells you want to link to. Click **OK**.
5. To assign a tip to be displayed when you rest the pointer on the hyperlink, click **ScreenTip** and then type the text you want in the **ScreenTip text** box. Click **OK**.

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Filtering

Filtering is a quick and easy way to find and work with a subset of data in a range. A filtered range displays only the rows that meet the criteria you specify for a column. Microsoft Excel provides two commands for filtering ranges: **AutoFilter** and **Advanced Filter**.

Unlike sorting, filtering does not rearrange a range. Filtering temporarily hides rows you do not want displayed. When Excel filters rows, you can edit, format, chart, and print your range subset without rearranging or moving it.

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Auto Filter

To use the Auto Filter command on a subset of data, from the **Data** menu, click **Auto Filter**. Your subset must contain Headers for the Auto Filter to work properly.

When you use the **AutoFilter** command, AutoFilter arrows  appear to the right of the column labels in the filtered range.

	A	B	C	D
1	Last Name	First Name	Middle	EE No
2	Singh-Corc	Conard	A	56849
3	Satterfield	David	A	56853
4	Smerka	Chunfu	A	56855

To apply a filter, click on an Auto Filter arrow and select a category/value to filter for. The Auto Filter arrow will change to a blue triangle to let you know that a filter is applied.

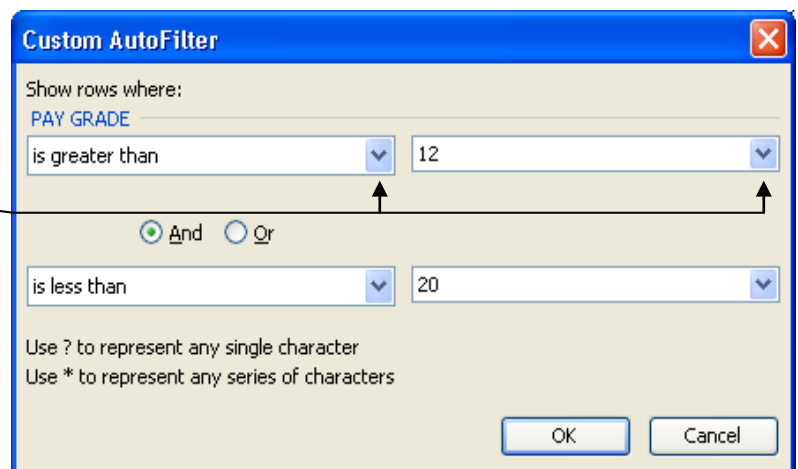
TIP: You can filter more than one column at a time

To apply a **Custom Filter**, click on an Auto Filter arrow and then click **(Custom...)**. In the Custom Auto Filter box, use the drop-down menu to select your criterion.

You can use more than one condition to filter your data. This example filters for numbers greater than 12 and less than 20.

Click **OK** to apply the filter.

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Custom AutoFilter

Show rows where:

PAY GRADE

is greater than 12

And Or

is less than 20

Use ? to represent any single character
Use * to represent any series of characters

OK Cancel

Filter for Unique Records

1. Select the column or click a cell in the range or list you want to filter.
2. On the **Data** menu, point to **Filter**, and then click **Advanced Filter**.
3. Do one of the following.
 - To filter the range or list in place, similar to using **AutoFilter**, click **Filter the list, in-place**.
 - To copy the results of the filter to another location, click **Copy to another location**. Then, in the **Copy To** box, enter a cell reference.

To select a cell, click **Collapse Dialog**  to temporarily hide the dialog box. Select the cell on the worksheet, and then press **Expand Dialog** .


4. Select the **Unique records only** check box.

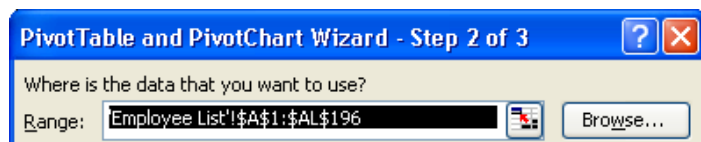
Note Once you filter for unique values, you can copy them to another worksheet and then archive or delete the original worksheet.

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Pivot Table Reports

Use the following steps to create a Pivot Table Report:

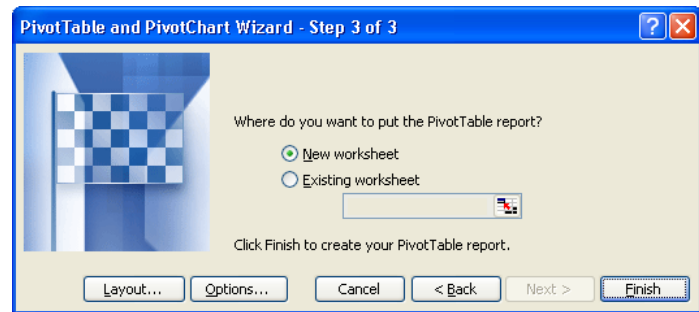
1. Open the workbook where you want to create the Pivot Table Report and click a cell in the list or database. **Note:** Each column in your spreadsheet must have a heading in order to produce a pivot table.
2. On the **Data** menu, click **PivotTable and PivotChart Report**.
3. In step 1 of the PivotTable and PivotChart Wizard, accept both of the default options—Microsoft Office Excel 



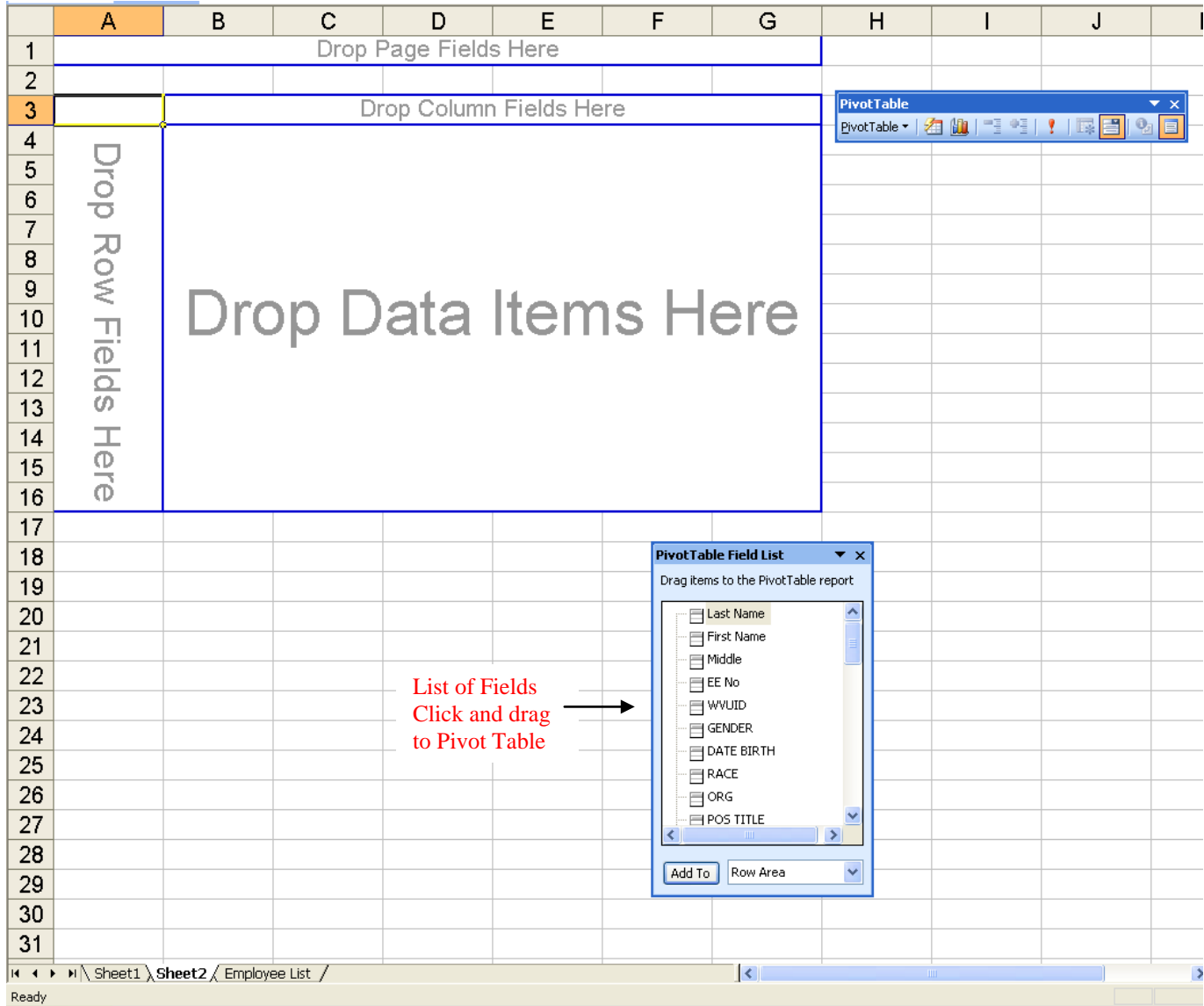
list or database and Pivot Table. Click **Next**

4. In step 2, make sure the range of your data is correct. Excel will choose a range based on how your spreadsheet is set up. Click **Next**. →

5. In step 3, accept the default option of placing the Pivot Table in a New worksheet. Click **Finish**. →



A new sheet will be created with a blank Pivot Table similar to the one on the next page.



6. From the **PivotTable Field List** window, drag the fields with data that you want to display in rows to the drop area labeled Drop Row Fields Here.

If you don't see the field list, click within the outlines of the PivotTable drop areas.

7. Drag fields with data that you want to display across columns to the drop area labeled Drop Column Fields Here.
8. Drag fields that contain the data that you want to summarize to the area labeled Drop Data Items Here.

If you add more than one data field, arrange these fields in the order you want: Right-click a data field, point to **Order** on the shortcut menu, and use the commands on the **Order** menu to move the field.

9. Drag fields that you want to use as page fields to the area labeled Drop Page Fields Here.

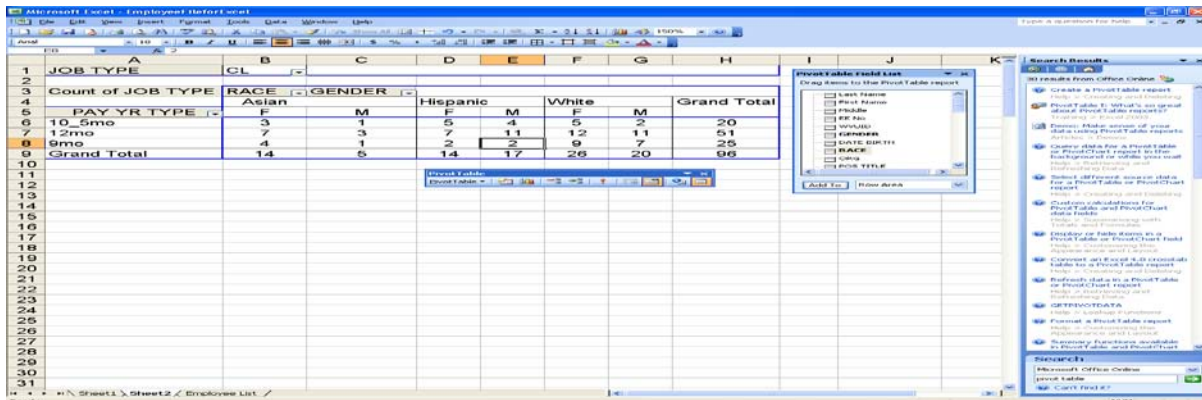
To rearrange fields, drag them from one area to another. To remove a field, drag it out of the PivotTable report.

To hide the drop area outlines, click a cell outside the PivotTable report.

The following Pivot Table example summarizes the number of employees by Gender and Job Type:

	A	B	C	D	E
1	Drop Page Fields Here				
2					
3	Count of JOB TYPE	GENDER			
4	JOB TYPE	F	M	Grand Total	
5	AP	25	26	51	
6	CL	54	42	96	
7	FN	10	10	20	
8	FT		1	1	
9	GA		1	1	
10	LB	2		2	
11	NC	5	19	24	
12	Grand Total	96	99	195	
13					

The following Pivot Table example summarizes the number of CL employees by Race, Gender and Pay Year Type:



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Vlookups

Searches for a value in the first column of a table array and returns a value in the same row from another column in the table array.

The V in VLOOKUP stands for vertical. Use VLOOKUP instead of HLOOKUP when your comparison values are located in a column to the left of the data that you want to find.

Syntax

VLOOKUP(lookup_value,table_array,col_index_num,range_lookup)

Lookup_value The value to search in the first column of the table array. Lookup_value can be a value or a reference. If lookup_value is smaller than the smallest value in the first column of table_array, VLOOKUP returns the #N/A error value.

Table_array Two or more columns of data. Use a reference to a range or a range name. The values in the first column of table_array are the values searched by lookup_value. These values can be text, numbers, or logical values. Uppercase and lowercase text are equivalent.

Col_index_num The column number in table_array from which the matching value must be returned. A col_index_num of 1 returns the value in the first column in table_array; a col_index_num of 2 returns the value in the second column in table_array, and so on. If col_index_num is:

Less than 1, VLOOKUP returns the #VALUE! error value.

Greater than the number of columns in table_array, VLOOKUP returns the #REF! error value.

Range_lookup A logical value that specifies whether you want VLOOKUP to find an exact match or an approximate match:

If TRUE or omitted, an exact or approximate match is returned. If an exact match is not found, the next largest value that is less than lookup_value is returned.

The values in the first column of table_array must be placed in ascending sort order; otherwise, VLOOKUP may not give the correct value. You can put the values in ascending order by choosing the **Sort** command from the **Data** menu and selecting **Ascending**.

If FALSE, VLOOKUP will only find an exact match. In this case, the values in the first column of table_array do not need to be sorted. If there are two or more values in the first column of table_array that match the lookup_value, the first value found is used. If an exact match is not found, the error value #N/A is returned.

TIP: You can use a formula to prevent #N/A values from appearing. The following is an example of one such formula:

=if(isna(vlookup(A2,Sheet1!A:D,4,0))=true,"Value Not Found", vlookup(A2,Sheet1!A:D,4,0))

The formula basically states that if you don't get an exact match, return "Value Not Found", instead of #N/A.

Remarks

When searching text values in the first column of table_array, ensure that the data in the first column of table_array does not have leading spaces, trailing spaces, inconsistent use of straight (' or ") and curly (‘ or “) quotation marks, or nonprinting characters. In these cases, VLOOKUP may give an incorrect or unexpected value.

When searching number or date values, ensure that the data in the first column of table_array is not stored as text values. In this case, VLOOKUP may give an incorrect or unexpected value.

If range_lookup is FALSE and lookup_value is text, then you can use the wildcard characters, question mark (?) and asterisk (*), in lookup_value. A question mark matches any single character; an asterisk matches any sequence of characters. If you want to find an actual question mark or asterisk, type a tilde (~) preceding the character.

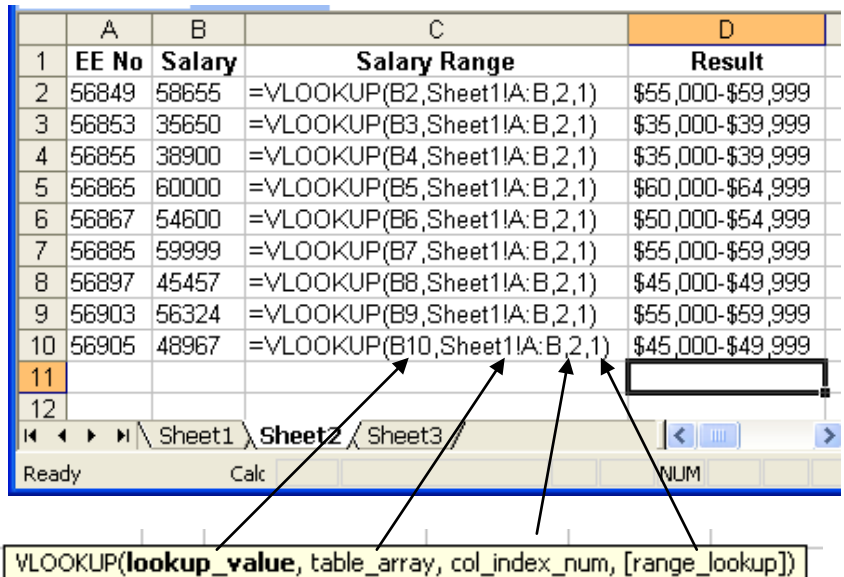
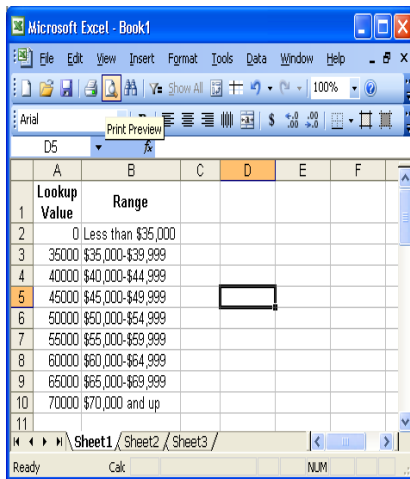
Vlookup Example for Exact Match:

	A	B	C	D
1	EE No	Last Name	First Name	ORG
2	56849	Smith	Conard	Physics
3	56853	Stone	David	Physical Plant
4	56855	Smerka	Chunfu	Presidents Staff
5	56865	Austin	Walter	Physics
6	56867	Arm	Whitney	Physics
7	56885	Howes	Lindsey	Biochemistry
8	56897	Fint	Norman	Biochemistry
9	56903	Ruth	Debra	Biology
10	56905	Brock	Susan	Biochemistry

	A	B	C
1	EE No	Vlookup Formula to get Org from Sheet 1	Result
2	56867	=VLOOKUP(A2,Sheet1!A:D,4,0)	Physics
3	56849	=VLOOKUP(A3,Sheet1!A:D,4,0)	Physics
4	56903	=VLOOKUP(A4,Sheet1!A:D,4,0)	Biology
5			

VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])

Vlookup Example for Approximate Match:



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Hlookups

Searches for a value in the top row of a table or an array of values, and then returns a value in the same column from a row you specify in the table or array. Use HLOOKUP when your comparison values are located in a row across the top of a table of data, and you want to look down a specified number of rows. Use VLOOKUP when your comparison values are located in a column to the left of the data you want to find.

The H in HLOOKUP stands for "Horizontal."

Syntax

HLOOKUP(lookup_value,table_array,row_index_num,range_lookup)

Lookup_value is the value to be found in the first row of the table. Lookup_value can be a value, a reference, or a text string.

Table_array is a table of information in which data is looked up. Use a reference to a range or a range name.

The values in the first row of table_array can be text, numbers, or logical values.

If range_lookup is TRUE, the values in the first row of table_array must be placed in ascending order: ...-2, -1, 0, 1, 2,..., A-Z, FALSE, TRUE; otherwise, HLOOKUP may not give the correct value. If range_lookup is FALSE, table_array does not need to be sorted.

Uppercase and lowercase text are equivalent.

You can put values in ascending order, left to right, by selecting the values and then clicking **Sort** on the **Data** menu. Click **Options**, click **Sort left to right**, and then click **OK**. Under **Sort by**, click the row in the list, and then click **Ascending**.

Row_index_num is the row number in table_array from which the matching value will be returned. A row_index_num of 1 returns the first row value in table_array, a row_index_num of 2 returns the second row value in table_array, and so on. If row_index_num is less than 1, HLOOKUP returns the #VALUE! error value; if row_index_num is greater than the number of rows on table_array, HLOOKUP returns the #REF! error value.

Range_lookup is a logical value that specifies whether you want HLOOKUP to find an exact match or an approximate match. If TRUE or omitted, an approximate match is returned. In other words, if an exact match is not found, the next largest value that is less than lookup_value is returned. If FALSE, HLOOKUP will find an exact match. If one is not found, the error value #N/A is returned.

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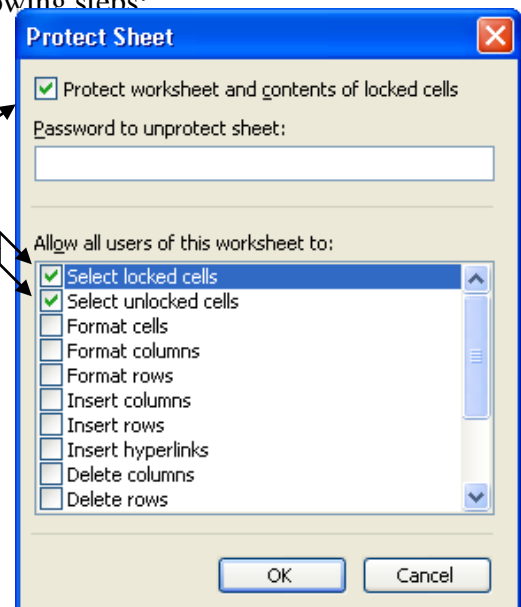
Tools

Protect Sheet

Lock All Cells

To protect your worksheet by locking all cells, complete the following steps:

1. While in the worksheet you want protected, go to the **Tools** menu, point to **Protection**, and then click **Protect Sheet**.
2. Accept the default choices of “Protect worksheet and contents of locked cells”, “Select locked cells” and “Select unlocked cells.”
3. Enter a password that you will remember and click OK.
4. Enter the same password on the next screen and click OK.



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Lock Selected Cells

To lock certain cells within a worksheet, complete the following steps:

1. Select the entire worksheet by clicking the **Select All** button (the gray rectangle directly above the row number for row 1 and to the left of column letter A).
2. Click **Cells** on the **Format** menu, click the **Protection** tab, and then clear the **Locked** check box.

This unlocks all the cells on the worksheet

Note If the **Cells** command is not available, parts of the worksheet may already be locked. On the **Tools** menu, point to **Protection**, and then click **Unprotect Sheet**.

3. Select just the cells you want to lock and repeat step 2, but this time select the **Locked** check box.
4. On the **Tools** menu, point to **Protection**, click **Protect Sheet**, and then click **OK**.

Note In the **Protect Sheet** dialog box, you have the option to specify a password and select the elements that you want users to be able to change.

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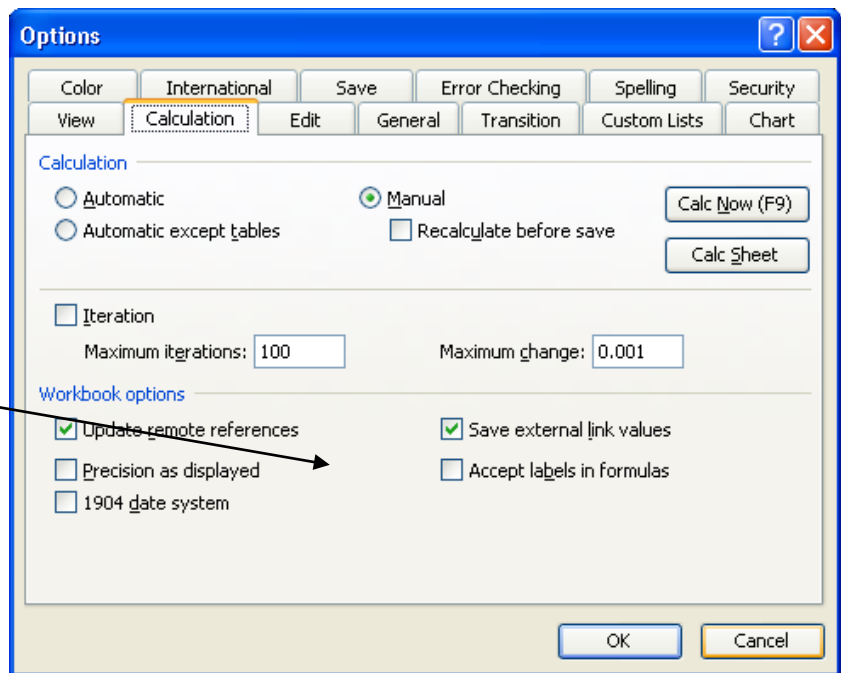
Manual Calculation

If you are working with large amounts of data with thousands of calculations (especially Vlookups and/or links to other workbooks), you may notice that Excel will “slow down” in order to perform all vlookups and other calculations. One way to eliminate this problem is to set Excel to Manual Recalculation mode. This can be done by completing the following steps:

1. On the **Tools** menu, click **Options**, and then click the **Calculation** tab.
2. Under **Calculation**, select **Manual**. Changing this option affects all open workbooks. Click **OK**.
3. To calculate all worksheets in all open workbooks press F9.

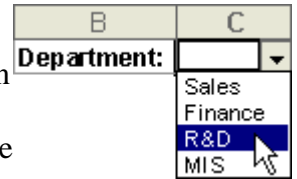
To calculate only the active worksheet, press SHIFT+F9.

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Validation

To make data entry easier, or to limit entries to certain items that you define, you can create a drop-down list of valid entries that is compiled from cells elsewhere on the worksheet. When you create a drop-down list for a cell, it displays an arrow next to that cell. To enter information in that cell, click the arrow, and then click the entry that you want.



To create a drop-down list from a range of cells, use the **Validation** command under the **Data** menu.

1. To create a list of valid entries for the drop-down list, type the entries in a single column or row without blank cells.

Note-you may want to sort the data in the order you want it to appear in the drop-down list.

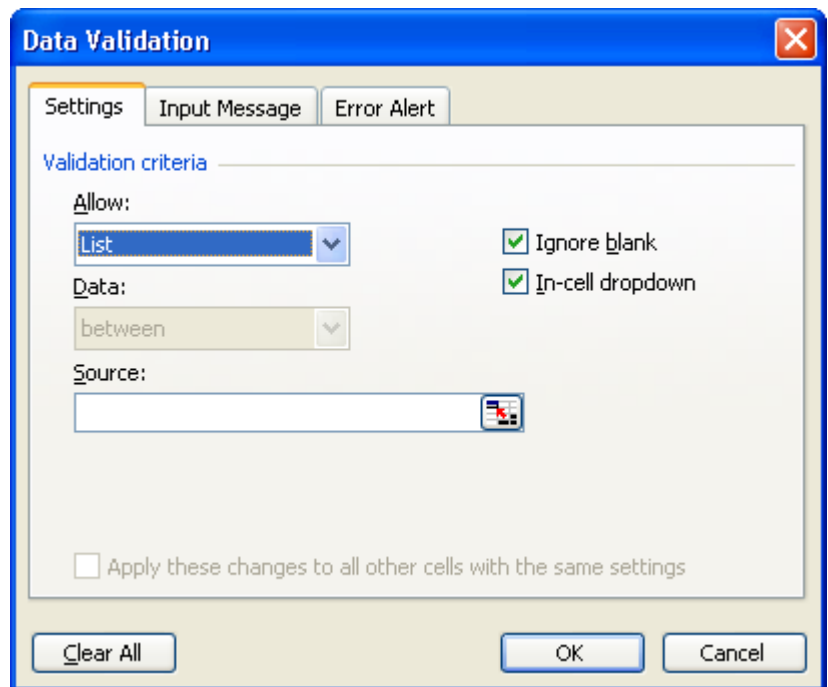
2. If you want to use a different worksheet in the same workbook, type the list on that worksheet, and then define a name for the list (Insert, Name, Define)
3. Select the cell where you want the drop-down list.

4. On the **Data** menu, click **Validation**, and then click the **Settings** tab.

5. In the **Allow** box, click **List**.

6. To specify the location of the list of valid entries, do one of the following:

- a. If the list is in the current worksheet, enter a reference to your list in the **Source** box.
- b. If the list is on a different worksheet in the same workbook or a different workbook, enter the name that you defined for your list in the **Source** box preceded with an equal sign (=).



7. Make sure that the **In-cell drop-down** check box is selected.
8. To specify whether the cell can be left blank, select or clear the **Ignore blank** check box. If this box is selected, users can leave the cell blank.
9. Optionally, display an input message when the cell is clicked. To do this:
 - Click the **Input Message** tab.

- Make sure that the **Show input message when cell is selected** check box is selected.
- Type the title and text for the message (up to 225 characters).

10. Optionally, you can specify how you want Microsoft Office Excel to respond when invalid data is entered.

- Click the **Error Alert** tab, and make sure that the **Show error alert after invalid data is entered** check box is selected.
- Select one of the following options for the **Style** box:
 - To display an information message that does not prevent entry of invalid data, click **Information**.
 - To display a warning message that does not prevent entry of invalid data, click **Warning**.
 - To prevent entry of invalid data, click **Stop**.
- Type the title and text for the message (up to 225 characters).

Note If you don't enter a title or text, the title defaults to "Microsoft Excel" and the message to: "The value you entered is not valid. A user has restricted values that can be entered into this cell."


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Charts

You can quickly create a chart in Microsoft Excel by using the Chart Wizard. In this wizard, you can choose from a variety of chart types and specify various chart options. Although worksheet data that you want to plot in a chart can be located in rows or columns, some chart types require a specific arrangement of the data before you can create a chart.

1. On the worksheet, arrange the data that you want to plot in a chart.
2. Select the cells that contain the data that you want to use for the chart.

Tip If the cells that you want to select for the chart are not in a continuous range, select the first group of cells that contain the data that you want to include. Hold down CTRL, and then select any additional cell groups that you want to include. The nonadjacent selections must form a rectangle.

3. Click **Chart Wizard**  on the **Standard** toolbar, or click **Chart** on the **Insert** menu.
4. Follow the instructions in the Chart Wizard.

For information about the Chart Wizard options, click **Help**  in the title bar of the wizard.

Tip If you use a specific chart type frequently when you create a chart, you may want to set that chart type as the default chart type. To change the default chart type:

1. Click anywhere in the chart area to select the chart.
2. On the **Chart** menu, click **Chart Type**.
3. On the **Standard Types** tab or **Custom Types** tab, in the **Chart type** list, click the chart type that you want or accept the current selection, and then click **Set As Default Chart**.
4. Click **Yes**, and then click **OK**.
5. If the **Add Custom Chart Type** dialog box appears, type a name in the **Name** box and a description in the **Description** box, and then click **OK**.

Notes

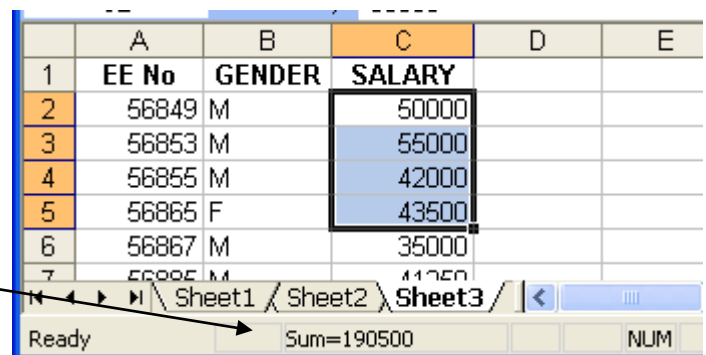
When you create a chart, the **Chart** toolbar is displayed and the **Chart** menu is added to the menu bar. You can use the toolbar buttons and menu commands to modify the chart. For example, use the toolbar to select specific items in the chart, change the chart type, make formatting changes, show or hide the legend or data table, or switch between displaying the data series by row and displaying it by column. The **Chart** menu allows you to make changes to the source data, add data to the chart, specify numerous chart options, change the location of the chart, and apply 3-D effects. The **Chart** menu does not, however, provide a command for creating a chart.

The **Chart** toolbar can also be displayed (or hidden) at any time by pointing to **Toolbars** on the **View** menu, and then clicking **Chart**. If you display the **Chart** toolbar before you create a chart, you can use it to create a chart. Select the cells that contain the data that you want to use in the chart, and then click **Chart Type** on the **Chart** toolbar. The chart will be displayed in the selected chart type on the same worksheet.

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Quick Tools

Excel has a quick tool feature that will enable you to find the sum, min, max, count and average of selected cells without entering any formulas. Once cells with numbers are selected, excel will calculate and show the result at the center of the bottom toolbar.



The default for most excel worksheets will be the sum function. To change the calculation, right click on the bottom toolbar and choose the desired statistic (see next figure). Your choices will

be as follows:

None—does not perform a calculation

Average—finds the average of selected cells that contain numbers

Count—counts the number of selected non-blank cells

Count Nums—counts the number of selected cells that contain numbers

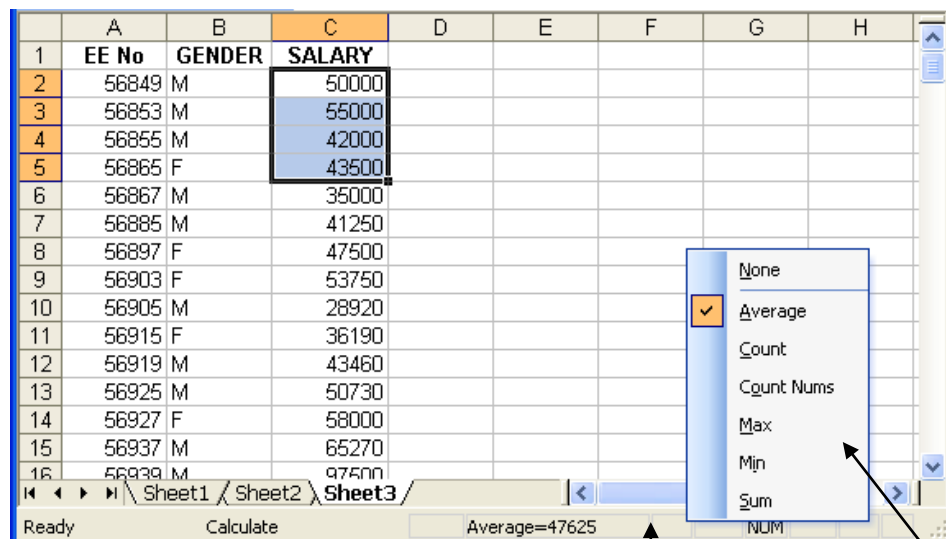
Max—finds the largest value of the selected cells that contain numbers

Min—finds the smallest value of the selected cells that contain numbers

Sum—finds the summation of the selected cells that contain numbers

Anytime you select more than one cell, excel will calculate your choice on the bottom toolbar.

Note: Excel will ignore numbers that are stored as text.



Right-click here, then choose one

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