



Excel 2013: Data Tables and Charts

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Excel 2013: Data Tables and Charts

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Organizing Worksheet Data with Tables

Lesson Time: 1 hour, 15 minutes

Lesson Objectives

In this lesson, you will:

- Create and modify tables.
- Sort or filter worksheet and table data.
- Use functions to calculate data.

Lesson Introduction

You've built worksheets and workbooks and used functions and formulas to analyze data. As your worksheets and workbooks grow in size and complexity, you might find it more and more challenging to locate and study the data you need to make business decisions. You want to organize the data in your Microsoft Office Excel 2013 files so that you can find the data you need as efficiently as possible.

In this lesson, you will organize worksheet data with tables.

TOPIC A

Create and Modify Tables

Imagine you have a worksheet with thousands of rows and a dozen columns. The worksheet lists retail store transactions by date and various other criteria. You want to view all of the transactions on a specific date between two specific hours. You could use Excel's sort functionality, but the spreadsheet is so large, simple sorting would just take too much time. Additionally, because of the sheer volume of transactions, with sorting, you might miss some of the transactions.

An easier way to find and summarize the data you're looking for is to convert your dataset into a table. Tables enable you to quickly sort and filter data based on the header rows of the table. One of the key benefits of tables is that a table limits the visible view of data to only the sort and filter criteria you have selected. Tables don't manipulate or change the data; they manipulate and change the *view* of the data.

So, if your transactions dataset is 175,000 rows long, and you want to see only the transactions that occurred on August 20, 2012, between the hours of 10:00 a.m. and 11:00 a.m., for a specific store, you can select these criteria from the date and time columns and the table will adjust its view so that you see only the 137 transactions that occurred on that date between those hours for that store.

By removing all of the data you don't need to see from your view, Excel helps improve your efficiency at finding and analyzing the data you do need.

Tables

A *table* is a dataset composed of contiguous rows and columns that Excel treats as a single, independent data object. When a standard dataset is converted to a table, the header row converts from plain text labels into sortable fields.

Table Components

Tables contain a variety of components that enhance the presentation of data.

<i>Component</i>	<i>Description</i>
Table name	Functions much the same way as a range name. You can add a name to a table so that you can use the table name in formulas.
Header row	The first row of a table that contains the labels for each column. Unlike standard data ranges, table header rows include drop-down lists that enable you to filter and sort the data in the table.
Total row	The total row is the last row in a table. It can display the total or other summary data for each column in the table.
Banded rows and columns	Tables can be formatted so that rows and columns appear in different colors, making it easier for users of the data to differentiate between one row or column and another.

The screenshot shows the 'Table Tools DESIGN' contextual tab in Excel. The ribbon includes options like 'Summarize with PivotTable', 'Remove Duplicates', 'Insert Slicer', 'Export', 'Refresh', 'Open in Browser', 'Unlink', 'External Table Data', 'Table Style', 'Properties', 'Header Row', 'First Column', 'Total Row', 'Last Column', 'Banded Rows', and 'Banded Table Styles'. The table below has the following data:

	Initial Contract	Years Under Co	Number of Boc	Number of Boc	Sell Price	Income Earned	Entry Pro
1068	6/18/2012	-0.01	20	497,555	\$ 2.99	\$1,487,639.45	Ye
1069	5/21/2012	0.07	20	689,482	\$ 15.99	\$11,024,817.18	Ye
1070	5/29/2011	1.05	22	42,545	\$ 2.99	\$127,209.55	Ye
1071	12/6/2003	8.32	8	630,450	\$ 7.99	\$5,037,235.50	N
1072	7/31/2009	2.37	22	376,088	\$ 2.99	\$1,124,533.12	N
1073	4/6/2002	10.19	24	44,125	\$ 12.99	\$573,133.75	N
1074	10/30/2003	8.52	1	535,446	\$ 7.99	\$4,278,213.54	N
1075	Total			377,987,010			

Figure 1-1: A sample table.

The Create Table Dialog Box

You can use the **Create Table** dialog box to select a specific data range and convert it to a table. You can find the **Create Table** dialog box by selecting **INSERT**→**Tables**→**Table**.

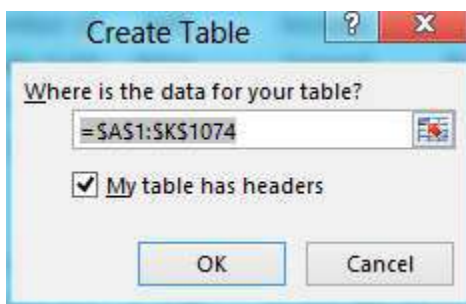


Figure 1-2: The Create Table dialog box.

Styles and Quick Style Sets

A *style* is a collection of formatting options that you can define and then apply to worksheet columns and rows. A *Quick Style Set* is a group of predefined styles that come packaged with Excel. Quick Style sets enable you to apply a predefined style quickly and easily to tables of any size.

The TABLE TOOLS DESIGN Contextual Tab

The **TABLE TOOLS DESIGN** contextual tab displays only when you have selected a table or a cell within a table.

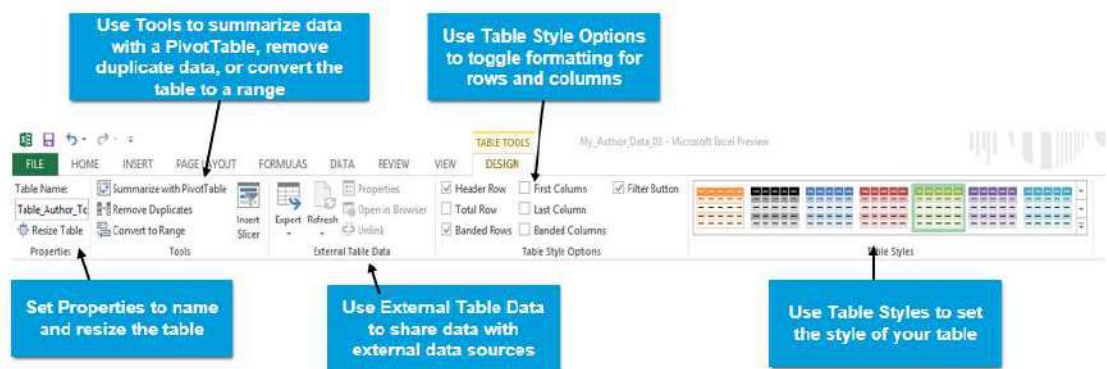


Figure 1-3: The TABLE TOOLS DESIGN contextual tab.

Table Formatting Options

You can format a table by using any of the predefined Quick Style sets, or you can create your own custom styles. Custom styles enable you to align the formatting of your table with any color and formatting style guidelines that might be governed by other departments in your organization. For example, if your firm has strict color branding guidelines for internal and external communications and reports, you can use custom styles to align the formatting of your worksheets to meet those branding guidelines.

Table Modification Options

Once you've built a table, you can modify it in various ways. You can add and delete columns and rows while maintaining both the data and formatting integrity of the table. You change the size of the table without impacting data that might appear elsewhere on the worksheet but not in the table. If necessary, you can also convert a table into a data range if you need to remove the table functionality from how the data is presented and viewed.

How to Create and Modify Tables

Use these procedures to create a table and apply a style to it.



Note: Access the **Checklist** tile in the LogicalCHOICE Course screen to view all How To procedures for this lesson.

Create a Table with the Default Table Style

To create a table with the default table style:

1. Before converting a range to a table, ensure you know the precise range that you wish to convert to a table. You don't want to include any unnecessary rows or columns.
2. Select the range that you wish to convert to a table.
3. Select **INSERT**→**Tables**→**Table**.
4. In the **Create Table** dialog box, verify that Excel displays the correct range to convert to a table. If necessary, edit the range.
5. If you want the cells in the top row of the selected range to become table headers, check the **My table has headers** check box. If you want Excel to insert a row of default column headers, uncheck the **My table has headers** check box.
6. Select **OK**.

Create a Table with a Quick Style Set

To create a table with a Quick Style set:

1. Select the range that you want to convert to a table.
2. Select **HOME**→**Styles**→**Format as Table**, and then select your desired Quick Style set.
3. In the **Format as Table** dialog box, verify that the correct range is identified. If necessary, edit the range.
4. If you want the cells in the top row of the selected range to become table headers, check the **My table has headers** check box. If you want Excel to insert a row of default column headers, uncheck the **My table has headers** check box.
5. Select **OK**.

Convert a Table to a Worksheet Data Range

To convert a table to a worksheet data range:

1. Select a cell within the table.
2. On the **TABLE TOOLS DESIGN** contextual tab, in the **Tools** group, select **Convert to Range**.
3. In the Microsoft Excel dialog box, select **Yes**.
4. If necessary, remove the table style formatting from the range.

Insert Table Rows

To insert table rows:

1. Select a cell that is in the row that will appear immediately below the new row.
2. Right-click and select **Insert**→**Table Rows Above**. **Note:** When inserting or deleting rows or columns, you can select more than one cell to insert or delete the same number of rows or columns. For example, if you want to insert five rows above the current cell B5, you could select the range **B5:B9**, right-click, and select **Insert**→**Table Rows Above**.

Delete Table Rows

To delete table rows:

1. Select a cell that is in the row that you want to delete.
2. Right-click and select **Delete**→**Table Rows**.

Insert Table Columns

To insert table columns:

1. Select a cell that is in the column that will appear immediately to the right of the new column.
2. Right-click and select **Insert**→**Table Columns to the Left**.

Delete Table Columns

To delete table columns:

1. Select a cell that is in the column that you want to delete.
2. Right-click and select **Delete**→**Table Columns**.

Resize a Table

To resize a table:

1. Select a cell within the table. **Note:** In this context, resizing a table does not resize the width of columns or the height of rows. Rather, it resizes the range of data that is included in the table by either increasing or decreasing the size of the range.
2. On the **TABLE TOOLS DESIGN** contextual tab, in the **Properties** group, select **Resize Table**.
3. Select the new data range and then select **OK**.

Remove Duplicate Rows in a Table

To remove duplicate rows:

1. Select the table. **Note:** It is strongly recommended that before you use the **Remove Duplicates** dialog box to delete any data, you save a safe copy of your worksheet in a secure location. You will always be able to roll back to the safe copy in the event that Excel removed rows you actually wanted to keep. Until you are comfortable using this functionality, you might consider first sorting your data, looking for duplicates, running **Remove Duplicates**, and then verifying the data you expected to be removed was removed.
2. On the **TABLE TOOLS DESIGN** contextual tab, in the **Tools** group, select **Remove Duplicates**.
3. In the **Remove Duplicates** dialog box, in the **Columns** area, select and deselect the columns in which you are looking for duplicates.
4. Verify that only the columns that contain potential duplicates are selected.
5. Select **OK**.

ACTIVITY 1-1

Converting a Range to a Table

Data Files

C:\091015Data\Organizing Worksheet Data with Tables\Author_Data_03.xlsx

Before You Begin

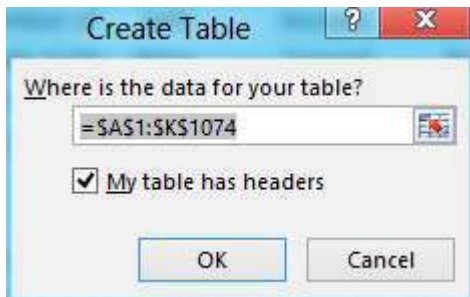
Excel 2013 is open.

Scenario

In the last year, Fuller & Ackerman (F&A) acquired two publishing houses, bringing the total number of F&A authors to just over 1,000. The process of integrating the author rosters of the two new acquisitions is well underway.

With the addition of all the new authors, the Author Data worksheet has grown considerably. You still need to run various reports based on the data, but because the number of records has grown significantly, you have decided to convert the Author_Totals worksheet dataset into a table named Author_Totals.

1. Open the file **Author_Data_03.xlsx**.
2. Convert the range **A1:K1074** to a table.
 - a) Select any cell within the range **A1:K1074**.
 - b) Select **INSERT**→**Tables**→**Table**.
 - c) Verify that Excel has correctly anticipated the range **= $\$A\$1:\$K\1074** , and then select **OK**.



- d) Adjust the width of each column so the drop-down list arrows do not obscure any of the column labels.

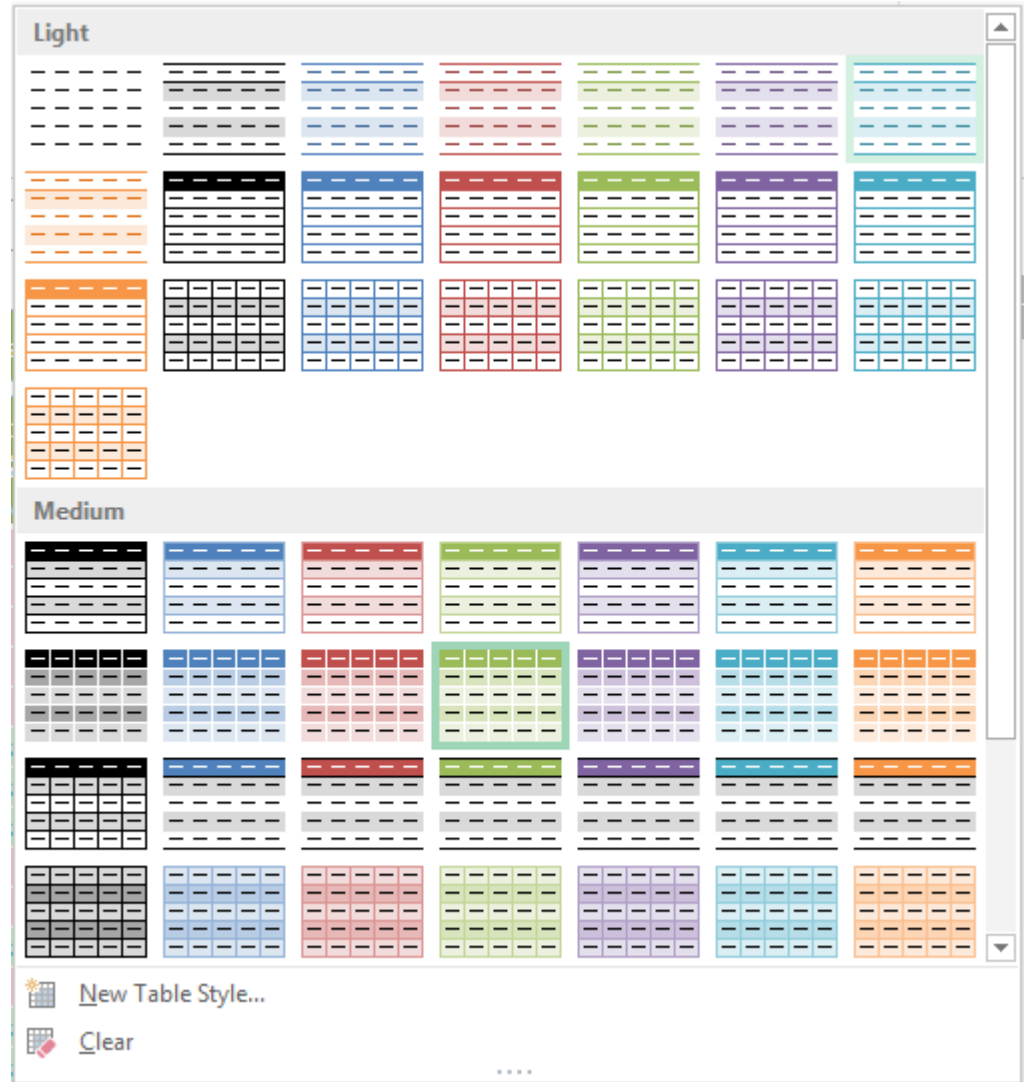
	A	B	C	D	E	F	G	H	I	J	K	
	AuthorID	Initial Contract Date	Years Under Contract	Number of Books in Print	Number of Books Sold	Sell Price	Income Earned	Early Production	5+ Years or High Production	Sold or \$1M+ Units	5+ Years and 350K+ Units	Royalty Rate
1	1005	1/21/2011	1.40	25	529,115	\$ 7.99	\$4,227,628.85	Yes	Yes	No		15%
2	1006	10/15/2000	11.66	3	105,627	\$ 5.99	\$632,705.73	No	Yes	No		9%
3	1008	4/12/2010	2.17	6	58,770	\$ 2.99	\$175,722.30	No	No	No		9%

3. Because F&A's brand colors are in the green spectrum, change the default color style of the table to a green style.

- a) Select any cell in the table.
- b) Select **TABLE TOOLS DESIGN**→**Table Styles**→**More** button



, and then select the **Table Style Medium 11** quick style.



4. Name the new table *Author_Totals*
 - a) On the **TABLE TOOLS DESIGN** tab, in the **Properties** group, select the contents of the **Table Name** field, and then type *Table_Author_Totals*
 - b) Press **Enter**.
5. Save your work as *My_Author_Data_03.xlsx*

TOPIC B

Sort and Filter Data

Creating tables is one thing. Leveraging their power for data analysis is quite another. Sometimes you will want to view your data in a specific order or view some subset of your data. In this topic, you will sort and filter data.

The Difference Between Sorting and Filtering

Neither sorting nor filtering changes your data; they change only the view of your data.

To *sort* data means to change the order of data in a row or column. To *filter* data means to remove from view any data that does not meet certain criteria. You can sort on one or more columns and rows, and you can combine sorting and filtering to provide precisely the view you need. Generally speaking, when you combine sorting and filtering, you filter first, and then sort the filtered data. Here are some examples.

This table is sorted by AuthorID only. The sort goes from lowest value to highest value.



	A	B	C	D
	AuthorID	Initial Contract Date	Years Under Contract	Number of Books in Print
1	1005	1/21/2011	1.40	25
2	1006	10/15/2000	11.66	3
3	1008	4/12/2010	2.17	6
4	1011	9/24/2001	10.72	11
5	1012	5/17/2009	3.08	13
6	1013	10/16/2006	5.66	18
7	1013	7/22/2003	8.90	8
8	1014	3/7/2006	6.27	9
9	1015	5/3/2009	3.12	4

Figure 1-4: Data sorted on a single column.

This table is sorted by three columns: first by number of books in print, then by sell price, then by number of books sold. To see this, first look at the order of the **Number of Books in Print** column, which is the fourth column in the figure: the 1s come first, then the 2s. Then, within the 1s, observe the order of the **Sell Price** (the sixth) column. It goes from lowest to highest sell price. The same is true for the Sell Price order for authors with 2 books in print. Now observe the order of the **Number of Books Sold** (the fifth) column for authors with one book sold. What do you notice? The Number of Books Sold column is sorted from highest to lowest for each Sell Price.

26	1129	8/16/2011	0.83	1	292,202	\$	15.99	\$4,672,309.98
27	1243	11/20/2005	6.57	1	429,724	\$	15.99	\$6,871,286.76
28	1270	4/22/2000	12.15	1	580,635	\$	15.99	\$9,284,353.65
29	1270	1/26/2010	1.55	1	489,499	\$	23.99	\$11,743,081.01
30	1270	4/6/2010	2.19	1	680,796	\$	23.99	\$16,332,296.04
31	1270	4/22/2010	2.15	2	44,772	\$	2.99	\$133,868.28
32	2953	10/28/2007	4.63	2	126,456	\$	2.99	\$378,103.44
33	2881	4/15/2007	5.17	2	146,564	\$	2.99	\$438,226.36
34	2416	3/30/2009	3.21	2	362,472	\$	2.99	\$1,083,791.28
35	1408	5/26/2006	6.05	2	392,854	\$	2.99	\$1,174,633.46
36	1789	5/2/2002	10.12	2	513,886	\$	2.99	\$1,536,519.14
37	2096	6/19/2008	3.99	2	58,720	\$	3.99	\$234,292.80

Figure 1-5: Data sorted on multiple columns.

When you sort on multiple columns, it's important to remember that each column you sort on—except the last—must have data that repeats. In this example, there's more than one author with 1 book in print, and there's more than one sell price with multiples of each sell price. However, the Number of Books sold is unique for each author.

The next example illustrates a table that has been both filtered and sorted. First, the table was filtered to show only those authors who have earned between \$100K and \$150K. Then, the list of authors returned by that filter was sorted from authors with the fewest books sold to the most books sold.

	A	B	C	D	E	F	G
1	AuthorID	Initial Contract Date	Years Under Contract	Number of Books in Print	Number of Books Sold	Sell Price	Income Earned
249	2432	12/18/2001	10.49	16	9,584	\$ 10.99	\$105,328.16
277	1624	2/4/2010	2.36	5	13,045	\$ 9.99	\$130,319.55
281	1847	7/19/2007	4.91	9	19,529	\$ 5.99	\$116,978.71
352	1861	12/15/2000	11.50	23	18,160	\$ 5.99	\$108,778.40
358	1690	2/23/2007	5.31	11	29,000	\$ 3.99	\$115,710.00
452	2553	1/20/2011	1.40	12	26,304	\$ 3.99	\$104,952.96
463	1680	7/1/2001	10.95	8	38,152	\$ 2.99	\$114,074.48
490	2097	9/18/2010	1.74	16	48,102	\$ 2.99	\$143,824.98
592	2119	7/27/2002	9.88	22	37,297	\$ 2.99	\$111,518.03
640	2198	4/22/2010	2.15	2	44,772	\$ 2.99	\$133,868.28
810	2985	5/29/2011	1.05	22	42,545	\$ 2.99	\$127,209.55

Figure 1-6: Filtered and sorted data.

Excel has many AutoFilters built in. The previous example shows the table being filtered for authors who have earned between \$100K and \$150K. This is an example of the Between AutoFilter.

Sometimes, though, you will want to filter data based on much more complex criteria than the **AutoFilter** options will allow for. In cases like this, you will want to use the **Advanced Filter** dialog box.

Advanced Filtering

The **Advanced Filter** dialog box enables you to create complex data filters that filter data on a variety of user-defined criteria. However, if your data is in a table, to use the **Advanced Filter** dialog box, you must first turn off **AutoFilter**.

Unlike **AutoFilter** options, where you enter the filter criteria in the **AutoFilter** dialog box or select it in a menu, the advanced filtering options look for specific filter criteria that appear in a specific range, known as the criteria range, on your worksheet. The criteria range must appear directly above the range you want to filter.

When you create advanced filters, criteria that appear on the same row in the criteria range use an AND operator and criteria that appear on different rows in the criteria range use the OR operator.

Here are some examples.

This filter looks for all authors who have been under contract for 10 or more years, have five or fewer books in print, and have sold 600,000 or more units. Five authors meet these criteria.

	A	B	C	D	E	F	G
						The criteria range is C1:E2	
1	AuthorID	InitialContract Date	YearsUnder Contract	Number ofBooks in Print	Number ofBooks Sold		
2			>=10	<=5	>=600000		
3	The data range is A5:K1078 (the table)						
4							
5	AuthorID	Initial Contract Date	Years Under Contract	Number of Books in Print	Number of Books Sold	Sell Price	Income Earned
38	1065	9/18/2001	10.74	5	635,933	\$ 2.99	\$1,901,439.67
199	1377	1/21/2001	11.39	4	687,237	\$ 9.99	\$6,865,497.63
503	1903	3/13/2001	11.26	3	677,022	\$ 5.99	\$4,055,361.78
570	2037	7/16/2000	11.91	4	693,802	\$ 7.99	\$5,543,477.98
814	2498	9/24/2000	11.72	1	675,254	\$ 12.99	\$8,771,549.46
	This advanced filter returns 5 records						

Figure 1-7: Advanced filter with three criteria using only the AND operator.

This filter looks for all authors who have been under contract for 11 or more years, have five or fewer books in print, and have sold more than 600,000 units OR any authors who have earned more than \$16 million. Six authors meet these criteria.

	A	B	C	D	E	F	G
						The criteria range is C1:G3	
1	AuthorID	InitialContract Date	YearsUnder Contract	Number ofBooks in Print	Number ofBooks Sold	SellPrice	IncomeEarned
2			>=11	<=5	>600000		
3							>16000000
4	The data range is A5:K1078 (the table)						
5	AuthorID	Initial Contract Date	Years Under Contract	Number of Books in Print	Number of Books Sold	Sell Price	Income Earned
199	1377	1/21/2001	11.39	4	687,237	\$ 9.99	\$6,865,497.63
498	1894	10/23/2001	10.64	12	675,050	\$ 23.99	\$16,194,449.50
503	1903	3/13/2001	11.26	3	677,022	\$ 5.99	\$4,055,361.78
570	2037	7/16/2000	11.91	4	693,802	\$ 7.99	\$5,543,477.98
814	2498	9/24/2000	11.72	1	675,254	\$ 12.99	\$8,771,549.46
1016	2907	4/6/2010	2.19	1	680,796	\$ 23.99	\$16,332,296.04
	This advanced filter returns 6 records						

Figure 1-8: Advanced filter with four criteria using both the AND and the OR operators.

Filter Operators

Filter operators help you narrow down your search for specific data. You can use any of the following filter operators in almost any combination.

Operator	What It Does
"=text"	Returns an exact match for the text that appears between the quotation marks and after the equal sign.
?	Serves as a wildcard character for a single character in the same position as the question mark.
*	Serves as a wildcard character for multiple characters in the same position as the asterisk.
=	Finds values equal to the filter criterion.
<	Finds values less than the filter criterion.
>	Finds values greater than the filter criterion.
<=	Finds values less than or equal to the filter criterion.
>=	Finds values greater than or equal to the filter criterion.
<>	Finds values not equal to the filter criterion.

How to Sort and Filter Data

Use these procedures to sort and filter data.

Sort Data in a Range

To sort data in a range:

1. Select a cell in the column or row you want to sort.
2. Select **HOME**→**Editing**→**Sort & Filter**→**Custom Sort**.
3. In the **Sort** dialog box, select **Options**.
4. To sort data by columns, select **Sort top to bottom** (this is the most common type of sort), or to sort data by rows, select **Sort left to right** (this is rarely used).
5. Select **OK**.
6. In the **Sort** dialog box, select **Add Level** to add the number of sort levels (criteria) you need. The default is one level.
7. For each column (or row) sort level, define what to **Sort by**, what to **Sort on**, and the **Order** in which you want the sort to appear.
8. Select **OK**.

Sort Data in a Table

To sort data in a table:

1. In the header row, in the drop-down list of the column you want to sort, select **Sort smallest to largest**, **Sort largest to smallest**, or **Sort by color**. **Note:** If the content of the column (or row) is textual as opposed to numeric, your options will be **Sort A to Z** and **Sort Z to A**.
2. If necessary, to create a custom sort, in the header row, in the drop-down list of the column you want to sort, select **Sort by color**, and then select **Custom Sort**. In the **Sort** dialog box, configure the sort criteria, and then select **OK**.

Sort Data Based on Font Color

To sort data based on font color:

1. Verify that the data in the field you want to sort has more than one font color associated with it. If the field has only one color, you won't be able to sort by font color. For example, if the field has values that appear in green font if they are less than 10 or yellow font if they are greater than 10, then you'll be able to sort by color. If all of the values in the field are one color—black, for example—you will not be able to sort on font color.
2. In the header row, in the drop-down list of the column you want to sort, select **Sort by Color**, and then, in the **Sort by Font Color** section, select the font color you want to sort on.

Sort Data Based on Cell Color

To sort data based on cell color:

1. Verify that the data in the field you want to sort has more than one cell color associated with it. If the field has only one color, you won't be able to sort by cell color. For example, if the field has values that appear in green cells if they are less than 10 or yellow cells if they are greater than 10, then you'll be able to sort by color. If all of the cells in the field are one color—for example, no background color, or all yellow—you will not be able to sort on cell color.
2. In the header row, in the drop-down list of the column you want to sort, select **Sort by Color**, and then, in the **Sort by Cell Color** section, select the cell color you want to sort on.

Filter Data Based on Font Color

To filter data based on font color:

1. Verify that the data in the field you want to filter has more than one font color associated with it. If the field has only one color, you won't be able to filter by font color. For example, if the field has values that appear in green font if they are less than 10 or yellow font if they are greater than 10, then you'll be able to filter by color. If all of the values in the field are one color—black, for example—you will not be able to filter on font color.
2. In the header row, in the drop-down list of the column you want to filter, select **Filter by Color**, and then, in the **Filter by Font Color** section, select the font color you want to filter for.

Filter Data Based on Cell Color

To filter data based on cell color:

1. Verify that the cells in the field you want to filter have more than one cell color associated with them. If the field has only one color, you won't be able to filter by cell color. For example, if the field has values that appear in green cells if they are less than 10 or yellow cells if they are greater than 10, then you'll be able to filter by color. If all of the values in the field are one color—for example, no background color, or all yellow—you will not be able to filter on cell color.
2. In the header row, in the drop-down list of the column you want to filter, select **Filter by Color**, and then, in the **Filter by Cell Color** section, select the cell color you want to sort on.

Filter Data in a Table by Using Excel's AutoFilters

To filter data in a table by using AutoFilters:

1. In the header row, in the drop-down list of the column you want to filter, check or uncheck the filter options you would like to use. **Note:** Filter options will vary depending upon the type of data in the column. For example, if the column contains dates, you will be presented with filter options relevant to dates. If the column contains numerical values, you will be presented with filter options for numbers.
2. If necessary, you can search for specific data by typing your filter criteria directly in the **Search** box and selecting the **Search** button. **Note:** The Search functionality will return only exact matches. You cannot use operators such as “>” or “<=” in the **Search** box.
3. Select **OK**.
4. If necessary, refine your filter by adding additional filters to additional columns.

Filter Data in a Table or Range by Using Advanced Filters

To filter data in a table by using advanced filters:

1. Create the criteria range, inserting enough rows above the table or range so that:
 - The criteria range contains a header row that matches the header row of the dataset.
 - In addition to the criteria range header row, there are enough rows to accommodate the total number of OR criteria you want to filter for. **Note:** Criteria on the same row use the AND operator. Criteria on separate rows use the OR operator.
 - There is one blank row between the criteria range and the header row of the dataset.
2. Copy the header row of the dataset to the first row of the criteria range.
3. Enter filter criteria in the criteria cells.
4. Select any cell in the dataset.
5. Select **DATA**→**Sort & Filter**→**Advanced**.
6. In the **Advanced Filter** dialog box, verify that the **List range** is the range for the dataset.
7. If necessary, select the **Criteria range**, making sure to include the header row of the criteria range and only rows that contain criteria. **Note:** The criteria range cannot contain blank rows. The blank row between the criteria range and the dataset header row indicates where the criteria range ends and the dataset begins.
8. Select **OK**.

Remove Duplicate Records

To remove duplicate records:

1. Select a cell within the column or row that contains the duplicate values. **Note:** It's recommended that until you are extremely comfortable with using the deduplication functionality, you first save a backup copy of your production workbook in a safe location and then work on a copy of the workbook. Verify that the correct records in the copy are being removed prior to removing them from the production version of the workbook.
2. Select **DATA**→**Data Tools**→**Remove Duplicates**.
3. In the **Remove Duplicates** dialog box, select the columns you want to delete duplicate values from.
4. Select **OK**.

ACTIVITY 1–2

Sorting Data and Removing Duplicate Records

Before You Begin

My_Author_Data_03.xlsx is open.

Scenario

In preparation for creating some reports, you are reviewing and verifying author data.

You notice the following:

- When you sort the author data by highest to lowest income earned, you see that some of the authors have a negative value for Years Under Contract.
- When you sort the author data by lowest to highest AuthorID, you notice that many of the AuthorIDs repeat.

Neither of these conditions is good. After some collaborative research with the human resources (HR) team, you have discovered that during the integration process, some of the data was corrupted. After consultation with HR, you decide to first remove all of the author records for any authors who have a negative value for Years Under Contract. Then, with those records removed, you decide to deduplicate any records with the same AuthorID.

HR has indicated that the correct value to keep for each duplicate AuthorID is the older of the two records.

-
1. In **My_Author_Data_03.xlsx**, sort the dataset from highest to lowest income earned.
 - a) In cell **G1**, select the drop-down list arrow, and then select **Sort Largest to Smallest**.
 - b) Verify that rows **5**, **21**, and **23** contain negative values in the **Years Under Contract** field.

	A	B	C
		Initial	Years
1	AuthorID	Contract Da	Under Contra
2	2907	4/6/2010	2.19
3	1894	10/23/2001	10.64
4	2436	9/9/2002	9.76
5	2189	10/24/2012	-0.36
6	1611	7/6/2002	9.94
7	2822	11/8/2009	2.60
8	1833	9/9/2010	1.76
9	2314	10/31/2003	8.62
10	1722	2/5/2011	1.36
11	1836	4/17/2005	7.16
12	1642	11/11/2010	1.59
13	2514	7/26/2000	11.89
14	2387	4/2/2006	6.20
15	1480	5/2/2005	7.12
16	2530	12/10/2011	0.51
17	1734	10/26/2003	8.64
18	2880	5/14/2000	12.08
19	1628	1/10/2007	5.43
20	1272	7/27/2009	2.88
21	1655	7/5/2012	-0.06
22	1258	11/26/2010	1.55
23	2552	7/23/2012	-0.11

2. Delete all records that contain a negative value in the **Years Under Contract** field.
 - a) In cell **C1**, select the drop-down list arrow, and then select **Sort Smallest to Largest**.
 - b) To delete all of the author records with a negative **Years Under Contract** value, select the range **A2:K40**.
 - c) Before deleting the records, verify that AuthorID 2831 on row 40 is the last author with a negative value.

40	2831	6/17/2012	-0.01	22
41	1989	6/12/2012	0.01	22

- d) Right-click any cell in the selected range, and then select **Delete**→**Table Rows**.

	Cut	557,191.23	Yes
	Copy	778,999.09	Yes
	Paste Options:	715,554.36	Yes
	Paste	577,789.96	Yes
	Paste with A	811,904.96	Yes
	Paste Special...	537,123.60	No
	Refresh	351,520.05	Yes
	Insert	473,325.49	Yes
	Delete	397,330.48	Yes
	Select	218,707.88	Yes
	Clear Contents		
	Quick Analysis	131,889.46	Yes
	Sort	81,496.18	Yes
	Filter	856,703.49	Yes
	Table	954,959.08	Yes
	Insert Comment	212,942.36	Yes
	Format Cells...	666,905.84	Yes
	Pick From Drop-down List...	133,803.88	Yes
	Hyperlink...	\$95,004.90	Yes
		588,609.40	Yes
		489,670.52	No
		068,069.38	No

- e) With the dataset still sorted from lowest to highest **Years Under Contract**, verify that author **1989** is now the first author in the list.

	A	B	C	D	E
		Initial	Years	Number of	Number of
1	AuthorID	Contract Date	Under Contract	Books in Print	Books Sold
2	1989	6/12/2012	0.01	22	118,435
3	1284	6/9/2012	0.01	18	416,726
4	1171	6/6/2012	0.02	13	532,758
5	2474	6/2/2012	0.03	17	114,745

3. Sort the dataset by **AuthorID** and then by **Initial Contract Date**.

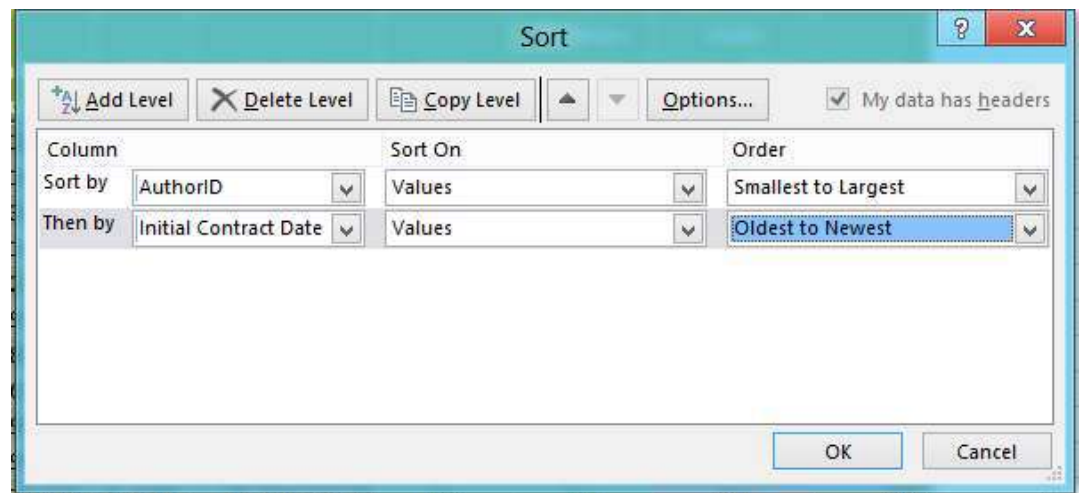
- Select any cell within the table.
- Select **HOME**→**Editing**→**Sort & Filter**→**Custom Sort**.



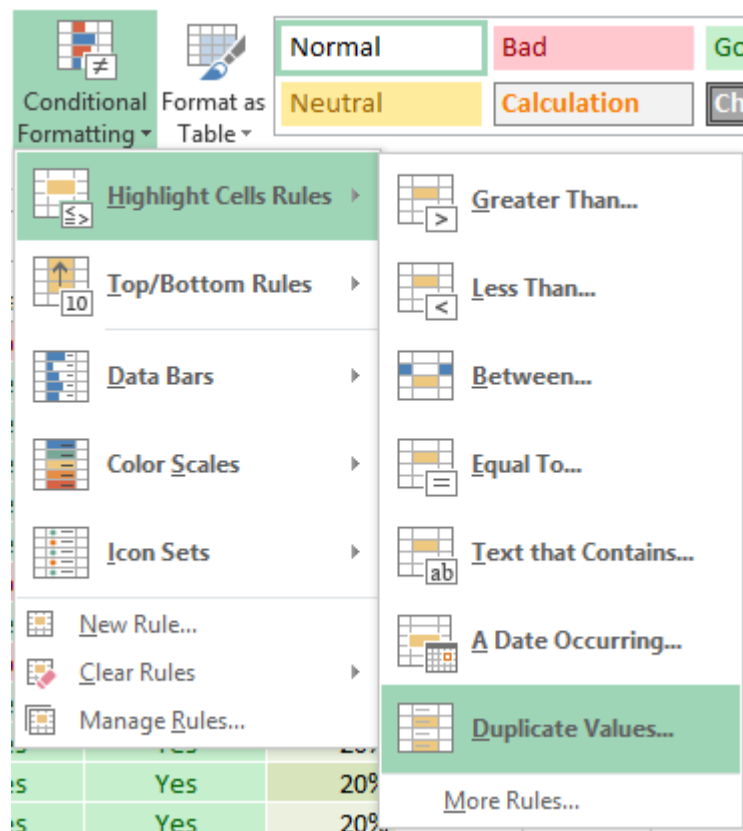
Note: When Excel deletes duplicate values, it deletes all of the records except the first record of the duplicates. Because you want to retain the oldest of the duplicate pairs, you want to first sort by AuthorID and then, within that sort, list AuthorIDs by Initial Contract Date with the oldest contract date first.

- In the **Sort** dialog box, in the **Column** area, from the **Sort by** list, select **AuthorID**.

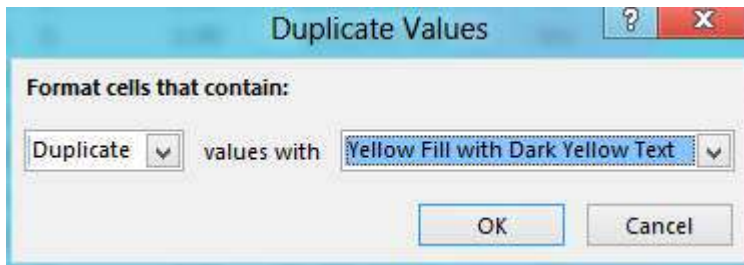
- d) In the **Sort On** area, verify **Values** is selected.
- e) In the **Order** area, verify **Smallest to Largest** is selected.
- f) Select **Add Level**.
- g) For the new level, set **Column** to **Initial Contract Date**, **Sort On** to **Values**, and **Order** to **Oldest to Newest**.



- h) Select **OK**.
4. Highlight and sort the duplicate values from oldest to newest.
 - a) Select the range **A2:A1035**.
 - b) On the **HOME** tab, in the **Styles** group, select **Conditional Formatting**→**Highlight Cells Rules**→**Duplicate Values**.



- c) In the **Duplicate Values** dialog box, verify that **Duplicate** is selected and then, from the **values with** drop-down list, select **Yellow Fill with Dark Yellow Text**.



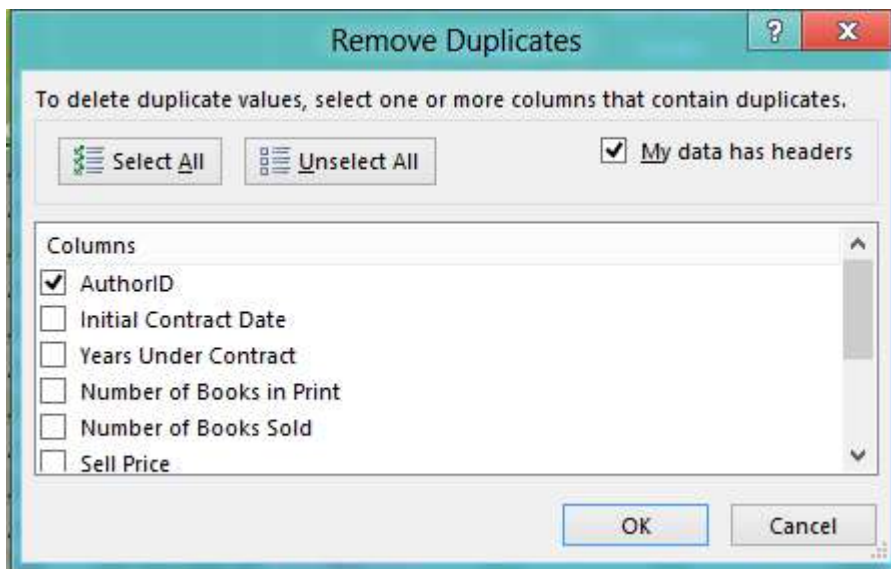
- d) Select **OK**.

5. How can you verify that the sort and highlight are working correctly?

6. If the deduplication works correctly, for the four AuthorIDs in question, which records would you expect to remain in the dataset?

7. Delete the duplicate records.

- a) Select **DATA→Data Tools→Remove Duplicates**.
 b) Because you want to delete only duplicates based on AuthorID, select **Unselect All** to clear all the check boxes, and then check **AuthorID**.



- c) Select **OK**.
 d) In the dialog box that confirms 222 duplicate values were removed, select **OK**.

8. How can you verify that the correct records remain in the dataset?

9. Verify that there are no more duplicate AuthorIDs by using one of the following methods:
 - a) Select the range of AuthorIDs and use conditional formatting to highlight duplicates.
 - b) Select the range of AuthorIDs and then, on the **DATA** tab, in the **Data Tools** group, verify whether the **Remove Duplicates** button is active. If a range is selected and the **Remove Duplicates** button is active, then the range contains duplicates. If the button is inactive, then the range does not contain duplicates.

 10. Save your work.
-

ACTIVITY 1–3

Filtering Records

Before You Begin

My_Author_Data_03.xlsx is open.

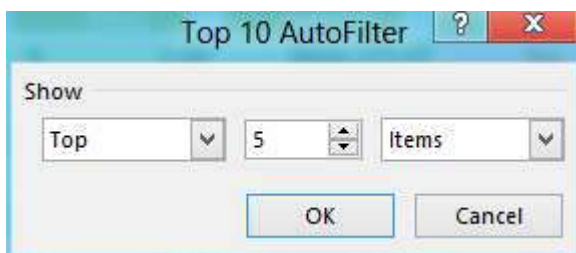
Scenario

Now that you've fixed the data errors, you're ready to filter the data in preparation for creating some reports.

You're looking for answers to the following questions:

- Who are the top 10 authors by income earned?
- Who are the top 5 authors by number of books sold?
- How many authors have been with F&A for 1 year or less?
- Which authors have been with F&A for less than 5 years and have sold more than 500,000 books?

1. In **My_Author_Data_03.xlsx**, filter the dataset to display only the top 10 income earners.
 - a) In cell **G1**, click the drop-down list arrow and select **Number Filters→Top 10**.
 - b) Select **OK**.
2. Filter the dataset to display only the top 5 authors by number of books sold.
 - a) Select **DATA→Sort & Filter→Clear**.
 - b) In cell **E1**, select the drop-down arrow and then select **Number Filters→Top 10**.
 - c) In the middle box, set the value to **5**.



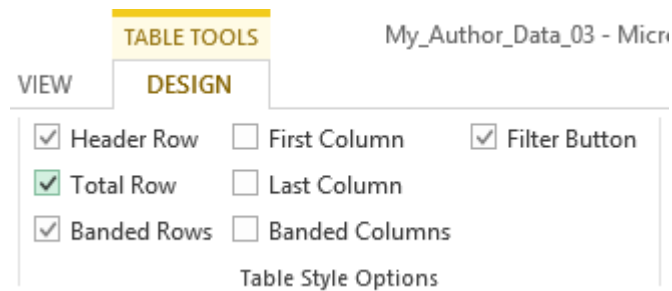
- d) Select **OK**.
3. Enter a filter to determine how many authors have been with F&A for one year or less.
 - a) Clear the previous filter.
 - b) Select the entire table, and then drag it down three rows, effectively inserting three rows above the header row.

	A	B	C	D	E
1					
2					
3					
4	AuthorID	Initial Contract Date	Years Under Contract	Number of Books in Print	Number of Books Sold

c) Copy the table's header row to row 1.

	A	B	C	D	E
1	AuthorID	Initial Contract Date	Years Under Contract	Number of Books in Print	Number of Books Sold
2					
3					
4	AuthorID	Initial Contract Date	Years Under Contract	Number of Books in Print	Number of Books Sold

- d) In cell **C2**, type `<=1`
- e) Press **Enter**.
- f) Select any cell within the dataset table.
- g) Select **DATA**→**Sort & Filter**→**Advanced**.
- h) In the **Advanced Filter** dialog box, verify that the correct range has been selected for the dataset table (`A4:K816`).
- i) In the **Criteria range** text box, type `A1:K2`
- j) Select **OK**.
- k) Select any cell within the dataset table.
- l) If not selected, select the **TABLE TOOLS DESIGN** contextual tab, and then, in the **Table Style Options** group, check the option **Total Row**.



m) From the drop-down list in cell **C817**, select **Count**.

817	Total			
818				None
819				Average
820				Count
821				Count Numbers
822				Max
823				Min
824				Sum
				StdDev
				Var
				More Functions...

4. How many authors have been with F&A for one year or less?

5. Clear all filters.

6. Save your work.

TOPIC C

Use Summary and Database Functions to Calculate Data

Raw data has value only when you begin to analyze it. As you continue developing your Excel skills, you'll learn that combining various methods of data manipulation will enable you to view your data in entirely new and, sometimes, unexpected ways.

Sorting and filtering data in tables provides new perspectives on your data. These new perspectives enable you to make the types of business decision that can drive innovation, change, and growth. However, by combining the data views, sorting and filtering, and Excel's powerful calculation capabilities, you can create new, richer views of your data that can further enhance business performance.

In this topic, you will use functions to calculate data.

Subtotals

Subtotals are functions that summarize values based on a specific range of data within a dataset. The dataset must be a range and not a table. Subtotals can return various calculations such as the AVERAGE or SUM of the subset of data.

Any cell that contains a SUBTOTAL function is not included in a grand total calculation.

In this example, the worksheet is sorted by Royalty Rate. The SUBTOTAL function returns the average Income Earned for each royalty rate.

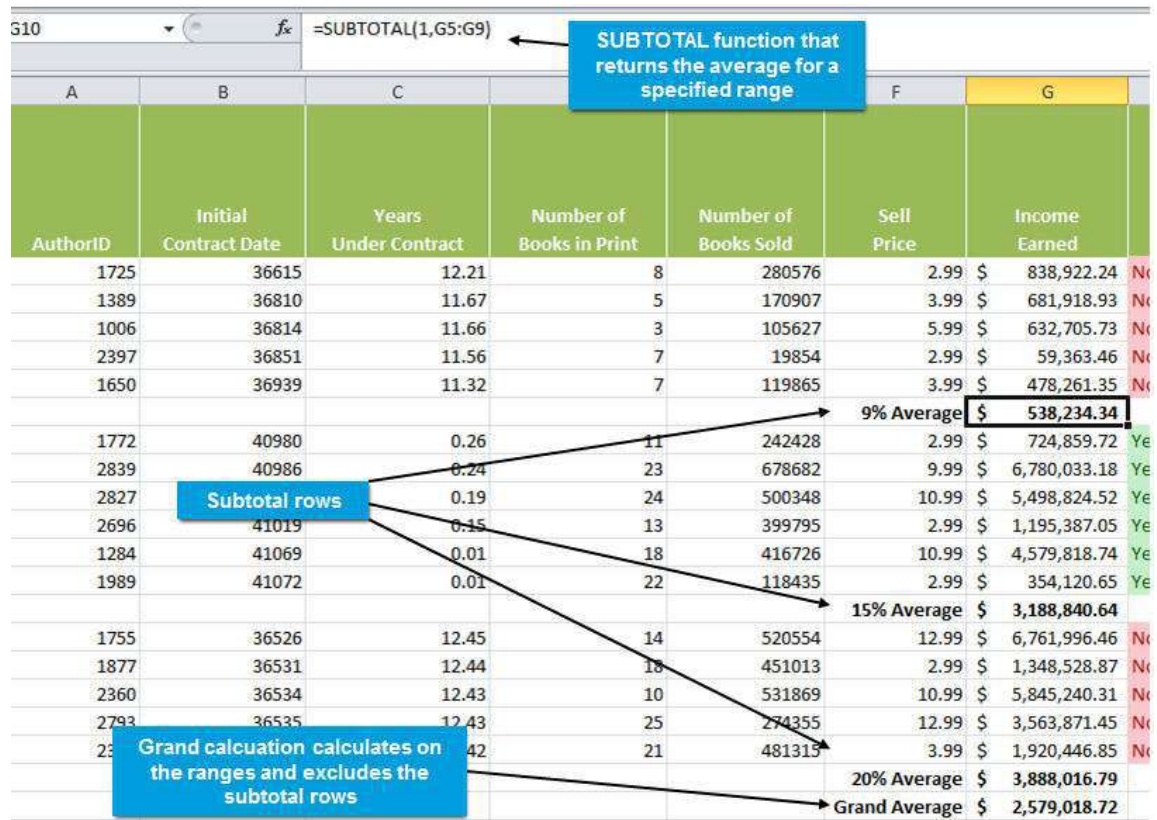


Figure 1-9: The SUBTOTAL function.

How to Summarize Range Data by Using Subtotals

This procedure will help you summarize range data by using subtotals.

Summarize Range Data with Subtotals

To summarize range data with subtotals:

1. Verify that the data you want to summarize is in a range and not in a table.
2. Select the range, including the header row, of the data you want to add subtotals to.
3. Select **DATA**→**Outline**→**Subtotal**.
4. In the **Subtotal** dialog box, from the **At each change in** drop-down list, select the field that will indicate where each subtotal calculation should appear.
5. From the **Use function** drop-down list, select the type of calculation you would like to perform for the subtotal.
6. In the **Add subtotal** section, select the field on which the subtotal will be calculated.
7. As necessary, check or uncheck the **Replace current subtotals**, **Page break between groups**, and **Summary below data** check boxes.
8. Select **OK**.

ACTIVITY 1–4

Using Subtotals with Range Data

Before You Begin

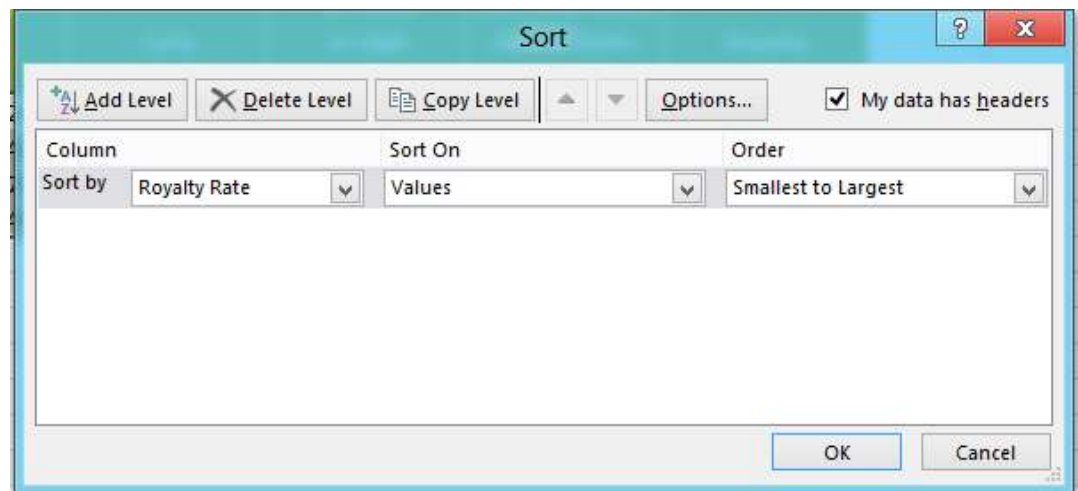
My_Author_Data_03.xlsx is open.

Scenario

You are on your way to a meeting. You need to report the total income earned for the entire group of authors. However, your manager has also indicated she would like to know not only the total for all of the authors but the subtotal for each group of authors when they are grouped by royalty rate.

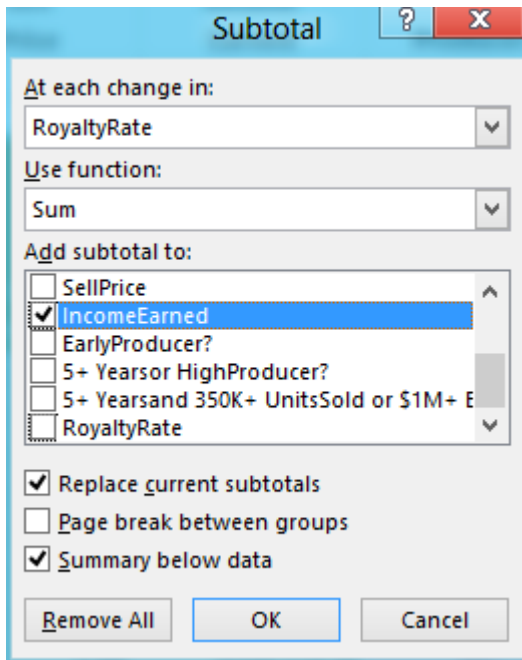
Because you are in a hurry to get to the meeting, rather than take the time to develop and test functions that can perform the calculations, you decide to quickly convert the table to a normal range and then subtotal the range by income earned per royalty rate.

1. In **My_Author_Data_03.xlsx**, convert the **Author_Data** table to a normal range.
 - a) Select any cell in the table.
 - b) Select **TABLE TOOLS DESIGN→Tools→Convert to Range**.
 - c) In the **Microsoft Excel** dialog box, select **Yes**.
2. Add subtotals for the total income earned by authors when they are grouped by royalty rate.
 - a) Select any cell within the dataset range.
 - b) Select **DATA→Sort & Filter→Sort**.
 - c) In the **Sort** dialog box, under **Column**, select **Royalty Rate**.



- d) Verify that **Sort On** is set to **Values** and **Order** is set to **Smallest to Largest**, and then select **OK**.
- e) Select any cell within the dataset range.
- f) Select **DATA→Outline→Subtotal**.
- g) In the **Subtotal** dialog box, from the **At each change in** drop-down list, select **Royalty Rate**.
- h) Verify that **Use function** is set to **Sum**.
- i) In the **Add subtotal to** list, check **IncomeEarned** and then uncheck any other items that might be selected. **IncomeEarned** should be the only option checked.

- j) Verify that **Replace current subtotals** is checked, **Page break between groups** is unchecked, and **Summary below data** is checked.



- k) Select **OK**.

3. Save your work.

4. Format the range so that the bold items appear to the left of the subtotals.

- Select cell **K156** and drag it to cell **F156**.
- By using the same technique, move the contents of cell **K321** to cell **F321** and the contents of range **K819:K820** to range **F819:F820**.
- If necessary, adjust the width of column **G** to accommodate the values.

5. Collapse the dataset so it shows only the subtotals for each royalty rate and the Grand Total.

- In the **Outline** pane, click the minus sign immediately to the left of row **156**.

155	381,328	\$	12.99	\$4,953,450.72
156	9% Total			\$321,821,624.64
157	529,115	\$	7.99	\$4,227,628.85
158	511,768	\$	2.99	\$1,530,186.32

- By using the same procedure, collapse the ranges for the 15% royalty rate and the 20% royalty rate.

156	9% Total	\$321,821,624.64
321	15% Total	\$541,122,741.81
819	20% Total	\$1,623,118,778.57
820	Grand Total	\$2,486,063,145.02

6. Save your work.

Summary Functions in Tables

Subtotals work only with data that is in a range and not in a table. However, you can still subtotal data in tables by using summary functions. *Summary functions* are subtotal functions that summarize data in the totals row for a specified range within a table.

To leverage the power of summary functions in tables, it's generally a good idea to add a total row to the table first, indicate what type of summary calculations you're looking for, and then sort and filter your data.

In this example, the table has been filtered to display only the top five income earners in the dataset. Then, the top five earners were sorted from highest earner to lowest. The total row uses three summary functions that return relevant calculations for the filter: Years Under Contract is counted and returns the total number of records returned; Number of Books Sold is totaled; and Income Earned is averaged. So, this total row contains COUNT, SUM, and AVERAGE subtotals.



Note: To explore a way to streamline how you write functions associated with tables, you can access the LearnTO Use **Structured References to Calculate Data in an Excel Table** presentation from the **LearnTO** tile on the LogicalCHOICE Course screen.

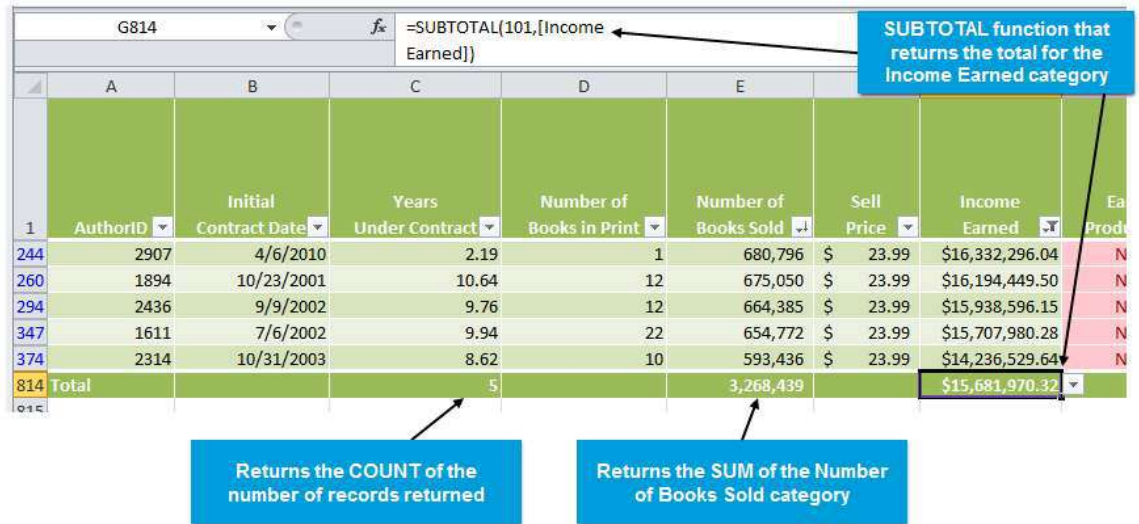


Figure 1-10: A table's total row with summary functions.

In this example, the table has been filtered to display all of the authors with earnings between \$1 million and \$2 million. However, no changes were made to the total row. The only thing that changed is the filter. The total row automatically adjusts its calculations based upon the filter criteria.

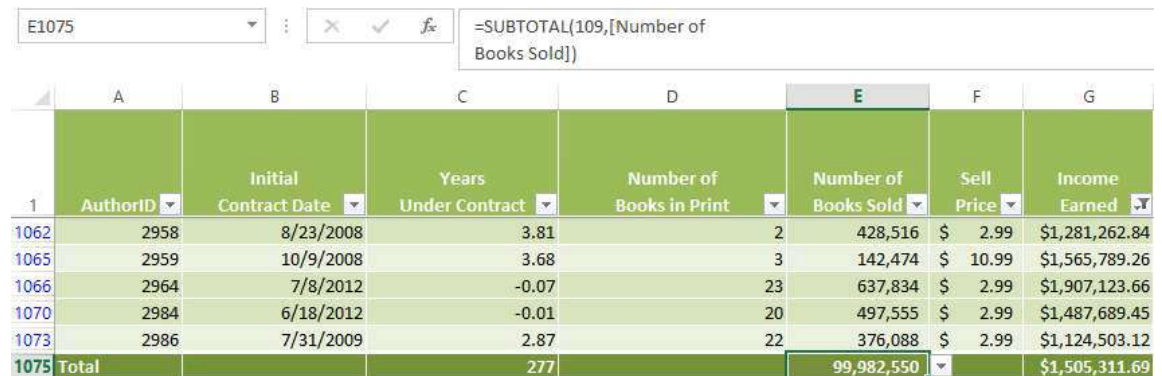


Figure 1-11: An updated total row.

How to Summarize Table Data by Using Summary Functions

This procedure will help you summarize table data by using summary functions.

Summarize Table Data with Summary Functions

To summarize table data with summary functions:

1. Verify that the data you want to summarize is in a table and not in a range.
2. Select any cell within the table.
3. On the **TABLE TOOLS DESIGN** tab, in the **Table Style Options** group, check **Total Row**.
4. Use the drop-down list options in the **Total** row to select the type of summary function you would like to apply for each field that requires a calculation.
5. Sort and filter the table data as needed.

ACTIVITY 1–5

Using Summary Functions in Tables

Before You Begin

My_Author_Data_03.xlsx is open.

Scenario

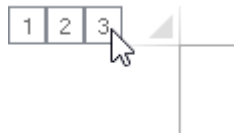
You've just returned from the meeting where you presented the subtotals for income earned when the authors are grouped by royalty rate.

One of the action items you took away from the meeting is to make it easy for users of the Author Data worksheet to quickly count how many authors fit a given criteria.

Specifically, you'd like to know how many authors signed their initial contract in the calendar year 2011.

You suspect this isn't the only question you'll have to ask of the data, so you decide to add a Total row so that you can sort and filter the data as needed and have the Total row dynamically change its output depending on what question needs to be answered.

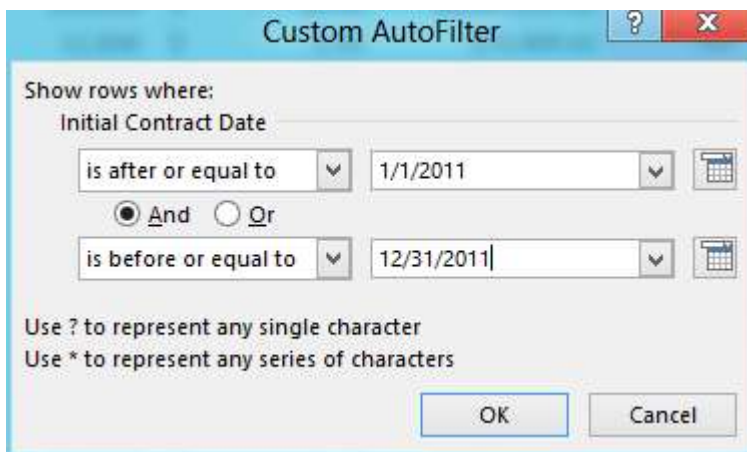
1. In **My_Author_Data_03.xlsx**, remove the subtotals rows and then convert the **Author_Data** range into a table that includes a **Total** row.
 - a) To expand the entire dataset, select **3** in the **Outline** pane.



- b) Select rows **156, 321, 819, and 820**.
 - c) Right-click any one of the selected rows, and then select **Delete**.
 - d) Select any cell in the dataset, and then select **INSERT→Tables→Table**.
 - e) In the **Create Table** dialog box, verify that the entire range **=A\$4:\$K\$816** is selected, and then select **OK**.
 - f) On the **TABLE TOOLS DESIGN** contextual tab, in the **Table Style Options** group, check **Total Row**.
2. Use the **Total** row and filtering to answer the question, "How many authors signed their initial contract in the calendar year 2011?"
 - a) Select cell **B817**.
 - b) From the drop-down list, select **Count**.

814	2986	12/6/2003
815	2997	4/6/2002
816	2999	10/30/2003
817	Total	
818		None
819		Average
820		Count
821		Count Numbers
822		Max
823		Min
824		Sum
		StdDev
		Var
		More Functions...

- c) From the **AutoFilter** list for the **Initial Contract Date**, select **Date Filters**→**Between**.
- d) Adjust the settings in the **Custom AutoFilter** dialog box so Initial Contract Date *is after or equal to* 1/1/2011 **And** *is before or equal to* 12/31/2011.



- e) Select **OK**.

3. How many authors signed their initial contract in the calendar year 2011?

4. Clear all filters.

5. Save your work.

Database Functions

Database functions are functions that return calculations for a range of data that meet specific criteria. Mathematically, database functions perform the same way as standard functions. The SUM function adds all the values in a range and the DSUM function (the database version of SUM) also adds all the values in range. The key difference is that standard functions calculate data based on a range while database functions calculate data that meet specific criteria within a range.

In this example, the SUM function on the left provides a total for the entire named range **Number_of_Books_Sold**. The DSUM on the right identifies the range **A4:K1077** as the database. This DSUM wants to sum values in the **Number of Books Sold** field (**E4**). And, specifically, it only wants the sum for all authors who have more than 23 books in print and have also sold more than 650,000 books. The total number of books sold for this subset of the data is 4,062,342.

=SUM(Number_of_Books_Sold)		
C	D	E
Years Under Contract	Number of Books in Print	Number of Books Sold
	>10	>250000
Years Under Contract	Number of Books in Print	Number of Books Sold
5.66	18	643,517
4.64	8	381,328
1.48	17	52,290
-0.01	20	497,555
	20	689,482
	22	42,545
	22	376,088
	24	44,125
10.19		377,987,010

=DSUM(A4:K1077,E4,D1:E2)		
C	D	E
Years Under Contract	Number of Books in Print	Number of Books Sold
	>23	>650000
Years Under Contract	Number of Books in Print	Number of Books Sold
7.43	25	657,159
11.73	24	699,988
	25	669,390
	25	689,608
	24	662,806
	24	683,391
		4,062,342

Figure 1–12: Compare SUM to DSUM

How to Summarize Data by Using Database Functions

This procedure will help you summarize data by using database functions.

Summarize Data with Database Functions

To summarize table data with database functions:

1. Create the criteria range, inserting enough rows above the table or range so that:
 - The criteria range contains a header row that matches the header row of the dataset.
 - In addition to the criteria range header row, there are enough rows to accommodate the total number of OR criteria you want to filter for. Database functions use criteria ranges in the same way advanced filtering uses criteria ranges. Criteria on the same row use the AND operator. Criteria on separate rows use the OR operator.
 - There is one blank row between the new rows and the header row of the dataset.
2. Copy the header row of the dataset to the first row of the criteria range.
3. Enter filter criteria in the criteria cells.
4. Select the cell that will contain the database function.
5. In the **Formula bar**, type the database function using the entire dataset as the database argument, the column label of the column you want to run the calculation on as the field argument, and the criteria range as the criteria argument.
6. Press **Enter**.
7. Verify that the function works as planned.

ACTIVITY 1–6

Using Database Functions

Before You Begin

My_Author_Data_03.xlsx is open.

Scenario

You're being asked more and more often for summary data based on various criteria. Although sorting and filtering are very powerful, you feel it would be much faster to gather the needed data if you could just type the required criteria into a criteria range and then have a function provide you with the answer. After some research, you've concluded that you'll use database functions to answer the following questions:

- How many authors signed their initial contract in April 2011?
- What is the average number of books sold for authors who signed their initial contract in the fourth quarter of 2009 and who have earned more than \$1 million?

You'll begin by moving the criteria range from the Author_Data worksheet to its own worksheet. You'll then add the database functions to answer the questions.

1. In **My_Author_Data_03.xlsx**, move the criteria range from the Author_Totals worksheet to its own worksheet named **Criteria**, and then rename the **Author_Totals** worksheet **Data**.
 - a) On the **Author_Totals** worksheet, select the range **A1:K3**.
 - b) Right-click and then select **Cut**.
 - c) Select the **Sheet2** tab.
 - d) With cell **A1** selected on **Sheet2**, press **Ctrl+V**.
 - e) Rename the **Sheet2** worksheet **Criteria**.
 - f) Rename the **Author_Totals** worksheet **Data**.
 - g) On the **Data** worksheet, select rows **1, 2, and 3**.
 - h) Right-click any of the selected rows and select **Delete**.
 - i) Arrange the worksheets so they are in the order **Statistics, Criteria, and then Data**.
2. On the **Criteria** worksheet, add a second column for **Initial Contract Date**.
 - a) On the **Criteria** worksheet, clear the contents of cell **C2**.
 - b) Select cell **A10**, type *Answer*, and then press **Enter**.
 - c) On the **Statistics** worksheet, select cell **A8**, and then select **HOME→Clipboard→Format Painter**.
 - d) On the **Criteria** worksheet, select cell **A10**.



Note: When you want an advanced filter or database function to use criteria between a range of dates or numbers, add another column to the criteria range and give the new column the same label as field you want to search through.

- e) Add a new column between the current columns **B** and **C**, and then copy the contents of cell **B1** to cell **C1**.

	A	B	C
1	AuthorID	Initial Contract Date	Initial Contract Date
2			
3			
4			
5			
6			
7			
8			
9			
10	Answer		

3. In preparation for counting the number of authors who signed their initial contract in April 2011, add a **DCOUNT** function to the **Criteria** worksheet.
 - a) On the **Criteria** worksheet, select cell **B10**.
 - b) Select **FORMULAS**→**Function Library**→**Insert Function**.
 - c) In the **Search for a function** text field, type *dcount* and then select **Go**.
 - d) In the **Select a function** list, double-click **DCOUNT**.
 - e) In the **Function Arguments** dialog box, select the **Collapse Dialog** button for **Database**.
 - f) Select the **Data** worksheet, and then select the range **A1:K813**.
 - g) Press **Enter**.

Function Arguments

DCOUNT

Database: data[[#Headers],[#Data]] = {"AuthorID","Initial Contract Date","Years Under Contract","Number of Books in Print","Number of Books Sold","Sell Price","Income Earned","Early Producer?","5+ Years or High Producer?","5+ Years and 350K+ Units Sold or \$1M+ Earned?","Royalty Rate";

Field: = number

Criteria: = text

Counts the cells containing numbers in the field (column) of records in the database that match the conditions you specify.

Database is the range of cells that makes up the list or database. A database is a list of related data.

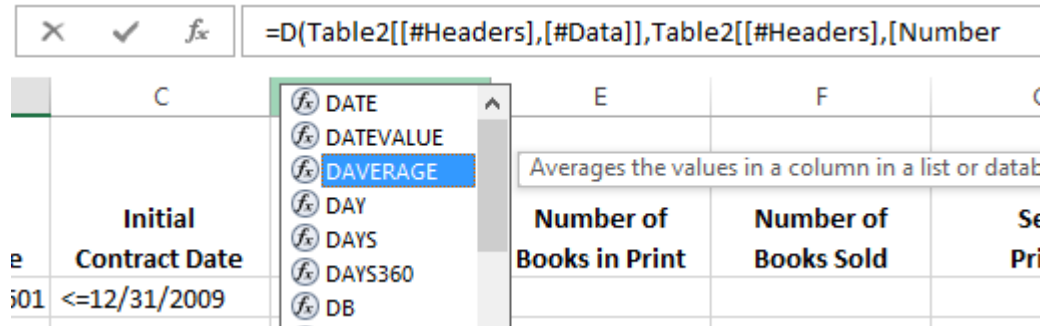
Formula result =

[Help on this function](#) OK Cancel

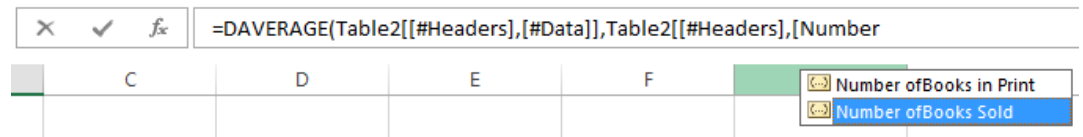
- h) Select the **Collapse Dialog** button for **Field**.
 - i) Select the **Data** worksheet, select cell **B1**, and then press **Enter**.
 - j) Select the **Collapse Dialog** button for **Criteria**.
 - k) On the **Criteria** worksheet, select the range **A1:L2** and then press **Enter**.
 - l) In the **Function Arguments** dialog box, select **OK**.
 - m) Save your work.
4. Using the criteria range, answer the following question: "How many authors signed their initial contract in April 2011?"
- a) On the **Criteria** worksheet, select cell **B2**, and then type **>=4/1/2011** and press **Enter**.
 - b) Select cell **C2**, and then type **<=4/30/2011** and press **Enter**.
 - c) If necessary, adjust the width of the columns so the text fits without overlapping other cells.

	A	B	C	D	E	F	G	H	I	J	K	L
		Initial Contract Date	Initial Contract Date	Years Under Contract	Number of Books in Print	Number of Books Sold	Sell Price	Income Earned	Early Producer ?	5+ Years or High Producer ?	5+ Years and 350K+ Units Sold or \$1M+ Earned?	Royalty Rate
1	AuthorID											
2		>=4/1/2011	<=4/30/2011									
3												
4												
5												
6												
7												
8												
9												
10	Answer	2										
11												

5. Use the criteria range to answer the following question: "What is the average number of books sold for authors who signed their initial contract in the fourth quarter of 2009 and who have earned more than \$1 million?"
- Change the contents of cell **B2** to $\geq 10/1/2009$.
 - Change the contents of cell **C2** to $\leq 12/31/2009$.
 - Type >1000000 in cell **H2**.
 - Select cell **B10**, and then, in the **Formula bar**, change **DCOUNT** to **DAVERAGE**.



- Change **Initial Contract Date** to **Number of Books Sold**.



6. Save and close your work.

Summary

In this lesson, you created and modified tables, sorted and filtered the data in tables, and used functions to calculate data.

By storing data in tables and leveraging Excel's powerful calculation, filtering, and sorting functionality, you open the door to deep business intelligence and analysis. With your data structured in tables, it's much easier to sort and filter the data to locate the information you need to make sound business decisions.

Tables, subtotals, database functions, sorting, and filtering . . . these are all very powerful tools for analyzing data. How might you leverage these tools either individually or in combination with each other to mine the data in your company?

Consider the types of data you work with in your company. What are some questions you might ask of the data and how would you use database functions to help you find the answers to your questions?



Note: Check your LogicalCHOICE Course screen for opportunities to interact with your classmates, peers, and the larger LogicalCHOICE online community about the topics covered in this course or other topics you are interested in. From the Course screen, you can also access available resources for a more continuous learning experience.

2

Visualizing Data with Charts

Lesson Time: 1 hour

Lesson Objectives

In this lesson, you will:

- Create a chart.
- Modify and format charts.
- Create a trendline.
- Create advanced charts.

Lesson Introduction

You've built worksheets and workbooks that leverage the power of various formulas and functions. These formulas and functions have enabled you to analyze your business data in powerful ways. Up to this point, you've been working primarily with tabular data. You're now ready to begin visualizing your data in new ways to help deepen your knowledge of your business.

In this lesson, you will visualize data by using charts.

TOPIC A

Create Charts

Data visualization techniques begin with a fundamental understanding of how charts enable you to view your data in ways that are at best challenging and at times virtually impossible when the data appears strictly in a tabular format. Compare these two presentations of the same data. And when you do, keep in mind this is a very simple, two-column, five-row dataset. Imagine a dataset 10, 20, or 30 columns wide by thousands or millions of rows deep.

Which version makes it easier to grasp the relative size of each market compared to the whole quickly?

Market	Total Sales (in millions)
NA	\$757.9
LA	\$498.7
APAC	\$484.0
EMEA	\$285.3

Figure 2-1: Data in a table.

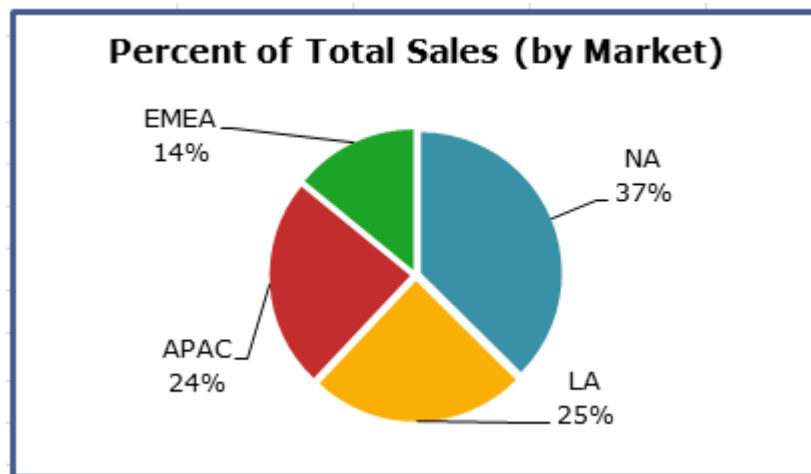


Figure 2-2: Data in a chart.

When a gourmet chef prepares a meal, she works with a variety of individual ingredients. Often, the chef will purchase these ingredients from a store or wholesale market that sells thousands of different individual ingredients. In fact, hundreds of chefs might shop at the same market, but every chef will select different ingredients for every meal because every diner has different expectations, needs, and desires. Even chefs who select the exact same ingredients will often prepare completely different meals.

You could think of the market where the chefs shop for ingredients as your tabular data. It's the raw, individual pieces collected in one place.

But diners don't go to a gourmet restaurant to eat individual ingredients; they go to a gourmet restaurant to eat beautifully prepared and presented meals.

When you create charts that present the data in new and valuable ways, you are like a chef who selects the best individual ingredients in the right amounts and combines them in the best ways for consumption by others.

Charts

Charts are non-tabular representations of tabular data. They enable users of data to see relationships, patterns, and trends in the data that, if the data were to remain in a table, would be difficult or impossible to see.



Note: To explore one way to incorporate an Excel chart in another application, you can access the LearnTO **Save an Excel Chart as a Picture** presentation from the **LearnTO** tile on the LogicalCHOICE Course screen.

Chart Types

Excel 2013 includes 11 chart types for presenting data. The types appear in the left pane of the **Insert Chart** dialog box. Each chart type comes in a variety of sub-types. For example, there are 19 types of **Column** charts.

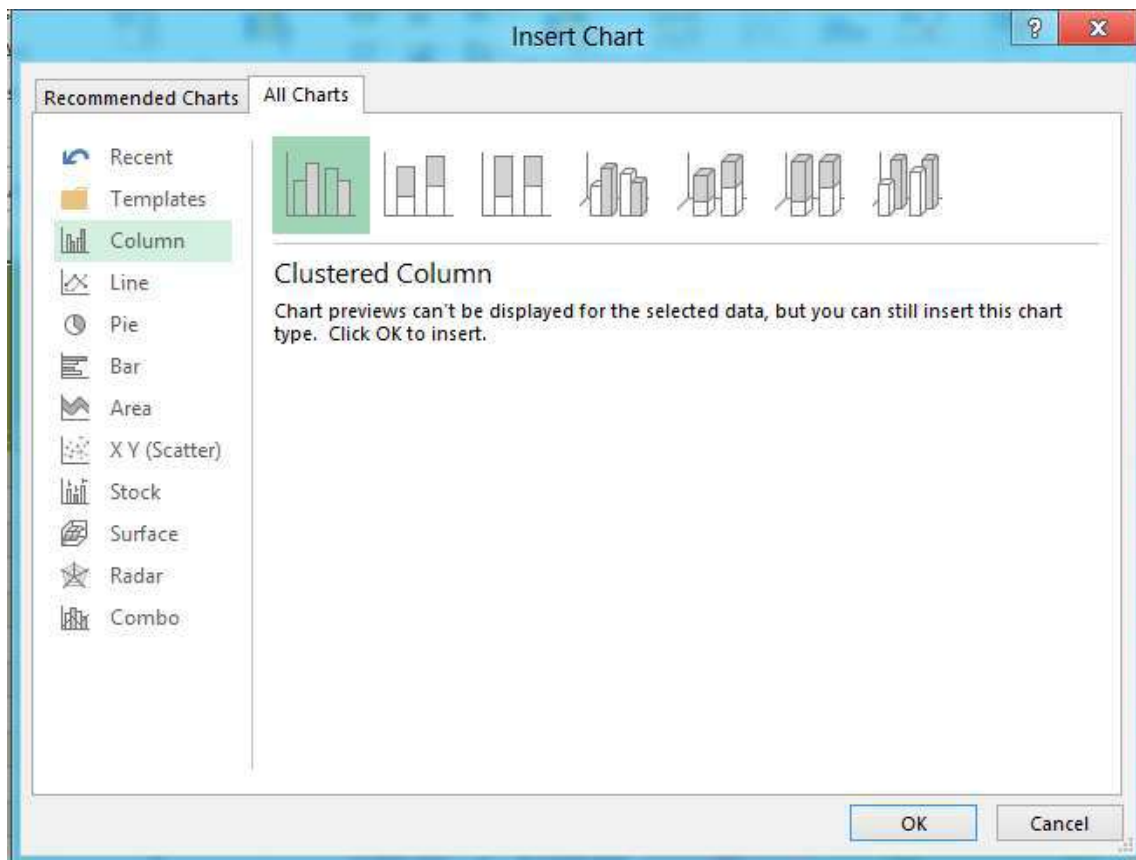


Figure 2-3: *The Insert Chart dialog box.*

This amounts to 73 chart types in Excel 2013, each of which can be individually customized and combined with other chart types to handle nearly any conceivable data visualization need you may have. Charts may also include animated graphs related to things like corporate sales, profits, and customer satisfaction. When data is changed, the corresponding graph reflects the change.

Here's a brief explanation and example of each chart type.

Chart Type	Use To
Column	Visualize the relationship of parts to each other. Example: You have production data on today's output of ten crude oil wells and you want to quickly identify which well has the highest production for the day.
Line	Visualize data over time. Example: You are presenting the previous year's financial stats at the annual shareholders meeting, and you want to illustrate for participants the growth in the firm's return on capital employed over each of the previous four quarters.
Pie	Visualize the relationship of a part to a whole. Example: You have demographic data on the languages spoken in Botswana and you want a visual representation of the percentage each language represents of the whole.
Bar	Visualize the relationship of parts to each other. The primary difference between bar and column charts is that bar charts have a horizontal orientation compared to the vertical orientation of column charts.
Area	Visualize the change over time of multiple categories of data. Example: You want to compare the change in consumption of a country's energy sources—nuclear, coal, oil, gas, and renewables—over the last ten years.
XY (Scatter)	Visualize the relationship between two variables. Example: You want to compare the performance of two servers in a data center and you want to compare them based on the number of requests they receive per second and their response time in seconds.
Stock	Visualize the changes in stock prices over time. Example: You are analyzing your company's stock performance over time and want to show the opening, high, low, and close prices for a selected series of dates.
Surface	Create a three dimensional representation of data. Usually, in a surface chart, you have at least three variables you want to display. Example: You want to illustrate the number of new retail outlets built per month over the last ten years.
Radar	Visualize data for multiple variables by showing the relationship between each variable based on a set of criteria. Example: You want to compare the average wind speed in three regions over the last 12 months.
Combo	Create a combination chart by selecting at least two series of data.

Chart Insertion Methods

There are two primary methods for inserting charts. You can:

- Select a chart by selecting **Charts** in the **Quick Analysis** dialog box.
- Select a chart from the **Charts** group on the **INSERT** tab. Use this method when you want to select a specific chart type.

You can also press **F11** to insert the default chart type. You can set any chart type to be the default type. When you press **F11**, Excel automatically inserts that type of chart into your workbook. Using the default chart type is beneficial when you know you will be entering many charts of the same type.

How to Create Charts

Use these procedures to create charts.



Note: Access the **Checklist** tile in the LogicalCHOICE Course screen to view all How To procedures for this lesson.

Create a Chart by Selecting the Chart Type

To create a chart by selecting the chart type:

1. On a worksheet, select the data you want to include in the chart.
2. On the **INSERT** tab, in the **Charts** group, select the down-arrow of the chart type you would like to insert, and then select the sub-type.

Create a Chart by Using the Quick Analysis button

To create a chart with the **Quick Analysis** button:

1. On a worksheet, select the data you want to include in the chart.
2. Move the mouse pointer over the right bottom corner of your selection to display the **Quick Analysis** button.
3. Select the **Quick Analysis** button.
4. From the top of the menu, select **Charts**.
5. Select the chart of your choice.

Set the Default Chart Type

To set the default chart type:

1. To open the **Insert Chart** dialog box, press **Alt+N+K**. **Note:** Even if you are not inserting a chart at the time, you must select a data range for the keyboard shortcut to open the **Insert Chart** dialog box.
2. Select the **All Charts** tab.
3. In the left pane of the **Insert Chart** dialog box, select the type of chart you'd like to set as the default type.
4. At the top of the right pane, right-click the desired chart subtype, and then select **Set as Default Chart**.
5. Select **OK**.

Create a Chart by Using the Default Chart Type

To create a chart by using the default chart type:

1. Set the default chart type.
2. On a worksheet, select the data you want to include in the chart.
3. Press **F11**.

Create a Chart Template

To create a chart template:

1. Select the chart you want to save as a template
2. Right-click and select **Save As Template**.
3. In the **Save Chart Template** dialog box, type a filename and select **Save**.

ACTIVITY 2–1

Creating Charts

Data Files

C:\091015Data\Visualizing Data with Charts\Author_Data_04.xlsx

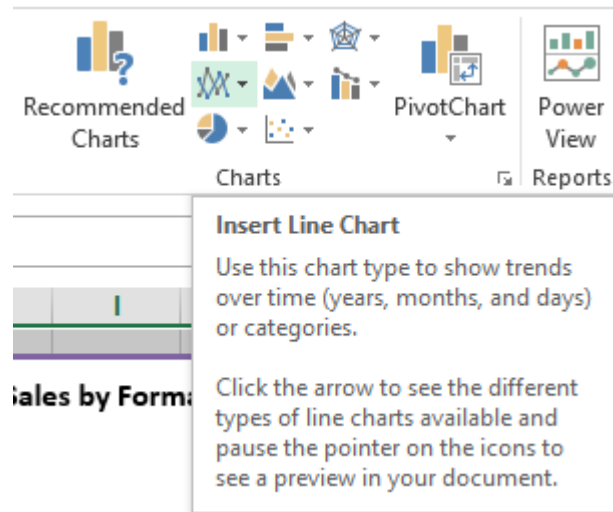
Before You Begin

Excel 2013 is open.

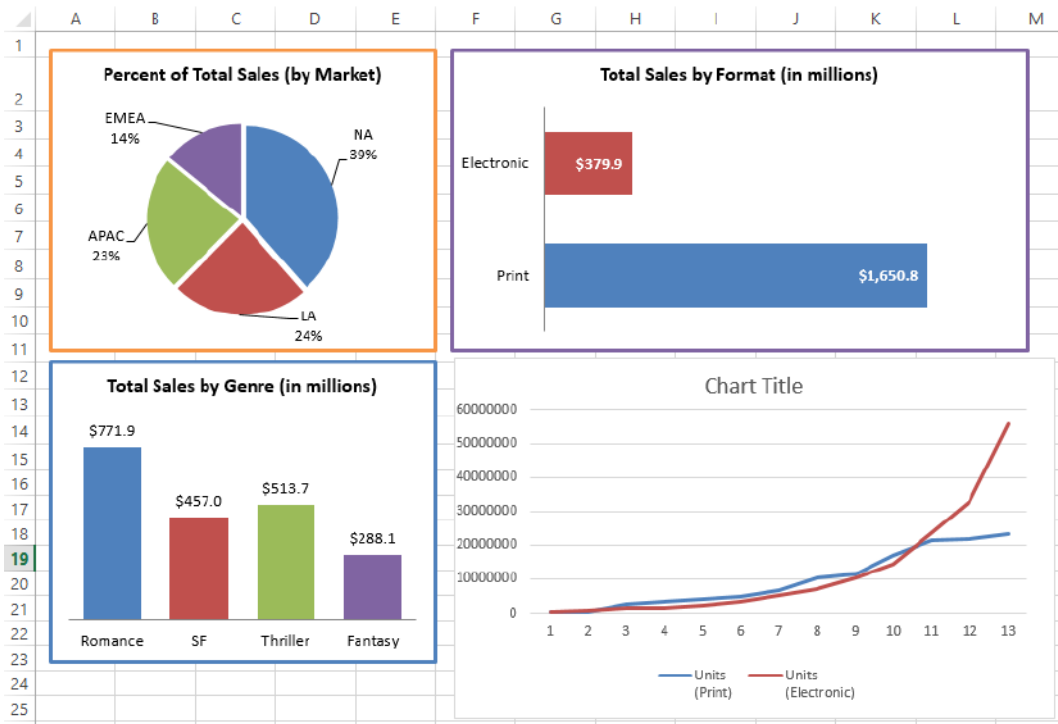
Scenario

You are building out the Sales Dashboard worksheet and are now ready to add a chart to help visualize the data in Total Sales by Fiscal Year table.

1. Open the file **Author_Data_04.xlsx**.
2. Beneath the bar chart, add a line chart that shows the units sold per fiscal year per media format.
 - a) On the **Sales Dashboard** spreadsheet, select the range **AK2:AL15**.
 - b) Select **INSERT→Charts→Insert Line Chart**, and then, in the **2-D Line** section, select **Line**.



- c) Drag the line chart so that it appears below the bar chart.



3. Save your work as *My_Author_Data_04.xlsx*

TOPIC B

Modify and Format Charts

Creating charts places the chart in your workbook. However, in the vast majority of cases, you will need to modify some aspect of the default settings to meet your specific business needs.

The Difference Between Modifying and Formatting

Modifying and formatting charts go hand-in-hand. While these terms might be used synonymously, generally speaking, modifying charts changes things such as the layout, position, and type of chart (think “working with the chart's data”), whereas formatting charts changes things such as the color of the data series, the size of the font, border of the chart shape, or the size of the chart (think “working the look and feel of the chart”).

Chart Elements

Every chart has some number of chart elements. Chart elements include items such as chart titles, data series, data labels, axes, data tables, and legends.

Every chart type has its own available elements. For example, although bar and column charts have two axes, and surface charts have three axes, pie charts do not have any axes. Every chart type does include at least one data series element.

Minimize Extraneous Chart Elements

When creating a chart, include only those elements that are 100% essential for conveying meaning. As you develop your charting skills, you might be inclined to begin adding multiple chart elements to ensure no meaning is lost for chart users. Indeed, it's not a bad idea to add many chart elements when you first insert a chart. However, cluttered charts impede the transfer of knowledge, so, once you've added all the chart elements you think your target audience is going to need, start stripping them away until all that is left are only those elements that are 100% necessary.

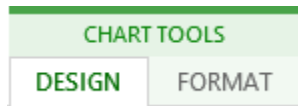
Always keep your target audience in mind, and ask yourself questions such as:

- If I remove the gridlines, will the chart still convey meaning?
- Do I need a legend? Can I remove the legend and use data labels instead?
- For axes that include numerical values, what level of precision do I need? Must the axes include one, two, three, or more decimal places, or, for the purposes of the chart, can I round the values on the axes? Will “30” do in place of “30.1” or “30.125” or “30,125,978”?
- For axes that include text, can I abbreviate anything? Will “J” or “Jan” do in place of “January”?
- Do I really need axes titles?
- Do I really need that 3D effect?
- Does the data table actually aid understanding?
- Do I really need that many major and minor tick marks on each axis?

Before adding chart elements to a chart, considering the old adage “less is more.” If the chart audience must have the element to get meaning from the chart, then use the element. Otherwise, remove it.

CHART TOOLS Contextual Tabs

With a chart selected on a worksheet, Excel provides you with two **CHART TOOLS** contextual tabs: **DESIGN** and **FORMAT**.

Contextual Tab**With a Chart Selected, Use This Group To (Group: Description)**

Type: Change the chart's type or save the chart as a template.

Data: Switch the data position of the rows/columns or select data.

Chart Layouts: Change the layout of the chart.

Chart Styles: Change the color style of the data series in the chart.

Location: Move the chart from its current position to another place in the workbook.

Current Selection: Select a specific chart element for formatting and editing.

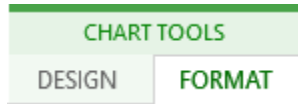
Insert Shapes: Add shapes to charts or worksheets that contain charts.

Shape Styles: Apply a style to the shape of the chart.

WordArt Styles: Apply a style to the text in a chart.

Arrange: Position the chart relative to other items on the worksheet.

Size: Specify the size of the chart.



How to Modify and Format Charts

Use these procedures to modify various components of a chart.

Change a Chart's Type

To change a chart's type:

1. Select the chart.
2. Select **CHART TOOLS DESIGN**→**Type**→**Change Chart Type**.
3. In the **Change Chart Type** dialog box, select the new type for the chart, and then select **OK**.
4. Edit the new version of the chart as necessary.

Change the Data Associated with a Chart

To change the data associated with a chart:

1. Select the chart.
2. Select **CHART TOOLS DESIGN**→**Data**→**Select Data**.
3. In the **Select Data Source** dialog box, set the chart's data range, and then select **OK**.

Change the Layout or Style of a Chart

To change the layout or style of a chart:

1. Select the chart.
2. If desired, change the chart layout.
 - Select **CHART TOOLS DESIGN**→**Chart Layouts**→**Quick Layout**.
 - Select the desired layout.
3. If desired, change the chart style.
 - Select **CHART TOOLS DESIGN**→**Chart Styles**→**More button**



- From the **Chart Styles** gallery, select the desired style.
4. Edit the chart elements as necessary.

Change the Location of a Chart

To change the location of a chart:

1. Select the chart.
2. Select **CHART TOOLS DESIGN**→**Location**→**Move Chart**.
3. In the **Move Chart** dialog box, select where you would like the chart to move to, and then select **OK**.

Reposition Labels on a Chart

To reposition labels on a chart:

1. Select the chart.
2. Select **CHART TOOLS DESIGN**→**Chart layouts**→**Add Chart Element**, and then select **Data Labels**.
3. Select one of the options on the menu.

Modify the Axes of a Chart

To modify the axes of a chart:

1. Select the chart.
2. Modify the axes.
 - Select **CHART TOOLS DESIGN**→**Chart Layouts**→**Add Chart Element**→**Axes**, and then select the desired option.
 - Select **CHART TOOLS DESIGN**→**Chart Layouts**→**Add Chart Element**→**Axes**→**More Axis Options**, and then, in the **Format Axis** panel, configure the axes.
3. Close the **Format Axis** panel.

ACTIVITY 2-2

Modifying Charts

Before You Begin

My_Author_Data_04.xlsx is open.

Scenario

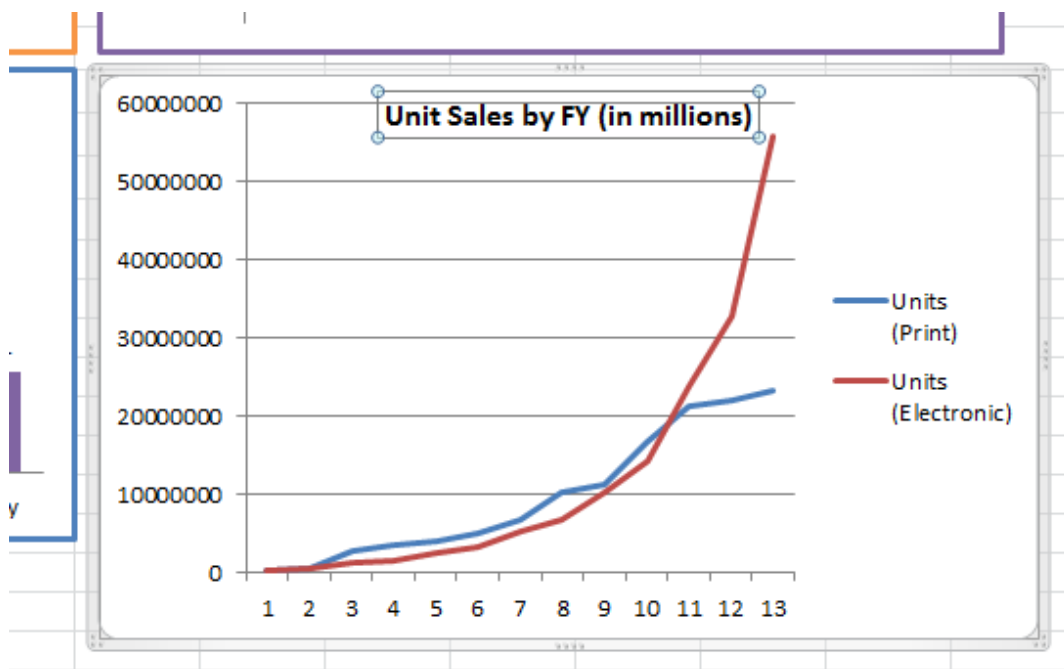
You're still working on your sales dashboard. With the line chart in position, you're now ready to modify it to better fit your needs.

Specifically, you are going to:

- Add a title to the chart to align with the look of the other charts.
- Give the chart a useful name.
- Edit the legend of the chart.
- Remove the gridlines.
- Add data labels.
- Assess the axes and their labels and edit them as needed.

You'll begin by changing the title of the line chart.

1. In **My_Author_Data_04.xlsx**, add a title to the line chart to align with the look of the other charts.
 - a) Select the line chart.
 - b) Select **CHART TOOLS DESIGN**→**Chart Layouts**→**Add Chart Element**→**Chart Title**→**Centered Overlay**.
 - c) In the **Formula bar**, type *Unit Sales by FY (in millions)* and then press **Enter**.
 - d) On the chart, select the title text, and then, on the mini-toolbar, select the **Font Size down-arrow**.

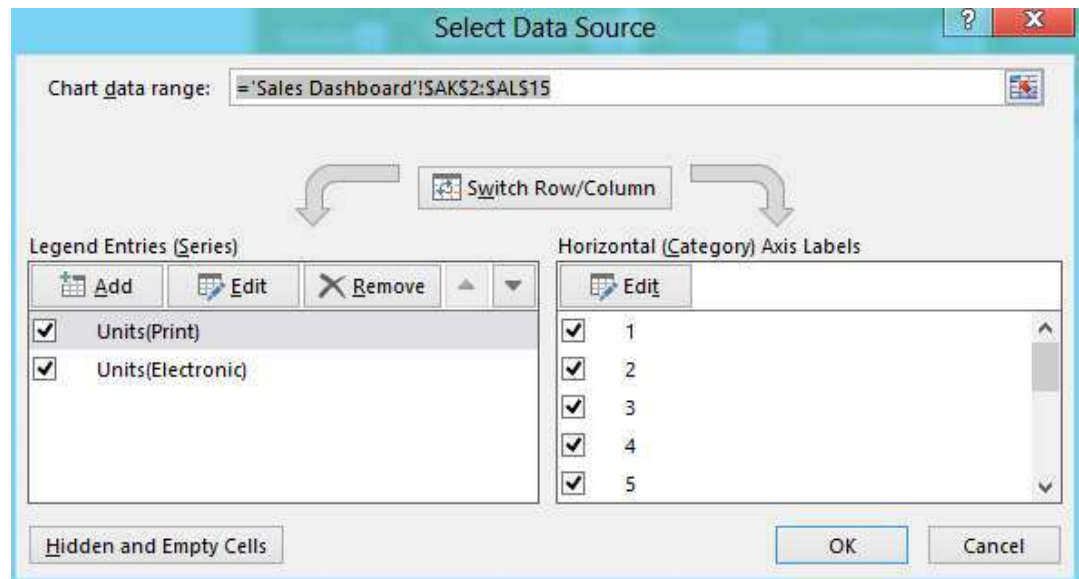


- e) Change the font size to 12.

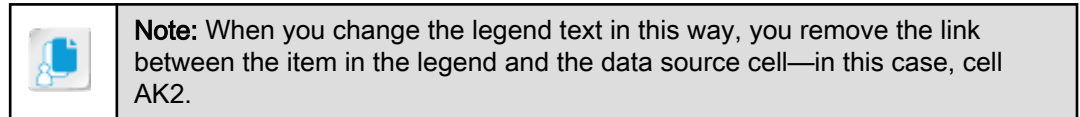
- f) Save your work.
2. Give the line chart a useful name.
- Select the line chart.
 - In the **Name box**, type *Unit Sales by FY* and then press **Enter**.



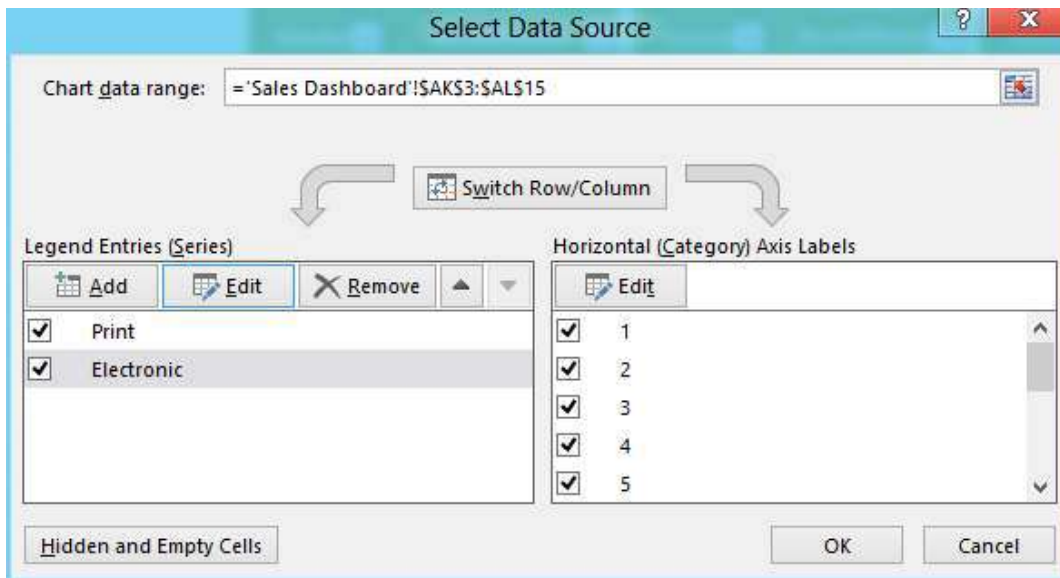
3. Edit the legend of the line chart for readability.
- With the **Unit Sales by FY** chart selected, select **CHART TOOLS DESIGN**→**Data**→**Select Data**.



- In the **Select Data Source** dialog box, in the **Legend Entries(Series)** list, verify that **Units(Print)** and **Units(Electronic)** are selected.
- Highlight **Units (Print)**.
- Select **Edit**.
- In the **Edit Series** dialog box, verify that the contents of the **Series name** field is selected, and then type *Print*.
- Select **OK**.

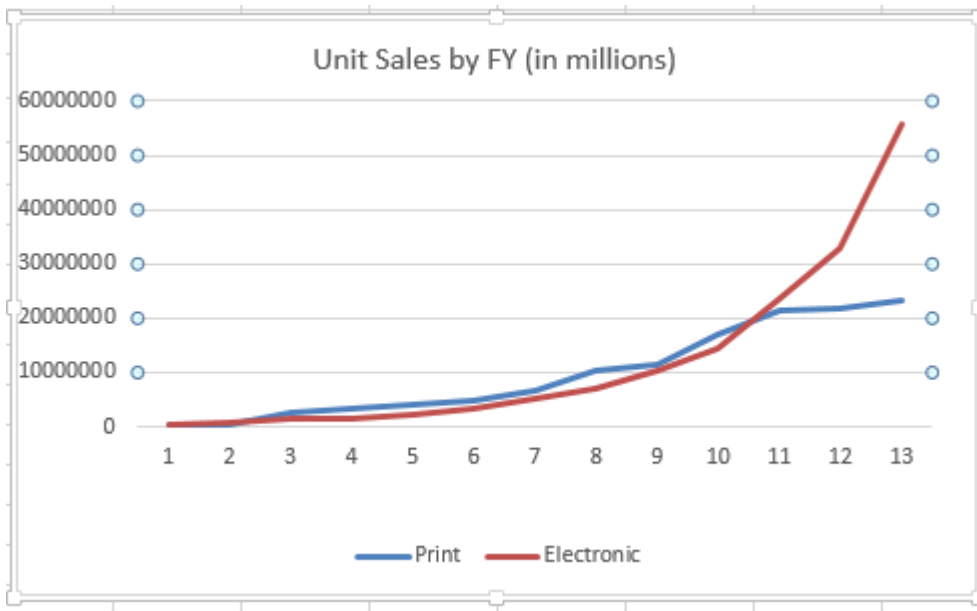


- Using the same method, change the name of the **Units(Electronic)** legend entry to **Electronic**.
- In the **Select Data Source** dialog box, select **OK**.

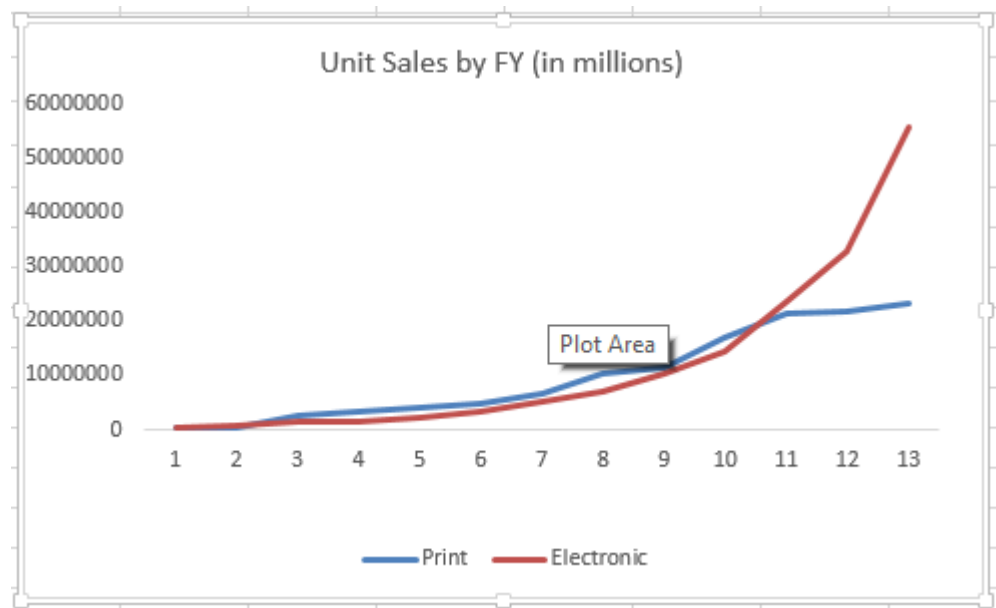


4. Remove the gridlines.

- a) On the **Unit Sales by FY** chart, to select all of the vertical axis gridlines at once, select the gridline for 50000000.



- b) Press **Delete**.



5. Add data labels.

- On the **Unit Sales by FY** chart, right-click the **Electronic** line, and then select **Add Data Labels**.
- Right-click the **55724773** data label, and then select **Format Data Labels**.
- In the **Format Data Labels** panel, expand the **Number** menu.

▲ **NUMBER**

Category

Custom

Type

\$#,##0.0,,

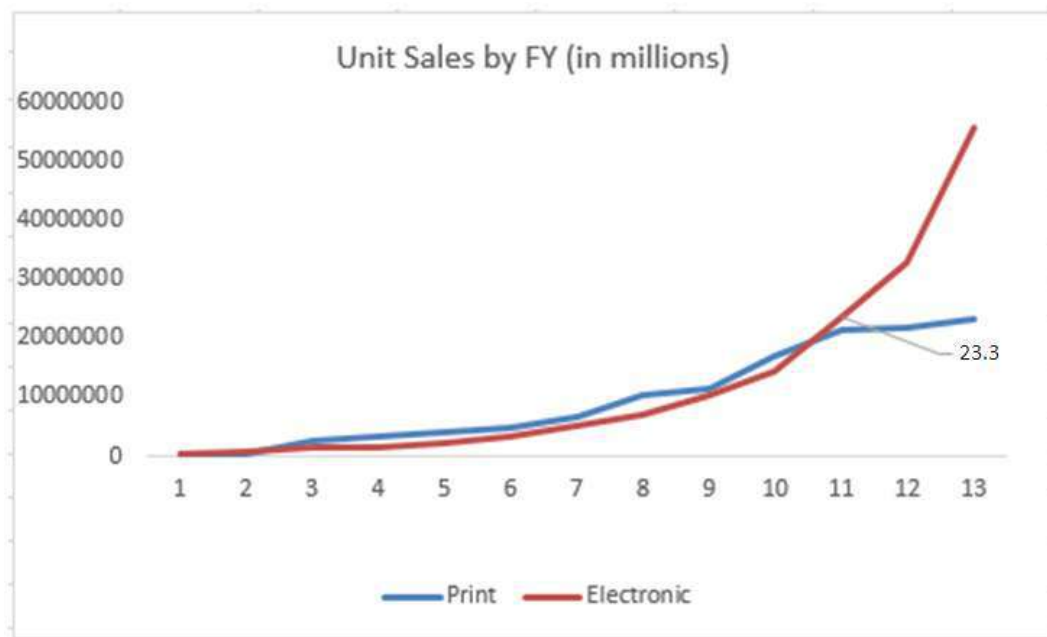
Format Code ⓘ

\$#,##0.0,,

Add

Linked to source

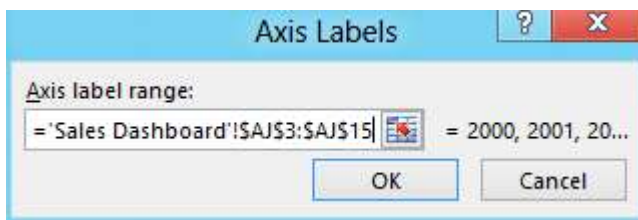
- In the **Category** drop-down list, select **Custom**.
- In the **Type** drop-down list, select **\$#,##0.0,,**
- In the **Format Code** field, delete the dollar sign (\$).
- Select **Add**.
- On the chart, delete all of the data labels except **55.7**.
- On the chart, select the **Print** line, add data labels in the same format, deleting all but the **23.3** label.
- Drag the **23.3** label so that it appears just below the **Print** line.



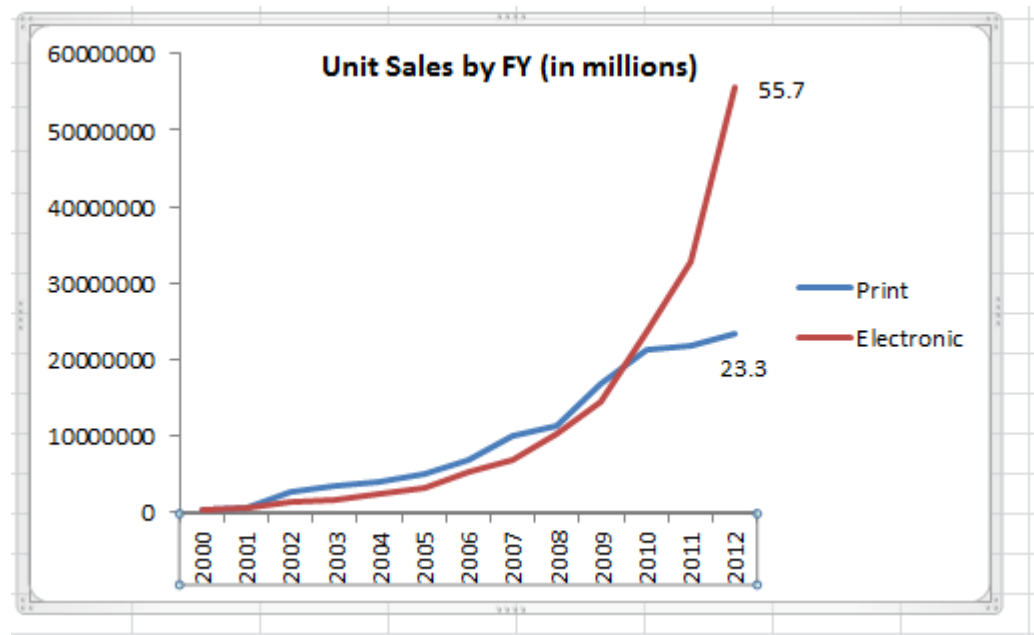
k) Save your work.

6. Edit the axes and their labels as needed.

- a) On the **Unit Sales by FY** chart, right-click the **X** axis labels and then select **Select Data**.
- b) In the **Select Data Source** dialog box, under **Horizontal (Category) Axis Labels**, select **Edit**.
- c) In the **Axis Labels** dialog box, select the **Collapse Dialog** button, and then, on the **Sales Dashboard** worksheet, select the range **AJ3:AJ15** and press **Enter**.



d) Select **OK** twice, and then scroll back to the chart section of the worksheet.



- e) Right-click the **Y** axis and select **Format Axis**.
- f) In the **Format Axis** panel, expand the **NUMBER** menu.
- g) In the **Category** drop-down list, select **Custom**, and then, in the **Format Code** text field, type **##0,,**
- h) Select **Add**.

NUMBER
 Category
 Custom
 Type
 ##0,,
 Format Code
 ##0,, **Add**
 Linked to source

7. Resize the line chart.
 - a) Select the line chart.
 - b) On the **Format Chart Area** panel, if necessary, select the **Size & Properties** tab



- c) Expand the **Size** section, and then select the **Height** down-arrow until the height equals **2.5"**.
- d) Set the width of the chart to **4.8"**.

Format Chart Area

CHART OPTIONS | TEXT OPTIONS



SIZE

Height

2.5"

Width

4.8"

e) Save your work.

8. Edit the **Unit Sales by FY** chart for readability.

- On the **Unit Sales by FY** chart, right-click the **Legend** and select **Format Legend**.
- In the **Format Legend** panel, verify that the **Legend Options** tab is selected, and then, under **Legend Position**, select **Top**.

Format Legend

LEGEND OPTIONS | TEXT OPTIONS



LEGEND OPTIONS

Legend Position

Top

Bottom

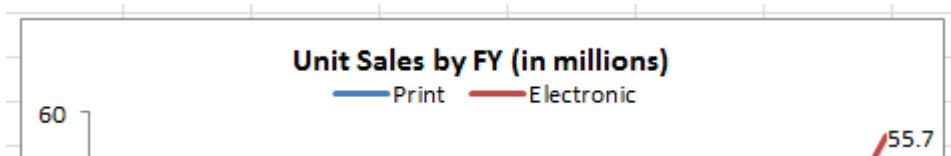
Left

Right

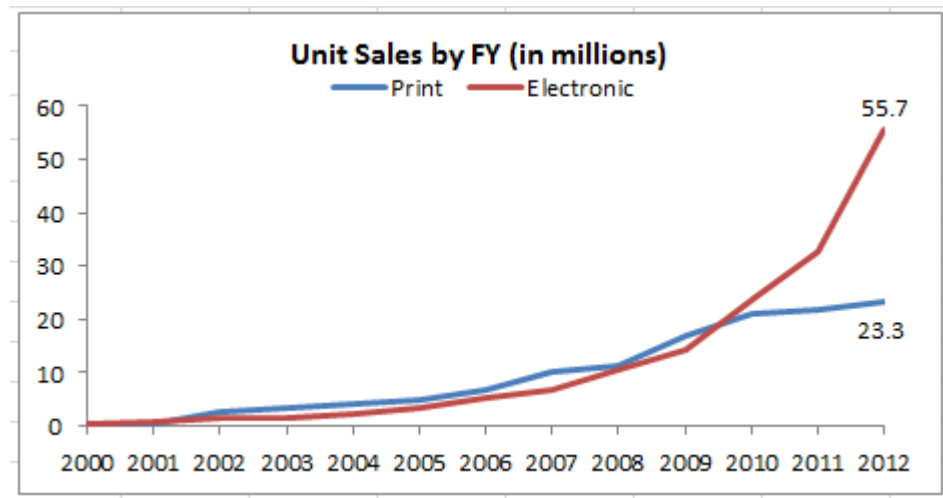
Top Right

Show the legend without overlapping the chart

c) On the chart, drag the legend so it is centered below the chart title.



- Right-click the **X axis** and select **Format Axis**.
- In the **Format Axis** panel, verify that the **Axis Options** tab is selected, and then, under **Axis Position**, select **On Tick Marks**.
- Drag the **55.7** and **23.3** data labels so they are above and below their data lines, respectively.



9. Right-click the **Electronic** data line and select **Format Data Series**. Then, on the **Fill & Line** tab in the **Format Data Series** panel, set the width of the line to **1.25 pt**.
 10. Close the **Format Data Series** panel.
 11. Save your work.
-

ACTIVITY 2–3

Formatting Charts

Before You Begin

My_Author_Data_04.xlsx is open.

Scenario

You are continuing work on your sales dashboard. You are now ready to format the charts.

Specifically, you are going to:

- Update the border color and thickness around the line chart.
- Decrease the gap width between the data points in the bar and column charts.

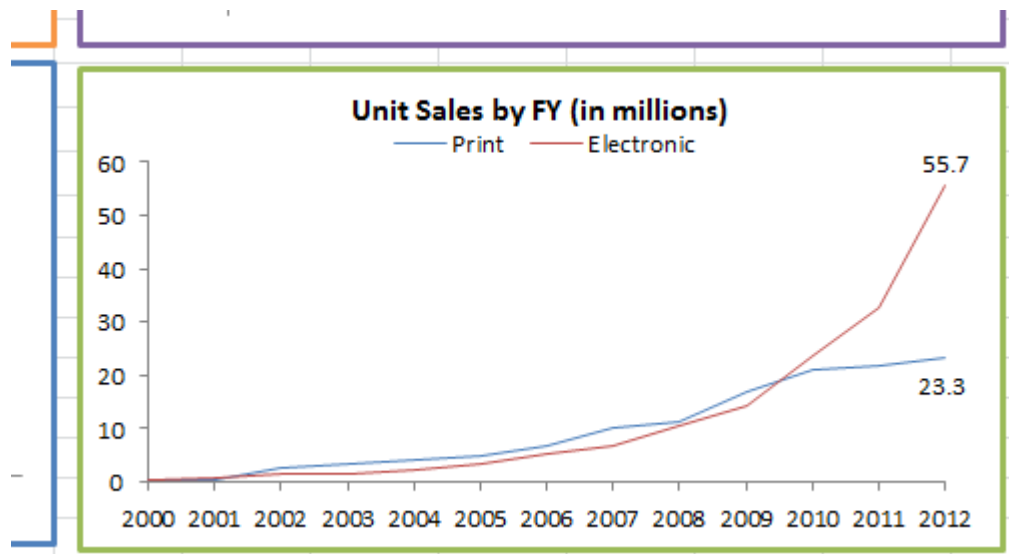
You'll begin by adding a border to the line chart.

1. In **My_Author_Data_04.xlsx**, update the border color and thickness of the line chart.
 - a) On the **Sales Dashboard** worksheet, select the line chart.
 - b) Select **CHART TOOLS FORMAT**→**Shape Styles**→**More button**→**Colored Outline - Olive Green, Accent 3**.



2. What happened when you applied the green outline?

3. Return the line chart title to 12 pt size.



4. Edit the bar and column charts so they have a smaller gap width between the data points.
 - a) On the bar chart, right-click the data series, and then select **Format Data Series**.



Note: In charts, the bars, columns, lines, pie pieces, etc. represent the data series. You can right-click either bar to perform this procedure.

- b) In the **Format Data Series** panel, set the **Gap Width** to 40%.

Format Data Series ▼ ×

SERIES OPTIONS ▼

▲ **SERIES OPTIONS**

Plot Series On

Primary Axis
 Secondary Axis

Series Overlap | ▼▲

Gap Width + ▼▲

- c) Set the gap width for the column chart data series to 40%.

5. Save your work.

TOPIC C

Create a Trendline

A common business task is to project what the business will be doing in the near-, mid-, and long-term. These projections could be anything from the number of units sold of a particular product to the projected income of a proposed project.

The data you have is the data that will help you make these types of projections, and trendlines are the Excel tool that will help you visualize those projections.

Trendlines

A *trendline* is a chart data series that makes predictions about the future state of the data based on current trends in the data.

You can use trendlines to make predictions about virtually any type of data.

In this example, two trendlines predict the future trends for unit sales of books in an electronic format (the steep, green dashed line), and unit sales of books in a print format (the gently sloping, red dashed line).

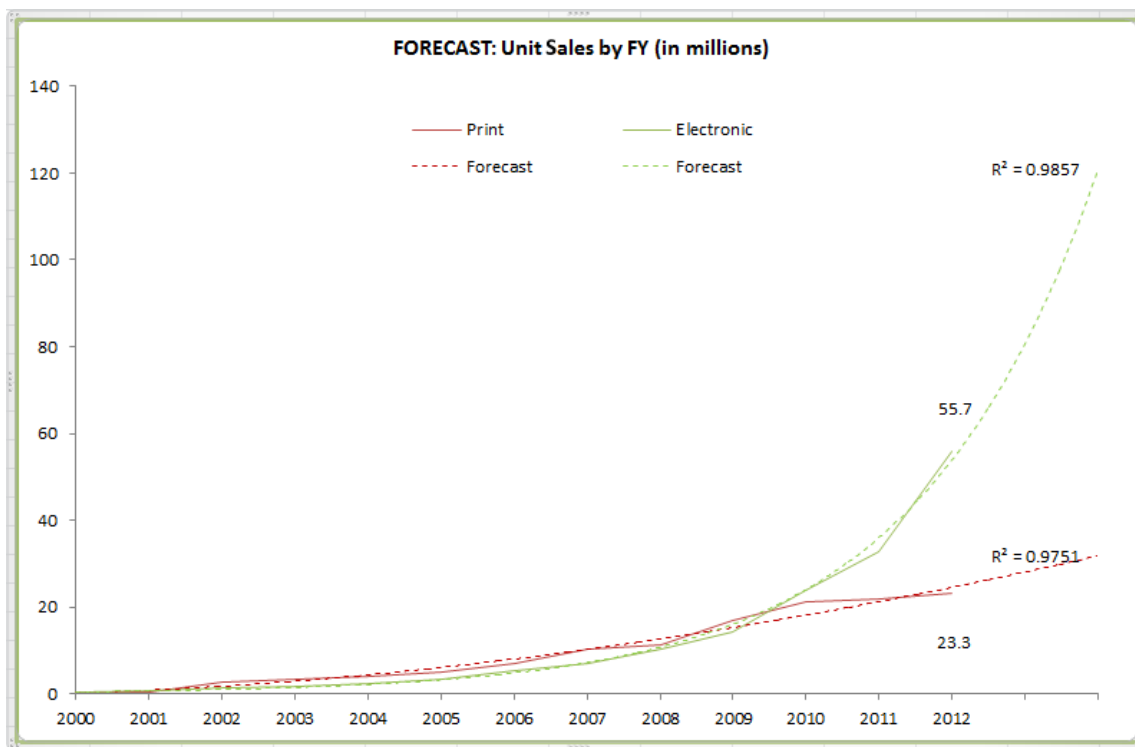








Figure 2-4: Trendlines forecasting out two years.

Types of Trendlines

There are six types of trendlines available in Excel: Exponential, Linear, Logarithmic, Polynomial, Power, and Moving Average. Each type of trendline has its own unique application.

<i>Trendline Type</i>	<i>Description</i>
 <input checked="" type="radio"/> Exponential	A curved trendline for use with data that increases or decreases in value at ever greater frequencies.
 <input checked="" type="radio"/> Linear	A straight trendline for use with data that essentially clusters in a straight line pattern trend if the data is displayed as dots.
 <input checked="" type="radio"/> Logarithmic	A curved trendline for use with data that either increases or decreases in value rather quickly but then at some point begins to even out over time.
 <input checked="" type="radio"/> Polynomial	A curved trendline for use with data that either increases or decreases in value but does not necessarily even out over time.
 <input checked="" type="radio"/> Power	A curved trendline for use with data that increases or decreases at a predetermined and steady rate.
 <input checked="" type="radio"/> Moving Average	A curved and/or straight trendline that follows the fluctuation in the average values of data over a period of time.

The Format Trendline Panel

Use the **Format Trendline** panel to either add a new trendline or adjust an existing trendline. One way to open the **Format Trendline** panel is to right-click the data series you want to add the trendline to, and then select **Add Trendline**.

Format Trendline

TRENDLINE OPTIONS



TRENDLINE OPTIONS



Exponential



Linear



Logarithmic



Polynomial Order



Power



Moving Average Period

Trendline Name

Automatic

Expon. (Units
(Electronic))

Custom

Forecast

Forward periods

Backward periods

Set Intercept

Display Equation on chart

Display R-squared value on chart

Figure 2-5: The Format Trendline panel.

How to Create a Trendline

Use this procedure to create a trendline.

Create a Trendline

To create a trendline:

1. On the chart that will contain the trendline, right-click the data series to which you would like to add the trendline, and then select **Add Trendline**.
2. In the **Format Trendline** panel, from the **Trendline Options** tab, select the type of trendline you'd like to add.
3. In the **Forecast** section, enter the number of periods for which you would like the trend line to forecast forward or backward.
4. Configure the other desired options.
5. Close the **Format Trendline** panel.

ACTIVITY 2-4

Creating a Trendline

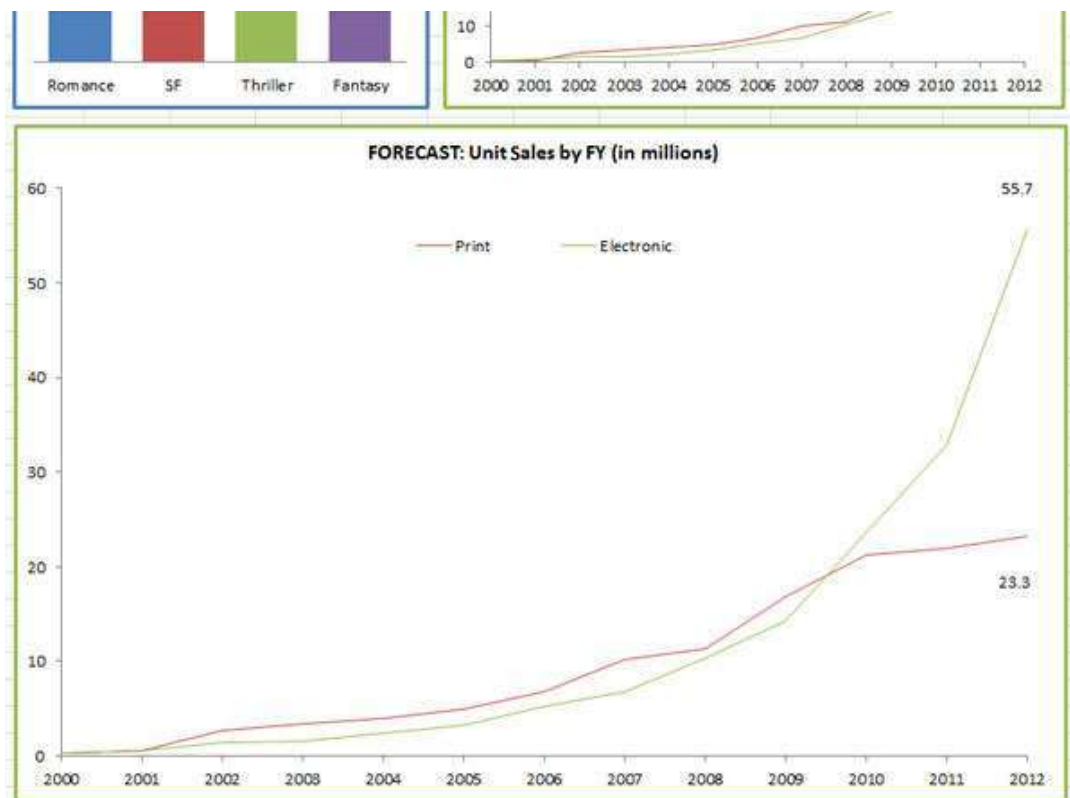
Before You Begin

My_Author_Data_04.xlsx is open.

Scenario

You want to project unit sales growth for both print and electronic books for the next two years. Because you do not want to change the current version of the Unit Sales by FY chart, you've decided to copy the chart, add trendlines to the copy, and then edit the new chart for readability. You plan to add the new chart below the four charts currently on the sales dashboard.

1. In **My_Author_Data_04.xlsx**, create a copy of the **Unit Sales by FY** chart and then place the new version under the existing charts on the **Sales Dashboard**.
 - a) On the **Sales Dashboard** worksheet, select the line chart.
 - b) Press **Ctrl+C**.
 - c) Select cell **A24**.
 - d) Press **Ctrl+V**.
 - e) Use the drag handles on the selected chart's border to increase the width of the new chart so that it matches the combined width of the two charts above it.



- f) In the **Format Chart Area** panel, select the **Size & Properties** tab.

Format Chart Area ▼ ✕

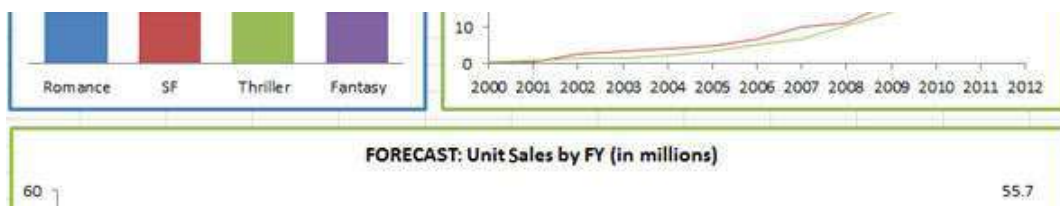
CHART OPTIONS ▼ | TEXT OPTIONS



- ▷ SIZE
- ▷ PROPERTIES
- ▷ ALT TEXT

Size & Properties

- g) Set the new chart's height to **5.25** inches.
- h) Change the title of the new chart to **FORECAST: Unit Sales by FY (in millions)**.



2. Save your work.
3. Add a trendline that extends out two years for **Print** units.
 - a) With the **FORECAST** chart selected, select **CHART TOOLS DESIGN**→**Chart Layouts**→**Add Chart Element**→**Trendline**→**More Trendline Options**.
 - b) In the **Add Trendline** dialog box, verify that **Print** is selected, and then select **OK**.
 - c) In the **Format Trendline** panel, on the **Trendline Options** tab, select the **Power** radio button.

Format Trendline ▼ ✕

TRENDLINE OPTIONS ▼

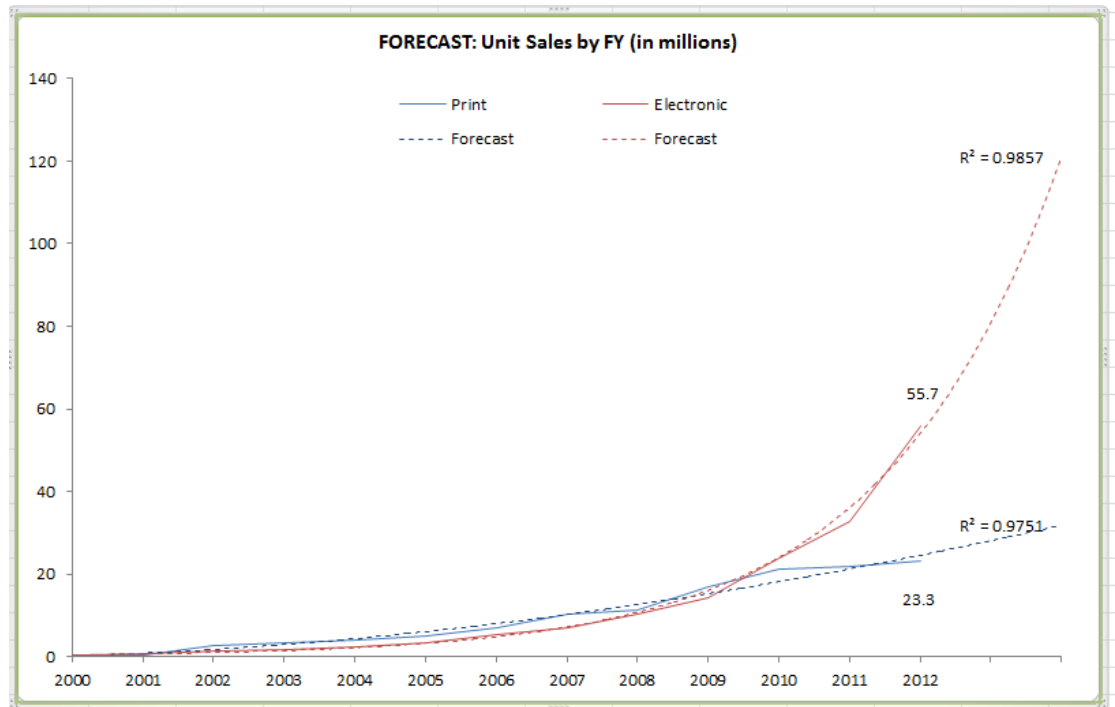


Trendline Options

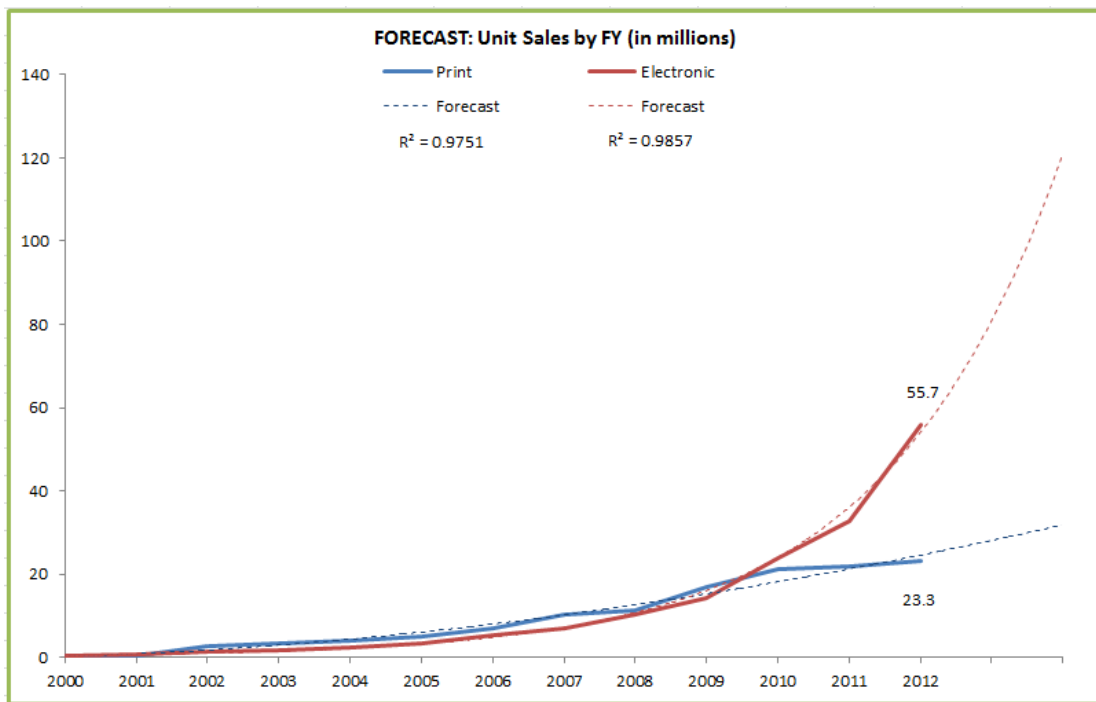
▲ TRENDLINE OPTIONS

- Exponential
- Linear
- Logarithmic
- Polynomial Order
- Power
- Moving Average Period

- d) In the **Trendline Name** section, select the **Custom** radio button, and then, in the text box, type **Forecast** and press **Tab**.
 - e) In the **Forecast** section, in the **Forward** text box, type **2**
 - f) Check the **Display R-squared value on chart** check box.
 - g) Select the **Fill & Line** tab, and then, in the **Dash type** drop-down menu, select **Dash**.
 - h) Close the **Format Trendline** panel.
4. Create a similarly styled **Exponential** trendline that extends out two years for **Electronic** units. Be sure to match the color of the **Electronic** trendline to the **Electronic data series**.



5. Save your work.
6. Position the $R^2=0.9751$ trendline label under **Print** and **Forecast** in the legend, and position the $R^2=0.9857$ trendline label under **Electronic** and **Forecast**.
7. Increase the thickness of the **Print** and **Electronic** data series to **2.25 pt**.
8. If necessary, position the **55.7** and **23.3** data labels so they are vertically aligned above 2012.



9. Based on these trendlines, what does the data suggest?

10. Save your work.

TOPIC D

Create Advanced Charts

Sometimes you need to visualize data based on two X and/or two Y axes. The additional axes help chart users better grasp what the data is trying to tell them.

Dual Axes Charts

A *dual axes chart* is a chart that uses primary and secondary X and/or Y axes to convey meaning about more than one measurement on a single chart.

In this example, the primary Y axis on the left ranges from \$0 to \$600 million. It represents the total sales, in dollars, of all books sold in both print and electronic formats. This data is represented by the columnar data series. The secondary Y axis on the right ranges from 0 to 140 million units (not dollars). This represents the total number of units sold for the print format (the lowest solid line data series ending at 2012), the electronic format (the solid line series ending about halfway up the 2012 column), and their combined total (the tallest solid line ending near the top of the 2012 column).

The advantage of a dual axes chart is that it consolidates the data into a single view—instead of using more than one chart.

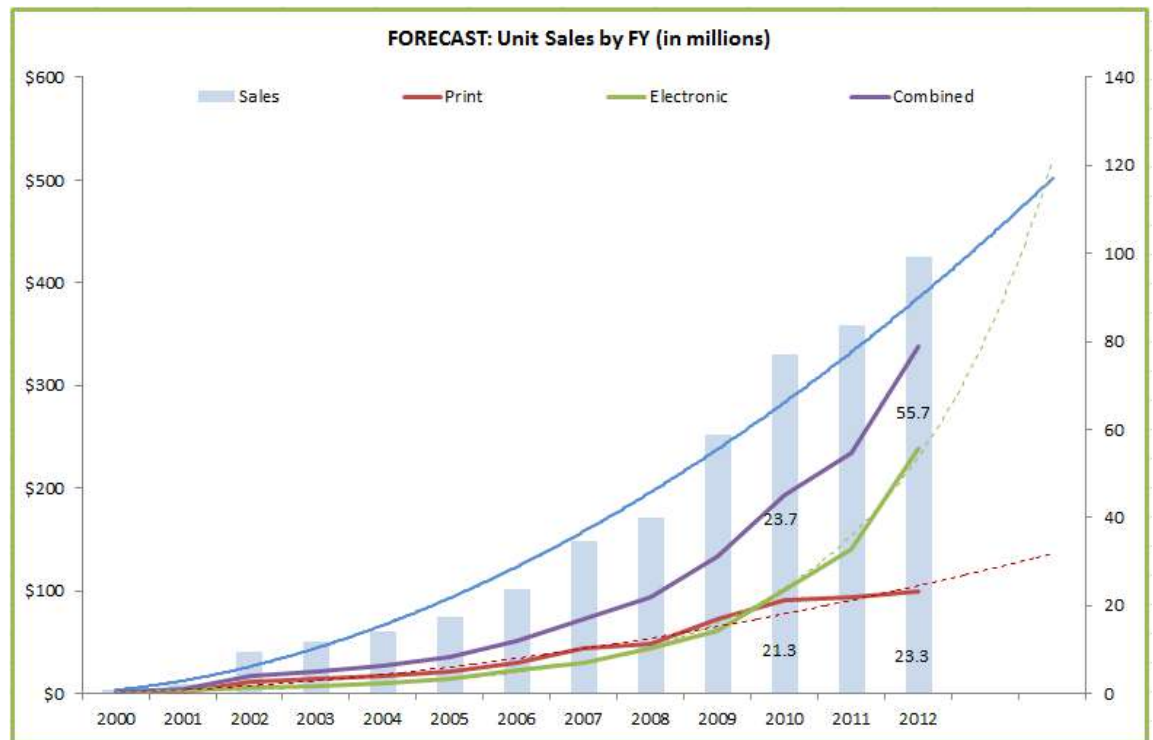


Figure 2-6: A dual-axes chart.

How to Create a Dual Axes Chart

Use this procedure to create a dual axes chart.

Create a Dual Axes Chart

To create a dual axes chart:

1. Select the chart.
2. On the **CHART TOOLS FORMAT** contextual tab, in the **Current Selection** group, select the data series for which you would like to add the secondary axis, and then select **Format Selection**.
3. In the **Format Data Series** panel, on the **Series Options** tab, select the **Secondary Axis** radio button.
4. Format the secondary axis as necessary.

ACTIVITY 2–5

Creating a Dual Axis Chart

Before You Begin

My_Author_Data_04.xlsx is open.

Scenario

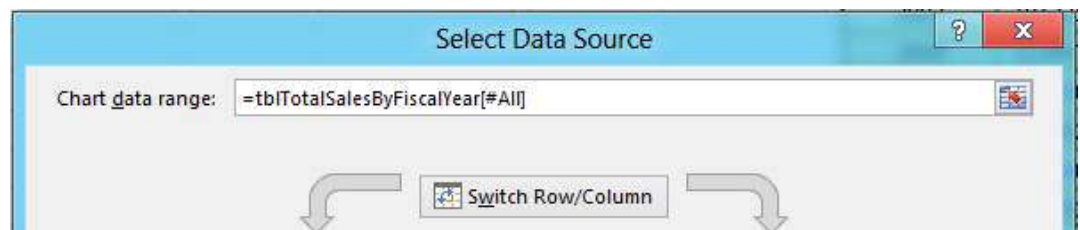
The Forecast chart is coming along nicely. You've decided this chart could add even more value if it also included the combined unit sales and monetary sales for each fiscal year.

To add these additional levels of data visualization to the existing Forecast chart, you will:

- Include the Units Combined and Sales (in millions) columns from the table in the data range for the chart.
- Make the Sales (in millions) data the primary axis.
- Show the monetary sales as a column data series behind the unit sales line data series.
- Switch all three of the unit sales to the secondary axis.

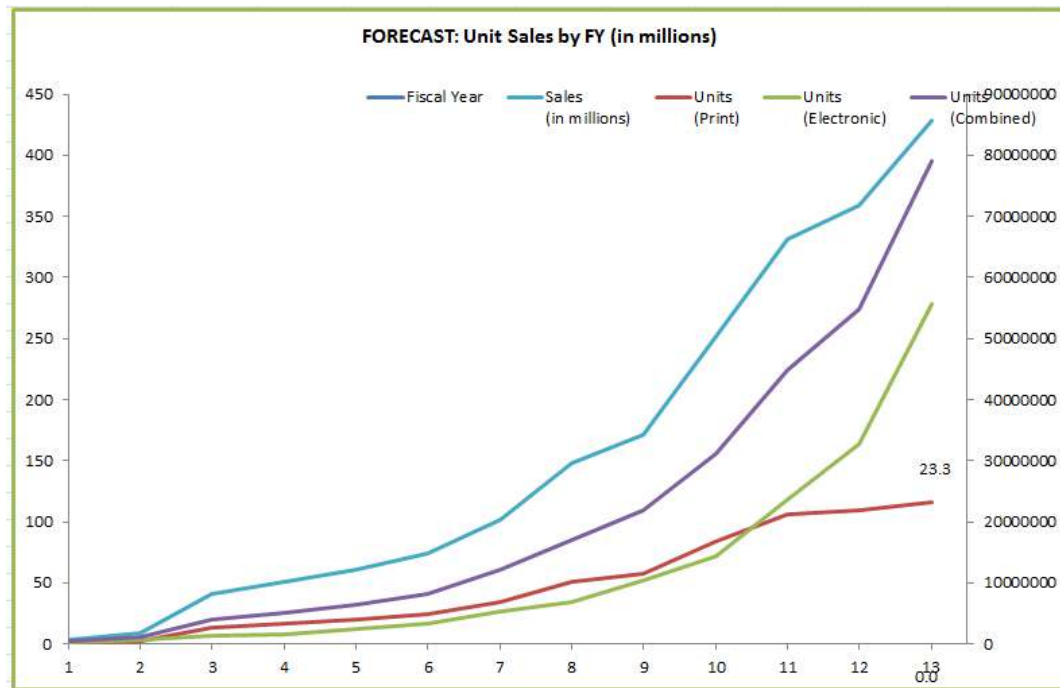
You start by including the entire table in the data range.

1. In **My_Author_Data_04.xlsx**, delete the trendlines. You'll add them back in after you've added the second axis.
2. Add the **Units Combined** and **Sales (in millions)** columns to the data range in the **Forecast** chart.
 - a) On the **Sales Dashboard** worksheet, right-click the **FORECAST** chart and select **Select Data**.
 - b) In the **Select Data Source** dialog box, select the **Collapse Dialog** button to the right of the **Chart data range** field.
 - c) On the **Sales Dashboard** worksheet, scroll to and select the range **AJ2:AN15**, and then press **Enter**.



- d) What do you notice about the range?
 - e) In the **Select Data Source** dialog box, select **OK** and then scroll back to view the **FORECAST** chart.
3. Switch the three unit sales lines to a secondary axis.
 - a) On the **CHART TOOLS FORMAT** contextual tab, in the **Current Selection** group, from the drop-down list, select **Series "Units(Print)"** and then, in the same group on the ribbon, select **Format Selection**.
 - b) In the **Format Data Series** panel, from the **Series Options** tab, select **Secondary Axis**.
 - c) With the **Format Data Series** panel still open, on the **CHART TOOLS FORMAT** tab, in the **Current Selection** group, from the drop-down list, select **Series "Units(Electronic)"** and, in the **Format Data Series** panel, select **Secondary Axis**.

- d) On the **CHART TOOLS FORMAT** tab, in the **Current Selection** group, from the drop-down list, select **Series "Units(Combined)"** and, in the **Format Data Series** panel, select **Secondary Axis**.

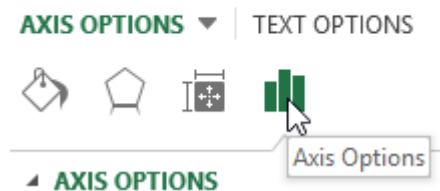


- e) Save your work.

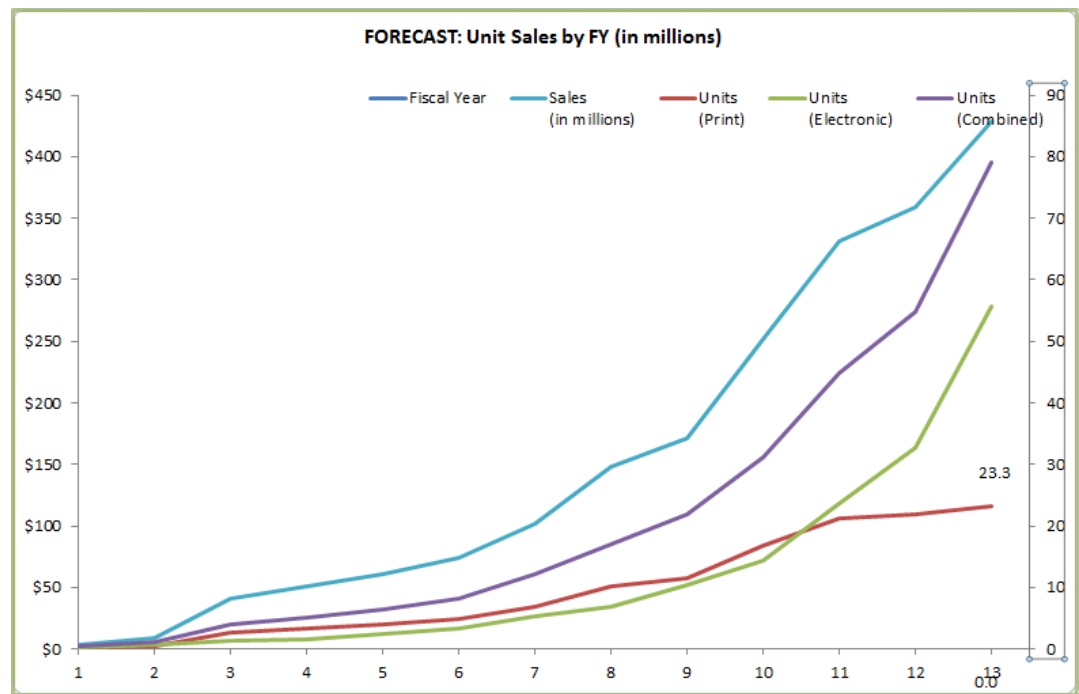
4. Format the numbers in the primary and secondary axes.

- a) On the chart, select the primary Y axis. The task pane automatically changes to the **Format Axis** panel.
 b) In the **Format Axis** panel, from the **Axis Options** tab, expand the **Number** menu.

Format Axis



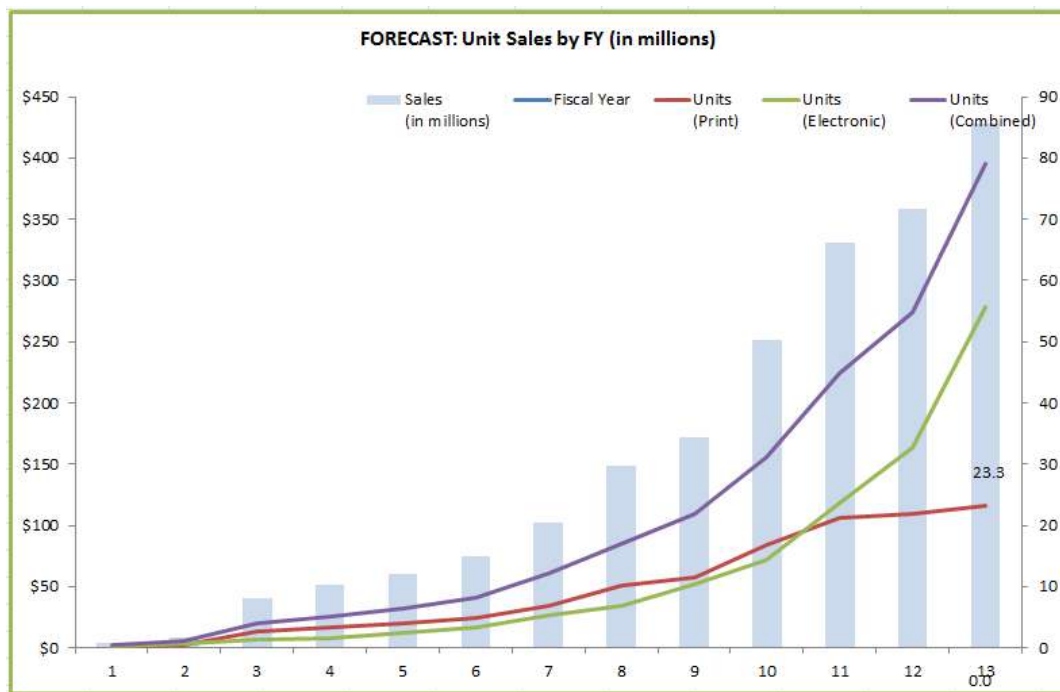
- c) Under **Category**, select **Custom**.
 d) In the **Format Code** field, type **\$\$,##0,,**
 e) Select **Add**.
 f) On the chart, select the **secondary Y axis**.
 g) In the **Format Axis** panel, from the **Axis Options** tab, expand the **Number** menu.
 h) Under **Category**, select **Custom**.
 i) From the **Type** drop-down menu, select **##0,,**



j) Save your work.

5. Change the chart type for the **Sales (in millions)** data series to **Column**.

- a) On the chart, right-click the **Sales (in millions)** data series, and then select **Change Series Chart Type**.
- b) In the **Change Chart Type** dialog box, from the **All Charts** tab, in the right pane, from the **Choose the chart type and axis for your data series** section, scroll down to the **Sales (in millions)** drop-down list, select the down-arrow, and then, in the **Column** section, select **Clustered Column**.
- c) Select **OK**.
- d) Right-click any of the columns in the **Sales (in millions)** data series, and then select **Format Data Series**.
- e) In the **Format Data Series** panel, from the **Fill & Line** tab, expand the **Fill** section, and then select **Solid fill**.
- f) Set the **Transparency** to **70%**.
- g) If necessary, expand the **Border** section, and then select the **No line** radio button.
- h) Close the **Format Data Series** panel.



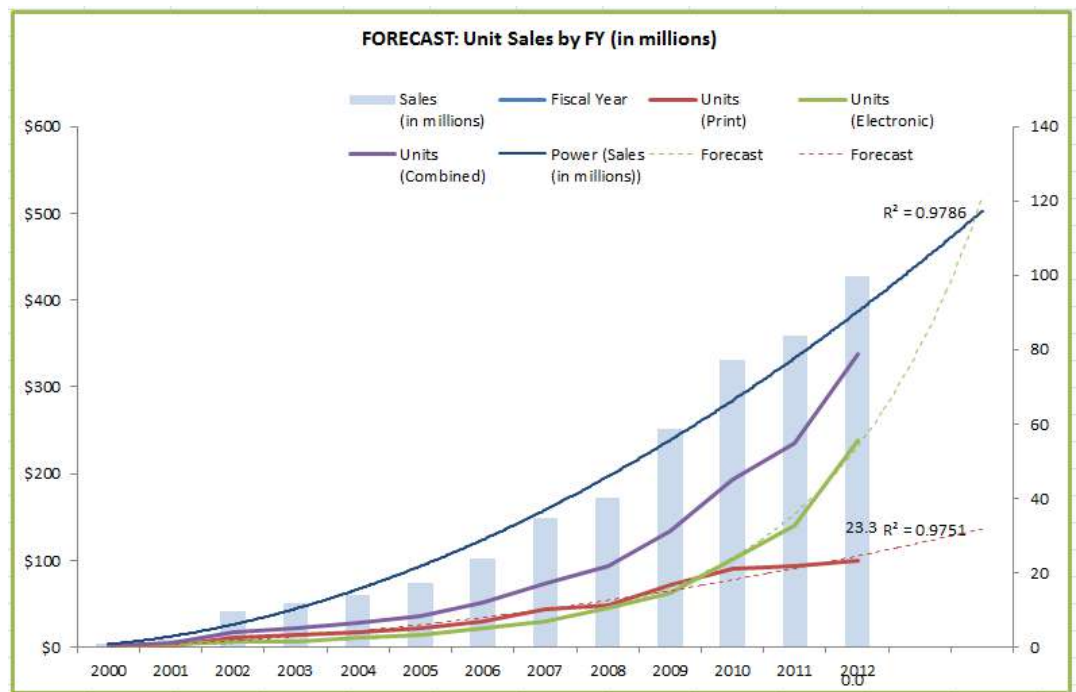
i) Save your work.

6. Edit the X axis so that it displays years.

- a) Right-click the **X** axis and select **Select Data**.
- b) In the **Select Data Source** dialog box, under **Horizontal (Category) Axis Labels** select **Edit**.
- c) In the **Axis Labels** dialog box, select the **Collapse Dialog** button, and then, on the **Sales Dashboard** worksheet, select the range **AJ3:AJ15**.
- d) Press **Enter** and then select **OK**.
- e) In the **Select Data Source** dialog box, select **OK**.
- f) If necessary, scroll to view the **FORECAST** chart.

7. Add trendlines that forecast out two years for **Sales (in millions)**, **Print Units** and **Electronic Units**.

- a) Right-click any of the columns in the **Sales (in millions)** data series and select **Add Trendline**.
- b) Add a **Power** trendline named **Forecast** that looks forward 2 periods, displays its R-squared value, and has a 2 pt dark blue solid line style.
- c) Right-click the **Units (Electronic)** data series, select **Add Trendline**, and then add an **Exponential** trendline named **Forecast** that looks forward 2 periods, displays its R-squared value, and has a 0.75 pt dark green dashed line style.
- d) Right-click the **Units (Print)** series, select **Add Trendline**, and then add a **Power** trendline named **Forecast** that looks forward 2 periods, displays its R-squared value, and has a 0.75 pt dark red dashed line style.



e) Save your work.

8. Edit the chart for readability.

- a) With the **FORECAST** chart selected, select **CHART TOOLS DESIGN**→**Data**→**Select Data**.
- b) Under **Legend Entries (Series)**, select **Units(Print)** and then select **Edit**.
- c) Clear the contents of the **Series Name** field and, in that field, type **Print** and select **OK**.
- d) Change the name of **Units(Electronic)** to **Electronic**, the name of **Units(Combined)** to **Combined**, and the name of **Sales (in millions)** to **Sales**.
- e) In the **Select Data Source** dialog box, select **OK**, and scroll back to the chart.
- f) On the chart, delete each of the **Forecast** legend entries, the **Fiscal Year** legend entry, the **R²** values, and the **23.3** and **0.0** data labels.

9. Save and close your work.

Summary

In this lesson, you created and modified charts.

Excel 2013 provides an enormous array of charts, from bar and column charts to pie and doughnut charts to line, area, and scatter charts.

No matter which type of chart you need, always keep the chart user in mind. Ask yourself, which chart type will work best to transfer knowledge as quickly and efficiently as possible? Once you've identified which chart type you will use, focus on limiting the chart to displaying only those components it will need to transfer the knowledge. Do you really need a legend and gridlines? Do you need tick marks for every tenth of the Y axis measurement?

Consider the charts you've encountered at work. Perhaps you've presented some charts or have been in meetings where charts have been presented. What did you learn from these charts?

What would you add to or remove from the charts to enable them to better convey meaning?



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