

Problem Solving Using Excel

LEARNING OUTCOMES

1. Describe how to create and sort a list using Excel.
2. Explain why you would use conditional formatting using Excel.
3. Describe the use of AutoFilter using Excel.
4. Explain how to use the Subtotal command using Excel.
5. Describe the use of a PivotTable using Excel.

Introduction

If you routinely track large amounts of information, such as customer mailing lists, phone lists, product inventories, sales transactions, and so on, you can use the extensive list-management capabilities of Excel to make your job easier.

In this plug-in you will learn how to create a list in a workbook, sort the list based on one or more fields, locate important records by using filters, organize and analyze entries by using subtotals, and create summary information by using pivot tables and pivot charts. The lists that you create will be compatible with Access, and, if you are not already familiar with Access, the techniques that you learn here will give you a head start on learning several database commands and terms. Plug-In T6, “Basic Skills and Tools Using Access,” will provide detail on many of the Access database commands and terms.

There are five areas in this plug-in:

1. Lists
2. Conditional Formatting
3. AutoFilter
4. Subtotals
5. PivotTables

Lists

A *list* is a collection of rows and columns of consistently formatted data adhering to somewhat stricter rules than an ordinary worksheet. To build a list that

works with all of Excel's list-management commands, you need to follow a few guidelines.

When you create a list, keep the following in mind:

- Maintain a fixed number of columns (or categories) of information; you can alter the number of rows as you add, delete, or rearrange records to keep your list up to date.
- Use each column to hold the same type of information.
- Don't leave blank rows or columns in the list area; you can leave blank cells, if necessary.
- Make your list the only information in the worksheet so that Excel can more easily recognize the data as a list.
- Maintain your data's integrity by entering identical information consistently. For example, don't enter an expense category as *Ad* in one row, *Adv* in another, and *Advertising* in a third if all belong to the same classification.

To create a list in Excel, you would follow these steps:

1. Open a new workbook or a new sheet in an existing workbook.
2. Create a column heading for each field in the list, format the headings in bold type, and adjust their alignment.
3. Format the cells below the column headings for the data that you plan to use. This can include number formats (such as currency or date), alignment, or any other formats.
4. Add new records (your data) below the column headings, taking care to be consistent in your use of words and titles so that you can organize related records into groups later. Enter as many rows as you need, making sure that there are no empty rows in your list, not even between the column headings and the first record. See Figure T3.1 for a sample list.

Each column represents a field containing one type of information.

Each row represents a record in the list.

	A	B	C	D	E	F	G	H	I
	Sales Rep	Region	Month	Sale	Magazine				
2	Blickle, Peter	West	1-Jan	\$ 500	Business Times				
3	Suyama, Michael	South	1-Feb	\$ 900	IT Weekly				
4	Anderson, Rhea	South	1-Feb	\$ 700	Value Driven Journal				
5	Fuller, Peter	North	1-Feb	\$ 375	People, Places, and Machines				
6	Cashel, Seamus	North	1-Feb	\$ 450	Dollars and Sense				
7	Leverling, Janet	East	1-Jan	\$ 550	Value Driven Journal				
8	Greif, Jacob	East	1-Feb	\$ 800	People, Places, and Machines				
9	Davolio, Nancy	West	1-Jan	\$ 700	Dollars and Sense				
10	Leverling, Janet	East	1-Feb	\$ 600	Business Times				
11	Suyama, Michael	South	1-Feb	\$ 1,250	IT Weekly				
12	Anderson, Rhea	South	1-Feb	\$ 1,400	Business Times				
13	Cashel, Seamus	North	1-Jan	\$ 1,000	IT Weekly				
14	Blickle, Peter	West	1-Feb	\$ 600	Dollars and Sense				
15	Greif, Jacob	East	1-Jan	\$ 1,000	Value Driven Journal				
16	Fuller, Peter	North	1-Feb	\$ 1,200	People, Places, and Machines				
17	Davolio, Nancy	West	1-Feb	\$ 580	Dollars and Sense				
18	Suyama, Michael	South	1-Jan	\$ 400	Value Driven Journal				
19	Leverling, Janet	East	1-Jan	\$ 720	People, Places, and Machines				
20	Fuller, Peter	North	1-Jan	\$ 925	Dollars and Sense				
21	Blickle, Peter	West	1-Jan	\$ 1,100	Business Times				
22	Cashel, Seamus	North	1-Jan	\$ 1,200	Business Times				
23	Greif, Jacob	East	1-Jan	\$ 250	Value Driven Journal				
24	Davolio, Nancy	West	1-Jan	\$ 700	People, Places, and Machines				
25	Anderson, Rhea	South	1-Jan	\$ 750	Dollars and Sense				
26	Cashel, Seamus	North	1-Jan	\$ 1,100	People, Places, and Machines				
27	Blickle, Peter	West	1-Feb	\$ 1,200	Dollars and Sense				
28	Fuller, Peter	North	1-Feb	\$ 250	Value Driven Journal				
29	Leverling, Janet	East	1-Feb	\$ 700	People, Places, and Machines				

FIGURE T3.1
An Excel List

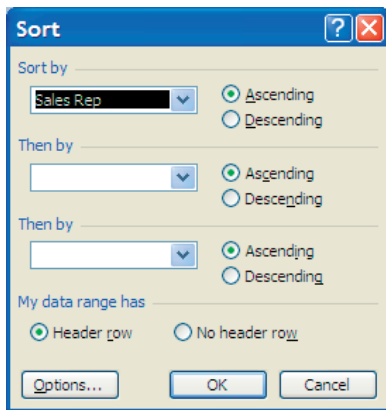


FIGURE T3.2
Sort Dialog Box

SORTING ROWS AND COLUMNS

Once your records are organized into a list, you can use several commands on the Data menu to rearrange and analyze the data. The Sort command allows you to arrange the records in a different order based on the values in one or more columns. You can sort records in ascending or descending order or in a custom order, such as by days of the week, months of the year, or job title.

To sort a list based on one column, follow these steps:

1. Select the **SortData** worksheet from the **T3_ProblemSolving_Data.xls** workbook that accompanies this textbook.
2. Click any **cell** in the **Sales Rep** column; you want to use this column as the basis for sorting the list.
3. Click the **Data** button on the standard toolbar, and then select **Sort**. Excel selects all the records in the list and displays a dialog box such as the one in Figure T3.2.
4. The Sort By drop-down list contains the heading for the column you selected.
5. Click the **Ascending** radio button to specify the order to sort by (A to Z, lowest to highest, earliest date to latest).

6. Click **OK** to run the sort. Your screen will look similar to Figure T3.3.

	A	B	C	D	E	F	G	H	I
	Sales Rep	Region	Month	Sale	Magazine				
1	Anderson, Rachel	South	1-Feb	\$ 700	Value Driven Journal				
2	Anderson, Rachel	South	1-Feb	\$ 1,400	Business Times				
3	Anderson, Rachel	South	1-Jan	\$ 750	Dollars and Sense				
4	Anderson, Rachel	South	1-Jan	\$ 500	Value Driven Journal				
5	Anderson, Rachel	South	1-Jan	\$ 900	Business Times				
6	Anderson, Rachel	South	1-Jan	\$ 375	Value Driven Journal				
7	Anderson, Rachel	East	1-Jan	\$ 750	Value Driven Journal				
8	Anderson, Rachel	North	1-Mar	\$ 580	Business Times				
9	Anderson, Rachel	East	1-Apr	\$ 1,200	Dollars and Sense				
10	Anderson, Rachel	West	1-Mar	\$ 600	Value Driven Journal				
11	Anderson, Rachel	South	1-Apr	\$ 1,250	Business Times				
12	Anderson, Rachel	North	1-Apr	\$ 720	Value Driven Journal				
13	Bucknell, Peter	West	1-Jan	\$ 500	Business Times				
14	Bucknell, Peter	West	1-Feb	\$ 600	Dollars and Sense				
15	Bucknell, Peter	West	1-Jan	\$ 1,100	Business Times				
16	Bucknell, Peter	West	1-Feb	\$ 1,200	Dollars and Sense				
17	Bucknell, Peter	West	1-Feb	\$ 750	Dollars and Sense				
18	Bucknell, Peter	West	1-Jan	\$ 700	IT Weekly				
19	Bucknell, Peter	North	1-Mar	\$ 250	Business Times				
20	Bucknell, Peter	South	1-Jan	\$ 720	Dollars and Sense				
21	Bucknell, Peter	South	1-Mar	\$ 250	Business Times				
22	Bucknell, Peter	South	1-Apr	\$ 700	Dollars and Sense				
23	Bucknell, Peter	East	1-Apr	\$ 1,200	Dollars and Sense				
24	Bucknell, Peter	East	1-Mar	\$ 1,400	IT Weekly				
25	Cushman, David	North	1-Feb	\$ 450	Dollars and Sense				
26	Cushman, David	North	1-Jan	\$ 1,000	IT Weekly				
27	Cushman, David	North	1-Jan	\$ 1,200	Business Times				
28	Cushman, David	North	1-Jan	\$ 1,100	People, Places, and Machines				

FIGURE T3.3
A Sorted List

SORTING MORE THAN ONE COLUMN

If you have records in your list that have identical entries in the column you are sorting with, you can specify additional sorting criteria to further organize your list.

To sort a list based on two or three columns follow these steps:

1. Click any **cell** in the **Sales Rep** column.
2. Click the **Data** button on the standard toolbar, and then select **Sort**. Excel selects the records in your list and displays the Sort dialog box.
3. Select the **Sales Rep** as the primary field for the sort in the **Sort By** drop-down list. Specify **ascending** order for that column.
4. Click the first **Then By** drop-down list and pick **Magazine** for the sort to further sort any records that have identical entries in the primary field. Specify **ascending** order for the second sort as well.
5. Click the next **Then By** drop-down list and pick **Sale** for the sort. Specify **ascending** order for the third sort as well. The Sort dialog box should look like Figure T3.4 when you are done.
6. Click **OK** to run the sort.

Figure T3.5 shows how the sort looks based on the options you selected above.

CREATING YOUR OWN CUSTOM SORT ORDER

Excel allows you to create custom sort orders so that you can rearrange lists that do not follow predictable alphanumeric or chronologic patterns. For example, you can

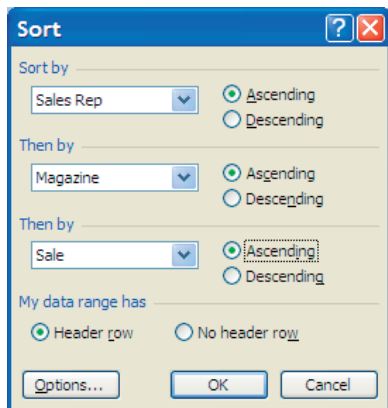


FIGURE T3.4
Sort Dialog Box with
Multiple Records

	A	B	C	D	E	F	G	H	I
1	Sales Rep	Region	Month	Sale	Magazine				
2	Anderson, Rachel	North	1-Mar	\$ 580	Business Times				
3	Anderson, Rachel	South	1-Jan	\$ 900	Business Times				
4	Anderson, Rachel	South	1-Apr	\$ 1,250	Business Times				
5	Anderson, Rachel	South	1-Feb	\$ 1,400	Business Times				
6	Anderson, Rachel	South	1-Jan	\$ 750	Dollars and Sense				
7	Anderson, Rachel	East	1-Apr	\$ 1,200	Dollars and Sense				
8	Anderson, Rachel	South	1-Jan	\$ 375	Value Driven Journal				
9	Anderson, Rachel	South	1-Jan	\$ 500	Value Driven Journal				
10	Anderson, Rachel	West	1-Mar	\$ 600	Value Driven Journal				
11	Anderson, Rachel	South	1-Feb	\$ 700	Value Driven Journal				
12	Anderson, Rachel	North	1-Apr	\$ 720	Value Driven Journal				
13	Anderson, Rachel	East	1-Jan	\$ 750	Value Driven Journal				
14	Bucknell, Peter	North	1-Mar	\$ 250	Business Times				
15	Bucknell, Peter	South	1-Mar	\$ 250	Business Times				
16	Bucknell, Peter	West	1-Jan	\$ 500	Business Times				
17	Bucknell, Peter	West	1-Jan	\$ 1,100	Business Times				
18	Bucknell, Peter	West	1-Feb	\$ 600	Dollars and Sense				
19	Bucknell, Peter	South	1-Apr	\$ 700	Dollars and Sense				
20	Bucknell, Peter	South	1-Jan	\$ 720	Dollars and Sense				
21	Bucknell, Peter	West	1-Feb	\$ 750	Dollars and Sense				
22	Bucknell, Peter	West	1-Feb	\$ 1,200	Dollars and Sense				
23	Bucknell, Peter	East	1-Apr	\$ 1,200	Dollars and Sense				
24	Bucknell, Peter	West	1-Jan	\$ 700	IT Weekly				
25	Bucknell, Peter	East	1-Mar	\$ 1,400	IT Weekly				
26	Cushman, David	North	1-Apr	\$ 700	Business Times				
27	Cushman, David	North	1-Jan	\$ 1,200	Business Times				
28	Cushman, David	North	1-Feb	\$ 450	Dollars and Sense				
29	Cushman, David	West	1-Apr	\$ 700	Dollars and Sense				

FIGURE T3.5
Data Sort Using More
Than One Column

create a custom sort order for the regions of the country (West, North, East, South). When you define a custom sort order, it appears in the Options dialog box and is available to all the workbooks on your computer.

To create a custom sort order, follow these steps:

1. Choose **Tools, Options**, and then click the **Custom Lists** tab.
2. Click the line **NEW LIST** under **Custom Lists** section and the text pointer appears in the List Entries list box. This is where you will type the items in your custom list.
3. Type **West, North, South, East**, and then click **Add**. You can either separate each value with a comma or type each one on a separate line. The new custom order appears in the Custom Lists list box, as shown in Figure T3.6.
4. Click **OK** to close the Options dialog box.

To use a custom sort order, follow these steps:

1. Click any cell in your list.
2. Choose **Data, Sort**. Excel selects the records in your list and displays the Sort dialog box.
3. Select the **Region** field, and click on **Ascending** order. You may have to remove any secondary and ternary sort criteria under the Then By sections.
4. Click **Options** to display the Sort Options dialog box, as shown in Figure T3.7.
5. Click the **First Key Sort Order** drop-down list, and click the custom order you created in the step above.
6. Click **OK** to run the sort. Your list appears sorted with the custom criteria you specified.

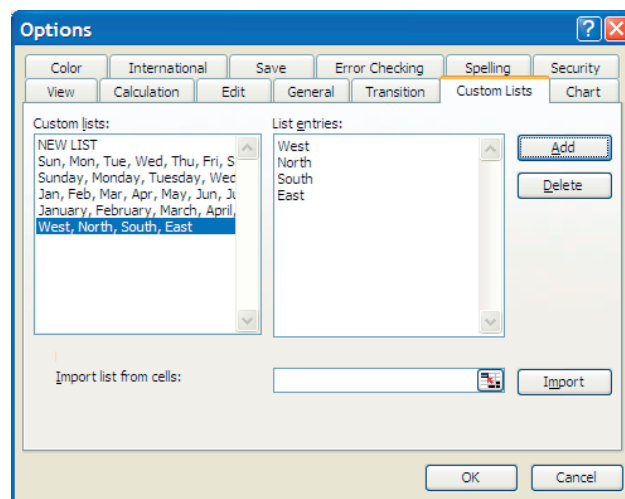


FIGURE T3.6
Creating a Custom
Sort Order

Creating Conditional Formatting

Excel gives you the ability to add *conditional formatting*—formatting that automatically adjusts depending on the contents of cells—to your worksheet. This means

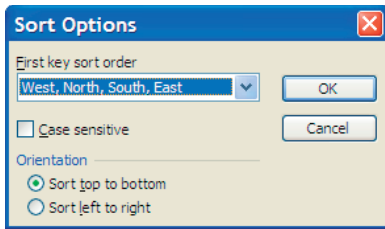


FIGURE T3.7

Sort Options Dialog Box

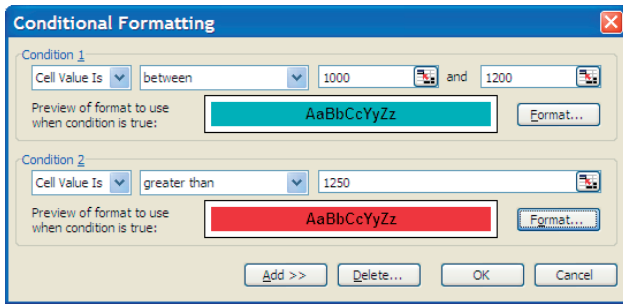


FIGURE T3.8

Conditional Formatting
Dialog Box

FIGURE T3.9

Conditional Formatting

Sales Rep	Region	Month	Sale	Magazine
Bucknell, Peter	West	1-Jan	\$ 500	Business Times
Smith, Michael	South	1-Feb	\$ 900	IT Weekly
Anderson, Rachel	South	1-Feb	\$ 700	Value Driven Journal
Fuller, Brad	North	1-Feb	\$ 375	People, Places, and Machines
Cushman, David	North	1-Feb	\$ 450	Dollars and Sense
Nell, Janet	East	1-Jan	\$ 550	Value Driven Journal
Peaslee, Garrett	East	1-Feb	\$ 800	People, Places, and Machines
Drew, Nancy	West	1-Jan	\$ 700	Dollars and Sense
Nell, Janet	East	1-Feb	\$ 600	Business Times
Smith, Michael	South	1-Feb	\$ 1,250	IT Weekly
Anderson, Rachel	South	1-Feb	\$ 1,400	Business Times
Cushman, David	North	1-Jan	\$ 1,000	IT Weekly
Bucknell, Peter	West	1-Feb	\$ 600	Dollars and Sense
Peaslee, Garrett	East	1-Jan	\$ 1,000	Value Driven Journal
Fuller, Brad	North	1-Feb	\$ 1,200	People, Places, and Machines
Drew, Nancy	West	1-Feb	\$ 580	Dollars and Sense
Smith, Michael	South	1-Jan	\$ 400	Value Driven Journal
Nell, Janet	East	1-Jan	\$ 720	People, Places, and Machines
Fuller, Brad	North	1-Jan	\$ 925	Dollars and Sense
Bucknell, Peter	West	1-Jan	\$ 1,100	Business Times
Cushman, David	North	1-Jan	\$ 1,200	Business Times
Peaslee, Garrett	East	1-Jan	\$ 250	Value Driven Journal
Drew, Nancy	West	1-Jan	\$ 700	People, Places, and Machines
Anderson, Rachel	South	1-Jan	\$ 750	Dollars and Sense
Cushman, David	North	1-Jan	\$ 1,100	People, Places, and Machines
Bucknell, Peter	West	1-Feb	\$ 1,200	Dollars and Sense
Fuller, Brad	North	1-Feb	\$ 250	Value Driven Journal
Nell, Janet	East	1-Feb	\$ 700	People, Places, and Machines

you can highlight important trends in your data, such as the rise in a stock price, a missed milestone, or a sudden spurt in your college expenses, based on conditions you set in advance using the Conditional Formatting dialog box. With this feature, an out-of-the-ordinary number jumps out at anyone who routinely uses the worksheet.

For example, if a stock in a Gain/Loss column rises by more than 20 percent, you want to display numbers in bold type on a light blue background. In addition, if a stock in the Gain/Loss column falls by more than 20 percent, the number will be displayed in bold type on a solid red background. This is where you want to use conditional formatting.

To create such a conditional format, complete the following steps:

1. If the workbook **T3_ProblemSolving_Data.xls** is closed, open it.
2. Select the worksheet **ConditionalFormatting**.
3. Select the column **Sale**. (Note that each cell can maintain its own, unique conditional formatting, so that you can set up several different conditions.)
4. Choose **Format, Conditional Formatting**. The Conditional Formatting dialog box appears, containing several drop-down list boxes.
5. In the first list box, select **Cell Value Is**.
6. In the second list box, select **Between**.
7. In the first text box, type the number **1000**.
8. In the second text box, type the number **1200**.
9. Click the **Format** button and selected **Bold** style on the Fonts tab and **Light Blue** on the Patterns tab and then click **OK**. The formatting will be used for the cells if the conditional statement you specified in steps 5 through 8 becomes true.
10. Click the **Add** button in the Conditional Formatting dialog box to add another condition to the scenario. The dialog box expands to accept an additional condition. The **Add** button lets you add up to three conditions. The **Delete** button removes conditions you no longer want.
11. Specify **Greater Than** as the operator you want to use in the second drop-down list box, and then type **1250** in the third list box.
12. Click the **Format** button for Condition 2 and select **Bold** for the font style on the Font tab, and then, using the Patterns tab, select **red** shading. Click **OK**. Figure T3.8 displays the settings for this example.
13. Click **OK** to close the dialog box, and the conditional formatting will be applied to the selected text. If any numbers fall into the ranges you specified, the formatting you specified will be applied. Figure T3.9 shows the conditional formatting you entered for this example.

Using AutoFilter to Find Records

When you want to hide all the records (rows) in your list except those that meet certain criteria, you can use the AutoFilter command on the Filter submenu of the Data menu. The *AutoFilter* command places a drop-down list at the top of each column in your list (in the heading row). To display a particular group of records, select the criteria that you want in one or more of the drop-down lists. For example, to display the sales history for all employees that had \$1,000 orders in January, you could select January in the Month column drop-down list and \$1,000 in the Sale drop-down list.

To use the AutoFilter command to find records, follow these steps:

1. If the workbook **T3_ProblemSolving_Data.xls** is closed, open it.
2. Select the worksheet **AutoFilter**.
3. Click any cell in the list.
4. Choose **Data, Filter**, and then choose **AutoFilter** from the submenu. Each column head now displays a down arrow.
5. Click the **down arrow** next to the **Region** heading. A list box that contains filter options appears, as shown in Figure T3.10.

If a column in your list contains one or more blank cells, you will also see (Blanks) and (NonBlanks) options at the bottom of the list. The *(Blanks)* option displays only the records containing an empty cell (blank field) in the filter column, so that you can locate any missing items quickly. The *(NonBlanks)* option displays the opposite—all records that have an entry in the filter column.

6. Click **East** to use for this filter. Excel hides the entries that don't match the criterion you specified and highlights the active filter arrow. Figure T3.11 shows the results of using East as the criterion in the Region column.

You can use more than one filter arrow to further narrow your list, which is useful if your list is many records long. To continue working with AutoFilter but to also redisplay all your records, choose **Data, Filter, Show All**. Excel displays all your records again. To

Autofilter
options for
the region
column

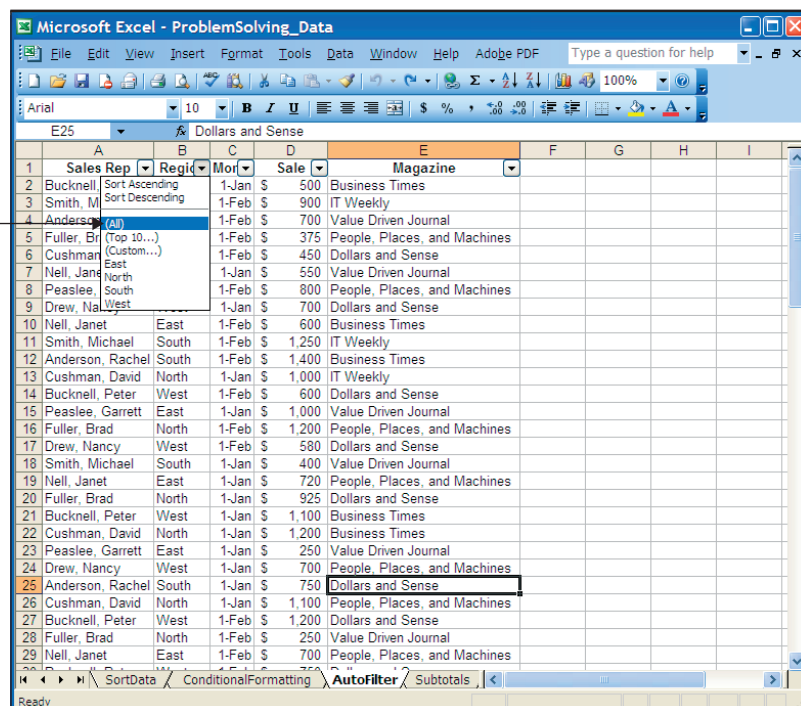
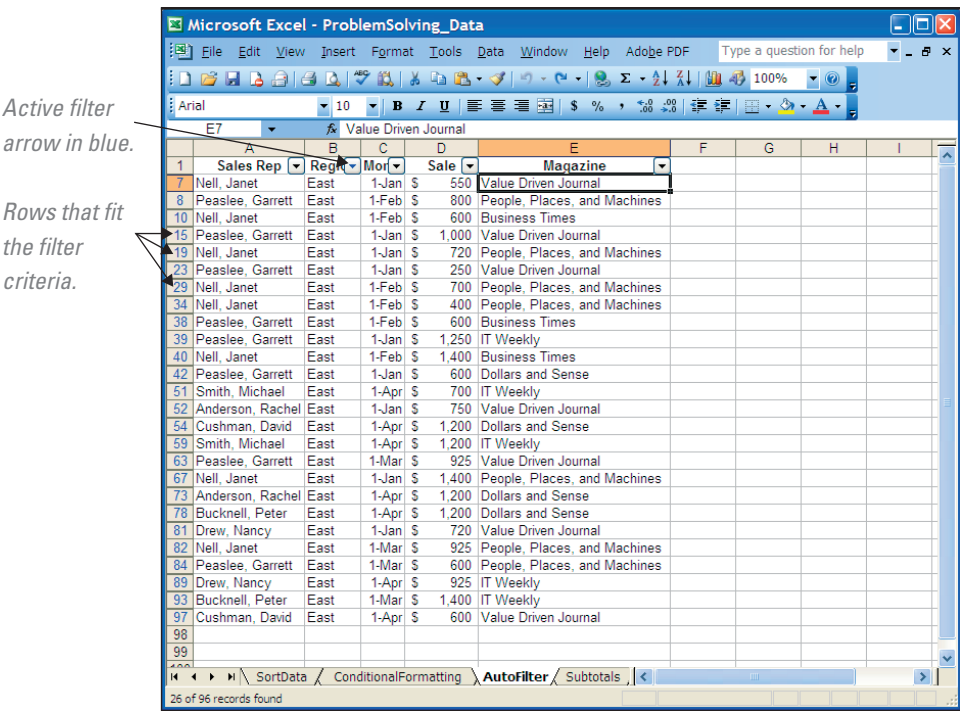


FIGURE T3.10
AutoFilter Options

FIGURE T3.11
AutoFilter Output



remove the AutoFilter drop-down lists, unselect the AutoFilter command on the Filter submenu.

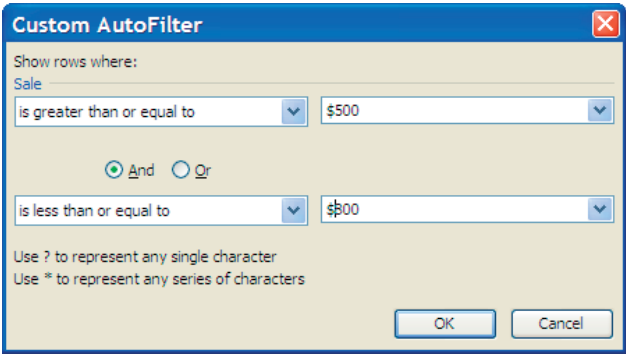
CREATING A CUSTOM AUTOFILTER

When you want to display a numeric range of data or customize a column filter in other ways, choose Custom from the AutoFilter drop-down list to display the Custom AutoFilter dialog box. The dialog box contains two relational list boxes and two value list boxes that you can use to build a custom range for the filter. For example, you could display all sales greater than \$1,000 or all sales between \$500 and \$800.

To create a custom AutoFilter, follow these steps:

1. Click any cell in the list.
2. If AutoFilter is not already enabled, choose **Data, Filter**, and then choose **AutoFilter** from the submenu.
3. Click the arrow next to the heading **Sale** and select **(Custom...)** from the list of choices. The Custom AutoFilter dialog box opens.
4. Click the first relational operator list box and select **is greater than or equal to** and then click the value list box and select **\$500**.
5. Click the **And** radio button to indicate that the records must meet both criteria, then specify **is less than or equal to** in the second relational operator list box and select **\$800** in the second value list box. Figure T3.12 shows the Custom AutoFilter dialog box with two range criteria specified.
6. Click **OK** to apply the custom AutoFilter. The records selected by the filter are displayed in your worksheet.

FIGURE T3.12
Custom AutoFilter



Analyzing a List with the Subtotals Command

The *Subtotals* command on the Data menu helps you organize and analyze a list by displaying records in groups and inserting summary information, such as subtotals, averages, maximum values, or minimum values. The Subtotals command can also display a grand total at the top or bottom of your list, letting you quickly add up columns of numbers. As a bonus, Subtotals displays your list in *Outline view* so that you can expand or shrink each section in the list simply by clicking.

To add subtotals to a list, follow these steps:

1. If the workbook **T3_ProblemSolving_Data.xls** is closed, open it.
2. Select the worksheet **Subtotals**.
3. Arrange the list so that the records for each group are located together. To do this, sort the list by **Region**.
4. Choose **Data**, then select **Subtotals**. Excel opens the Subtotal dialog box and selects the list.
5. In the **At Each Change In** list box, choose **Sales Rep**. Each time this value changes, Excel inserts a row and computes a subtotal for the numeric fields in this group of records.
6. In the **Use Function** list box, choose **SUM**.
7. In the **Add Subtotal To** list box, choose **Sale**, which is the column to use in the subtotal calculation. Figure T3.13 shows the settings for this example.
8. Click **OK** to add the subtotals to the list. You will see a screen similar to the one in Figure T3.14, complete with subtotals, outlining, and a grand total.

When you use the Subtotals command in Excel to create outlines, you can examine different parts of a list by clicking buttons in the left margin. Click the numbers at the top of the left margin to choose how many levels of data you want to see. Click the plus or minus button to expand or collapse specific subgroups of data.

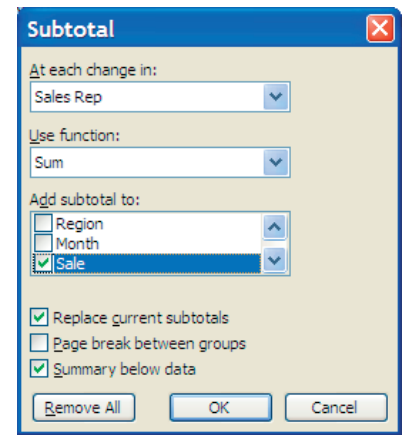


FIGURE T3.13
Subtotal Settings

	A	B	C	D	E	F	G	H
	Sales Rep	Region	Month	Sale	Magazine			
1	Anderson, Rachel	West	1-Mar	\$ 600	Value Driven Journal			
2	Anderson, Rachel	North	1-Mar	\$ 580	Business Times			
3	Anderson, Rachel	North	1-Apr	\$ 720	Value Driven Journal			
4	Anderson, Rachel	South	1-Feb	\$ 700	Value Driven Journal			
5	Anderson, Rachel	South	1-Feb	\$ 1,400	Business Times			
6	Anderson, Rachel	South	1-Jan	\$ 750	Dollars and Sense			
7	Anderson, Rachel	South	1-Jan	\$ 500	Value Driven Journal			
8	Anderson, Rachel	South	1-Jan	\$ 900	Business Times			
9	Anderson, Rachel	South	1-Jan	\$ 375	Value Driven Journal			
10	Anderson, Rachel	South	1-Apr	\$ 1,250	Business Times			
11	Anderson, Rachel	East	1-Jan	\$ 750	Value Driven Journal			
12	Anderson, Rachel	East	1-Apr	\$ 1,200	Dollars and Sense			
13	Anderson, Rachel	Total		\$ 9,725				
14	Bucknell, Peter	West	1-Jan	\$ 500	Business Times			
15	Bucknell, Peter	West	1-Feb	\$ 600	Dollars and Sense			
16	Bucknell, Peter	West	1-Jan	\$ 1,100	Business Times			
17	Bucknell, Peter	West	1-Feb	\$ 1,200	Dollars and Sense			
18	Bucknell, Peter	West	1-Feb	\$ 750	Dollars and Sense			
19	Bucknell, Peter	West	1-Jan	\$ 700	IT Weekly			
20	Bucknell, Peter	North	1-Mar	\$ 250	Business Times			
21	Bucknell, Peter	South	1-Jan	\$ 720	Dollars and Sense			
22	Bucknell, Peter	South	1-Mar	\$ 250	Business Times			
23	Bucknell, Peter	South	1-Apr	\$ 700	Dollars and Sense			
24	Bucknell, Peter	East	1-Apr	\$ 1,200	Dollars and Sense			
25	Bucknell, Peter	East	1-Mar	\$ 1,400	IT Weekly			
26	Bucknell, Peter	Total		\$ 9,370				
27	Cushman, David	West	1-Apr	\$ 400	IT Weekly			
28	Cushman, David	West	1-Mar	\$ 250	People, Places, and Machines			
29								
30								

FIGURE T3.14
Subtotals, Outline,
and Grand Total

You can choose the Subtotals command as often as necessary to modify your groupings or calculations. When you are finished using the Subtotals command, click **Remove All** in the Subtotal dialog box.

PivotTables

A powerful built-in data-analysis feature in Excel is the PivotTable. A *PivotTable* analyzes, summarizes, and manipulates data in large lists, databases, worksheets, or other collections. It is called a PivotTable because fields can be moved within the table to create different types of summary lists, providing a “pivot.” PivotTables offer flexible and intuitive analysis of data.

Although the data that appear in PivotTables look like any other worksheet data, the data in the data area of the PivotTable cannot be directly entered or changed. The PivotTable is linked to the source data; the output in the cells of the table are read-only data. The formatting (number, alignment, font, etc.) can be changed as well as a variety of computational options such as SUM, AVERAGE, MIN, and MAX.

PIVOTTABLE TERMINOLOGY

Some notable PivotTable terms are:

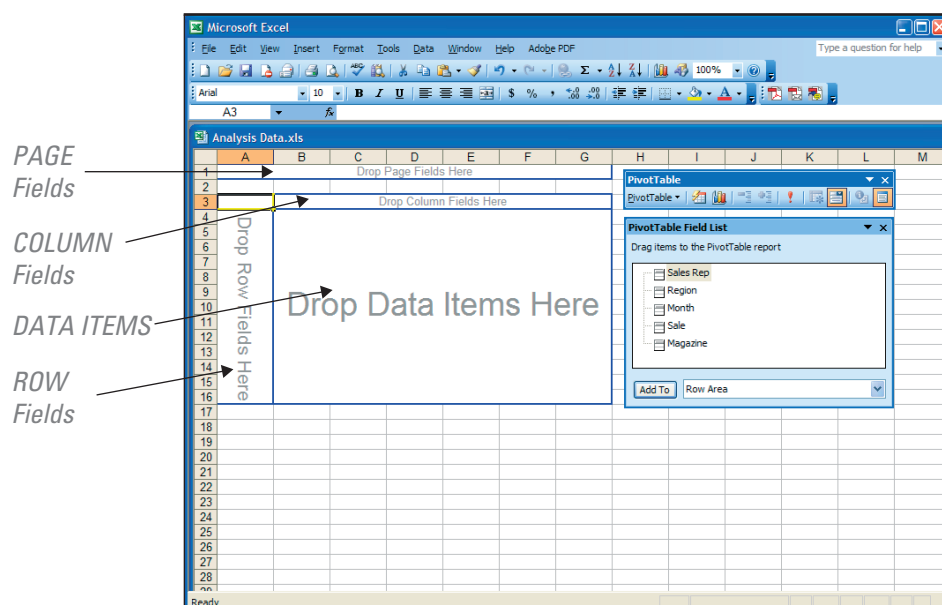
- **Row field**—Row fields have a row orientation in a PivotTable report and are displayed as row labels. These appear in the ROW area of a PivotTable report layout.
- **Column field**—Column fields have a column orientation in a PivotTable report and are displayed as column labels. These appear in the COLUMN area of a PivotTable report layout.
- **Data field**—Data fields from a list or table contain summary data in a PivotTable, such as numeric data (e.g., statistics, sales amounts). These are summarized in the DATA area of a PivotTable report layout.
- **Page field**—Page fields filter out the data for other items and display one page at a time in a PivotTable report.

BUILDING A PIVOTTABLE

The PivotTable wizard steps through the process of creating a PivotTable, allowing a visual breakdown of the data in the Excel list or database. When the wizard steps are complete, a diagram, such as Figure T3.15, with the labels PAGE, COLUMN, DATA ITEMS, and ROW, is displayed.

FIGURE T3.15

The PivotTable, PivotTable
Toolbar, and PivotTable
Field List



ROW, and DATA appears. The next step is to drag the field buttons onto the PivotTable grid. This step tells Excel about the data needed to be analyzed with a PivotTable.

Using the PivotTable Feature

1. If the workbook **T3_ProblemSolving_Data.xls** is closed, open it.
2. Select the worksheet **PivotTableData**. Click any cell in the list. Now the active cell is within the list, and Excel knows to use the data in the Excel list to create a PivotTable.
3. Select **Data** on the menu bar, then choose **Pivot-Table and PivotChart Report**. The PivotTable and Pivot Chart Wizard—Step 1 of 3 dialog box opens, as shown in Figure T3.16.
4. In the **Where is the data that you want to analyze?** area, choose **Microsoft Excel list or database** if it is not already selected.
5. In the **What kind of report do you want to create?** area, choose **PivotTable**.
6. Click the **Next** button. The PivotTable and PivotChart Wizard—Step 2 of 3 dialog box opens. In the Range box, the range should be **\$A\$1:\$E\$97**, which defines the data range to use for the PivotTable. The range must include the column headings in row 1, which will be the names of the fields to drag into the PivotTable.
7. Click the **Next** button. The PivotTable and PivotChart Wizard—Step 3 of 3 dialog box opens. This dialog box is used to tell Excel whether to place the PivotTable on an existing or new worksheet. Select **New Worksheet**.
8. The next step is to design the layout of the PivotTable. Click the **Layout** button. Excel opens the PivotTable and PivotChart Wizard—Layout dialog box, as shown in Figure T3.17.
9. The fields appear on buttons to the right in the dialog box. These currently are the column fields. The four areas you can define to create your PivotTable are ROW, COLUMN, DATA, and PAGE.
10. In the next step, you will drag the field buttons to the areas to define the layout of the PivotTable. For example, to summarize the values in a field in the body of the table, place the field button in the DATA area. To arrange items in a field in columns with the labels across the top, place the field button in the COLUMN area. To arrange items in a field of rows with labels along the side, place the field button in the ROW

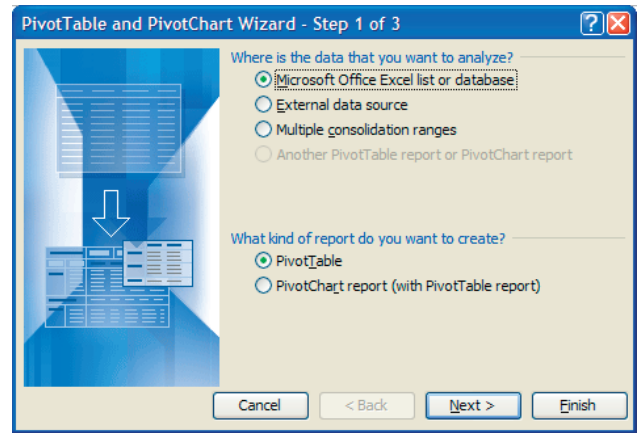


FIGURE T3.16
The PivotTable and PivotChart Wizard—Step 1 of 3 Dialog Box

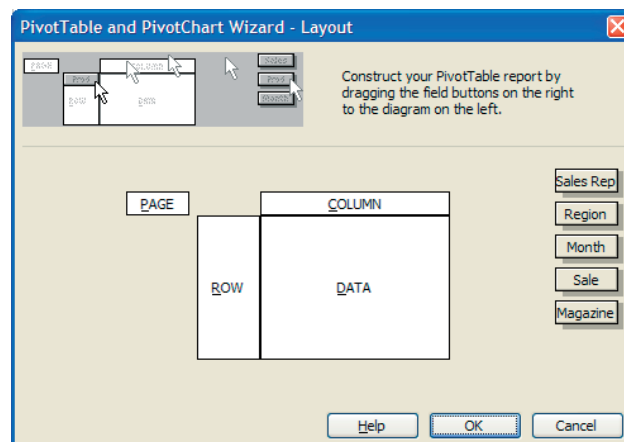
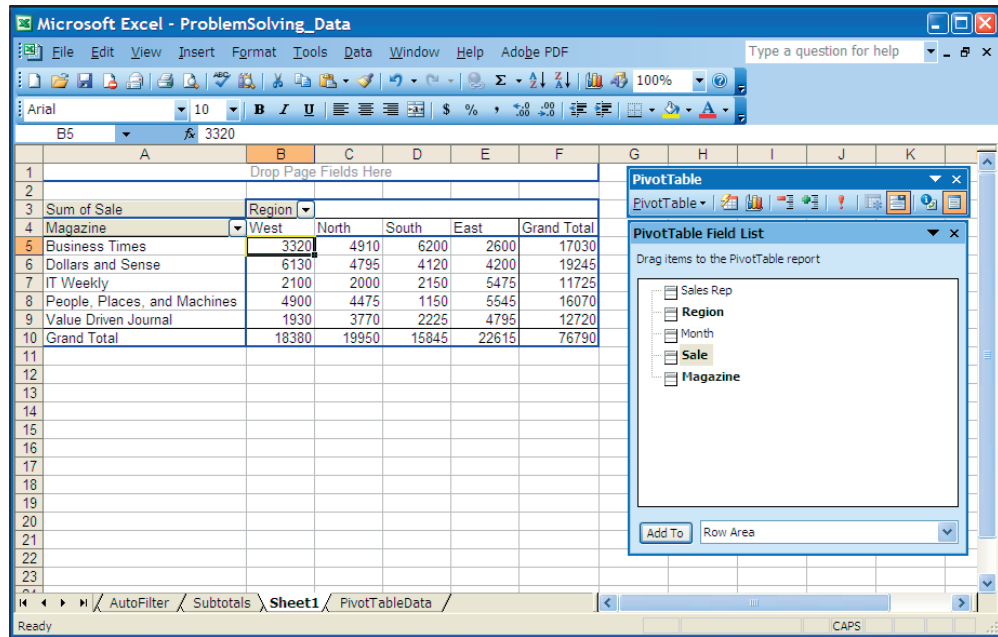


FIGURE T3.17
The PivotTable and PivotChart Wizard—Layout Dialog Box

FIGURE T3.18

The PivotTable with Data, PivotTable Toolbar, and PivotTable Field List



area. To show data for one item at a time, one item per page, place the field button in the **PAGE** area.

11. Drag the **Month** button to the **PAGE** area. The page field operates like the row and column fields but provides a third dimension to the data. It allows another variable to be added to the Pivot Table without necessarily viewing all its values at the same time.
12. Drag the **Sale** button to the **DATA** area. The data field is the variable that the Pivot Table summarizes.
13. Drag the **Region** button to the **COLUMN** area. The column field is another variable used for comparison.
14. Drag the **Magazine** button to the **ROW** area. A row field in a PivotTable is a variable that takes on different values.
15. Click **OK** to return to the PivotTable and PivotChart Wizard—Step 3 of 3 dialog box.
16. Click the **Finish** button. The PivotTable Wizard places the table in the new worksheet called Sheet2, as illustrated in Figure T3.18. In addition, the PivotTable toolbar and the PivotTable Field List should appear.

MODIFYING A PIVOTTABLE VIEW

After a PivotTable is built, modifications can be done at any time. For example, examining the sales for a particular region would mean that the Region field would need to be changed. Use the drop-down list to the right of the field name. Select a region and click OK. Click on the red ! button on the PivotTable toolbar to refresh the data with the new criteria. The grand total dollar amounts by region are at the bottom of each item, which have been recalculated according to the selected region (or regions).

This report can be used in various ways to analyze the data. For instance, click the PivotTable down arrow button on the PivotTable toolbar, choose PivotTable Wizard, and click the Layout button. Drag the buttons off the diagram and arrange the fields like this:

1. **Magazine** in the **PAGE** area.
2. **Month** in the **COLUMN** area.

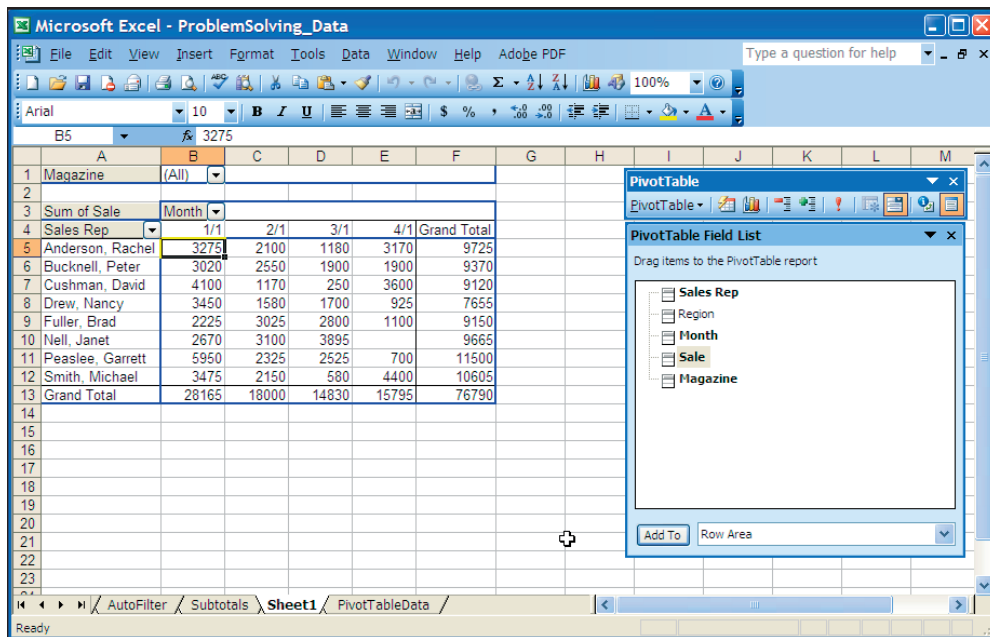


FIGURE T3.19

Rearranged Data in the PivotTable

3. **Sale** in the **DATA** area.
4. **Sales Rep** in the **ROW** area.

The completed PivotTable dialog box should look like the one in Figure T3.19. The PivotTable now illustrates the sales by month for each salesperson, along with the total amount for the sales for each sales representative.

PIVOTTABLE TOOLS

There are a number of PivotTable tools that you should be aware of, such as:

- **PivotTable**—Contains commands for working with a PivotTable.
- **Format Report**—Enables the user to format the PivotTable report.
- **Chart Wizard**—Enables the user to create a chart using the data in the PivotTable.
- **Hide Detail**—Hides the detail information in a PivotTable and shows only the totals.
- **Show Detail**—Shows the detail information in a PivotTable.
- **Refresh External Data**—Allows the user to refresh the data in the PivotTable after changes to data are made in the data source.
- **Include Hidden Items in Totals**—Lets the user show the hidden items in the totals.
- **Always Display Items**—Always shows the field item buttons with drop-down arrows in the PivotTable.
- **Field Settings**—Displays the PivotTable Field dialog box so that the user can change computations and their number format.
- **Hide Field List**—Hides and shows the PivotTable Field List window.

BUILDING A PIVOTCHART

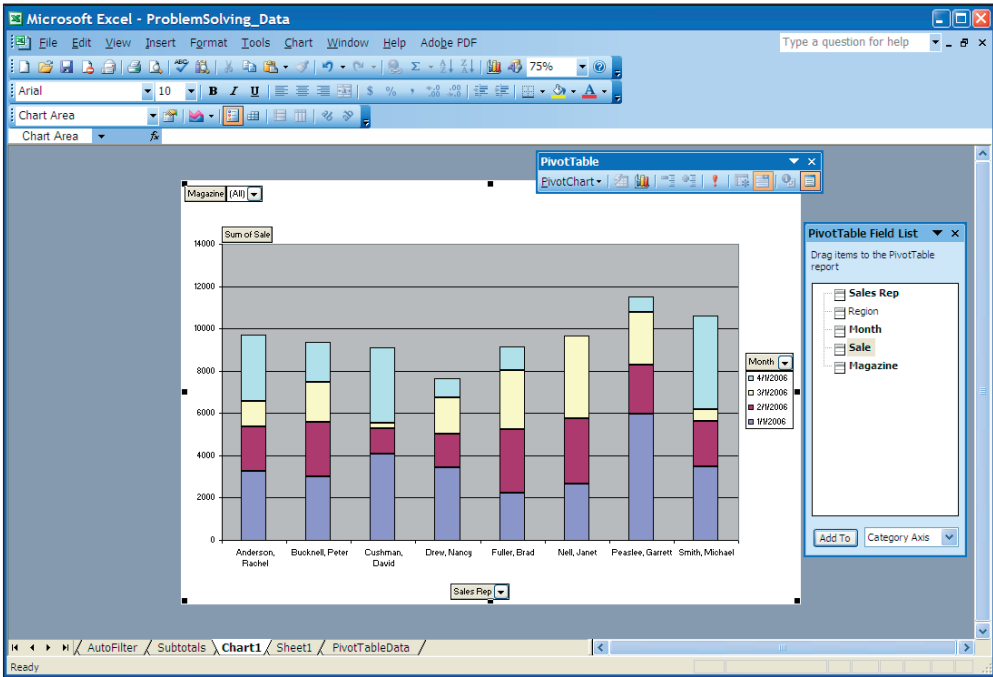
A PivotChart is a column chart (by default) that is based on the data in a PivotTable. The chart type can be changed if desired. To build a PivotChart:

1. Click the **Chart Wizard** (see Figure T3.20) on the PivotTable toolbar. Excel will automatically create a new worksheet, labeled Chart 1, and display the current PivotTable information in chart form like Figure T3.21.

PivotTable Toolbar



PivotChart



2. Modifications to the PivotChart can be done by selecting the drop-down lists to the right of the field names.

Note: Whatever changes are selected on the PivotChart are also made to the PivotTable, as the two features are linked dynamically.



If you routinely track large amounts of information, you can use several Excel tools for problem solving. A *list* is a table of data stored in a worksheet, organized into columns of fields and rows of records. Excel gives you the ability to add *conditional formatting*—formatting that automatically adjusts depending on the contents of cells—to your worksheet. The *AutoFilter* command places a drop-down list at the top of each column in your list (in the heading row). The *Subtotals* command on the Data menu helps you organize and analyze a list by displaying records in groups and inserting summary information, such as subtotals, averages, maximum values, or minimum values. A *PivotTable* analyzes, summarizes, and manipulates data in large lists, databases, worksheets, or other collections.



1. Production Errors

Established in 2002, t-shirts.com has rapidly become the place to find, order, and save on T-shirts. One huge selling factor is that the company manufactures its own T-shirts. However, the quality manager for the production plant, Kasey Harnish, has noticed an unacceptable number of defective T-shirts being produced. You have been hired to assist Kasey in understanding where the problems are concentrated. He suggests using a PivotTable to perform an analysis and has provided you with a data file, **T3_TshirtProduction_Data.xls**. The following is a brief definition of the information within the data file:

- A. Batch:** A unique number that identifies each batch or group of products produced.
- B. Product:** A unique number that identifies each product.
- C. Machine:** A unique number that identifies each machine on which products are produced.
- D. Employee:** A unique number that identifies each employee producing products.
- E. Batch Size:** The number of products produced in a given batch.
- F. Num Defect:** The number of defective products produced in a given batch.

2. Coffee Trends

College chums Hannah Baltzan and Tyler Phillips are working on opening a third espresso drive-through stand in Highlands Ranch, Colorado, called Brewed Awakening. Their original drive-through stand, Jitters, and their second espresso stand, Bean Scene, have done well in their current locations in Englewood, Colorado, five miles away. Since Hannah and Tyler want to start with low overhead, they need assistance analyzing the data from the past year on the different types of coffee and amounts that they sold from both stands. Hannah and Tyler would like a recommendation of the four top sellers to start offering when Brewed Awakening opens. They have provided you with the data file **T3_JittersCoffee_Data.xls** for you to perform the analysis that will support your recommendation.

3. Filtering SecureIT Data

SecureIT, Inc., is a small computer security contractor that provides computer security analysis, design, and software implementation for commercial clients. Almost all of SecureIT work requires access to classified material or company confidential documents. Consequently, all of the security personnel have clearances of either Secret or Top Secret.

Some have even higher clearances for work that involves so-called black box security work.

While most of the personnel information for SecureIT resides in database systems, a basic employee worksheet is maintained for quick calculations and ad hoc report generation. Because SecureIT is a small company, it can take advantage of Excel's excellent list management facilities to satisfy many of its personnel information management needs. You have been provided with a sample worksheet, **T3_Employee_Data.xls**, to assist SecureIT with producing several worksheet summaries. Here is what is needed:

1. One worksheet that is sorted by last name and hire data.
2. One worksheet that uses a custom sort by department in this order: Marketing, Human Resources, Management, and Engineering.
3. One worksheet that uses a filter to display only those employees in the Engineering department with a clearance of Top Secret (TS).
4. One worksheet that uses a custom filter to display only those employees born between 1960 and 1969 (inclusive).
5. One worksheet that totals the salaries by department and the grand total of all department salaries. This worksheet should be sorted by department name first.

4. Filtering RedRocks Consulting Contributions

RedRocks Consulting is a large computer consulting firm in Denver, Colorado. Don McCubrey, the CEO and founder of the firm, is well-known for his philanthropic efforts. He believes that many of his employees also contribute to nonprofit organizations and wants to reward them for their efforts while encouraging others to contribute to charities. He started a program in which RedRocks Consulting matches 50 percent of each donation an employee makes to the charity of his or her choice. The only guidelines are that the charity must be a nonprofit organization and the firm's donation per employee may not exceed \$500 a year.

Don has started an Excel file, **T3_RedRocks_Data.xls**, to record the firm's donations. Included in this file are the dates the request for a donation was submitted, the employee's name and ID number, the name of the charity, the dollar amount contributed by the firm, and the date the contribution was sent. Don wants you to help him create several worksheets with the following criteria:

1. One worksheet that sorts the list alphabetically by organization and then by employee's last name.
2. One worksheet that totals the contribution made per employee for the month of December.
3. One worksheet that sorts the list by donation value by lowest amount to highest amount.