Chapter 43

Using PivotTables and slicers to describe data

Questions answered in this chapter:

- What is a PivotTable?
- How can I use a PivotTable to summarize grocery sales at several grocery stores?
- What PivotTable layouts are available in Excel 2016?
- Why is a PivotTable called a *PivotTable*?
- How can I easily change the format in a PivotTable?
- How can I collapse and expand fields?
- How do I sort and filter PivotTable fields?
- How do I summarize a PivotTable by using a PivotChart?
- How do I use the Reports Filter section of the PivotTable?
- How do PivotTable slicers work?
- How do I add blank rows or hide subtotals in a PivotTable?
- How do I apply conditional formatting to a PivotTable?
- How can I update my calculations when I add new data?
- I work for a small travel agency for which I need to mass-mail a travel brochure. My funds are limited, so I want to mail the brochure to people who spend the most money on travel. From information in a random sample of 925 people, I know the gender, the age, and the amount these people spent on travel last year. How can I use this data to determine how gender and age influence a person's travel expenditures? What can I conclude about the type of person to whom I should mail the brochure?
- I'm doing market research about station wagons. I need to determine what factors influence the likelihood that a family will purchase a station wagon. From information in a large sample of families, I know the family size (large or small) and the family income (high or low). How can I determine how family size and income influence the likelihood that a family will purchase a station wagon?

- I work for a manufacturer that sells microchips globally. I'm given monthly actual and predicted sales for Canada, France, and the United States for Chip 1, Chip 2, and Chip 3. I'm also given the variance, or difference, between actual and budgeted revenues. For each month and each combination of country and product, I'd like to display the following data: actual revenue, budgeted revenue, actual variance, actual revenue as a percentage of annual revenue, and variance as a percentage of budgeted revenue. How can I display this information?
- What is a calculated field?
- How do I use a report filter or slicer?
- How do I group items in a PivotTable?
- What is a calculated item?
- What is *drilling down*?
- I often have to use specific data in a PivotTable to determine profit, such as the April sales in France of Chip 1. Unfortunately, this data moves around when new fields are added to my PivotTable. Does Excel have a function that enables me to always extract April's Chip 1 sales in France from the PivotTable?
- How can I use the Timeline feature to summarize data during different time periods?
- How I can use a PivotTable to summarize total sales to date during a year?
- How can I use a PivotTable to summarize sales this month compared to the same month a year earlier?
- How can I create a PivotTable based on data in several different locations?
- How can I create a PivotTable based on an already created PivotTable?
- How can I easily use the report filter to create multiple PivotTables?

Answers to this chapter's questions

What is a PivotTable?

In numerous business situations, you need to analyze, or, as we say, "slice and dice," your data to gain important insights. Imagine that you sell different grocery products in different stores at different points in time. You might have hundreds of thousands of data points to track. PivotTables let you quickly summarize your data in almost any way imaginable. For example, for your grocery-store data, you could use a PivotTable to quickly determine the following:

- Amount spent by customers per year in each store on each product

- Total revenue at each store
- Total revenue for each year

In a travel agency, as another example, you might slice data so that you can determine whether the average amount customers spend on travel is influenced by age or gender or by both factors. In analyzing automobile purchases, you'd like to compare the fraction of your customers who are householders with large families buying station wagons to the fraction of householders with small families purchasing station wagons. If you're a microchip manufacturer, you'd like to determine total Chip 1 sales in France, for example, during April, and so on. A PivotTable is an incredibly powerful tool to use in scenarios like these. The easiest way to understand how a PivotTable works is to walk through some carefully constructed examples, so let's get started! I'll begin with an introductory example and then illustrate many advanced PivotTable features through subsequent examples.

How can I use a PivotTable to summarize grocery sales at several grocery stores?

The Data worksheet in the file Groceriespt.xlsx contains more than 900 rows of sales data. (See Figure 43-1.) Each row contains the number of units sold and revenue for a product at a store, as well as the month and year of the sale. The product group (fruit, milk, cereal, or ice cream) is also included. You would like to see a breakdown of sales during each year of each product group and product at each store. You would also like to be able to show this breakdown during any subset of months in a given year (for example, what the sales were during January–June).

	A	B	C	D	E	F	G
1	Year	Month	Store	Group	Product	Units	Revenue
2	2007	August	south	milk	low fat	805	$ 3,187.80
3	2007	March	south	ice cream	Edies	992	$ 3,412.48
4	2007	January	east	milk	skim	712	$ 1,808.48
5	2006	March	north	ice cream	Edies	904	$ 2,260.00
6	2006	January	south	ice cream	Edies	647	$ 2,076.87
7	2005	September	west	fruit	plums	739	$ 1,707.09
8	2006	March	east	milk	low fat	974	$ 2,181.76
9	2007	June	north	fruit	apples	615	$ 1,894.20
10	2007	July	west	fruit	cherries	714	$ 1,856.40
11	2006	May	south	cereal	Special K	703	$ 1,553.63
12	2005	June	west	ice cream	Edies	528	$ 2,064.48
13	2006	October	east	cereal	Raisin Bran	644	$ 1,809.64
14	2005	June	south	fruit	grapes	919	$ 2,196.41
15	2007	May	west	milk	skim	767	$ 1,932.84
16	2007	June	west	cereal	Raisin Bran	984	$ 1,987.68
17	2005	March	south	cereal	Raisin Bran	744	$ 2,217.12
18	2007	September	east	ice cream	Edies	693	$ 2,189.88
19	2006	October	east	milk	chocolate	658	$ 1,895.04
20	2005	November	east	ice cream	Breyers	878	$ 3,274.94

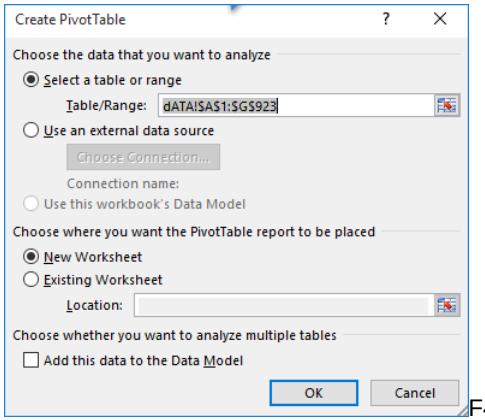
F43xx01

FIGURE 43-1 The data for the grocery PivotTable example.

F43xx01: This figure shows grocery-store sales data.

Before creating a PivotTable, you must have headings in the first row of your data. Notice that the grocery data contains headings (Year, Month, Store, Group, Product, Units, and Revenue) in row 2.

Place your cursor anywhere in the data, and then click PivotTable in the Tables group on the Insert tab. Excel opens the Create PivotTable dialog box, shown in Figure 43-2, and makes an assumption about your data range. (In this case, Excel correctly guessed that the data range was C2:I924.) By selecting Use An External Data Source, you can also refer to a database as a source for a PivotTable. The Data Model option, added in Excel 2013, will be discussed in Chapter 44.

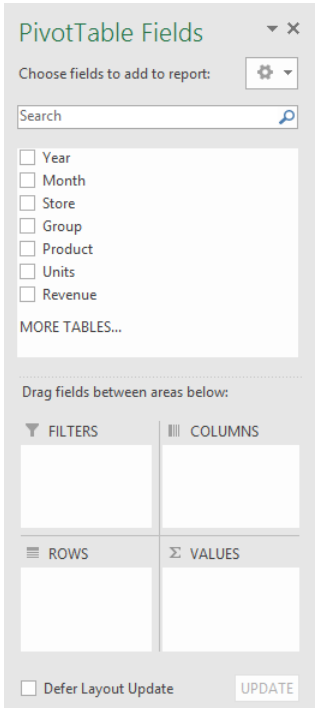


F43xx02

FIGURE 43-2 The Create PivotTable dialog box.

F43xx02: This figure shows the Create PivotTable dialog box for the grocery-store data.

After you click OK, you see the PivotTable Fields pane shown in Figure 43-3.



F43xx03

FIGURE 43-3 The PivotTable Fields pane.

F43xx03: This figure shows the PivotTable field pane for the grocery example.

You fill in the PivotTable Field pane by dragging PivotTable headings, or fields, into the boxes, or zones. This step is critical to ensuring that the PivotTable will summarize and display the data in the manner you want. The four zones are as follows:

- **Rows** Fields dragged here are listed on the left side of the table in the order in which they are added to the box. For example, I dragged to the Rows box the fields Year, Group, Product, and Store, in that order. This causes Excel to summarize data first by year, then for each product group within a given year, then by product within each group, and finally each product by store. You can drag a field at any time to a different zone or reorder the fields within a zone by dragging a field up or down in a zone or by clicking the arrow to the right of the field label.

- **Columns** Fields dragged here have their values listed across the top row of the PivotTable. As we begin this example, we have no fields in the Columns zone.

- **Values** Fields dragged here are summarized mathematically in the table. I dragged Units and Revenue (in that order) to this zone. Excel tries to guess what kind of calculation you want to perform on a field. In this example, Excel guesses that Revenue and Units should be summed, which happens to be correct. If you want to change the method of calculation for a data field to an average, a count, or something else, simply click the data field and choose

Value Field Settings. I give an example of how to use the Value Field Settings command later in the chapter.

- **Filters** For fields dragged to the Filters area, you can easily pick any subset of the field values so that the PivotTable shows calculations based only on that subset. In this example, I dragged Month to the Filters area. That lets me easily select any subset of months, for example January–June, and the calculations are based on only those months. Slicers now make report filters virtually obsolete.

The completed PivotTable Field pane is shown in Figure 43-4. The resulting PivotTable is shown in Figure 43-5 and in the All Row Fields worksheet of the workbook Groceriespt.xlsx. In row 6, you can see that 243,228 units were sold for $728,218.68 in 2005.

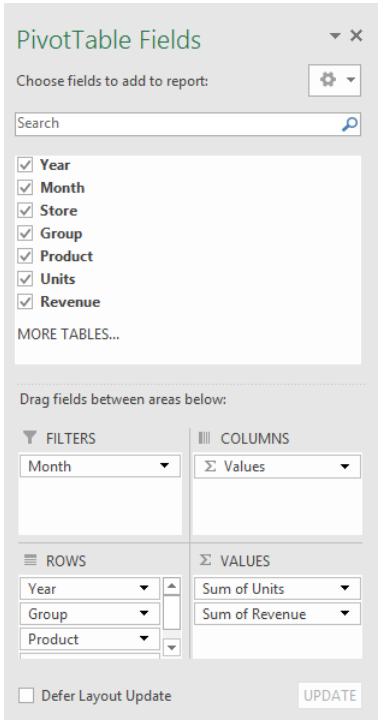
Tip Here is some advice about navigating between worksheets:

Ctrl+Page up moves you back one worksheet

Ctrl+Page down moves you forward one worksheet

Right-clicking either of the arrows to the left of the first worksheet name brings up a list of worksheet names from which you can move to any worksheet in the workbook.

Note To see the field list, you need to be in a field in the PivotTable. If you do not see the field list, right-click any cell in the PivotTable and select Show Field List.



F43xx04

FIGURE 43-4 A completed PivotTable Field List.

F43xx04: This figure shows the Field List for the grocery example.

	A	B	C
1	Month	(All)	
2			
3		Values	
4	Row Labels	Sum of Units	Sum of Revenue
5	2005	243228	728218.68
6	cereal	63689	192172.93
7	Cheerios	11163	32993.1
8	east	1645	5055.8
9	north	1639	4988
10	south	3265	9216.47
11	west	4614	13732.83
12	Raisin Bran	35797	105793.04
13	east	6226	19500.19
14	north	8458	22822.23
15	south	8989	26069.35
16	west	12124	37401.27
17	Special K	16729	53386.79
18	east	2289	5998.21
19	north	4172	14956.36
20	south	3366	11339.47
21	west	6902	21092.75
22	fruit	60047	182813.88
23	apples	14535	48127.74
24	east	1229	3972.44
25	north	3734	13631.83

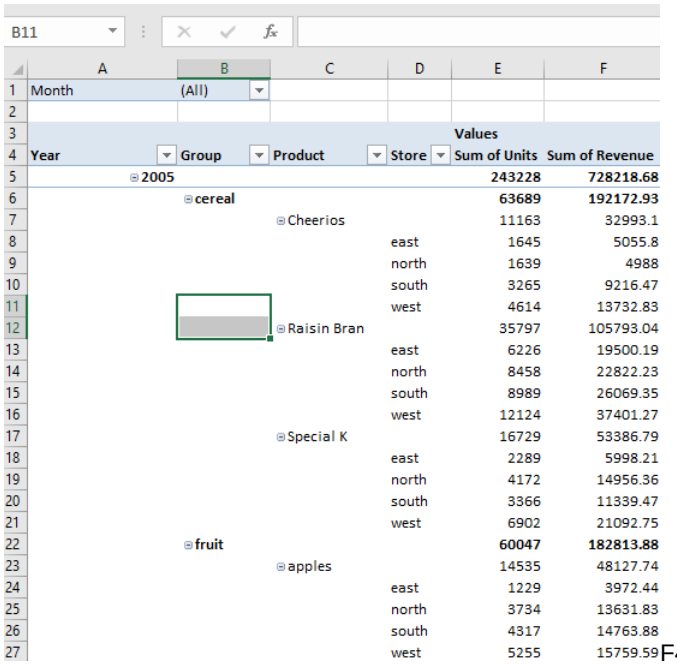
F43xx05

FIGURE 43-5 The grocery PivotTable in compact form.

F43xx05: This figure shows a summary of 2005 sales in compact form.

What PivotTable layouts are available?

The PivotTable layout shown in Figure 43-5 is called the *compact form*. In the compact form, the row fields are shown one on top of another. To change the layout, first place your cursor anywhere within the table. On the Design tab, in the Layout group, click Report Layout, and choose one of the following: Show In Compact Form (see Figure 43-5), Show In Outline Form (see Figure 43-6 and the Outline Form worksheet), or Show In Tabular Form (Figure 43-7 and the Tabular Form worksheet).



	A	B	C	D	E	F
1	Month	(All)				
2						
3					Values	
4	Year	Group	Product	Store	Sum of Units	Sum of Revenue
5	⊟2005				243228	728218.68
6		⊟cereal			63689	192172.93
7			⊟Cheerios		11163	32993.1
8				east	1645	5055.8
9				north	1639	4988
10				south	3265	9216.47
11				west	4614	13732.83
12			⊟Raisin Bran		35797	105793.04
13				east	6226	19500.19
14				north	8458	22822.23
15				south	8989	26069.35
16				west	12124	37401.27
17			⊟Special K		16729	53386.79
18				east	2289	5998.21
19				north	4172	14956.36
20				south	3366	11339.47
21				west	6902	21092.75
22		⊟fruit			60047	182813.88
23			⊟apples		14535	48127.74
24				east	1229	3972.44
25				north	3734	13631.83
26				south	4317	14763.88
27				west	5255	15759.59

F43xx06

FIGURE 43-6 The outline format.

F43xx06: This picture shows the PivotTable in an outline format.

H6

	A	B	C	D	E	F
1	Month	(All)				
2						
3					Values	
4	Year	Group	Product	Store	Sum of Units	Sum of Revenue
5	2005	cereal	Cheerios	east	1645	5055.8
6				north	1639	4988
7				south	3265	9216.47
8				west	4614	13732.83
9			Cheerios Total		11163	32993.1
10			Raisin Bran	east	6226	19500.19
11				north	8458	22822.23
12				south	8989	26069.35
13				west	12124	37401.27
14			Raisin Bran Total		35797	105793.04
15			Special K	east	2289	5998.21
16				north	4172	14956.36
17				south	3366	11339.47
18				west	6902	21092.75
19			Special K Total		16729	53386.79
20		cereal Total			63689	192172.93
21		fruit	apples	east	1229	3972.44
22				north	3734	13631.83
23				south	4317	14763.88
24				west	5255	15759.59
25			apples Total		14535	48127.74
26			cherries	east	1646	4051.22

F43xx07

FIGURE 43-7 The tabular format.

F43xx07: This figure shows the tabular format for a PivotTable.

Why is a PivotTable called a *PivotTable*?

You can easily pivot fields from a row to a column and vice versa to create a different layout. For example, by dragging the Year field to the Columns box, you create the PivotTable layout shown in Figure 43-8. (See the Years Column worksheet.)

	A	B	C	D	E	F	G	H	I
2	Month	(All)							
3									
4		Column Labels							
5		Sum of Units			Sum of Revenue			Total Sum of Units	Total Sum of Revenue
6	Row Labels	2005	2006	2007	2005	2006	2007		
7	cereal	63689	52489	58671	192172.93	150710	172828.96	174849	515711.89
8	Cheerios	11163	16142	13652	32993.1	46657.49	38617.12	40957	118267.71
9	west	4614	1454	1586	13732.83	4696.16	4633.76	7654	23062.75
10	south	3265	6424	3064	9216.47	18450.16	8635.3	12753	36301.93
11	north	1639	3027	4207	4988	10199.31	11409.85	8873	26597.16
12	east	1645	5237	4795	5055.8	13311.86	13938.21	11677	32305.87
13	Raisin Bran	35797	24056	27715	105793.04	69391.29	81254.09	87568	256438.42
14	west	12124	4515	10115	37401.27	14147.68	27038.27	26754	78587.22
15	south	8989	6015	5329	26069.35	16593.97	16632.9	20333	59296.22
16	north	8458	7505	8366	22822.23	23099.35	25008.01	24329	70929.59
17	east	6226	6021	3905	19500.19	15550.29	12574.91	16152	47625.39
18	Special K	16729	12291	17304	53386.79	34661.22	52957.75	46324	141005.76
19	west	6902	2585	2328	21092.75	7715.78	6860.4	11815	35668.93
20	south	3366	3436	5826	11339.47	9125.62	17647.74	12628	38112.83
21	north	4172	2570	3789	14956.36	8665.32	12736.82	10531	36358.5
22	east	2289	3700	5361	5998.21	9154.5	15712.79	11350	30865.5
23	fruit	60047	53910	61816	182813.88	157192.37	189616.27	175773	529622.52
24	apples	14535	12090	13256	48127.74	34879.74	40939.04	39881	123946.52
25	west	5255	3707	5123	15759.59	11024.11	15069.53	14085	41853.23
26	south	4317	4717	1855	14763.88	14052.05	4829.24	10889	33645.17

F43xx08

FIGURE 43-8 The Year field pivoted to the Column field.

F43xx08: This figure shows the PivotTable after Year is placed in the Column field.

How can I easily change the format in a PivotTable?

If you want to change the format of an entire column field, simply double-click the column heading and select Number Format in the Value Field Settings dialog box. Then apply the format you want in the Format Cells dialog box, and click OK in both dialog boxes. For example, in the Formatted $s worksheet, I formatted the Revenue field as currency by double-clicking the Sum Of Revenue heading and applying a currency format. You can also change the format of a value field by clicking the arrow to the right of the value field in the PivotTable Field pane. Select Value Field Settings to open the field's dialog box, and click Number Format. Then you can reformat the column as you want it.

From any cell in a PivotTable, you can click the Design tab on the ribbon to reveal many PivotTable styles.

How can I collapse and expand fields?

Expanding and collapsing fields (a feature introduced in Excel 2007) is a great advantage in PivotTables. In Figure 43-5, you see minus (**–**) signs by each year, group, and product. Clicking the minus sign collapses a field and changes the sign to a plus (**+**) sign. Clicking the plus sign expands the field. For example, if you click the minus sign by *cereal* in any cell in column A, you will find that in each year, *cereal* is reduced to one row, and the various cereals are no longer listed. See Figure 43-9 and the Cerealcollapse worksheet. Clicking the plus sign in cell A6 brings back the detailed or expanded view listing all the cereals.

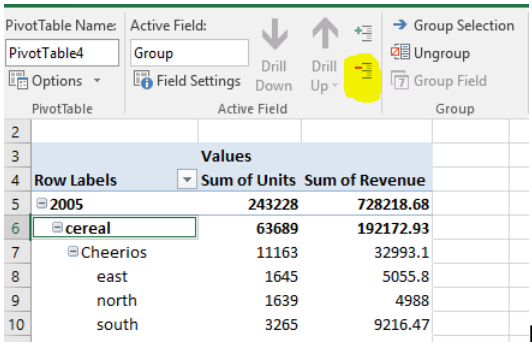
	A	B	C
1	Month	(All)	
2			
3		Values	
4	Row Labels	Sum of Units	Sum of Revenue
5	2005	243228	728218.68
6	cereal	63689	192172.93
7	fruit	60047	182813.88
8	apples	14535	48127.74
9	east	1229	3972.44
10	north	3734	13631.83
11	south	4317	14763.88
12	west	5255	15759.59
13	cherries	11083	32042.39
14	east	1646	4051.22
15	north	3701	11087.14
16	south	3277	9092.92
17	west	2459	7811.11
18	grapes	20005	60126.15
19	east	4811	13052.68
20	north	4865	14698.63
21	south	6268	20474.65
22	west	4061	11900.19
23	plums	14424	42517.6
24	east	2216	7497.52
25	north	1515	5055.55

F43xx09

FIGURE 43-9 The cereal field collapsed.

F43xx09: This figure shows the cereal field collapsed so individual cereal sales data is not shown.

You can also expand or collapse an entire field. Go to any row containing a member of that field, and select the Analyze tab on the ribbon. In the Active Field group, click either the Expand Field button (labeled with a green plus sign) or the Collapse Field button (labeled with a red minus sign). (See Figure 43-10.)



2			
3		Values	
4	Row Labels	Sum of Units	Sum of Revenue
5	2005	243228	728218.68
6	cereal	63689	192172.93
7	Cheerios	11163	32993.1
8	east	1645	5055.8
9	north	1639	4988
10	south	3265	9216.47

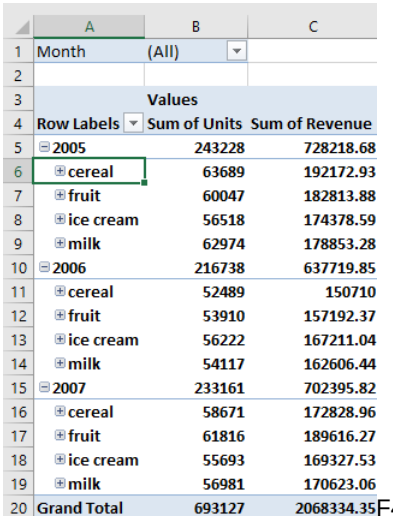
F43xx10

FIGURE 43-10 The Expand Field and Collapse Field buttons.

F43xx10: This figure shows the Collapse Field button highlighted in yellow.

For example, suppose you simply want to see for each year only the sales by product group.

Pick any cell containing a group's name (for example, A6), select the PivotTable Tools Analyze tab on the ribbon, and click the Collapse Field button. You will see the result shown in Figure 43-11 (the Groups Collapsed worksheet). Selecting the Expand Field button brings you back to the original view.



	A	B	C
1	Month	(All)	
2			
3		Values	
4	Row Labels	Sum of Units	Sum of Revenue
5	⊟2005	243228	728218.68
6	⊞cereal	63689	192172.93
7	⊞fruit	60047	182813.88
8	⊞ice cream	56518	174378.59
9	⊞milk	62974	178853.28
10	⊟2006	216738	637719.85
11	⊞cereal	52489	150710
12	⊞fruit	53910	157192.37
13	⊞ice cream	56222	167211.04
14	⊞milk	54117	162606.44
15	⊟2007	233161	702395.82
16	⊞cereal	58671	172828.96
17	⊞fruit	61816	189616.27
18	⊞ice cream	55693	169327.53
19	⊞milk	56981	170623.06
20	Grand Total	693127	2068334.35

F43xx11

FIGURE 43-11 The group fields collapsed.

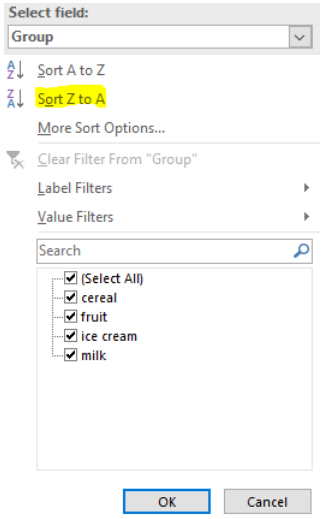
F43xx11: This figure shows all the details on the products collapsed.

How do I sort and filter PivotTable fields?

In Figure 43-5, the products are listed alphabetically within each group. For example, Cheerios is the first type of cereal listed. If you want the products to be listed in reverse alphabetical order, simply move the cursor to any cell containing a product (for example, A7, containing Cheerios in the Groups Collapsed worksheet) and click the drop-down arrow to the right of the Row Labels entry in A4. You will see the list of filtering options shown in Figure 43-12. Selecting Sort Z To A, as shown in Figure 43-12, would list Special K first for *cereal*, whole milk first for *milk*, plums for *fruit*, and so on.

Initially, our PivotTable displays results first from 2005, then 2006, and then 2007. If you want to see the data for 2007 first, move the cursor to any cell containing a year (for example, A5), and choose Sort Largest To Smallest from the available options.

At the bottom of the filtering options dialog box, you can also select any subset of products to be displayed. You may want to first clear Select All and then select only the products you want to show.



F43xx12

FIGURE 43-12 The PivotTable filtering options for the Product field.

F43xx12: This figure shows Sorting Z To A highlighted in yellow for products.

For another example of filtering, look at the Data worksheet in the file Ptcustomers.xlsx, shown in Figure 43-13. The worksheet data contains, for each customer transaction, the customer number, the amount paid, and the quarter of the year in which payment was received. After dragging Customer to the Rows box, Quarter to the Columns box, and Paid to the Values box, the PivotTable shown in Figure 43-14 is displayed. (See the Ptable worksheet in the Ptcustomers.xlsx file.)

	A	B	C	D	E	F
3	Sum of Paid	Column Labels				
4	Row Labels	1	2	3	4	Grand Total
5	1	30965	42039	57790	43417	174211
6	2	96038	121118	59089	45355	321600
7	3	57419	33589	61960	97548	250516
8	4	48947	79352	63052	59520	250871
9	5	57270	86555	69517	33471	246813
10	6	75639	71976	55212	78644	281471
11	7	53130	65768	49064	89018	256980
12	8	33289	74001	45219	43512	196021
13	9	61611	99009	61075	50945	272640
14	10	31785	71213	60417	63835	227250
15	11	59127	35567	62130	107832	264656
16	12	71862	21670	67312	63558	224402
17	13	100626	56058	39500	75109	271293
18	14	74240	63023	36217	77218	250698
19	15	30612	62277	45561	52567	191017
20	16	41870	71490	64909	57120	235389
21	17	61811	85706	46978	40802	235297
22	18	24456	44916	55519	81421	206312
23	19	89591	53157	37558	38247	218553
24	20	68349	104140	35083	69424	276996
25	21	77336	37476	51815	57065	223692

F43xx13

FIGURE 43-13 The Customer PivotTable data.

F43xx13: This figure shows customer-sales data.

	A	B	C	D	E	F
3	**Sum of Paid**	**Column Labels**				
4	**Row Labels**	**1**	**2**	**3**	**4**	**Grand Total**
5	1	30965	42039	57790	43417	174211
6	2	96038	121118	59089	45355	321600
7	3	57419	33589	61960	97548	250516
8	4	48947	79352	63052	59520	250871
9	5	57270	86555	69517	33471	246813
10	6	75639	71976	55212	78644	281471
11	7	53130	65768	49064	89018	256980
12	8	33289	74001	45219	43512	196021
13	9	61611	99009	61075	50945	272640
14	10	31785	71213	60417	63835	227250
15	11	59127	35567	62130	107832	264656
16	12	71862	21670	67312	63558	224402
17	13	100626	56058	39500	75109	271293
18	14	74240	63023	36217	77218	250698
19	15	30612	62277	45561	52567	191017
20	16	41870	71490	64909	57120	235389
21	17	61811	85706	46978	40802	235297
22	18	24456	44916	55519	81421	206312

F43xx14

FIGURE 43-14 The Customer PivotTable.

F43xx14: This figure shows a PivotTable summarizing each customer's total sales by quarter.

Naturally, you might like to show a list of just your top-10 customers. To obtain this layout, simply click the Row Labels arrow and select Value Filters. Then choose Top 10, verify Top 10 Items is selected in the Top 10 Filter dialog box, and then click OK. You obtain the layout shown in Figure 43-15 (see the Top 10 Cus worksheet). Of course, by clicking the arrow again and selecting Clear Filter, you can return to the original layout.

D21

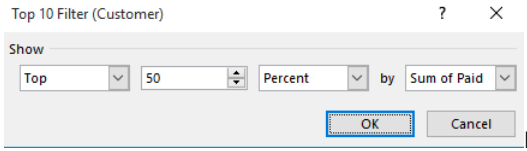
	A	B	C	D	E	F
3	**Sum of Paid**	**Column Labels**				
4	**Row Labels**	**1**	**2**	**3**	**4**	**Grand Total**
5	2	96038	121118	59089	45355	321600
6	6	75639	71976	55212	78644	281471
7	9	61611	99009	61075	50945	272640
8	11	59127	35567	62130	107832	264656
9	13	100626	56058	39500	75109	271293
10	20	68349	104140	35083	69424	276996
11	22	31149	77333	104364	65664	278510
12	23	87124	56387	63290	71953	278754
13	27	45214	89826	56302	71285	262627
14	28	53737	69938	73471	69135	266281
15	**Grand Total**	**678614**	**781352**	**609516**	**705346**	**2774828**

F43xx15

FIGURE 43-15 The top-10 customers.

F43xx15: This figure shows quarterly sales for the top-10 customers.

Suppose you simply want to see the top customers that generate 50 percent of your revenue. Click the Row Labels filtering arrow, select Value Filters, click Top 10, and fill in the dialog box as shown in Figure 43-16, updating the Show selection lists to Top 50 Percent.



F43xx16

FIGURE 43-16 Configuring the Top 10 Filter dialog box to show customers generating 50 percent of the revenue.

F43xx16: This figure shows settings needed to list top customers generating 50 percent of sales.

The resulting PivotTable is in the Top Half worksheet and shown in Figure 43-17. As you can see, the top 14 customers generate a little more than half of the revenue.

	A	B	C	D	E	F
3	**Sum of Paid**	**Column Labels**				
4	**Row Labels**	**1**	**2**	**3**	**4**	**Grand Total**
5	2	96038	121118	59089	45355	321600
6	3	57419	33589	61960	97548	250516
7	4	48947	79352	63052	59520	250871
8	6	75639	71976	55212	78644	281471
9	7	53130	65768	49064	89018	256980
10	9	61611	99009	61075	50945	272640
11	11	59127	35567	62130	107832	264656
12	13	100626	56058	39500	75109	271293
13	14	74240	63023	36217	77218	250698
14	20	68349	104140	35083	69424	276996
15	22	31149	77333	104364	65664	278510
16	23	87124	56387	63290	71953	278754
17	27	45214	89826	56302	71285	262627
18	28	53737	69938	73471	69135	266281
19	**Grand Total**	**912350**	**1023084**	**819809**	**1028650**	**3783893**

F43xx17

FIGURE 43-17 The top customers generating half of the revenue.

F43xx17: This figure shows the customers generating at least 50 percent of revenue.

Now, let's suppose you want to sort your customers by Quarter 1 revenue. (See the Sorted Q1 worksheet.) Right-click anywhere in the Quarter 1 column (column B), point to Sort, and then click Sort Largest To Smallest. The resulting PivotTable is shown in Figure 43-18. Note that Customer 13 paid the most in Quarter 1, Customer 2 paid the second most, and so on.

	A	B	C	D	E	F
3	Sum of Paid	Column Labels				
4	Row Labels	1	2	3	4	Grand Total
5	13	100626	56058	39500	75109	271293
6	2	96038	121118	59089	45355	321600
7	19	89591	53157	37558	38247	218553
8	23	87124	56387	63290	71953	278754
9	21	77336	37476	51815	57065	223692
10	6	75639	71976	55212	78644	281471
11	14	74240	63023	36217	77218	250698
12	12	71862	21670	67312	63558	224402
13	20	68349	104140	35083	69424	276996
14	17	61811	85706	46978	40802	235297
15	9	61611	99009	61075	50945	272640
16	26	59994	70594	50446	44050	225084
17	30	59599	64192	44335	42944	211070
18	11	59127	35567	62130	107832	264656
19	3	57419	33589	61960	97548	250516
20	5	57270	86555	69517	33471	246813
21	28	53737	69938	73471	69135	266281
22	7	53130	65768	49064	89018	256980

F43xx18

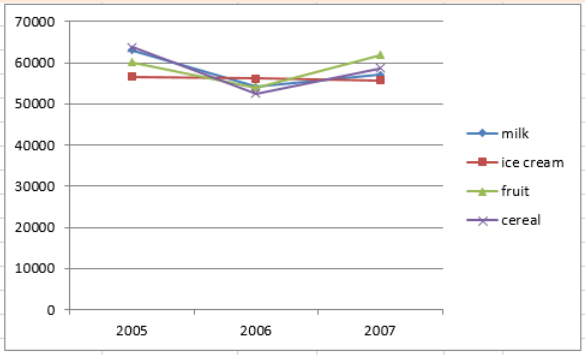
FIGURE 43-18 Sorting the customers on Quarter 1 revenue.

F43xx18: This figure shows customers sorted in order of Quarter 1 revenue.

How do I summarize a PivotTable by using a PivotChart?

Excel makes it easy to visually summarize PivotTables by using PivotCharts. The key to laying out the data the way you want it in a PivotChart is to sort data and collapse or expand fields. In the grocery example, suppose you want to summarize the trend over time of each food group's unit sales. (See the Chart 2 worksheet in the file Groceriespt.xlsx.) You should move the Year field to the Row area and delete Revenue from the Values area. You also need to collapse the entire Group field in the Row Labels zone and move Groups to the Column area. Now, you are ready to create a PivotChart. Simply click anywhere inside the table, and then select PivotChart on the Analyze tab. In the Insert Chart dialog box, pick the chart type you want to create. I chose the first line graph option, which displays the chart in Figure 43-19. The chart shows that milk sales were highest in 2005 and lowest in 2006.

	A	B	C	D	E	F
1						
2	Month	(All)		COMPACT VIEW		
3						
4	Sum of Units	Column Labels				
5	Row Labels	milk	ice cream	fruit	cereal	Grand Total
6	2005	62974	56518	60047	63689	243228
7	2006	54117	56222	53910	52489	216738
8	2007	56981	55693	61816	58671	233161
9	Grand Total	174072	168433	175773	174849	693127



F43xx19

FIGURE 43-19 A PivotChart for the unit group sales trend.

F43xx19: This figure shows the trend of sales for each product group.

How do I use the Filter section of the PivotTable?

Recall that I placed Month in the Filters section of the table. To see how to use a report filter, suppose that you want to summarize the sales for the months January–June. By clicking the Filter icon in cell B2 of the First 6 Months worksheet, you can select January–June. This results in the PivotTable shown in Figure 43-20, which summarizes the number of units sold by product, group, and year for the months January–June.

	A	B	C
1			
2	Month	(Multiple Ite	
3			
4		Values	
5	Row Labels	Sum of Units	Sum of Revenue
6	2007	115258	346295.58
7	milk	30069	89222.68
8	chocolat	4875	14077.99
9	west	2014	5839.06
10	south	736	2141.76
11	north	1437	4136.37
12	east	688	1960.8
13	low fat	9447	27341.25
14	west	3285	10732.35
15	south	531	1062
16	north	3905	10212.44
17	east	1726	5334.46
18	skim	10182	30450.57
19	west	2156	6169.53
20	south	2778	8881.2
21	north	2521	7726.56
22	east	2727	7673.28

F43xx20

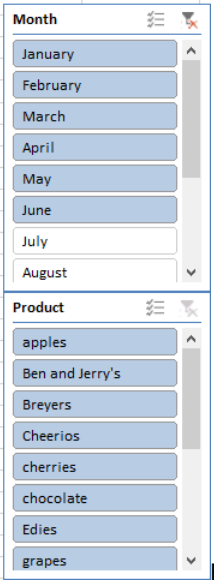
FIGURE 43-20 A PivotTable summarizing January–June sales.

F43xx20: After you filter on Month, this figure shows the sales for January through June.

How do PivotTable slicers work?

The problem with a report filter is that a viewer of the PivotTable shown in Figure 43-20 cannot easily see that the table summarizes January–June sales. Excel's slicer feature (introduced in Excel 2010) neatly solves this problem. To create a slicer for any of the columns of data used to generate your PivotTable, place your cursor anywhere in the PivotTable, and then click Slicer on the ribbon's Insert tab (in the Filters group). In the worksheet Slicers of the file Groceriespt.xlsx, I selected Slicer from the Insert menu. Then, in the Insert Slicers dialog box, I selected the Month and Product fields to create slicers for Month and Product. Using a given slicer, you can select any subset of possible values to be used in creating your table. In the Month slicer, I selected (one at a time, while holding down the Ctrl key) the months January through June. I did nothing to the Product slicer, so the data is based on all the products in January–June sales. The slicers are shown in Figure 43-21.

	A	B	C	D	E
1					
2	Month	(Multiple Ite			
3					
4		Values			
5	Row Labels	Sum of Units	Sum of Revenue		
6	2007	115258	346295.58		
7	milk	30069	89222.68		
8	chocolat	4875	14077.99		
9	west	2014	5839.06		
10	south	736	2141.76		
11	north	1437	4136.37		
12	east	688	1960.8		
13	low fat	9447	27341.25		
14	west	3285	10732.35		
15	south	531	1062		
16	north	3905	10212.44		
17	east	1726	5334.46		
18	skim	10182	30450.57		
19	west	2156	6169.53		
20	south	2778	8881.2		
21	north	2521	7726.56		
22	east	2727	7673.28		
23	whole	5565	17352.87		
24	west	735	1764		
25	south	1562	4495.15		
26	east	3268	11093.72		
27	ice cream	22336	69108.5		
28	Breyers	11446	36341.78		



F43xx21

FIGURE 43-21 Example of slicers for the Month and Product fields.

F43xx21: This figure shows slicers for Month and Product.

If you click a slicer, you see formatting options that allow you to change its appearance. For example, you can change the height and width as well as the number of columns in the slicer. You may also easily resize a slicer if you hold down the Ctrl key.

How do I add blank rows or hide subtotals in a PivotTable?

If you want to add a blank row between each grouped item, click a cell in the PivotTable, select the PivotTable Tools Design tab on the ribbon, click Blank Rows, and then click Insert Blank Line After Each Item. If you want to hide subtotals or grand totals, first select the PivotTable Tools Design tab. Then select Subtotals and click Do Not Show Subtotals, or select Grand Totals and click Off For Rows And Columns. After adding blank rows and hiding all the totals, I obtained the table in the Blank Rows No Totals worksheet of the workbook Grocerypt.xlsx, shown in Figure 43-22. After right-clicking in any PivotTable cell, you can select PivotTable Options to open the PivotTable Options dialog box. In this dialog box, in the Format section of the Layout & Format tab, you can replace empty cells by entering any character in the For Empty Cells Show box, such as an underscore (_), or by using a 0.

	A	B	C
2	Month	(All)	
3			
4		Values	
5	Row Labels	Sum of Units	Sum of Revenue
6	2007		
7	milk		
8	chocolate		
9	west	4379	12668.95
10	south	1545	4528.31
11	north	2322	7579.02
12	east	2184	5791.1
13			
14	low fat		
15	west	4668	15042.24
16	south	2431	7606.76
17	north	7957	23490.32
18	east	2517	7762.83
19			
20	skim		
21	west	3571	9951.37
22	south	2778	8881.2
23	north	3594	10792.09
24	east	4839	14609.52
25			

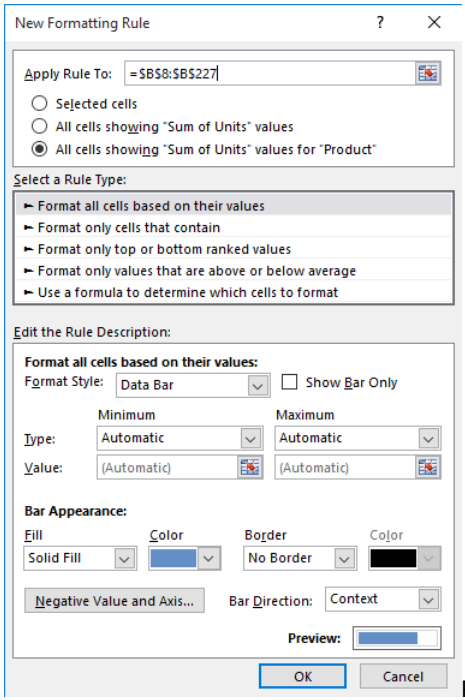
F43xx22

FIGURE 43-22 A grocery PivotTable without totals.

F43xx22: This figure shows a grocery PivotTable without totals.

How do I apply conditional formatting to a PivotTable?

Suppose you want to apply data bars to the Units column in the grocery PivotTable. One problem you'll encounter is that subtotals and grand totals will have large data bars and also make the other data bars smaller than they should be. It's better to have the data bars apply to all product sales, not the subtotals and grand totals. (See the Cond Form worksheet of the file Groceriespt.xlsx.) To apply the data bars to only the unit sales by product, begin by placing the cursor in a cell containing unit sales for a product (for example, the sales for chocolate milk in B8). On the Home tab, click Conditional Formatting followed by Data Bars, and then choose More Rules. You will see the New Formatting Rule dialog box shown in Figure 43-23.



F43xx23

FIGURE 43-23 The New Formatting Rule dialog box for using conditional formatting with PivotTables.

F43xx23: This figure shows the needed settings to place data bars in the PivotTable in all the rows listing unit sales for products.

By selecting All Cells Showing “Sum of Units” Values For “Product” and selecting the range $B$8:$B$227, you can ensure that data bars apply only to the cells listing unit sales for products, as you can see in the Cond Form worksheet and Figure 43-24.

	A	B	C
2	Month	(All)	
3			
4		Values	
5	Row Labels	Sum of Units	Sum of Revenue
6	2007	233161	702395.82
7	milk	56981	170623.06
8	chocolate	10430	30567.38
9	west	4379	12668.95
10	south	1545	4528.31
11	north	2322	7579.02
12	east	2184	5791.1
13	low fat	17573	53902.15
14	west	4668	15042.24
15	south	2431	7606.76
16	north	7957	23490.32
17	east	2517	7762.83
18	skim	14782	44234.18
19	west	3571	9951.37
20	south	2778	8881.2
21	north	3594	10792.09
22	east	4839	14609.52
23	whole	14196	41919.35
24	west	3252	8311.84
25	south	1562	4495.15

F43xx24

FIGURE 43-24 Data bars for a PivotTable.

F43xx24: This figure shows data bars representing product sales.

How can I update my calculations when I add new data?

If the data in your original set of rows changes, you can update your PivotTable to include the data changes by right-clicking the table and selecting Refresh. You can also select Refresh from the Analyze tab (in the Data group).

If you want data you add to be automatically included in your PivotTable calculations when you refresh it, you should name your original data set as a table by selecting it with Ctrl+T. (See Chapter 26, “Tables,” for more information.)

If you want to change the range of data used to create a PivotTable, you can always select Change Data Source on the Analyze tab (in the Data group). You can also move the table to a different location by selecting Move PivotTable in the Analyze tab’s Actions group.

I work for a small travel agency for which I need to mass-mail a travel brochure. My funds are limited, so I want to mail the brochure to people who spend the most money on travel. From information in a random sample of 925 people, I know the gender, the age, and the amount these people spent on travel last year. How can I use this data to determine how gender and age influence a person’s travel expenditures? What can I conclude about the type of person to whom I should mail the brochure?

To understand this data, you need to break it down as follows:

- Average amount spent on travel by gender
- Average amount spent on travel for each age group
- Average amount spent on travel by gender for each age group

The data is included on the Data worksheet in the file Traveldata.xlsx, and a sample is shown in Figure 43-25. For example, the first person is a 44-year-old male who spent $997 on travel.

	A	B	C
2	Amount Spent on Travel	Age	Gender
3	997	44	M
4	850	39	F
5	997	43	M
6	951	41	M
7	993	50	F
8	781	39	F
9	912	45	F
10	649	59	M
11	1265	25	M
12	680	38	F
13	800	41	F
14	613	32	F
15	993	46	F
16	1059	38	M
17	939	42	F
18	841	44	F
19	828	38	F
20	1004	50	F
21	983	48	F
22	837	46	M
23	924	42	M
24	852	48	M
25	963	39	M

F43xx25

FIGURE 43-25 The travel agency data showing the amount spent on travel, age, and gender.

F43xx25: This figure shows data on the amount people spent on travel.

Open the file Traveldatatemp.xlsx from this chapter's Templates folder. Let's first get a breakdown of spending by gender. On the Data worksheet, begin by selecting the Insert tab and clicking PivotTable in the Tables group. Excel extracts the range A2:D927 with the option Select A Table Or Range selected. After clicking OK, a new worksheet opens with the PivotTable Fields pane open on the right. Next, drag the Gender column (from the fields list at the top) to the Rows box in the lower left, and drag the field Amount Spent On Travel to the Values box in the lower right. This results in the PivotTable shown in Figure 43-26.

> **Note** The Fields List has changed a little with new versions of Excel. In Excel 2016, it becomes a natural drag-and-drop pane called the PivotTable Fields pane. The names of the areas have also been simplified.

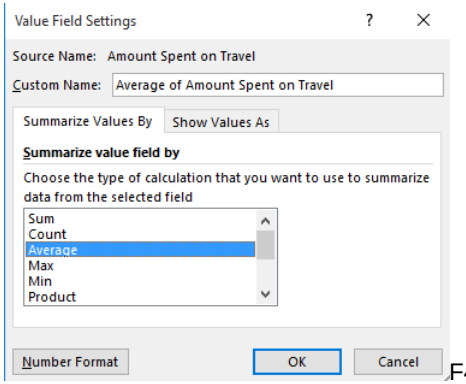
Row Labels	Sum of Amount Spent on Travel
F	413632
M	426387
Grand Total	**840019**

F43xx26

FIGURE 43-26 A PivotTable summarizing the total travel expenditures by gender.

F43xx26: This figure shows the total amount spent on travel, broken down by gender.

You can tell from the heading Sum Of Amount Spent On Travel that you are summarizing the total amount spent on travel by men and women, but you actually want the average amount spent on travel by men and women. To calculate the averages, double-click the cell showing Sum Of Amount Spent On Travel and then select Average from the Summarize Value Field By list in the Value Field Settings dialog box, shown in Figure 43-27.



F43xx27

FIGURE 43-27 Selecting a different summary function in the Value Field Settings dialog box.

F43xx27: This figure shows the Value Field Settings selections needed to compute the average amount spent per person, broken down by gender.

Click OK. You now see the results shown in Figure 43-28.

Row Labels	Average of Amount Spent on Travel
F	901.1590414
M	914.9935622
Grand Total	**908.1286486**

F43xx28

FIGURE 43-28 The average travel expenditures by gender.

F43xx28: This figure shows the average amount spent per person, broken down by gender.

On average, people spend $908.13 on travel (the grand total). Women spend an average of $901.16, whereas men spend $914.99. This PivotTable indicates that gender has little influence on the propensity to travel. By clicking the Row Labels arrow, you can show just male or female results.

Now, you want to see how age influences travel spending. Remove the Gender field from the Rows box (in the PivotTable Fields pane) by clicking it and selecting Remove Field. Then, to break down spending by age, drag Age from the fields list to the Rows area. The PivotTable now appears as it's shown in Figure 43-29.

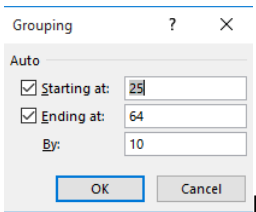
	A	B	C	D
3	Average of Amount Spent on Travel	Column Labels		
4	Row Labels	F	M	Grand Total
5	25	482.3846154	1305.764706	948.9666667
6	26	526.6923077	1281.583333	889.04
7	27	532.5714286	1266.722222	1061.16
8	28	584	1243.666667	960.952381
9	29	564.5	1229.833333	814
10	30	578	1176.666667	877.3333333
11	31	604.3333333	1212.733333	1038.904762
12	32	636.6153846	1160.818182	876.875
13	33	661.6153846	1146.928571	913.2592593
14	34	674.0909091	1128.615385	920.2916667
15	35	705.5555556	1089.25	886.1176471
16	36	722.4285714	1071.888889	859.173913
17	37	746.9166667	1061.416667	904.1666667
18	38	764.25	1051.846154	913.8

F43xx29

FIGURE 43-29 A PivotTable showing the average travel expenditures by age and gender.

F43xx29: This figure shows average amount spent on travel broken down by age and gender.

Age seems to have little effect on the travel expenditures. In fact, this PivotTable is pretty useless in its present state. You need to group the data by age to see any trends. To group the results by age, right-click anywhere in the Age column (column A) and choose Group. In the Grouping dialog box (shown in Figure 43-30), you can designate the interval by which to define an age group. By using 10-year increments (in the By box), you obtain the PivotTable shown in Figure 43-31.



F43xx30

FIGURE 43-30 Using the Group command to group detailed records.

F43xx30: This figure shows how to group the age averages in 10-year categories.

On average, 25–34 year olds spend $935.84 on travel, 55–64 year olds spend $903.57 on travel, and so on. This information is more useful, but it still indicates that people of all ages tend to spend about the same amount on travel (the younger group spends slightly more). This view of the data does not give enough details to help determine to whom you should mail your brochure.

Finally, let's get a breakdown of average travel spending by age, for men and women separately. All you have to do is drag Gender from the field list to the Columns box in the PivotTable Fields pane, resulting in the PivotTable shown in Figure 43-31 (see the Final Table worksheet in the file Traveldata.xlsx).

	A	B	C	D
3	Average of Amount Spent on Travel	Column Labels		
4	Row Labels	F	M	Grand Total
5	25-34	585.4752475	1221.209677	935.8355556
6	35-44	790.1652174	1004.098214	895.7180617
7	45-54	979.4782609	813.5765766	897.9955752
8	55-64	1179.609375	606.6470588	903.5668016
9	Grand Total	901.1590414	914.9935622	908.1286486

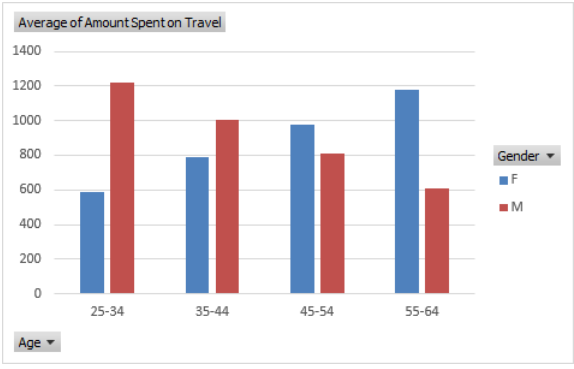
F43xx31

FIGURE 43-31 Breaking down the age and gender of travel spending.

F43xx31: This figure shows the average spending on travel, broken down by gender and 10-year age increments.

Now we're cooking! You can see that as age increases, women spend more on travel and men spend less. Now you know who should get the brochure: older women and younger men. As one of my students said, "That would be some kind of cruise!"

A graph provides a nice summary of this analysis. Click the cursor inside the PivotTable, and from the Analyze tab on the ribbon, select PivotChart in the Tools group. A menu of recommended charts appears (the Insert Chart dialog box). Select the first choice in Columns (Clustered Column), and click OK. The result is the chart shown in Figure 43-32. If you want to edit the chart further, with the chart selected, click the Design tab in the PivotChart Tools tabs. Then, for example, if you click Add Chart Element in the Chart Layouts group, you can add titles to the chart and axes and make other changes.



F43xx32

FIGURE 43-32 A PivotChart for the age/gender travel expenditure breakdown.

F43xx32: This figure shows a chart making it clear that men spend less on travel as they grow older and woman spend more.

Each age group spends approximately the same on travel, but as their age increases, women spend more than men. (If you want to use a different type of chart, you can change the chart type by right-clicking the PivotChart and then choosing Change Chart Type. Select a new chart in the Change Chart Type dialog box, and then click OK.)

Notice that the bars showing expenditures by males decrease with age, and the bars representing

the amount spent by females increase with age. You can see why the PivotTables that showed only gender and age data failed to unmask this pattern. Because half our sample population is male and half is female, we found that the average amount spent by people does not depend on the age. (Notice that the average height of the two bars for each age is approximately the same.) We also found that the average amount spent by men and women was approximately the same. You can see this because, averaged over all ages, the blue and red bars have approximately equal heights. Slicing and dicing the data simultaneously across age and gender does a much better job of showing you the real information.

Note that by clicking the drop-down arrow (on the PivotChart) that is associated with *Age*, you could filter the graph on age; clicking the drop-down arrow associated with *Gender*, you could filter the graph based on gender.

I'm doing market research about Volvo Cross Country Wagons. I need to determine what factors influence the likelihood that a family will purchase a station wagon. From information in a large sample of families, I know the family size (large or small) and the family income (high or low). How can I determine how family size and income influence the likelihood that a family will purchase a station wagon?

In the file Station.xlsx, you can find the following information:

- Is the family size large or small?
- Is the family's income high or low?
- Did the family buy a station wagon? Yes or no.

A sample of the data is shown in Figure 43-33 (see the Data worksheet). For example, the first family listed is a small, high-income family that did not buy a station wagon.

	A	B	C	D
2		Station Wagon?	Family Siz	Salary
3		No	Small	High
4		Yes	Large	High
5		Yes	Large	High
6		Yes	Large	High
7		Yes	Large	High
8		No	Small	High
9		Yes	Large	High
10		Yes	Large	High
11		Yes	Large	Low
12		Yes	Large	High
13		Yes	Large	Low
14		No	Small	Low
15		No	Small	Low
16		No	Small	High
17		Yes	Large	High
18		Yes	Large	High
19		No	Small	High
20		Yes	Large	High
21		No	Small	High
22		No	Large	Low

F43xx33

FIGURE 43-33 Data collected about income, family size, and the purchase of a station wagon.

F43xx33: This figure shows data on income, family size, and whether a family bought a station wagon.

You want to determine how family size and income influence the likelihood that a family will purchase a station wagon. The trick is to look at how income affects purchases for each family size and how family size affects purchases for each income level.

To begin, choose the Insert tab and click PivotTable in the Tables group. Then select the data (the cell range B2:D345) and click OK in the Create PivotTable dialog box. Using the PivotTable Fields pane, drag Family Size and Salary to the Rows area, drag Station Wagon? to the Columns area, and drag any of the three fields to the Values area. The result is the PivotTable shown in Figure 43-34 (see the 1st Table worksheet). Notice that Excel has chosen to summarize the data appropriately by counting the number of observations in each category. For example, 34 high-salary, large families did not buy a station wagon, whereas 100 high-salary, large families did buy one.

	A	B	C	D
3	**Count of Station Wagon?**	**Column Labels**		
4	**Row Labels**	**No**	**Yes**	**Grand Total**
5	**Large**	**48**	**138**	**186**
6	High	34	100	134
7	Low	14	38	52
8	**Small**	**147**	**10**	**157**
9	High	104	8	112
10	Low	43	2	45
11	**Grand Total**	**195**	**148**	**343**

F43xx34

FIGURE 43-34 Summary of station wagon ownership by family size and salary.

F43xx34: This figure shows the number of families in each income/family size group who purchased and did not purchase a station wagon.

You would like to know for each row in the PivotTable the percentage of families that purchased a station wagon. To display the data in this format, right-click anywhere in the PivotTable data and then choose Value Field Settings, which displays the Value Field Settings dialog box. In the dialog box, click the Show Values As tab, and then select % Of Row Total in the Show Values As list, and then click OK. You now obtain the PivotTable shown in Figure 43-35. (See the 1st Percent Breakdown worksheet.)

	A	B	C	D
3	Count of Station Wagon?	Column Labels		
4	Row Labels	No	Yes	Grand Total
5	**Large**	**25.81%**	**74.19%**	**100.00%**
6	High	25.37%	74.63%	100.00%
7	Low	26.92%	73.08%	100.00%
8	**Small**	**93.63%**	**6.37%**	**100.00%**
9	High	92.86%	7.14%	100.00%
10	Low	95.56%	4.44%	100.00%
11	**Grand Total**	**56.85%**	**43.15%**	**100.00%**

F43xx35

FIGURE 43-35 Percentage breakdown of station-wagon ownership by income for large and small families.

F43xx35: This figure shows a percentage breakdown of station-wagon ownership by income and family size.

From Figure 43-35, you learn that for both large and small families, income has little effect on whether the family purchases a station wagon. Now you need to determine how family size affects the propensity to buy a station wagon for high-income and low-income families. To do this, in the PivotTable Fields pane, drag the Salary field above Family Size in the Rows box, resulting in the PivotTable shown in Figure 43-36 (see the Final Percent Breakdown worksheet).

	A	B	C	D
3	Count of Station Wagon?	Column Labels		
4	Row Labels	No	Yes	Grand Total
5	**High**	**56.10%**	**43.90%**	**100.00%**
6	Large	25.37%	74.63%	100.00%
7	Small	92.86%	7.14%	100.00%
8	**Low**	**58.76%**	**41.24%**	**100.00%**
9	Large	26.92%	73.08%	100.00%
10	Small	95.56%	4.44%	100.00%
11	**Grand Total**	**56.85%**	**43.15%**	**100.00%**

F43xx36

FIGURE 43-36 Breakdown of station-wagon ownership by family size for high and low salaries.

F43xx36: This figure shows for high and low salaries a percentage breakdown of station-wagon ownership by family size.

From this table, you learn that for high-income families, a large family is much more likely to buy a station wagon than a small family. Similarly, for low-income families, a large family is also more likely to purchase a wagon than a small family. The bottom line is that family size has a much greater effect on the likelihood that a family will purchase a station wagon than income.

I work for a manufacturer that sells microchips globally. I'm given monthly actual and predicted sales for Canada, France, and the United States for Chip 1, Chip 2, and Chip 3. I'm also given the variance,

or difference, between actual and budgeted revenues. For each month and each combination of country and product, I'd like to display the following data: actual revenue, budgeted revenue, actual variance, actual revenue as a percentage of annual revenue, and variance as a percentage of budgeted revenue. How can I display this information?

In this scenario, you are a finance manager for a microchip manufacturer. You sell your products in different countries/regions and at different times. PivotTables can help you summarize your data in a format that's easily understood.

The file Ptableexample.xlsx includes monthly actual and predicted sales during 1997 of Chip 1, Chip 2, and Chip 3 in Canada, France, and the United States. The file also contains the variance, or difference, between actual revenues and budgeted revenues. A sample of the data is shown in Figure 43-37 (see the Data worksheet). For example, in the United States in January, sales of Chip 1 totaled $4,000, although sales of $5,454 were predicted. This yielded a variance of –$1,454.

	A	B	C	D	E	F
1	Month	Product	Country	Revenue	Budget	Var
2	January	Chip 1	US	4000	5454	-1454
3	January	Chip 1	Canada	3424	5341	-1917
4	January	Chip 1	US	8324	1232	7092
5	January	Chip 1	France	5555	3424	2131
6	January	Chip 1	Canada	5341	8324	-2983
7	January	Chip 1	US	1232	5555	-4323
8	January	Chip 1	France	3424	5341	-1917
9	January	Chip 1	Canada	8324	1232	7092
10	January	Chip 1	US	5555	3424	2131
11	January	Chip 1	France	5341	8324	-2983
12	January	Chip 1	Canada	1232	5555	-4323
13	January	Chip 1	US	3424	5341	-1917
14	January	Chip 1	Canada	8383	5454	2929
15	January	Chip 1	France	8324	1232	7092
16	January	Chip 1	Canada	5555	3424	2131
17	January	Chip 1	US	5341	8324	-2983
18	January	Chip 1	France	1232	5555	-4323
19	January	Chip 1	France	3523	9295	-5772

F43xx37

FIGURE 43-37 Chip data from different countries/regions for different months, showing actual, budget, and variance revenues.

F43xx37: This figure shows chip sales in different countries.

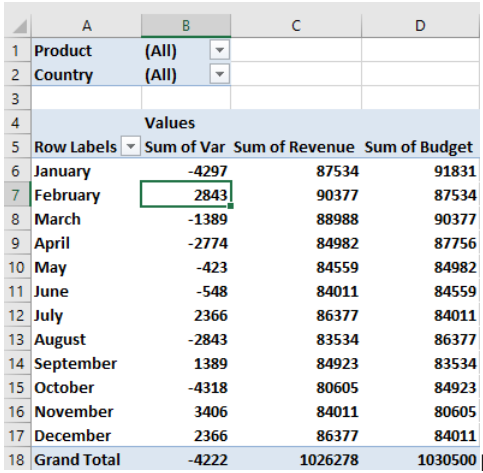
For each month and each combination of country and product, you would like to display the following data:

- Actual revenue
- Budgeted revenue
- Actual variance
- Actual revenue as a percentage of annual revenue

- Variance as a percentage of budgeted revenue

To begin, select a cell within the range of data you're working with (remember that the first row must include headings), and then select the Insert tab and click PivotTable in the Tables group. Excel automatically determines that your data is in the range A1:F208. Click OK in the Create PivotTable dialog box.

In the PivotTable Fields pane, if you drag the Month field to the Rows area, Country to the Columns area, and Revenue to the Values area, for example, you obtain the total revenue each month by country. A field you add to the Filters area (Product, for example) lets you filter your PivotTable by using values in that field. (Excel adds the Product filter to cells A1:B1.) By adding the Product field to the Filters area, you can filter the PivotTable to view sales of only Chip 1 by month for each country. Given that you want to be able to show data for any combination of country and product, you should drag Month to the Rows area of the PivotTable Fields pane and both Product and Country to the Filters area. Next, drag Var, Revenue, and Budget (in that order) to the Values area. You have now created the PivotTable that is shown in Figure 43-38. (See the 1st Table worksheet.)



	A	B	C	D
1	Product	(All)		
2	Country	(All)		
3				
4		Values		
5	Row Labels	Sum of Var	Sum of Revenue	Sum of Budget
6	January	-4297	87534	91831
7	February	2843	90377	87534
8	March	-1389	88988	90377
9	April	-2774	84982	87756
10	May	-423	84559	84982
11	June	-548	84011	84559
12	July	2366	86377	84011
13	August	-2843	83534	86377
14	September	1389	84923	83534
15	October	-4318	80605	84923
16	November	3406	84011	80605
17	December	2366	86377	84011
18	Grand Total	-4222	1026278	1030500

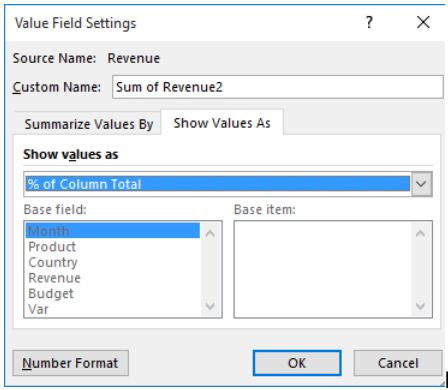
F43xx38

FIGURE 43-38 Monthly summary of revenue, budget, and variance.

F43xx38: This figure shows a monthly summary of revenue, budget, and variance.

For example, in January, the total revenue was $87,534 and the total budgeted sales were $91,831, so the actual sales fell $4,297 short of the forecast (the variance).

You want to determine the percentage of revenue earned during each month. Again, drag Revenue from the field list to the Values area of the PivotTable Fields pane (this will show as Sum Of Revenue2). Click this data column, and then choose Value Field Settings. In the Value Field Settings dialog box, click the Show Values As tab. In the Show Values As list, select % Of Column Total and rename this field (in the Custom Name box) as **Sum Of Revenue2**, as shown in Figure 43-39.



F43xx39

FIGURE 43-39 Creating each month's percentage of annual revenue.

F43xx39: This figure shows the settings needed to summarize each month's revenue as a percentage of the total.

You now obtain the PivotTable shown in Figure 43-40. (See the 2nd Table worksheet.) January sales provided 8.53 percent of the revenue. The total revenue for the year was $1,026,278 (shown in Figure 43-38).

	A	B	C	D
1	Product	(All)		
2	Country	(All)		
3				
4		Values		
5	Row Labels	Sum of Var	Sum of Revenue	Sum of Budget
6	January	-4297	8.53%	91831
7	February	2843	8.81%	87534
8	March	-1389	8.67%	90377
9	April	-2774	8.28%	87756
10	May	-423	8.24%	84982
11	June	-548	8.19%	84559
12	July	2366	8.42%	84011
13	August	-2843	8.14%	86377
14	September	1389	8.27%	83534
15	October	-4318	7.85%	84923
16	November	3406	8.19%	80605
17	December	2366	8.42%	84011
18	**Grand Total**	**-4222**	**100.00%**	**1030500**

F43xx40

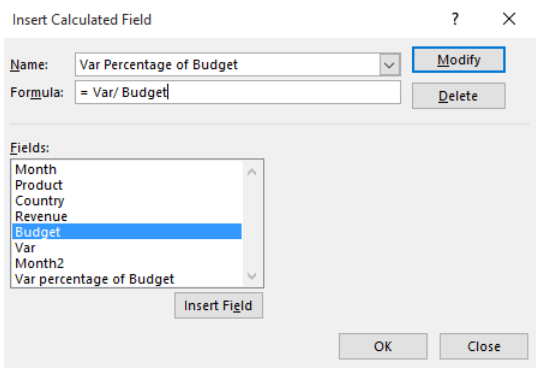
FIGURE 43-40 Monthly revenue breakdown.

F43xx40: This figure shows the percentage of revenue earned each month.

What is a calculated field?

Now, you want to determine for each month the variance as a percentage of the average sales. To do this, you can create a *calculated field*. Select a cell anywhere within the data area of the PivotTable, and then choose Fields, Items, & Sets from the Analyze tab (in the Calculations group). Next, choose Calculated Field to display the Insert Calculated Field dialog box. As shown in Figure 43-41, enter a

name for your field (I entered **Var Percentage of Budget** in the Name box), and then enter your formula. The formula for this example is =Var/Budget. You can enter the formula yourself or use the list of fields and the Insert Field button to add a field to the formula. After clicking Add and then OK, you see the PivotTable shown in Figure 43-42. (See the Calc Field worksheet of the Ptableexample.xlsx file.)



F43xx41

FIGURE 43-41 Creating a calculated field.

F43xx41: This figure shows the settings needed to create a calculated field.

	A	B	C	D	E	F
1	Product	(All)				
2	Country	(All)				
3						
4		Values				
5	Row Labels	Sum of Var	Sum of Budget	Sum of Revenue	Sum of Revenue2	Sum of Var percentage of Budget
6	January	-4297	91831	87534	8.53%	-0.046792477
7	February	2843	87534	90377	8.81%	0.032478808
8	March	-1389	90377	88988	8.67%	-0.015368954
9	April	-2774	87756	84982	8.28%	-0.031610374
10	May	-423	84982	84559	8.24%	-0.004977525
11	June	-548	84559	84011	8.19%	-0.006480682
12	July	2366	84011	86377	8.42%	0.028162979
13	August	-2843	86377	83534	8.14%	-0.032913854
14	September	1389	83534	84923	8.27%	0.01662796
15	October	-4318	84923	80605	7.85%	-0.050846061
16	November	3406	80605	84011	8.19%	0.042255443
17	December	2366	84011	86377	8.42%	0.028162979
18	Grand Total	-4222	1030500	1026278	100.00%	-0.00409704

F43xx42

FIGURE 43-42 The PivotTable with a calculated field for variance percentage.

F43xx42: This figure shows for each month's variance as a percentage of the budget.

Thus, in January, sales were 4.7 percent lower than budgeted. By displaying the Insert Calculated Field dialog box again, you can modify or delete a calculated field.

How do I use a report filter or slicer?

To see the sales of Chip 2 in France, for example, you can drag the Product and Country fields to the Filters area. With Chip 2 and France selected, you would see the PivotTable shown in Figure 43-43.

Figure 43-44 shows how to create the same table with slicers (see the Slicers worksheet).

	A	B	C	D	E
1	Product	Chip 2			
2	Country	France			
3					
4		Values			
5	Row Labels	Sum of Var	Sum of Revenue	Sum of Budget	Sum of Revenue2
6	February	-3846	29108	32954	23.90%
7	May	3318	35363	32045	29.04%
8	August	2769	33432	30663	27.45%
9	November	0	23876	23876	19.61%
10	Grand Total	2241	121779	119538	100.00%

F43xx43

FIGURE 43-43 The sales of Chip 2 in France.

F43xx43: This figure summarizes the sales of Chip 2 in France.

In the worksheet Slicers, I used slicers to create the same table. I clicked the PivotTable and selected Slicer from the Insert tab (in the Filters group). Then I created the slicers shown in Figure 43-44 by selecting the Product and Country fields from the Insert Slicers dialog box. Selecting Chip 2 from the Product slicer and France from the Country slicer yields the relevant computations for all transactions involving Chip 2 in France. If you want to resize a slicer, drag a handle on its border. To resize a slicer while keeping the same proportions, hold down the Ctrl key, and then resize the slicer.

	A	B	C	D	E	F	G	H
1	Product	Chip 2						
2	Country	France						
3								
4		Values						
5	Row Labels	Sum of Var	Sum of Revenue	Sum of Budget	Sum of Revenue2			
6	February	-3846	29108	32954	23.90%			
7	May	3318	35363	32045	29.04%			
8	August	2769	33432	30663	27.45%			
9	November	0	23876	23876	19.61%			
10	Grand Total	2241	121779	119538	100.00%			
11								
12								
13								
14								

Country
Canada
France
US

Product
Chip 1
Chip 2
Chip 3

F43xx44

FIGURE 43-44 The sales of Chip 2 in France with slicers.

F43xx44: This figure shows how slicers can be used to filter data.

How do I group items in a PivotTable?

Often, you want to group headings in a PivotTable. For example, you might want to combine sales for January–March. To create a group, select the items you want to group (press Ctrl and select January, February, and March in cells A6:A8), right-click the selection, and then choose Group. Click Month in the Rows area of the PivotTable Fields pane, and then click Remove Field. After changing the name from Group1 to **Jan-March** in the formula bar, you obtain the PivotTable shown in Figure 43-45.

	A	B	C	D	E
1	Product	(All)			
2	Country	(All)			
3					
4		Values			
5	Row Labels	Sum of Var	Sum of Revenue	Sum of Budget	Sum of Revenue2
6	Jan-March	-2843	266899	269742	26.01%
7	April	-2774	84982	87756	8.28%
8	May	-423	84559	84982	8.24%
9	June	-548	84011	84559	8.19%
10	July	2366	86377	84011	8.42%
11	August	-2843	83534	86377	8.14%
12	September	1389	84923	83534	8.27%
13	October	-4318	80605	84923	7.85%
14	November	3406	84011	80605	8.19%
15	December	2366	86377	84011	8.42%
16	Grand Total	-4222	1026278	1030500	100.00%

F43xx45

FIGURE 43-45 Grouping items together for January, February, and March.

F43xx45: This figure shows the January through March sales grouped.

Remarks about grouping

- You can disband a group by right-clicking a grouped cell and then selecting the Ungroup option.
- You can group nonadjacent selections by holding down the Ctrl key while you select nonadjacent rows or columns.
- With numerical values or dates in a row field, you can group by number or dates in arbitrary intervals. For example, you can create groups for age ranges and then find the average income for all 25–34 year olds.

What is a calculated item?

A *calculated item* works just like a calculated field except that you are creating one row rather than a column. To create a calculated item, you should select an item in the row area of the PivotTable, not an item in the body of the PivotTable. Then, on the Analyze tab, in the Calculations group, select Fields, Items, & Sets, followed by Calculated Item.

To illustrate how to create a calculated item, look at the file Calculateditem.xlsx. In the worksheet Data (see Figure 43-46), we have the sales of different car brands. We would like to summarize the total sales by the company's country (Japan, Germany, or United States).

	H	I
8	Brand	Sales
9	Ford	3
10	Nissan	2
11	Ford	6
12	VW	2
13	VW	4
14	Nissan	4
15	Chrysler	2
16	VW	2
17	BMW	6
18	Honda	2
19	VW	4
20	Honda	5
21	BMW	6
22	Honda	4
23	Ford	5
24	Ford	5
25	Ford	2

F43xx46

FIGURE 43-46 Data for creating a calculated item.

F43xx46: This figure shows data used to create a calculated item.

To begin, we create a PivotTable listing the total sales by country (see the worksheet PT 1). In the PivotTable Fields pane, drag Brand to the Rows area and Sales to the Values area. After changing Count to Sum (click Count of Sales in the Values area, select Value Field Settings, select Sum in the Summarize Value Field By list, and click OK), I obtain the PivotTable shown in Figure 43-47. (Remember, to open the PivotTable Fields pane, on the Analyze tab, in the Show group, clickField List.)

	A	B
3	Row Labels	Sum of Sales
4	BMW	359
5	Chrysler	286
6	Ford	277
7	GM	239
8	Honda	283
9	Nissan	219
10	VW	323
11	Japan	502
12	Germany	682
13	US	802
14	Grand Total	3972

F43xx47

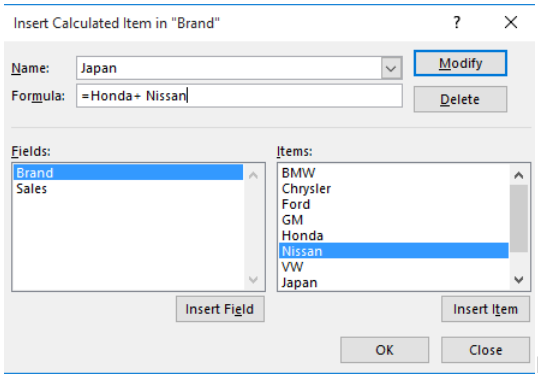
FIGURE 43-47 A PivotTable summarizing sales by brand.

F43xx47: This figure shows sales by brand.

Before creating a calculated item, it is a good idea to hide the grand totals by selecting Grand Totals on the Design tab and selecting Off For Rows and Columns. Otherwise, after you create the calculated item, the grand totals will count each car twice.

To create a calculated item for Japan, click anywhere in the Row Labels column and select Fields,

Items, & Sets from the Analyze tab (in the Calculations group). After selecting Calculated Item, fill in the dialog box by entering Japan in the Name box, entering the formula =Honda+Nissan in the Formula box, selecting Brand in the Fields list, and selecting Nissan in the Items list. The completed dialog box is shown in Figure 43-48.



F43xx48

FIGURE 43-48 Calculated-item creation for Japan.

F43xx48: This figure shows the creation of a calculated item, which totals sales for Japanese companies.

This dialog box creates a calculated item for Japan by adding up Honda and Nissan sales. In a similar fashion, you can create calculated fields that summarize sales in Germany and the United States. The resulting PivotTable is in the worksheet Calc Item and is shown in Figure 43-49.

If you want to delete a calculated item or calculated field, select Calculated Item or Calculated Field from the Fields, Items, & Sets menu (on the Analyze tab). Then, from the Name section of the dialog box, select the field or item you want to delete, and then click Delete.

	A	B
1		
2		
3	Row Labels	Sum of Sales
4	BMW	359
5	Chrysler	286
6	Ford	277
7	GM	239
8	Honda	283
9	Nissan	219
10	VW	323
11	Japan	502
12	Germany	682
13	US	802

F43xx49

FIGURE 43-49 Calculated items.

F43xx49: This PivotTable shows the calculated-item results for Japan, Germany, and US sales.

If you want, you may hide the individual brand sales by filtering on the row labels and selecting just Japan, Germany, and US.

See Problem 11 in the “Problems” section of this chapter for an example of creating a calculated item. In the chip manufacturing PivotTable example, you could not create a calculated item because you had multiple copies of the Revenue field.

What is *drilling down*?

When you double-click a cell in a PivotTable to display all the detailed data that’s summarized in that field, you’re *drilling down*. For example, double-clicking any March entry in the microchip scenario displays the data that’s related to March sales.

I often have to use specific data in a PivotTable, such as the April sales of Chip 1 in France, to determine profit. Unfortunately, this data moves around when new fields are added to my PivotTable. Does Excel have a function that enables me to always extract April’s Chip 1 sales in France from the PivotTable?

Yes, there is such a function. The GETPIVOTDATA function fills the bill. Suppose that you want to extract the sales of Chip 1 in France, during April, from the PivotTable contained in the Data worksheet in the file Getpivotdata.xlsx. (See Figure 43-50 and the worksheet Get Pivot Data.) Entering in cell E2 the formula =GETPIVOTDATA(A4,”April France Chip 1 Sum of Revenue”) yields the correct value ($37,600), even if additional products, countries/regions, and months are added to the PivotTable later. You can also determine the resulting revenue by pointing to the cell containing Chip 1 April sales in France (cell D24).

The first argument for this function is the cell in the upper-left corner of the PivotTable (cell A4). You enclose in quotation marks (separated by spaces) the PivotTable headings that define the entry you want. The last entry must specify the data field, but other headings can be listed in any order. Thus, the formula here means *For the PivotTable whose upper-left corner is in cell A4, find the Sum of Revenue for Chip 1 in France during April.* This formula returns the correct answer, even if the sales data for Chip 1 in France in April moves to a different location in the PivotTable.

	A	B	C	D	E	F
1					April Chip 2 France	total revenue
2					37600	1026278
3						
4		Values				
5	Row Labels	Sum of Var	Sum of Budget	Sum of Revenue	Sum of Revenue2	Sum of Var percentage of Budget
6	January	-4297	91831	87534	8.53%	-0.046792477
7	Chip 1	-4297	91831	87534	8.53%	-0.046792477
8	Canada	2929	29330	32259	3.14%	0.099863621
9	France	-5772	33171	27399	2.67%	-0.174007416
10	US	-1454	29330	27876	2.72%	-0.049573815
11	February	2843	87534	90377	8.81%	0.032478808
12	Chip 2	2843	87534	90377	8.81%	0.032478808
13	Canada	3318	32045	35363	3.45%	0.103541894
14	France	-3846	32954	29108	2.84%	-0.116708139
15	US	3371	22535	25906	2.52%	0.149589527
16	March	-1389	90377	88988	8.67%	-0.015368954
17	Chip 3	-1389	90377	88988	8.67%	-0.015368954
18	Canada	-10733	35363	24630	2.40%	-0.303509318
19	France	11529	20784	32313	3.15%	0.554705543
20	US	-2185	34230	32045	3.12%	-0.063832895
21	April	-2774	87756	84982	8.28%	-0.031610374
22	Chip 1	-2774	87756	84982	8.28%	-0.031610374
23	Canada	1054	19289	20343	1.98%	0.054642542
24	France	-54	37654	37600	3.66%	-0.001434111
25	US	-3774	30813	27039	2.63%	-0.122480771

F43xx50

FIGURE 43-50 Using the GETPIVOTDATA function to locate April Chip 1 Sales in France.

F43xx50: This figure shows the use of the GETPIVOTDATA function to extract April revenues in France.

If you want to simply return the total revenue ($1,026,278), you can enter the formula (see cell F2) =GETPIVOTDATA(A4,"Sum of Revenue").

To see the true power of the GETPIVOTDATA function, suppose you want to summarize the sales of each product, by country, for each month of the year in a nice table, as shown in Figure 43-51.

	I	J	K	L
9	Month	April		
10				
11				
12		Chip 1	Chip2	Chip 3
13	Canada	20343	0	0
14	France	37600	0	0
15	US	27039	0	0

F43xx51

FIGURE 43-51 Using GETPIVOTDATA to extract the April sales of each product, in each country.

F43xx51: This figure shows the April sales of each chip, in each country.

To begin, I created a drop-down box that allows me to enter the month of the year in cell J9. Then we entered the countries in I13:I15 and the products in J12:J12. Now in cell J13, we copied our previous GETPIVOTDATA formula from E2 and edited it to become =IFERROR(GETPIVOTDATA("Sum of Revenue",$A$4,"Month",$J$9,"Product",J$12,"Country",$I13),0). Copying this formula from J13 to J13:L15 pulls the sales of each product during each month from the PivotTable. As we copy the formula across, the product pulled changes; as we copy it down, the country pulled changes. In each

cell, the chosen month is pulled from cell J9. The use of the IFERROR function ensures that if no sales of a product occurred in a country during the selected month, we return a 0 instead of an error message. Imagine how useful this trick would be if we sold 1,000 products in 200 countries!

Often, the GETPIVOTDATA function is a nuisance. In these cases, you can turn off the option to use it. Suppose you want to refer to data in cells B5:B11 from a PivotTable elsewhere in your workbook. You would probably use the formula =B5 and copy it to the range B6:B11. You hope this action would extract B6, B7, ,…, B11 to the cells you want. Unfortunately, if the GETPIVOTDATA option is active, you get a bunch of GETPIVOTDATA functions that refer to the same cell. So if you want to turn off GETPIVOTDATA, click the File tab and then click Options. Select Formulas in the left pane, and under Working With Formulas, clear the option Use GetPivotData Functions For PivotTable References, and then click OK. This ensures that clicking inside a PivotTable yields a formula like =B6, rather than a GETPIVOTDATA function. You can also turn off GETPIVOTDATA in a particular PivotTable by clicking in the PivotTable, and then, in the PivotTable group on the Analyze tab, clicking the Options arrow, and from the drop-down list, clearing Generate GetPivotData.

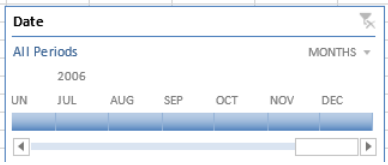
Finally, note that you can also combine the MATCH and OFFSET functions (explained in Chapter 5, “The MATCH function,” and Chapter 22, “The OFFSET function,” respectively) to extract various PivotTable entries.

How can I use the Timeline feature to summarize data during different time periods?

Excel 2013 introduced a wonderful new feature, Timeline, which allows you to easily filter your PivotTable based on time periods. You can select any subset of consecutive years, quarters, months, or days in your data, and the Timeline feature ensures that all the PivotTable calculations will include spreadsheet rows only from the selected time period.

To illustrate the use of the Timeline feature, look at the file Makeuptimeline.xlsx. In the worksheet Data, we have listed for 1,900 makeup transactions the following information: Salesperson (the Name column, H), Product (column J), Date (column I), Units (column K), and Revenue (the Dollars column, L). In the worksheet Pivot Table, you see a PivotTable that summarizes the sales of each product by each salesperson. After clicking anywhere in the PivotTable, go to the Insert tab on the ribbon and select Timeline from the Filters group. From the Insert Timelines dialog box, select Date and click OK. You will see the timeline shown in Figure 43-52.

Sum of Dollars	Column Labels					
Row Labels	eye liner	foundation	lip gloss	lipstick	mascara	Grand Total
Ashley	$5,844.95	$4,186.06	$6,053.68	$3,245.44	$6,617.10	25947.235
Betsy	$6,046.53	$8,276.84	$5,683.91	$3,968.61	$4,827.25	28803.147
Cici	$5,982.82	$6,198.25	$5,199.95	$3,148.84	$7,060.71	27590.573
Colleen	$3,389.63	$6,834.77	$5,573.32	$2,346.41	$6,746.53	24890.656
Cristina	$5,397.27	$5,290.99	$5,297.98	$2,401.67	$5,461.65	23849.559
Emilee	$7,587.39	$5,492.80	$5,270.25	$2,189.14	$4,719.30	25258.874
Hallagan	$6,964.62	$7,256.20	$5,603.12	$3,177.87	$5,703.35	28705.162
Jen	$7,010.44	$5,747.95	$5,461.61	$3,953.30	$6,877.23	29050.535
Zaret	$8,270.19	$6,451.65	$5,690.81	$2,448.71	$3,879.95	26741.306
Grand Total	**$56,493.84**	**$55,735.51**	**$49,834.64**	**$26,879.99**	**$51,893.07**	**240837.05**



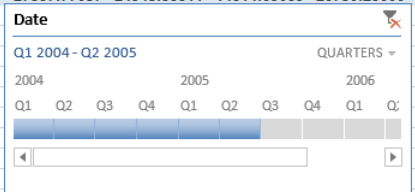
F43xx52

FIGURE 43-52 The timeline for makeup data.

F43xx52: This figure shows a timeline that can be used to summarize sales data for consecutive quarters.

Using the Shift key, you can select adjacent quarters that can be used to summarize sales. For example, in the worksheet Timeline (see Figure 43-53) we summarized sales during 2004 and the first two quarters of 2005. Clicking the funnel (Clear Filter) restores a PivotTable based on all the data.

Sum of Dollars	Column Labels					
Row Labels	eye liner	foundation	lip gloss	lipstick	mascara	Grand Total
Ashley	$2,259.97	$2,064.62	$3,387.84	$1,191.92	$4,773.72	$13,678.07
Betsy	$2,714.91	$4,195.09	$2,862.84	$2,223.66	$2,591.12	$14,587.61
Cici	$3,310.71	$3,313.91	$2,076.46	$1,676.03	$3,026.36	$13,403.47
Colleen	$2,122.76	$4,064.70	$3,190.32	$1,454.87	$3,163.44	$13,996.09
Cristina	$3,890.14	$2,047.07	$2,844.16	$1,531.34	$2,708.86	$13,021.57
Emilee	$4,086.75	$2,754.36	$2,808.22	$1,180.96	$2,462.89	$13,293.17
Hallagan	$4,195.40	$3,622.60	$2,857.48	$2,133.18	$2,309.15	$15,117.81
Jen	$3,364.89	$2,830.40	$1,875.47	$1,762.88	$3,866.27	$13,699.91
Zaret	$3,188.38	$2,695.03	$3,040.78	$1,659.86	$1,828.48	$12,412.53
Grand Total	**29133.89079**	**27587.77037**	**24943.58511**	**14814.69089**	**26730.28606**	**123210.2232**



F43xx53

FIGURE 43-53 The timeline that summarizes sales for 2004 and the first two quarters of 2005.

F43xx53: This timeline summarizes sales during 2004 and the first two quarters of 2005.

How I can use a PivotTable to summarize total sales to date during a year?

Using Value Field Settings, it is easy to summarize total sales to date during a year. To illustrate how to summarize total sales to date during a year, look at the file Monthtomonth.xlsx. The worksheet Data records the year, month, and revenue for a number of sales transactions. To begin in the worksheet Year To Date, we summarized the monthly sales for each year by dragging Month to the Rows area, Year to the Columns area, and Revenue to the Values area. This yields the PivotTable shown in Figure 43-54.

	A	B	C	D	E
3	Sum of Revenue	Column Labels			
4	Row Labels	2009	2010	2011	Grand Total
5	January		704.15%	-45.73%	
6	February		56.05%	-56.02%	
7	March		-63.15%	-52.46%	
8	April		-13.94%	-33.62%	
9	May		-24.27%	-40.01%	
10	June		-22.73%	44.80%	
11	July		150.55%	-55.59%	
12	August		-35.92%	43.03%	
13	September		-19.52%	-6.95%	
14	October		-57.66%	-15.00%	
15	November		-76.57%	183.40%	
16	December		144.25%	8.66%	
17	Grand Total		-6.94%	-19.88%	

F43xx54

FIGURE 43-54 Summary of sales by month and year.

F43xx54: This figure shows a summary of sales by month and year.

This figure shows a sales summary, broken down by month and year. From anywhere in cells B5:E17 of the PivotTable, right-click and select Value Field Settings. Then select the Show Values As tab, choose Running Total In from the Show Values As list, and select Month from the Base Field list. Then click OK. The resulting PivotTable, shown in Figure 43-55 (see the worksheet Year To Date), shows for each month the sales for the given year through that month. For example, sales through February of 2009 were $58,449.

	A	B	C	D	E
3	Sum of Revenue	Column Labels			
4	Row Labels	2009	2010	2011	Grand Total
5	January	10453	84058	45615	140126
6	February	58449	158954	78558	295961
7	March	171575	200643	98379	470597
8	April	241188	260553	138149	639890
9	May	306343	309898	167749	783990
10	June	361157	352253	229080	942490
11	July	396087	439769	267943	1103799
12	August	447675	472829	315230	1235734
13	September	508510	521792	360789	1391091
14	October	594117	558035	391594	1543746
15	November	666719	575045	439801	1681565
16	December	696762	648426	519534	1864722
17	Grand Total				

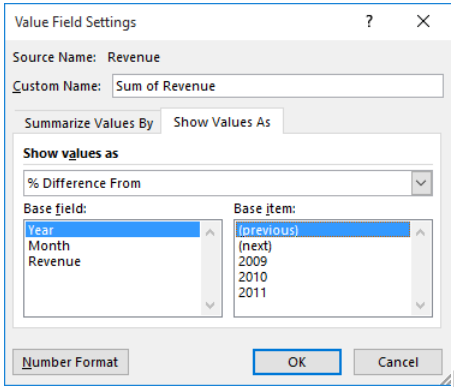
F43xx55

FIGURE 43-55 The year-to-date sales totals.

F43xx55: This figure shows year-to-date sales.

How can I use a PivotTable to summarize sales this month compared to the same month a year earlier?

Again, we will use the data in the file Monthtomonth.xlsx. In the worksheet Previous Year, we created a PivotTable by dragging Month to the Rows area, Year to the Columns area, and Revenue to the Values area. After right-clicking anywhere in the range B5:E17 in the PivotTable and selecting Value Field Settings, fill in the dialog box as shown in Figure 43-56 to create the PivotTable shown in Figure 43-57: update the Custom Name box to **Sum of Revenue**, select the Show Values As tab, select % Difference from the Show Value As list, select Year from the Base Field list, select Previous from the Base Item list, and click OK. Here we see how sales during each month compare to the same month in the previous year. For example, January 2010 sales increased 704.15 percent over January 2009 sales.



F43xx56

FIGURE 43-56 The settings needed to compare a month to the same month in the previous year.

F43xx56: This figure shows the settings needed to compare a month to the same month during the previous year.

	A	B	C	D	E
1					
2					
3	**Sum of Revenue**	**Column Labels**			
4	**Row Labels**	**2009**	**2010**	**2011**	**Grand Total**
5	January		704.15%	-45.73%	
6	February		56.05%	-56.02%	
7	March		-63.15%	-52.46%	
8	April		-13.94%	-33.62%	
9	May		-24.27%	-40.01%	
10	June		-22.73%	44.80%	
11	July		150.55%	-55.59%	
12	August		-35.92%	43.03%	
13	September		-19.52%	-6.95%	
14	October		-57.66%	-15.00%	
15	November		-76.57%	183.40%	
16	December		144.25%	8.66%	
17	**Grand Total**		**-6.94%**	**-19.88%**	

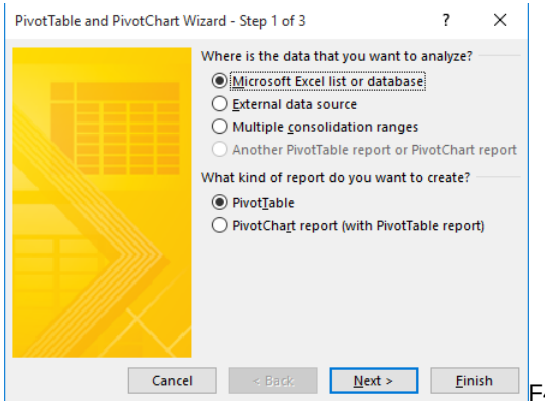
F43xx57

FIGURE 43-57 A comparison of sales to the same month during the previous year.

F43xx57: This figure shows the sales for each month compared to the same month during the previous year.

How can I create a PivotTable based on data in several different locations?

Often the data needed to create a PivotTable can lie in different worksheets or different workbooks (files). The key to creating a PivotTable from data in different locations is to press Alt+D+P and bring up the classic PivotTable and PivotChart Wizard, shown in Figure 43-58. (You might need to press Alt+D+P a few times.)

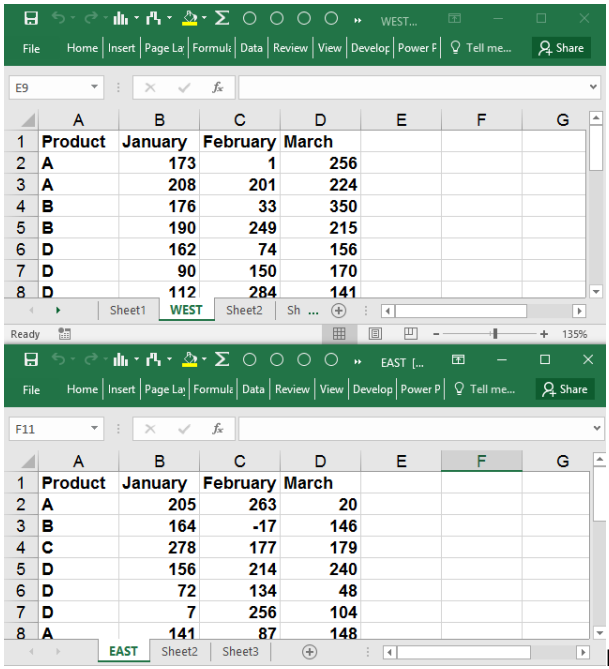


F43xx58

FIGURE 43-58 The classic PivotTable and PivotChart Wizard dialog box.

F43xx58: This figure shows the classic PivotTable and PivotChart Wizard, from which we can create PivotTables based on data in different locations.

To illustrate how to create a PivotTable based on data in different ranges, open the files East.xlsx and West.xlsx from this chapter's Templates folder. In the View tab on the ribbon, click Arrange All in the Window group, select Tiled from the Arrange Windows dialog box, and click OK. This displays all the open Excel files side by side or on top of each other as shown in Figure 43-59. (The arrangment depends on your resolution, but most often the windows display side by side.) This data represents the January, February, and March sales in the East and West. We want to produce a PivotTable that summarizes the total sales of each product during each month.

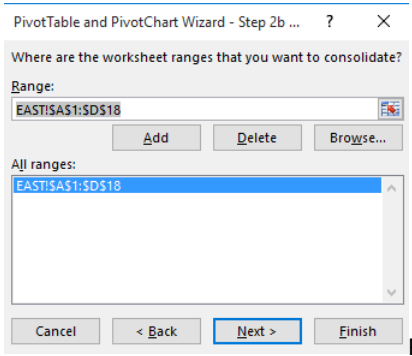


F43xx59

FIGURE 43-59 Two files that will be summarized with a PivotTable.

F43xx59: This figure shows the sales in East and West that will be summarized in a PivotTable.

To begin, press Alt+D+P (to bring up the PivotTable and PivotChart Wizard) and select Multiple Consolidation Ranges in step 1. After selecting Next, choose Create A Single Page Field For Me in step 2a, and then click Next. From step 2b of the PivotTable and PivotChart Wizard, select (as shown in Figure 43-60) the East sales data, EAST!$A$1:$D$18, and click Add to add it to the range of data that will be used to create our PivotTable.



F43xx60

FIGURE 43-60 Adding the East data.

F43xx60: This figure shows the East sales data added to the range that is generating the PivotTable.

Then clear the East data from the Range portion of the dialog box, and select the West data, WEST!$A$1:$D$24, and then click Add to add this data to the All Ranges section. After clicking Next, you can decide whether to place the final PivotTable in a new worksheet or the current worksheet (step 3). Choose a new worksheet, and after selecting Finish, you obtain the PivotTable (see Figure 43-61) in the worksheet PT of the workbook West.xlsx (in this chapter's Practice Files folder).

	A	B	C	D	E
1	Page1	(All)			
2					
3	Sum of Value	Column			
4	Row	January	February	March	Grand Total
5	A	1323	1317	1445	4085
6	B	890	335	812	2037
7	C	1231	922	843	2996
8	D	767	1424	1199	3390
9	E	579	483	371	1433
10	F	597	577	327	1501
11	G	570	850	811	2231
12	H	131	71	266	468
13	Grand Total	6088	5979	6074	18141

F43xx61

FIGURE 43-61 A PivotTable summarizing the East and West sales.

F43xx61: This figure summarizes the total sales of each product during each month.

We find, for example, that total sales of Product A in February were 1,317, and so on. You can filter the products by selecting the drop-down arrow in cell A4; filter the months by using the drop-down arrow in cell B3. The drop-down arrow in cell B1 allows you to filter the PivotTable so that only East or West sales data is used. Refresh updates the PivotTable, showing data changes. The Slicer and Timeline tools do not work with a PivotTable created from multiple ranges.

If you do not like using the Alt+D+P combination, you can add the PivotTable and PivotChart Wizard to the Quick Access Toolbar by selecting File, Options, Quick Access Toolbar, Commands Not In The Ribbon (from the Choose Commands From list), and selecting PivotTable And PivotChart Wizard. Then click Add to add the command to your customized Quick Access Toolbar, and click OK to close the Excel Options dialog box.

To create a PivotTable from multiple ranges, the headings (in this case January, February, and March) in each range must be identical. In Chapter 44, we will discuss a feature added in Excel 2013, the Data Model, which allows you to create PivotTables even when a heading from one source range occurs in none of the other source ranges.

How can I create a PivotTable based on an already created PivotTable?

Often, we want to create a PivotTable based on an already created PivotTable. This allows us to view several PivotTables based on the same data. For example, in the file Makeuptimeline.xlsx, we created (as shown in Figure 43-53) a summary of makeup sales with a list of salespeople's names going down and a list of products going across. Suppose we also want to create a PivotTable with the list of products going down and names of salespeople going across. After selecting a cell in the worksheet Pivot Table of the file Makeuptimeline.xls, press Alt+D+P to bring up the PivotTable and

PivotChart Wizard. Then choose the Another PivotTable Report Or PivotChart Report option in step 1, and click Next. Then, in step 2, choose the PivotTable from which you wish to build your new table. We chose our original PivotTable: PivotTable10. Click Finish. Now the PivotTable Fields pane appears, and you can create a new PivotTable without disturbing your old table. We chose to put Product in the Rows area, Name in the Columns area, and Dollars in the Values area. This creates the PivotTable shown in Figure 43-62.

	H	I	J	K	L	M	N	O	P	Q	R
24	PIVOTTABLE BASED ON ANOTHER PIVOTTABLE										
25											
26	Sum of Dollars	Column Labels									
27	Row Labels	Ashley	Betsy	Cici	Colleen	Cristina	Emilee	Hallagan	Jen	Zaret	Grand Total
28	eye liner	$5,844.95	$6,046.53	$5,982.82	$3,389.63	$5,397.27	$7,587.39	$6,964.62	$7,010.44	$8,270.19	$56,493.84
29	foundation	$4,186.06	$8,276.84	$6,198.25	$6,834.77	$5,290.99	$5,492.80	$7,256.20	$5,747.95	$6,451.65	$55,735.51
30	lip gloss	$6,053.68	$5,683.91	$5,199.95	$5,573.32	$5,297.98	$5,270.25	$5,603.12	$5,461.61	$5,690.81	$49,834.64
31	lipstick	$3,245.44	$3,968.61	$3,148.84	$2,346.41	$2,401.67	$2,189.14	$3,177.87	$3,953.30	$2,448.71	$26,879.99
32	mascara	$6,617.10	$4,827.25	$7,060.71	$6,746.53	$5,461.65	$4,719.30	$5,703.35	$6,877.23	$3,879.95	$51,893.07
33	Grand Total	$25,947.24	$28,803.15	$27,590.57	$24,890.66	$23,849.56	$25,258.87	$28,705.16	$29,050.53	$26,741.31	$240,837.05

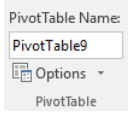
F43xx62

FIGURE 43-62 A PivotTable based on another PivotTable.

F43xx62: This figure shows a PivotTable based on our original makeup sales summary.

How can I easily use the report filter to create multiple PivotTables?

In the worksheet Slicers of the file Ptableexample.xlsx, I created filters based on Country and Product. Suppose, for example, you want to create a separate PivotTable for each country. Select a cell within the PivotTable. From the upper left-hand portion of the Analyze tab, select Options in the PivotTable group, as shown in Figure 43-63. Then select the Country field to create a separate PivotTable for each country and select the Product field to create a PivotTable for each product. Figure 43-64 shows, for example, the PivotTable created for sales in France.



F43xx63

FIGURE 43-63 Selecting Options to create multiple PivotTables based on the report filter.

F43xx63: This figure shows how to create multiple PivotTables based on filters.

A1 | Product

	A	B	C	D	E
1	Product	(All)			
2	Country	France			
3					
4		Values			
5	Row Labels	Sum of Var	Sum of Revenue	Sum of Budget	Sum of Revenue2
6	January	-5772	27399	33171	7.43%
7	February	-3846	29108	32954	7.89%
8	March	11529	32313	20784	8.76%
9	April	-54	37600	37654	10.19%
10	May	3318	35363	32045	9.59%
11	June	-3740	32855	36595	8.91%
12	July	-275	27239	27514	7.38%
13	August	2769	33432	30663	9.06%
14	September	-2983	29217	32200	7.92%
15	October	-1917	27300	29217	7.40%
16	November	0	23876	23876	6.47%
17	December	912	33171	32259	8.99%
18	Grand Total	-59	368873	368932	100.00%

F43xx64

FIGURE 43-64 A PivotTable created for France from the Country filter.

F43xx64: This figure shows a PivotTable for France created from the Country Filter.

Problems

1. Contoso, Ltd. produces microchips. Five types of defects (labeled 1–5) have been known to occur. The chips are manufactured by two operators (A and B) using four machines (1–4). You are given data about a sample of defective chips, including the type of defect, the operator, machine number, and day of the week the defect occurred. Use this data to chart a course of action that would lead, as quickly as possible, to improved product quality. You should use a PivotTable to “stratify” the defects with respect to the type of defect, day of the week, machine used, and operator working. You might even want to break down the data by machine, operator, and so on. Assume that each operator and machine made an equal number of products. You’ll find this data in the file Contoso.xlsx.

2. You own a fast-food restaurant and have done some market research in an attempt to better understand your customers. For a random sample of customers, you are given the income, gender, and number of days per week that residents go out for fast food. Use this information to determine how gender and income influence the frequency with which a person goes out to eat fast food. The data is in the file Mcdonalds.xlsx.

3. Students at the School of Fine Art apply to study either English or science. You have been assigned to determine whether the School of Fine Art discriminates against women in admitting students to the school of their choice. You are given the following data for the School of Fine Art’s students:

- Female or male
- Major applied for: English (Eng) or science (Sci)
- Admit? Yes or No

Assuming that women are as equally qualified for each major as men, does this data indicate that the college discriminates against women? Be sure you use all the available information. The data is in the file Finearts.xlsx.

4. You have been assigned to evaluate the quality of care given to heart-attack patients at Emergency Room (ER) and Chicago Hope (CH). For the last month, you are given the following patient data:

   - Hospital (ER or CH).
   - Risk category (high or low). High-risk people are less likely to survive than low-risk people.
   - Patient outcome (live or die).

   Use this data to determine which hospital is doing a better job of caring for heart attack patients. Hint: Use all the data. The data is in the file Hospital.xlsx.

5. You are given the monthly level of the Dow Jones Index for the years 1947 to 1992. Does this data indicate any unusual seasonal patterns in stock returns? Hint: You can extract the month (January, February, and so on) by using the formula =TEXT(A4,"mmm") copied to any column. The data is in the file Dow.xlsx.

6. The file Makeupdb.xlsx contains information about the sales of makeup products. For each transaction, you are given the following information:

   - Name of salesperson
   - Date of sale
   - Product sold
   - Units sold
   - Transaction revenue

   Create a PivotTable to compile the following information:

   - The number of sales transactions for each salesperson.
   - For each salesperson, the total revenue by product.
   - Using your answer to the previous question, create a function that always yields Jen's lipstick sales.

- Total revenue generated by each salesperson, broken down by location.
- Total revenue by salesperson and year. Hint: You need to group the data by year.

7. For the years 1985–1992, you are given monthly interest rates on bonds that pay money one year after the day they're bought. It's often suggested that interest rates are more volatile—tend to change more—when interest rates are high. Does the data in the file Intratevol-volatility.xlsx support this statement? Hint: PivotTables can display standard deviations.
8. For the grocery example, prepare a chart that summarizes the trend over time of the sales at each store.
9. For the grocery example, create a calculate field that computes an average per-unit price received for each product.
10. For the grocery example, create a PivotChart that summarizes the sales of each product at each store for the years 2005 and 2006.
11. For the data in the file Calcitemdata.xlsx, create calculated fields that summarize the sales of dessert (cakes+puddings) and fruits (apples+grapes).
12. In the chip PivotTable example, create a PivotTable that summarizes the monthly sales of Chips 1 and 3 in France and the United States.
13. In the customer PivotTable example, show the top 15 customers in one table and the bottom 5 customers in another table.
14. The file Ptablepartsdata.xlsx contains sales of various parts. Each part's code begins with either *Part* (for computer part) or *Comp* (for computer). Create a PivotTable that shows only the sales of Parts. Hint: Use a labels filter.
15. For the data in Problem 14, summarize the total sales of parts and computers.
16. The file Cigarettedata.xlsx contains the age of a sample of Americans, whether they smoke cigarettes or cigars, and whether they died during the current year. What can you conclude from this data?
17. The file Collegedata.xlsx tells you the following information about students who applied to graduate school at Kelley University: gender, desired major, and whether they were accepted or rejected. If you construct the appropriate PivotTable, you will find fewer women are accepted than men. Do you think Kelley discriminates against women?
18. The file Analyzesurveydata.xlsx contains answers on a 1–7 scale to various questions on a teaching evaluation survey. Create a PivotChart that charts for each question the fraction of the time each value (1–7) occurs. Then filter the chart to show the breakdown for any set of three questions you choose.

19. Using the data in the file Monthtomonth.xlsx, create a PivotTable that shows for the year 2010 how each month's sales differ from the previous month.

20. More than 1,000 registered voters were asked their political orientation (liberal, moderate, or conservative) and whether or not they favored the Dream Act. Using the data in the file Problem20data.xlsx, construct a PivotTable and PivotChart that show how opinions on the Dream Act depend on political orientation.

21. In the file Problem21data.xlsx, you are given the following information about a representative sample of US residents:

    - Do they subscribe to *Garden and Gun Magazine*?
    - Income level (low, middle, or upper)
    - Location (urban, rural, suburban)

    Use a PivotTable to help you determine the type of person who is most likely to subscribe to *Garden and Gun Magazine*.

22. The file Problem22data.xlsx contains information on births during 1995 at Dylan General Hospital. Construct a PivotChart that summarizes the births by day of the week. Then use another PivotTable or PivotChart to help you explain the pattern in births by day of the week.

23. The state of Happyville has nine congressional districts. In the file Problem23data.xlsx, you are given a voter's district and whether the voter is a Democrat or Republican. Construct a PivotTable and PivotChart that show the percentage of Democrats and Republicans in each district. Assuming that the party with the most voters in a district wins the election, how many districts will each party win? Note: this problem illustrates why the Republicans usually control the House of Representatives, even though the Democrats usually receive more total votes nationwide.

