Tableau Classroom Training
Desktop I: Fundamentals
Practice Guide

+ + ableau®

Contents

How to Use These Materials

Each practice in this book supports and reinforces the skills presented in class. You won't be assigned to do a practice until the instructor has gone over the skills you need to complete it.

The practices include specifications on what you are to create or do in Tableau, often with a graphic of the finished view. (For a challenge, try to complete the practice using just the specification and the graphic as a guide.) This course also includes starter Tableau .twbx files to use with the practices as well as completed solution files.

Practice Directions

Follow the general **Directions** included in each practice. These appear immediately after the graphic of the finished view. The steps might not include every menu item or mouse click, but they describe what you need to do to create the specified result.

Step-by-step Solutions

If you need additional help, refer to the detailed **Solution** steps at the back of this book. The solutions include every menu item and mouse click you need to complete the practices exactly as specified.

Student Files in the Practices Folder

The student **Practices** folder is either located on the desktop of your training computer, or will be provided to you as a download link. The **Practices** folder contains the following:

- **Data** folder, containing the data sources used in the practices for this course. For some practices, you may need to connect to data sources in this folder.
- **Workbooks** folder, containing starter files for the practices in each module and completed solution files.
- **Workbooks_menu** webpage, with links to the starter and solution files in the course, arranged by module. TIP This webpage is an easy way to open the practice and solution files for each module.
- A brief feedback survey form, which we encourage you to complete at the end of training.

Name ▲	Date modified	Type
📁 Data	1/5/2016 10:13 AM	File folder
📁 Workbooks	1/5/2016 10:13 AM	File folder
🔖 Training Feedback Survey	4/8/2015 8:22 AM	Internet Shortcut
🌐 Workbooks_menu.htm	1/5/2016 10:00 AM	HTML Document

You can also browse to the starter and solution files manually: open the **Workbooks** folder, open either the **Starters** or **Solutions** subfolder, and then browse to the module subfolder and the specific starter or solution file you want to view.

For Mac Users

The instructions and images in this book were created using the Windows operating system, so people running Tableau Desktop using Mac OS may experience a few differences when doing the activities in the book.

Keyboard and Mouse Differences

Windows-based instruction	Difference on a Mac
CTRL + click	Press and hold the Command ⌘ key while you click.
Right-click	When using a mouse with no right-click button, press and hold the control key while you click.
Right-click and drag	Press the Option ⌥ (Alt) key, and hold it down while you click and drag.
Press CTRL	Press Command ⌘.
Press CTRL + Left Arrow	Press Command ⌘ + Control + Left Arrow

Visual Differences

The Windows-based instructions and images in this book may indicate that the X button to close a dialog box or window is in the top right corner, but on a Mac these buttons may be located in the top left corner instead.

There may also be small differences in the appearance and location of tabs, drop-down menus, and other visual features of Tableau Desktop, but the use and functionality of those features is the same in both operating systems.

Additional Note for Mac Users

When you open multiple workbooks in Tableau Desktop on a Mac, multiple instances of the application are created, each with its own icon in the Dock. This differs from typical Mac application behavior, where one instance of the application handles all open files managed by that application.

1. Introduction to Desktop

This module contains the following:

The Tableau Platform

Application Terminology

Visual Cues for Fields

The Tableau Platform

Data Sources	Data Preparation	Data Visualization	Share/Store

Server-based

Tableau extract files

Web data

Cloud-based

File-based

Tableau Prep Builder
- Clean, shape, combine data
- Save/Edit flows (.tfl, .tflx)
- Publish flows
- Save/Publish extracts (.tde, .hyper) or .csv files

Extracts (.tde, .hyper) or .csv files

Tableau Desktop
- Create/Author
- Ad hoc analysis
- Save/Publish

Web Edit
- Create/Author online using cloud or published data sources
- Edit published workbooks

Tableau Server
- Secure
- Create/Save/Publish
- Ask Data (NLP)
- Data Management
- Server Management

Tableau Online
- Hosted version of Tableau Server
- Sync with on-premises data using Tableau Bridge

Tableau Mobile
Free app for devices running iOS 10 or later, or Android 5 or later

Tableau Public
- Free, public instance of Tableau Online
- Access using a browser
- Create and publish using a custom free version of Tableau Desktop

Tableau Reader
- Free desktop application
- Offline
- Interact with packaged workbooks (.twbx)

Application Terminology

Term	Description
1 Go to Start Page	Toggle between the active sheet and the Desktop Start Page.
2 Data pane	Includes dimensions and measures, populated from your selected data source. May also include calculated fields, parameters, or sets.
3 Analytics pane	Includes options you can use to apply reference lines, forecasts, trend lines, to add totals to crosstabs, and to build boxplots.
4 Workbook name	The file name of your workbook.
5 View cards	Used for modifying the worksheet.
6 Toolbar icons	Icons are available for quick access to popular features.
7 Worksheet/View	Workspace for building your visualizations.
8 Go to Data Source	Returns you to the data source specification page.
9 Worksheet tabs	Click to view a specific worksheet, dashboard, or story.
10 New Worksheet, Dashboard, and Story tabs	Click to create a new Worksheet, Dashboard, or Story.
11 Status bar	Displays data about the fields and marks included in the view.

Visual Cues for Fields

Tableau displays the following visual cues in the **Data** pane and the view.

Modifiers

The following table explains how each of the field icons displayed in the **Data** pane can be modified by one of four indicators:
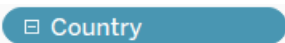
Abc	Blue icons indicate that the field is discrete.
#	Green icons indicate that the field is continuous.
=Abc	Icons preceded by the equal sign (=) indicate that the field is a user-defined calculation or a copy of another field.
Abc **Market !**	Fields in the Data pane with an exclamation mark next to them indicate that the field is invalid.

Fields in the Data Pane

These are the primary fields you will see in the **Data** pane. For a complete list, see the topic "Visual Cues and Icons in Tableau Desktop" in the Tableau Desktop **Help** menu.

Icon	Description
T|F	Boolean (true/false) values
🗓	Date and time values
🗓	Date only values
🌐	Geographic data
📎	Group
#	Numeric values
▦	Table
Abc	Text values
⊘	User-defined set

Fields on Shelves

Icon or Visual Cue	Description
Category	A blue field on a shelf indicates a discrete field.
SUM(Shipping Cost)	A green field on a shelf indicates a continuous field.
Market	A (SORT) icon indicates a sorted field.
SUM(Sales) Δ	The delta icon indicates that the field has a table calculation applied to it.
⊟ Country ⊞ State	The plus and minus controls appear when the field is part of a hierarchy in which you can drill up or down.

2. Desktop Workflow

This module contains the following:

Practice: Exploring Tableau and the Data

✛ Practice: Exploring Tableau and the Data

In this practice, you will connect to data in a text file. Then, build a sorted bar chart and a text table so you can find the answer to some questions. Finally, use your views to build an interactive dashboard to share the data for exploration.

Carnegie Library Exploration

Between 1883 and 1929, Andrew Carnegie, an American businessman and philanthropist, donated $45 million to cities across the United States to build libraries. Use the data set provided to answer these questions:

- Which state has the most Carnegie public libraries?
- Which state was granted the most money for libraries overall?

Use the data to create a dashboard like this:

NOTE The image is blurred so the state names don't show.

Connect to Data
1. Open Tableau Desktop, and under **Connect** click **Microsoft Excel**.
2. Navigate to the **Practices** folder and open the **Data** folder.
3. Open the **libraries.xlsx** file.

You should now see the data from the Excel file on the lower half of the screen, with the **Libraries Public and Academic** sheet in the area above.

4. Click **Sheet 1** to go to the worksheet.

Analyze the Data and Build Two Views

Question 1: Which state has the most Carnegie public libraries?

1. Create a bar chart using the dimension **State** and measure **Public libraries**.

Drag this field	To
Public libraries	Columns
State	Rows

2. On the toolbar, click the **Sort Descending** icon ⬇☰. This sorts the values from highest to lowest.
3. Give your worksheet a title. Double-click the tab **Sheet 1**, and type a name for your view. For example: Number of public libraries by state

The state with the most Carnegie public libraries: _____

Question 2: Which state was granted the most money to build libraries?

1. Click the **New Worksheet** tab to add a second worksheet:

Sheet 1 ⊞ ⊞ ⊞

2. Create a text table (also referred to as a crosstab):

Drag this field	To
Total amount of grants	The middle of the view, labeled **Drop field here**
State	Rows

3. Add more measures to the view: drag **Public libraries** to the text table, and when Desktop displays **Show Me**, drop the field.
4. Repeat the previous step for the fields **Public grants** and **Academic libraries**.
5. On the toolbar, use the drop-down to change from **Standard** to **Fit Width**. This expands the view so you can read the column headings.
6. Hover your pointer over the **Total amount of grants** column header, and click the **Sort Descending** icon that displays. Total amount of grants ⊵
7. Give your worksheet a title. Double-click the tab **Sheet 2**, and type a name for your view. For example: "Total amount of grants"

The state with the highest total amount of grant money: _____

Build a Dashboard

1. Click the **New Dashboard** tab to add a dashboard.

2. Under **Sheets**, drag the worksheet **Number of public libraries by state** to the dashboard on **Drop sheets here**.

3. Drag the worksheet **Total amount of grants** to the bottom half of the dashboard and drop when you see the gray box.
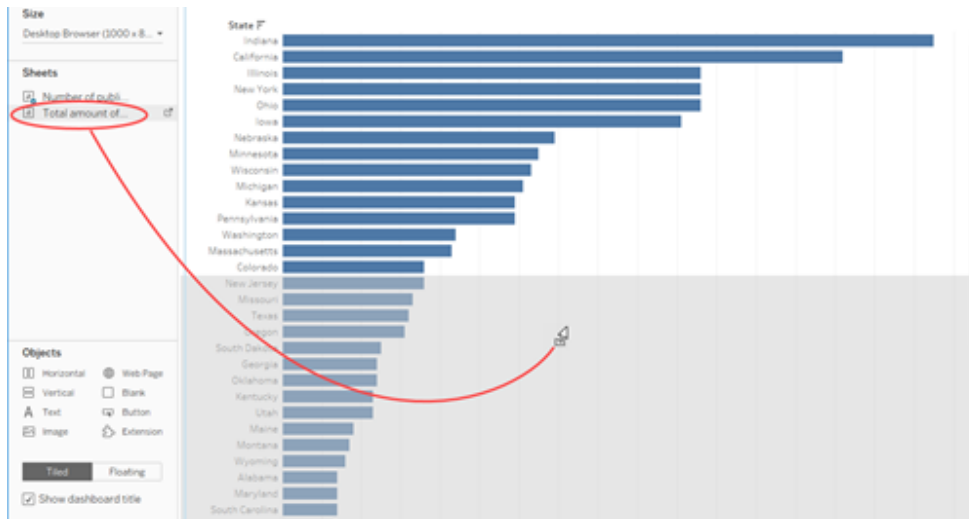
4. On the **Number of public libraries by state** sheet, click the **Use as Filter** button.
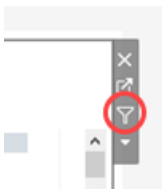
5. Use CTRL + click to select both Indiana and New York.

   *Notice how the **Total amount of grants** sheet now displays only the results for Indiana and New York.*

6. Name the dashboard **Carnegie Libraries in the US** and on the **Dashboard** menu, click **Show Title**.

Solution

For the solution to this practice, see "Solution: Exploring Tableau and the Data" on page 65.

3. Setting Up Connections and Data Sources

This module contains the following:

Practice: Creating a Local Data Connection

11

Practice: Creating a Local Data Connection

Connect to a data source and edit some data attributes. Save those changes locally so you won't need to make those changes again during future analysis. Finally, create a visualization.
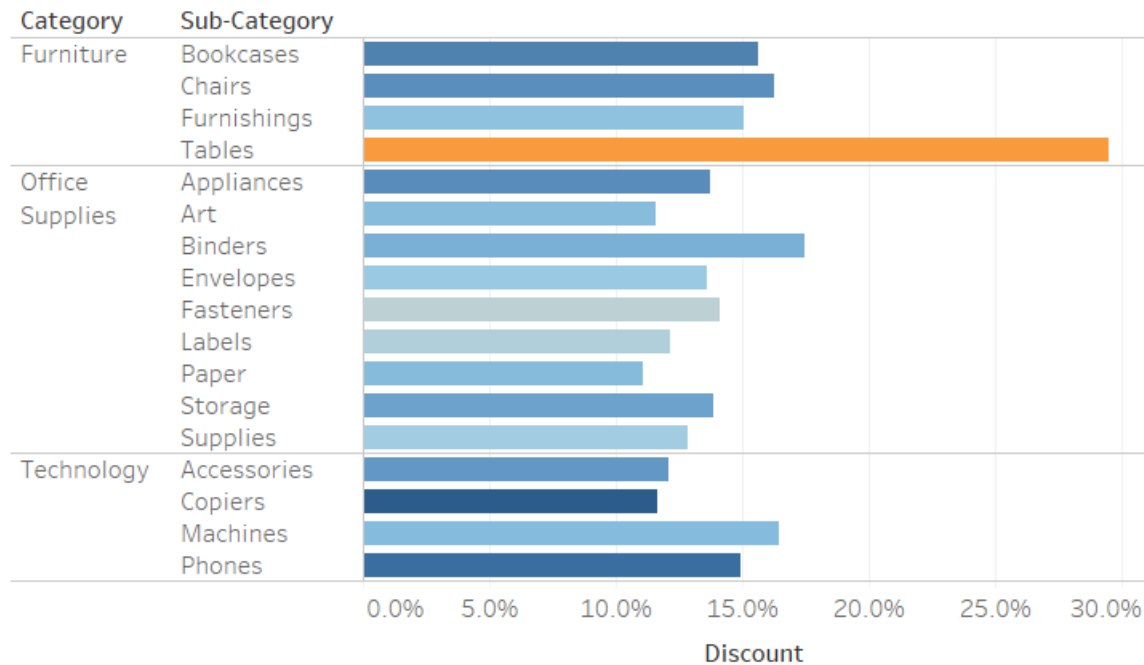
Category	Sub-Category	
Furniture	Bookcases	
	Chairs	
	Furnishings	
	Tables	
Office Supplies	Appliances	
	Art	
	Binders	
	Envelopes	
	Fasteners	
	Labels	
	Paper	
	Storage	
	Supplies	
Technology	Accessories	
	Copiers	
	Machines	
	Phones	

0.0%   5.0%   10.0%   15.0%   20.0%   25.0%   30.0%

Discount

Create the Connection

1. Open Tableau Desktop.
2. In the **Connect** pane, under **To a File**, click **Microsoft Excel**.
3. In the dialog box that opens, browse to the **Data Connection Practice.xlsx** data source, located in the **Data** folder within the **Practices** folder and click **Open**.
4. Double-click the **Orders** table, and then open **Sheet 1**.

Change Data Attributes

1. In the **Data** pane, rename the **Row** field to **Row ID**.
2. Change **Row ID** from a **Measure** to a **Dimension**.

   NOTE Tableau normally displays fields containing numbers as measures, however, Tableau recognized that the **Customer ID** field from the original Excel file should be a dimension because of the " ID" at the end.

3. Rename the **Global Area** field to **Country**, and assign this field a geographic role of **Country/Region**.
4. Change the **Default Properties** of both **Profit** and **Sales** fields to **Currency** with 0 decimal places
5. Change the **Default Properties** of the **Discount** field to use the **Average** aggregation, and use **Percentage** with 1 decimal place.
6. Add a comment for the **Discount** field to read "Average Discount Percentage."

NOTE Changes to the data attributes do not modify the actual data in the underlying data source.

Save the Data Source and Test the Connection

1. Add **Orders (Data Connection Practice)** to **Saved Data Sources** as "My Superstore" and ensure it is saved in the **Data Sources** subfolder of the **My Tableau Repository** folder, which is located in the Documents folder on your computer.
2. Close the current workbook without saving changes, and then open a new workbook. On the Connect pane, under **Saved Data Sources** select the new "My Superstore" data source, and observe the data attribute changes that were saved.

NOTE A saved data source does not contain the actual data, but rather the information necessary to connect to the data as well as any data attribute modifications you've made, such as different default properties.

Create a Visualization

1. Build a bar chart showing the average **Discount** by **Category** and **Sub-Category**.
2. From **Measures**, drag **Profit** to **Color** on the **Marks** card.
3. Observe that **Discount** and **Profit** are displayed with the saved attribute changes.

Solution

For the solution to this practice, see "Solution: Creating a Local Data Connection" on page 67.

4. Simplifying and Sorting Your Data

This module contains the following:

Practice: Filtering

Practice: Sorting

Practice: Filtering

You have a view that shows sales data for all of your inventory. Add filters to the view in order to only show information for the selected market and within a range of the sum of sales.
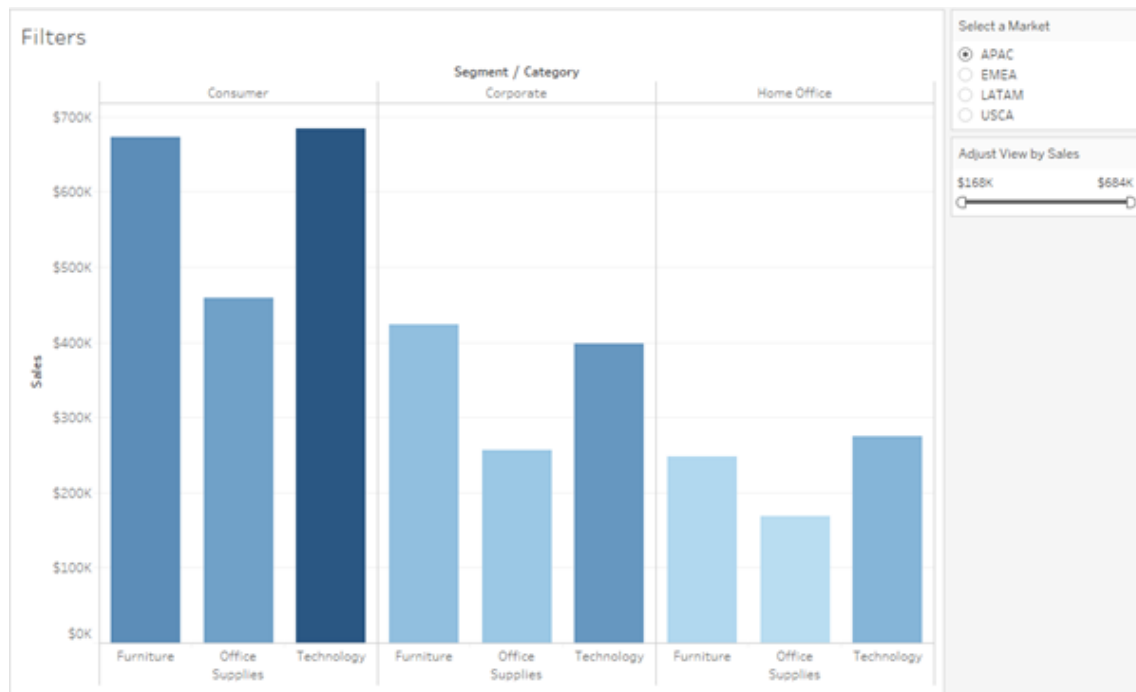
Directions

1. Open **Filtering_Starter.twbx**.
2. Create a filter for **Market**, displayed as a single value list, removing the **All** option, and titled "Select a Market."
3. Create a filter for **Sum** of **Sales**, displayed as a slider, and titled "Adjust view by Sales.".
4. Experiment with the sliders and notice the **"AND"** logic being used. The results shown are those that match the criteria of both filters.

SELF CHECK Which **Segment / Category** had the greatest sales for the **EMEA Market** when the sum of sales was between $300K and $800K?

Solution

For the solution to this practice, see "Solution: Filtering" on page 68.

Practice: Sorting

You currently have a view that shows sales broken down by product category and sub-category.

View One

Sort the data in order to make it easier to compare your sales within sub-categories. Manually change the order of the categories so you can keep an eye on Technology sales.
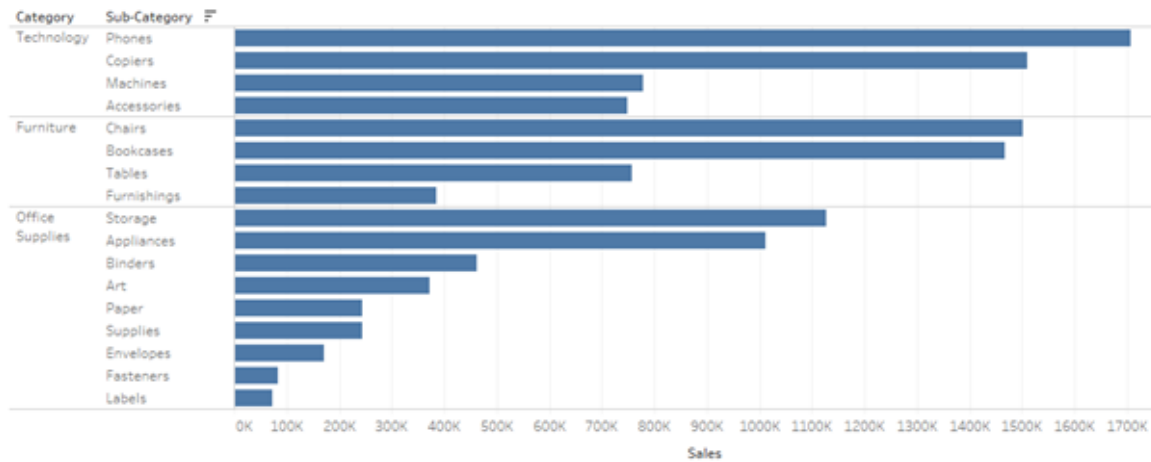
Directions

1. Open **Sorting_Starter.twbx**.
2. On the **View One** worksheet, on the **Format** menu, click **Animations**.
3. In the **Animations** pane, under **Workbook Default**, do the following:
   - Click **ON**.
   - Under **Duration**, select **1.00 seconds (Slow)**.
   - Under **Style**, keep the selection set to **Simultaneous**.
   - Close the **Animations** pane.
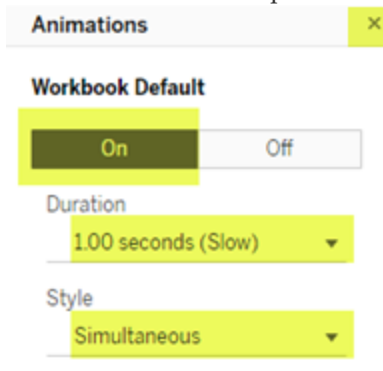
4. On the **View One** worksheet, sort **Sub-Category** by **SUM**(**Sales**) in descending order.
5. On the **View One** worksheet, create a manual sort for **Category**, with values ordered by **Technology**, **Furniture**, and then **Office Supplies**.

SELF CHECK 1 In **Office Supplies**, which **Sub-Category** has slightly higher sales than **Supplies**? How do you know?

View Two

Starting with a duplicate of the first worksheet, use color and a computed sort to compare the sum of profit for the sub-categories.
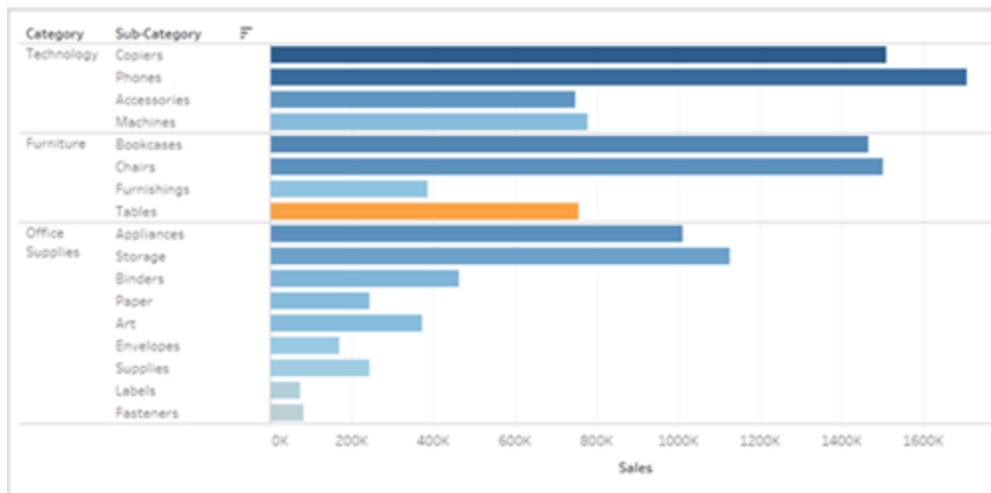
Directions

1. Duplicate the **View One** worksheet to create a **View Two** worksheet.
2. On the **View Two** worksheet, color encode the bars by **Profit**, and edit the color palette to Orange-Blue Diverging.
3. On the **View Two** worksheet, edit the sort applied to **Sub-Category** so the field selected is **Profit** aggregated by sum.

SELF CHECK 2 Which **Sub-Category** is the least profitable? Does it have higher or lower sales than the **Furnishings Sub-Category**? How do you know?

Solution

For the solution to this practice, see "Solution: Sorting" on page 69.

5. Organizing Your Data

This module contains the following:

Practice: Creating Groups and Hierarchies

Practice: Creating Groups and Hierarchies

You currently have a view that displays sales broken down by product sub-category. Create a group to compare the sales of desk supplies with other products in the same category. Then, create a product hierarchy to drill up and down so you can quickly compare sales by category, sub-category (group), or sub-category.
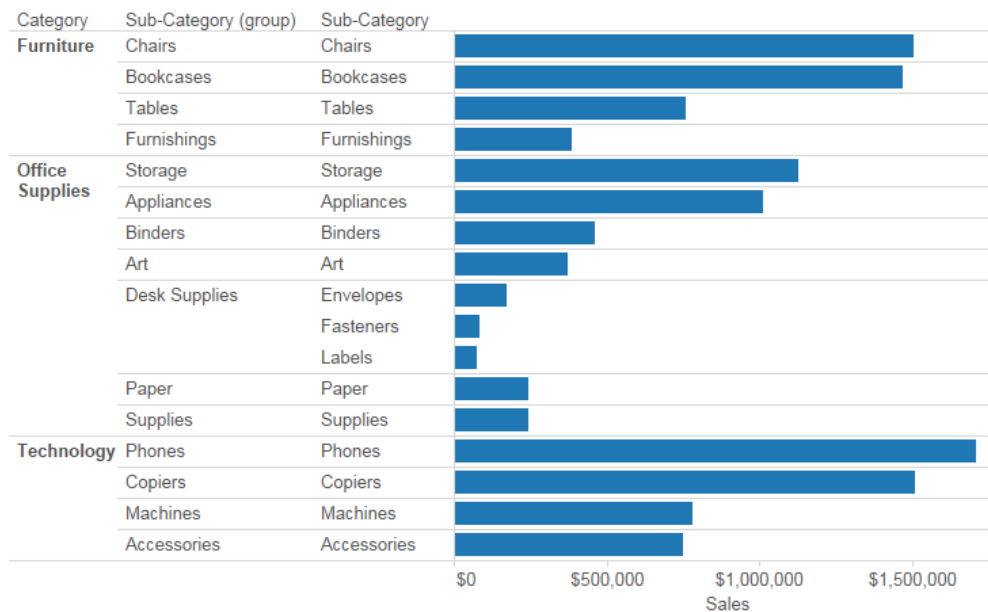
Directions

1. Open **Creating_Groups_and_Hierarchies_Starter.twbx**.
2. On the worksheet, create a new group from the following items in **Sub-Category**: **Envelopes**, **Fasteners**, and **Labels**. (Hint: Group the sub-category labels, not the bars.)
3. In the data pane, right-click **Sub-Category (group)**, and then click **Edit Group**.
4. In the **Edit Group** dialog box, rename the new **Envelopes, Fasteners, Labels** group to "Desk Supplies".
5. Create a hierarchy called "Products" in the **Data** pane organized as follows: **Category**, **Sub-Category (group)**, **Sub-Category**, **Product Name**.
6. Drag the new hierarchy to the far left of **Rows**.
7. In the view, drill down to **Sub-Category (group)** and **Sub-Category**.

SELF CHECK Use the hierarchy in the view to answer the following questions: Which **Category** has the greatest sales? What are the total sales for the **Desk Supplies** group?

Solution

For the solution to this practice, see "Solution: Creating Groups and Hierarchies" on page 71.

6. Slicing Your Data by Date

This module contains the following:

Practice: Date Parts and Date Values

Practice: Custom Dates

✛ Practice: Date Parts and Date Values

Create a Bar Chart to Show Seasonal Trends

Create a bar chart to show seasonal trends in sales by discrete month of order date. Use your visualization to determine which months of the year see highest and lowest sales.

SELF CHECK Which format, date part or date value, would better show seasonal trends?
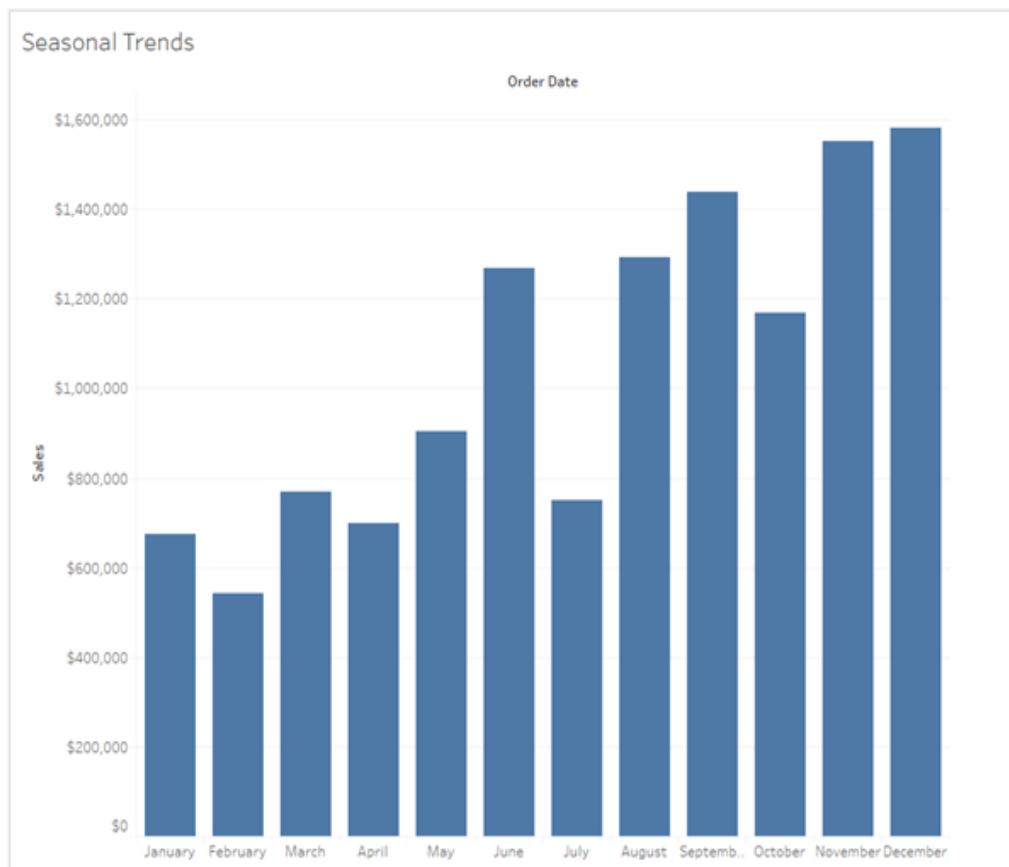
Directions for Seasonal Trends View

1. Open Tableau Desktop and connect to the Excel data source **Global_Superstore_Recent_Dates.xlsx** (in the **Practices\Data** folder).
2. Use the **Orders** sheet for your analysis.
3. Name **Sheet 1** "Seasonal Trends."
4. Create a view that shows **Sales** by **Order Date**.
5. Change the chart type to **Bar**. (Hint: Use the **Marks** card.)
6. Right-click the **Order Date** and select the **Month** date part (May) format.
7. On the date on columns, use the plus and minus sign icons to drill down and up to different levels of detail.
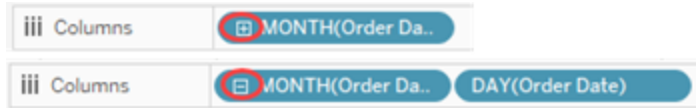
8. Create a filter for years. Show the filter and observe the results.

SELF CHECK When the most recent year is included, what was the sales total for all years in the highest selling month? The lowest? Are these results different when the most recent year is excluded?

Create a Timeline to Show Sales Over Time

On **Sheet 2**, create a line chart to show sales for each month of the order date in a continuous timeline. Use your visualization to see highs and lows for sales over time and to determine sales for a particular month and year.

SELF CHECK Which format, date part or date value, would better show sales on a chronological timeline?
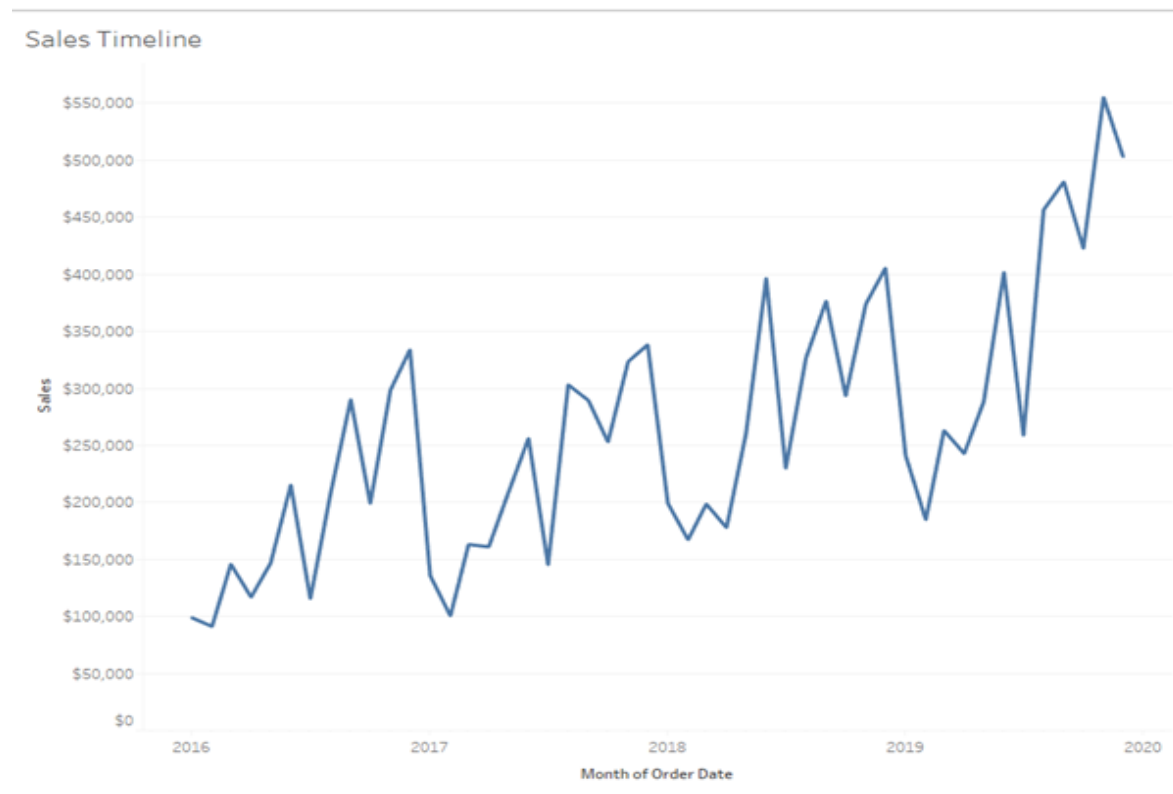
Directions for Sales Timeline View

1. Name **Sheet 2** "Sales Timeline."
2. Create a view that shows **Sales** by **Order Date**.
3. Right-click the **Order Date** and select the **Month** date value (May 2015) format.

   NOTE The field for **Order Date** is now green, indicating it is continuous.

4. On the **Order Date** axis, use the plus and minus sign icons to drill down and up to different levels of detail.
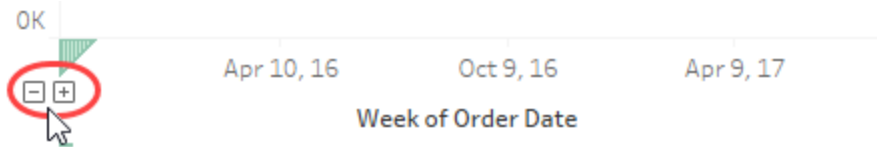
5. Create a filter for years. Show the filter and observe the results.

SELF CHECK When the most recent year is included, which month has had the highest sales so far? Does this change when the most recent year is excluded? How do these results compare with data shown on the "Seasonal Trends" visualization?

Solution

For the solution to this practice, see "Solution: Date Parts and Date Values" on page 72.

Practice: Custom Dates

Practice creating custom dates, then build a hierarchy to control and simplify your view so you only see sales by the date parts you need for more efficient analysis.

Discrete Custom Dates

Create a bar chart that shows sales by order date using a custom discrete date in quarters.
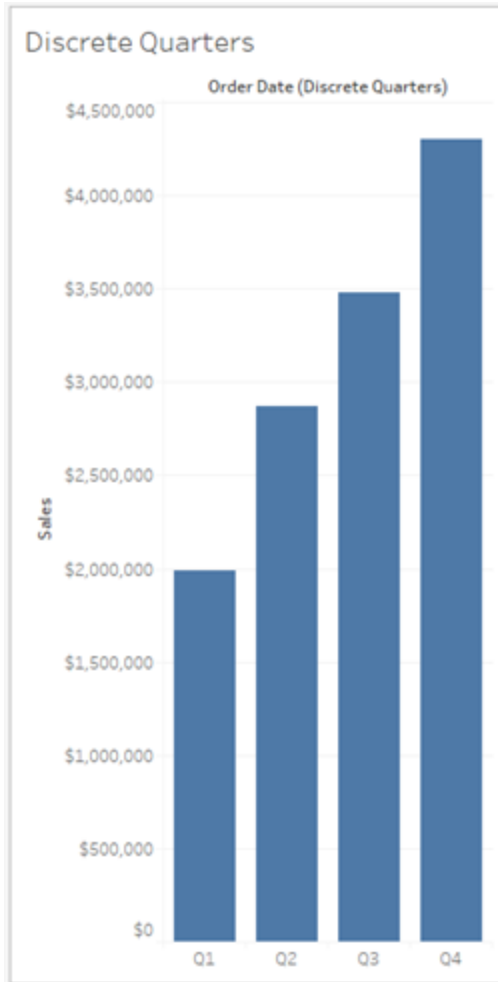
Directions

1. Open **Custom_Dates_Starter.twbx**
2. On the sheet named **Discrete Quarters**, create a custom date with a date value of quarters, change to **Date Part**, and name this field "Order Date (Discrete Quarters)".
3. Remove the date field on the **Columns** shelf, and drag this new field to **Columns**.
4. Change the mark type to **Bar**.

Discrete Year to Quarters Hierarchy

Create a bar chart that shows sales by order date using a custom discrete date hierarchy of years to quarters.

Year to Quarter Custom Date Hierarchy
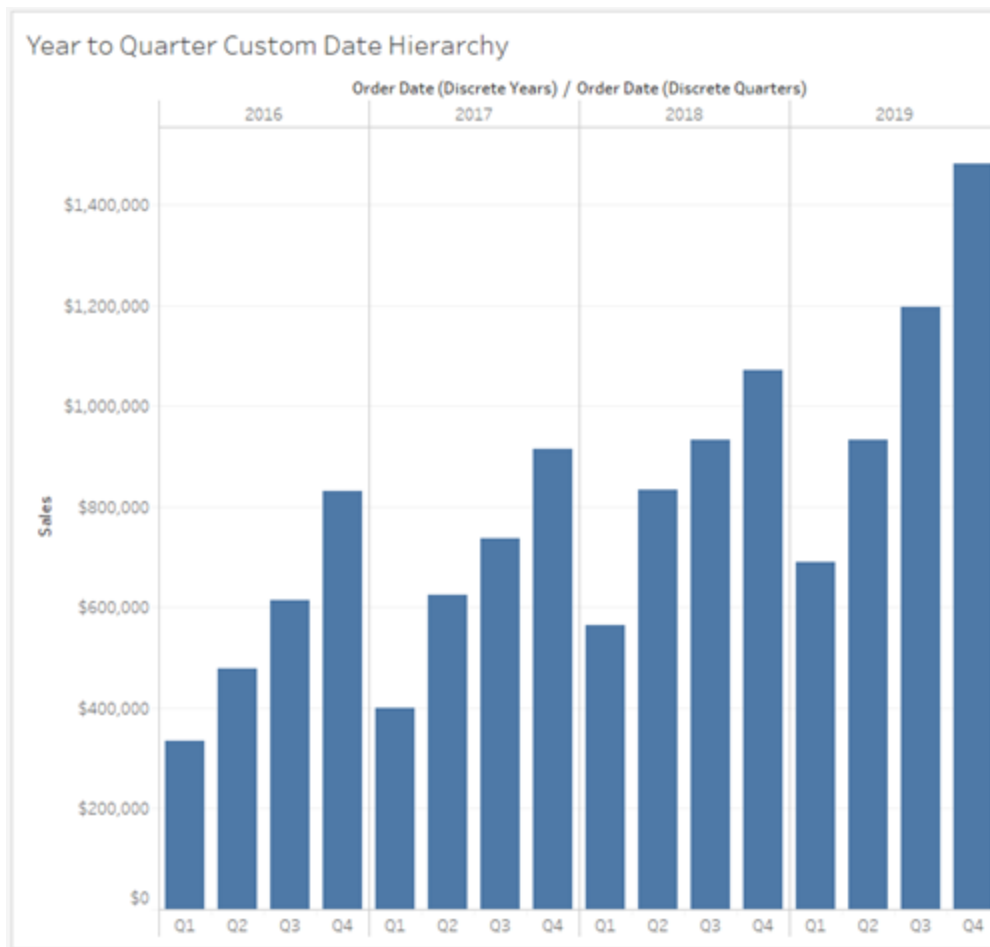
Directions

1. On the sheet named **Year to Quarter Custom Date Hierarchy**, create a custom date with a date value of years, change to **Date Part**, and name this field "Order Date (Discrete Years)".
2. In the **Data** pane, drag **Order Date (Discrete Quarters)** on top of **Order Date (Discrete Years)** to create a hierarchical group, and name the group "Order Date (Discrete Years to Quarters)".
3. On **Columns**, drag **MONTH(Order Date)** off of the view.
4. Drag the hierarchical group you just created to **Columns**, and then expand to show both years and quarters.
5. Change the mark type to **Bar**.

SELF CHECK 1 What are the total sales in all of 2019? What are the total sales in Q4 of 2019?

SELF CHECK 2 What trends over time can you see in the sales data?

Solution

For the solution to this practice, see "Solution: Custom Dates" on page 74.

7. Using Multiple Measures in a View

This module contains the following:

Practice: Combined Axis Chart

Practice: Dual Axis Chart

Practice: Combined Axis Chart

Create a bar chart broken down by **Segment** and **Category** that shows **Profit** and **Sales** on the same axis. Use your chart to compare measures within dimensions.

Directions

1. Open Tableau Desktop and connect to the Excel data source **Global Superstore.xlsx** (in the **Practices\Data** folder).
2. Use the **Orders** sheet for your analysis.
3. Create an initial view showing **Sales** broken down by **Category** and **Segment**.
4. Show **Profit** on the same vertical axis as **Sales**.

    Hint: Drop **Profit** when the mouse icon changes to a double ruler.
5. Show Sales and Profit in different colors.

    Hint: Use **Measure Names**.
6. Rename the "Value" axis "Dollars."

SELF CHECK Which **Category** looks like it made less **Profit** for the amount of **Sales** compared to other categories?

Solution

For the solution to this practice, see "Solution: Combined Axis Chart" on page 75.

Practice: Dual Axis Chart

Create a dual axis chart with synchronized axes in order to compare sales and profit using different mark types. Use your chart to analyze the measures over time.
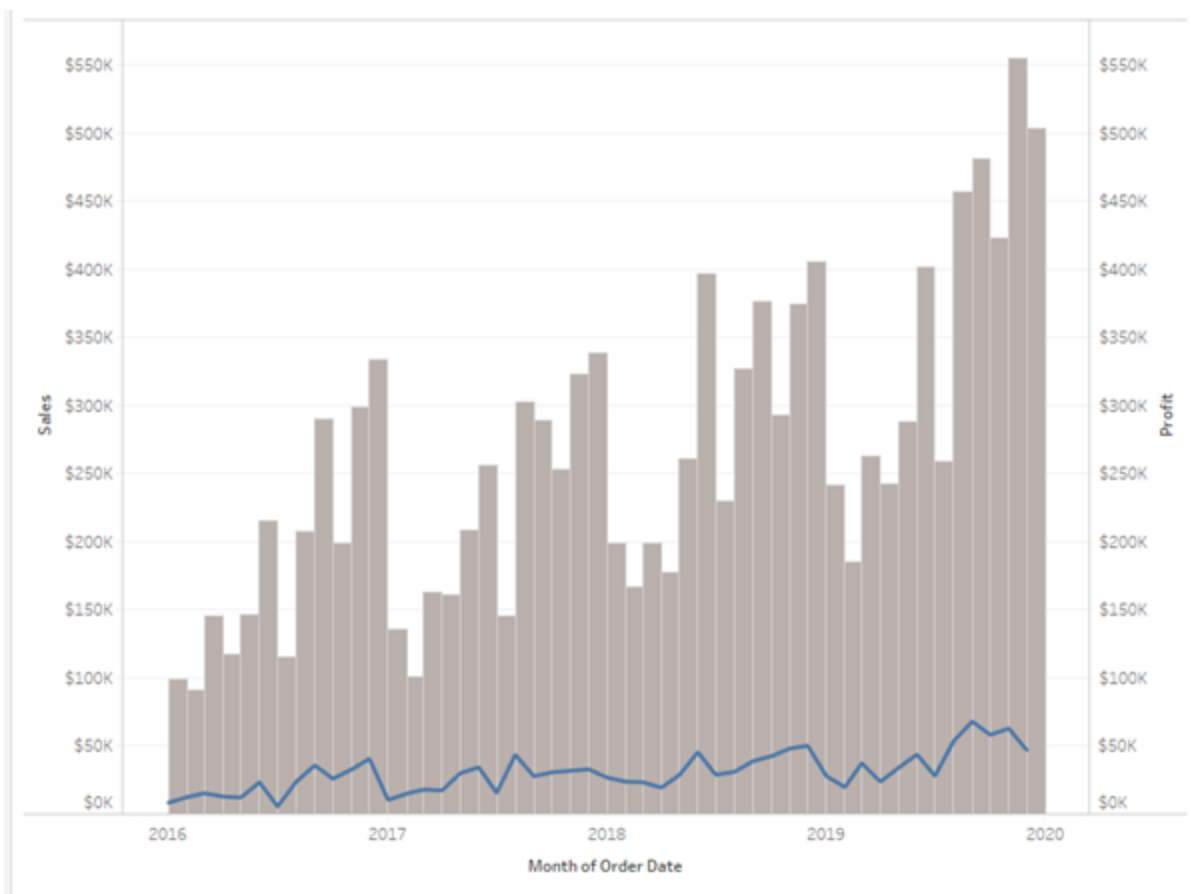
Directions

1. Open Tableau Desktop and connect to the Excel data source **Global_Superstore_Recent_Dates.xlsx** (in the **Practices\Data** folder).
2. Use the **Orders** sheet for your analysis.
3. Create an initial view showing **Sales** by **Order Date**.
4. Right-click **Order Date** on **Columns** and select the **Month** date value (May 2015) format.
5. Change the mark type to **Bar**.

6. Create a dual axis chart using **Profit**. Hint: use the opposite axis.
7. Change the mark type to **Line** for the newly-created **Profit** axis.
8. Synchronize the **Profit** axis to the **Sales** axis.
9. Edit the colors so **Sales** is shown as light gray bars instead of orange. Hint: use the **Tableau Classic 20** color palette.

SELF CHECK Which month had the greatest sales? Is this the same month that had the greatest profit?

Solution

For the solution to this practice, see "Solution: Dual Axis Chart" on page 76.

8. Viewing Specific Values

This module contains the following:

Practice: Totals and Aggregation

Practice: Highlight Table

31

Practice: Totals and Aggregation

View One: Total Sales

Create a crosstab that shows total product sales broken down by category, sub-category, and market. Use your crosstab to compare totals across different dimensions.

Category	Sub-Categ..	Market				
		APAC	EMEA	LATAM	USCA	Grand Total
Furniture	Bookcases	504,823	538,720	302,415	120,614	1,466,572
	Chairs	512,974	354,836	302,219	331,652	1,501,682
	Furnishings	101,038	129,571	62,456	92,514	385,578
	Tables	225,099	179,248	144,880	207,815	757,042
	Total	1,343,934	1,202,374	811,971	752,595	4,110,874
Office Supplies	Appliances	307,621	405,896	182,075	115,473	1,011,064
	Art	63,008	236,661	41,185	31,238	372,092
	Binders	63,527	148,743	43,140	206,502	461,912
	Envelopes	52,112	60,392	41,357	17,044	170,904
	Fasteners	28,097	32,497	19,145	3,504	83,242
	Labels	22,323	24,618	13,555	12,908	73,404
	Paper	59,901	66,202	38,190	79,999	244,292
	Storage	216,076	534,543	142,036	234,431	1,127,086
	Supplies	71,655	80,197	43,239	47,983	243,074
	Total	884,320	1,589,749	563,921	749,081	3,787,070
Technology	Accessories	186,235	249,410	141,739	171,854	749,237
	Copiers	494,594	541,527	316,322	156,994	1,509,436
	Machines	190,307	354,299	40,941	193,513	779,060
	Phones	486,354	590,665	289,711	340,093	1,706,824
	Total	1,357,490	1,735,901	788,714	862,453	4,744,557
Grand Total		3,585,744	4,528,024	2,164,605	2,364,129	12,642,502

Directions for View One

1. Open Tableau Desktop and connect to the Excel data source **Global Superstore.xlsx** (in the **Practices\Data** folder).
2. Use the **Orders** sheet for your analysis.
3. Rename **Sheet 1** to **Total Sales**.
4. On the **Total Sales** worksheet, create a crosstab that shows the total **Sales** of each **Category** and **Sub-Category** of product broken down by **Market**.
5. Show all subtotals.
6. Show all row and column grand totals.

SELF CHECK 1 Which **Market** had a higher **Grand Total** for **Sales** than the entire **Furniture Category**?

View Two: Maximum Sales

Create a new crosstab that shows maximum product sales, broken down by category, sub-category, and market.

Category	Sub-Category	Grand Total	Market			
			APAC	EMEA	LATAM	USCA
Grand Total		22,638	6,999	7,959	3,474	22,638
Furniture	Total	5,760	5,760	5,729	3,473	4,416
	Bookcases	5,668	5,668	3,499	2,751	4,405
	Chairs	5,760	5,760	5,729	3,473	4,416
	Furnishings	1,519	880	1,519	785	1,336
	Tables	5,451	5,451	5,451	3,117	4,298
Office Supplies	Total	9,893	4,864	7,959	3,243	9,893
	Appliances	7,959	4,864	7,959	3,243	2,625
	Art	1,113	513	769	479	1,113
	Binders	9,893	609	720	434	9,893
	Envelopes	605	486	570	435	605
	Fasteners	271	226	271	119	116
	Labels	786	160	158	104	786
	Paper	734	498	677	315	734
	Storage	2,963	1,981	2,963	1,455	2,934
	Supplies	8,188	540	667	431	8,188
Technology	Total	22,638	6,999	5,785	3,474	22,638
	Accessories	3,450	3,079	3,450	2,298	3,347
	Copiers	17,500	4,448	5,301	2,366	17,500
	Machines	22,638	2,195	2,910	1,601	22,638
	Phones	6,999	6,999	5,785	3,474	4,549

Directions for View Two

1. Create a duplicate crosstab named **Maximum Sales**.
2. Change **Sales** to be aggregated using **Maximum**.
3. Show the row totals on the left and the column totals on the top in the crosstab.

SELF CHECK 2 Which **Market** had the **Maximum Sales** for any product? Which **Category** and **Sub-Category** product was responsible for that maximum?

Solution

For the solution to this practice, see "Solution: Totals and Aggregation" on page 78.

Practice: Highlight Table

Create a highlight table that shows profit for category and sub-category broken down by market and region. Include grand totals for the rows in the color encoding to see which sub-categories were the most and least profitable.

Category	Sub-Categ..	APAC Central Asia	North Asia	Oceania	Southeast Asia	EMEA Africa	Central	EMEA	North	South	LATAM Caribbean	Central	North	South	USCA Canada	Central	East	South	West	Grand Total
Furniture	Bookcases	21,944	25,657	13,389	6,667	7,165	20,290	7,938	15,289	20,829	1,949	11,167	4,977	6,794	1,343	-1,998	-1,168	1,339	-1,647	161,924
	Chairs	17,435	26,509	15,028	3,230	2,784	22,218	-610	4,754	-7,181	5,416	8,278	5,215	9,872	857	6,593	9,358	6,612	4,028	140,396
	Furnishings	5,367	5,486	3,862	1,452	2,302	11,023	1,441	-2,801	5,428	-1,205	2,436	-3,523	2,527	114	-3,906	5,881	3,443	7,641	46,967
	Tables	4,190	-5,471	-230	-18,618	4,011	-15,321	2,764	3,296	-8,974	63	-2,670	3,716	-13,415	300	-3,560	-11,025	-4,623	1,483	-64,083
Office Supplies	Appliances	6,269	12,859	12,444	10,557	3,670	18,184	3,024	7,785	20,369	5,597	4,136	12,189	4,226	2,234	-2,639	8,391	4,124	8,261	141,681
	Art	2,172	4,101	2,255	-1,190	3,977	19,464	1,452	4,016	7,314	964	1,722	3,675	590	913	1,195	1,900	1,059	2,374	57,954
	Binders	2,767	2,907	2,728	2,395	2,659	12,825	2,910	2,470	4,466	1,145	1,186	2,756	228	786	-1,044	11,268	3,901	16,097	72,450
	Envelopes	2,182	3,421	1,262	-1,641	1,518	4,732	811	1,704	2,205	994	1,647	3,286	346	171	1,778	1,812	1,465	1,909	29,601
	Fasteners	1,025	1,480	774	-1,602	854	2,997	945	533	898	467	360	1,297	408	140	237	264	174	275	11,525
	Labels	896	1,300	1,158	-870	786	2,006	391	480	802	366	659	946	415	129	1,073	1,129	1,041	2,303	15,011
	Paper	3,006	3,032	2,693	-1,859	2,063	4,871	887	1,320	2,693	1,292	1,356	2,517	909	374	6,972	9,015	5,947	12,119	59,208
	Storage	6,138	8,482	7,706	2,418	11,915	24,845	3,453	6,484	-3,379	2,616	3,649	8,687	1,256	2,912	1,970	8,389	2,274	8,645	108,461
	Supplies	2,649	3,344	2,286	-4,034	1,038	6,484	997	933	2,208	1,378	1,311	3,326	1,556	297	-662	-1,155	2	626	22,583
Technology	Accessories	8,026	8,796	7,702	-8,642	6,478	18,861	3,583	5,000	9,581	3,346	6,423	11,123	6,116	1,295	7,252	11,196	7,005	16,485	129,626
	Copiers	17,812	30,090	21,597	11,356	14,009	22,602	8,178	15,539	18,059	7,179	6,540	21,343	5,983	2,664	15,609	17,023	3,659	19,327	258,568
	Machines	7,494	10,308	3,958	4,783	5,948	11,930	2,742	9,559	-4,201	-2,604	441	3,680	839	608	-1,486	6,929	-1,439	-619	58,868
	Phones	23,108	23,277	21,477	13,452	17,695	27,523	2,991	15,421	-5,600	5,608	7,522	17,608	-560	2,680	12,323	12,315	10,767	9,111	216,717

Directions

1. Open Tableau Desktop and connect to the Excel data source **Global Superstore.xlsx** (in the **Practices\Data** folder).
2. Use the **Orders** sheet for your analysis.
3. Create a view that shows **Profit** as colored text.
   Hint: Use the **Marks** card.

4. Continue making the view by showing profit for **Category** and **Sub-Category**.
5. Refine the view by adding in **Market** and **Region**.
6. Change the **Mark** type to **Square**.
7. Use **Show Row Grand Totals**.
8. Edit **Color** on the **Marks** card to include totals.

SELF CHECK Which product **Sub-Category** was the most profitable? Which was the least profitable?

Solution

For the solution to this practice, see "Solution: Highlight Table" on page 78.

---

9. Showing the Relationship Between Numerical Values

This module contains the following:

Practice: Marketing Expenses Scatter Plot

Practice: Marketing Expenses Scatter Plot

Create a scatter plot to compare average sales with average marketing expenses, broken down by area code and product type. Use a highlighter and Explain Data to examine outliers and to compare specific marks with others in the data set.
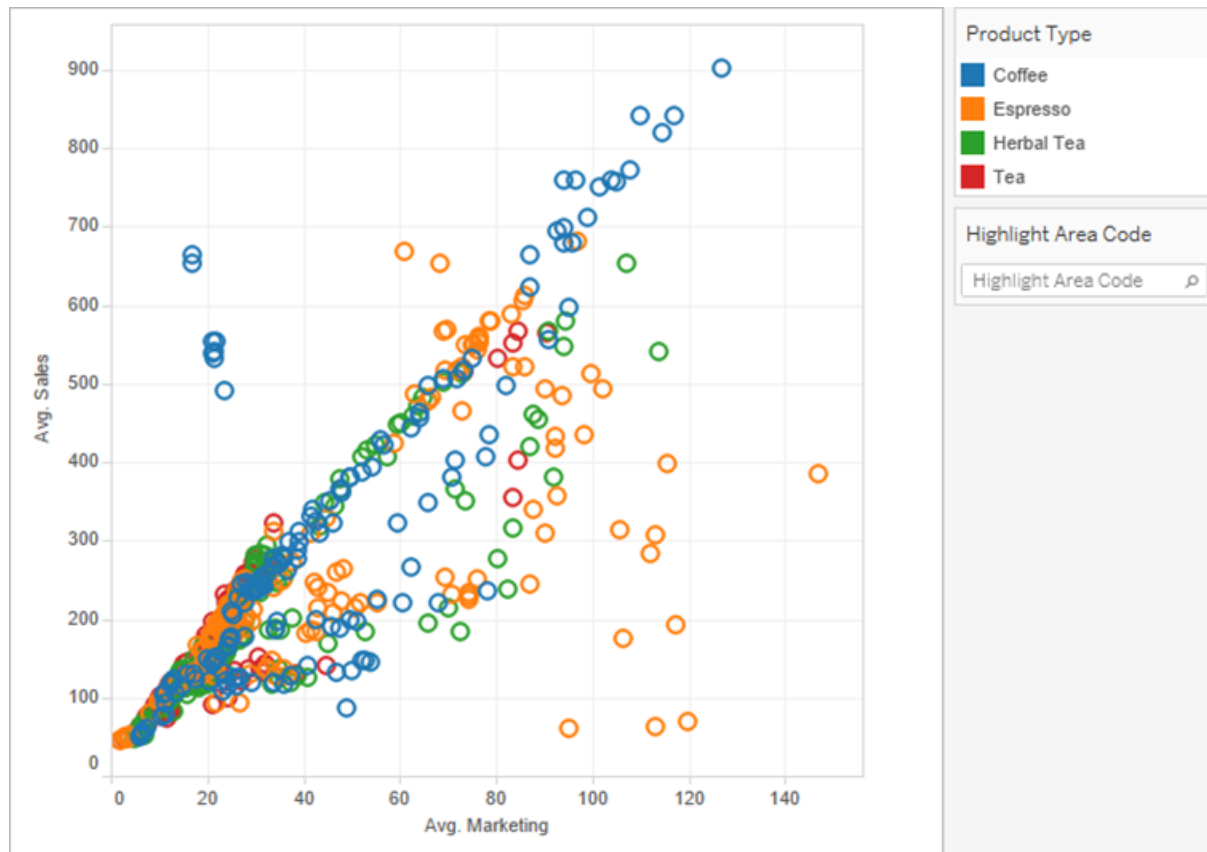
Directions

1. Open Tableau Desktop and connect to the Excel data source **CoffeeChain_Query.xlsx** (in the **Practices\Data** folder).
2. Create a scatter plot that compares average **Marketing** expenses with average **Sales** values.
3. Add **Area Code** and **State** to the worksheet's level of detail.
4. Use color to show the **Product Type**.
5. Add a highlighter for **Area Code**.

SELF CHECK 1 What product type has 10 area codes with over $100 in average marketing expenses while yielding below $500 in average sales?

Analyze with the Highlighter and with Explain Data

1. Use the highlighter to select the 530 area code. Note that the espresso **Product Type** seems to be an outlier for this area code.

2. Click the mark and select the **Explain Data icon** in its tooltip.
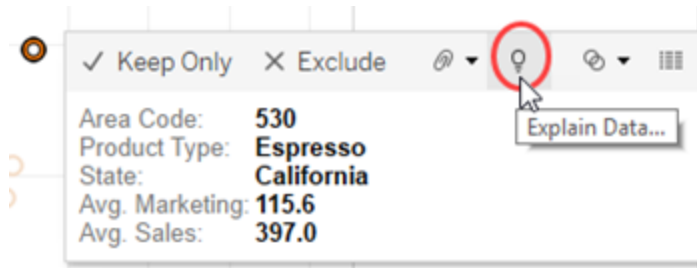
3. At the top of the **Explain Data** window, confirm that **530, Espresso, California** is the selected mark, and that **AVG(Sales)** is the selected measure.
4. Below the **AVG(Sales)** tab, read the expected value summary, and then mouse over it to read about the expected value range.
5. Below the summary is a clickable list of possible explanations on the left, and a description of the selected explanation on the right. Notice that Explain Data only surfaced a single explanation for this data set. Examine the information shown.
6. If desired, click the **AVG(Marketing)** tab to see its summary information.

SELF CHECK 2 What is the possible explanation given for the higher than expected average sales value for espresso in area code 530?

Solution

For the solution to this practice, see "Solution: Marketing Expenses Scatter Plot" on page 79.

10. Mapping Data Geographically

This module contains the following:

Practice: Airport Geographic Mapping

Practice: Creating Geographic Groups

Practice: Airport Geographic Mapping

Create a map of European airports using the three-character (IATA) airport industry codes. Use size and color to compare the number of passengers for each airport in 2019. Add a filter to the view so you can easily determine which airports were the busiest.
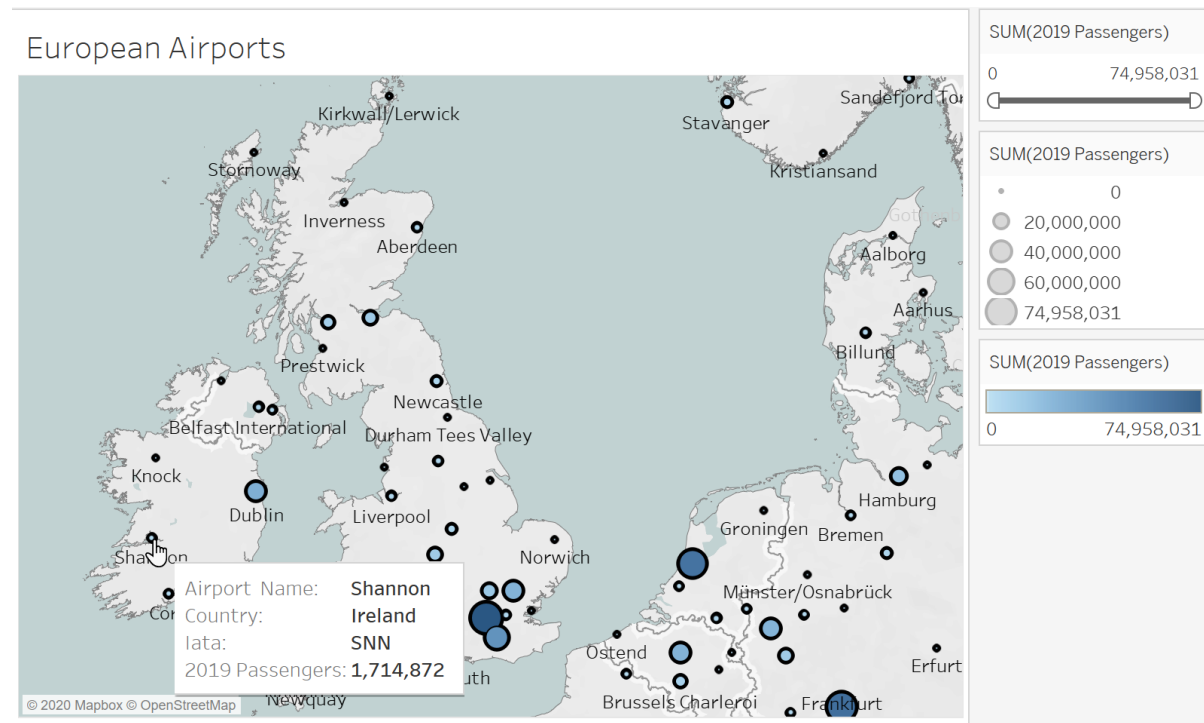
Directions

1. Open Tableau Desktop and connect to the Excel data source **European Airports 2019.xlsx** (in the **Practices\Data** folder).
2. Use the **Airports** sheet for your analysis.
3. Rename **Sheet 1** to **European Airports**.
4. Create a map by dragging the **IATA** airport code to **Detail**. Notice the indicator in the bottom right of the map. The code for **MADMAD** was entered incorrectly in the data.
5. Click the **1 unknown** notification on the map and edit the location from **MADMAD** to the airport code of **MAD** for **Madrid**.
6. Label the map with the **Airport Name**.
7. Add **Country** to **Detail**.
8. Show the number of **2019 Passengers** using **Size** and **Color**.
9. Increase the size of the marks.
10. Edit the color of the marks to set the **Opacity** to 75%, and add a black **Border**.
11. Adjust the **Map Layers** to select the **Normal** map style and show the **Coastline**. Clear **Country/Region Names**, and **State/Province Borders**, and **State/Province Names** to remove those layers from the map.

You may need to adjust the level of zoom of the map in order to check or clear certain layer options.

12. Test the levels of zoom, and map selection options on your map.
13. Add a filter to the view with a slider for **2019 Passengers**. Test the filter.

SELF CHECK Use the **SUM(2019 Passengers)** filter slider to answer the following question: Which were the five busiest airports in 2019?

BONUS Reset the **SUM(2019 Passengers)** filter slider to show all airports. Then, add a filter for **Airport Name** to check your answer to the question: Which were the five busiest airports in 2019?

Solution

For the solution to this practice, see " Solution: Airport Geographic Mapping" on page 80.

Practice: Creating Geographic Groups

Use geographic groups to show the total number of schools in custom sales territories for your company in Washington state. Use your map to explore whether you should consider splitting one of your territories.
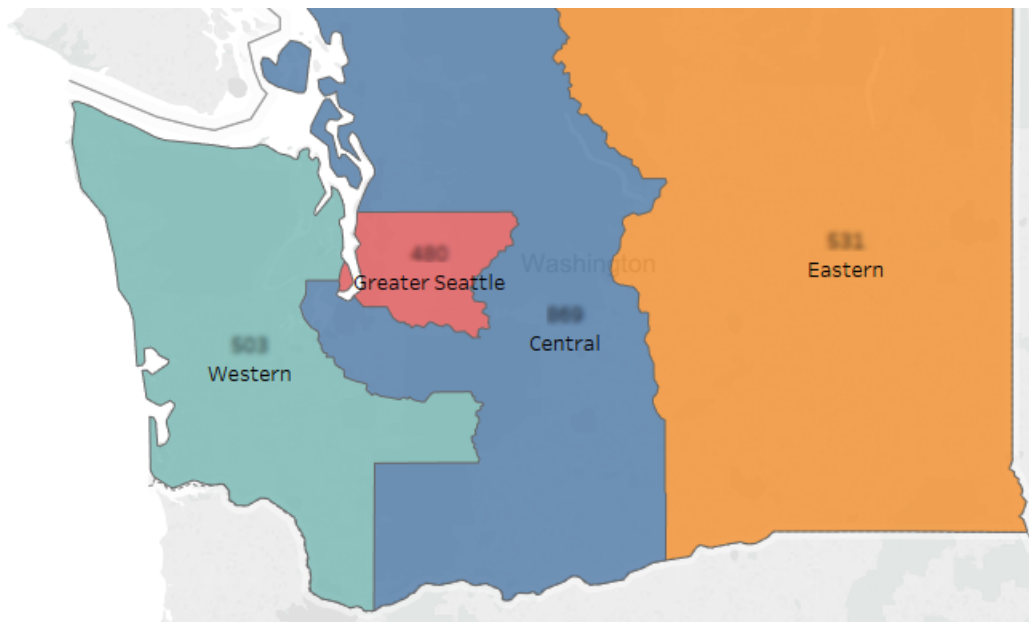
Create a Map

1. Open Tableau Desktop and connect to the Excel data source **school data.xlsx** (in the **Practices\Data** folder).
2. Rename **Sheet 1** to **Geographic Groups**.
3. Create a map with **State** and **County Name**, labeled with the number of **Schools** for each county.

Create Geographic Groups

1. Use the map selection tools or **CTRL+click** to select counties for the first geographic group.
2. On the toolbar, use the **Group** icon with **All Dimensions** to create custom sales territories using geographic groups.
   Note that a new group named **County Name & State (group)** appears in the **Data** pane.
3. Repeat steps 1 and 2 to create the territories as shown.

   NOTE It is not necessary to create the territories exactly as shown. A reasonable resemblance will suffice.

See Number of Schools by Geographic Group

1. Use **Edit Group** to rename the territories as shown.
2. Remove **County Name** from the view to show only the territories. Note that the number of schools is now aggregated for each territory and when you click on the map, each territory acts as a geographical group.
3. Add a copy of the group to **Label** on the **Marks** card.

SELF CHECK If you were the regional sales manager for Washington state, which territory would you consider splitting? Why?

Solution

For the solution to this practice, see "Solution: Creating Geographic Groups" on page 82.

11. Customizing Your Data

This module contains the following:

Practice: Calculations and Aggregations in Profit Ratio

Practice: Using Date Calculations

Practice: Calculations and Aggregations in Profit Ratio

Create a view showing the results of a profit ratio calculation broken down by year and product category. Experiment with the calculation to see how the aggregation level impacts your results. Use your visualization to compare the profit ratio of products, and then use your calculation in additional analysis, if desired.

Year of Order Date	Category		
	Furniture	Office Supplies	Technology
2016	7.10%	12.73%	13.20%
2017	6.77%	12.99%	14.26%
2018	7.52%	14.77%	13.59%
2019	6.48%	13.78%	14.54%

Directions

1. Open Tableau Desktop and connect to the Excel data source **Global_Superstore_Recent_Dates.xlsx** (in the **Practices\Data** folder).
2. On the **Data Source** tab, in the left pane under **Sheets**, double-click **Orders** (or drag and drop it onto the **Drag tables here** area).
3. Create a view called "Profit Ratio by Category" using **Order Date**, **Category**, and **Profit**, showing **Profit** on **Color** with labels.
4. Use the Calculated Field Editor to create a calculation for **Profit Ratio**, using the formula: `[Profit]/[Sales]`.
5. Set the default formatting for the calculation as a percentage with two decimal places.
6. Drag the new calculation to **Color** to replace the original **Profit** field.

   SELF CHECK 1 Examine the results of the calculation. Do percentages appear accurate? Why do you think the numbers are so large?
   How could you fix the calculation?

7. Edit the calculation to `SUM([Profit])/SUM([Sales])`.
8. Drag the edited calculation to **Color** to replace the original **Profit Ratio** calculation and observe the difference.

   NOTE Because you modified a field that was already in the view with a different level of aggregation, you must now replace that field with the new computation.

SELF CHECK 2 Which **Category** has the lowest profit ratio?

Bonus: Use Profitability Ratio in a Logic Calculation

Now that you have demonstrated the profit ratios for categories, create a second visualization that shows the profitability for sub-categories using a simple logic calculation.
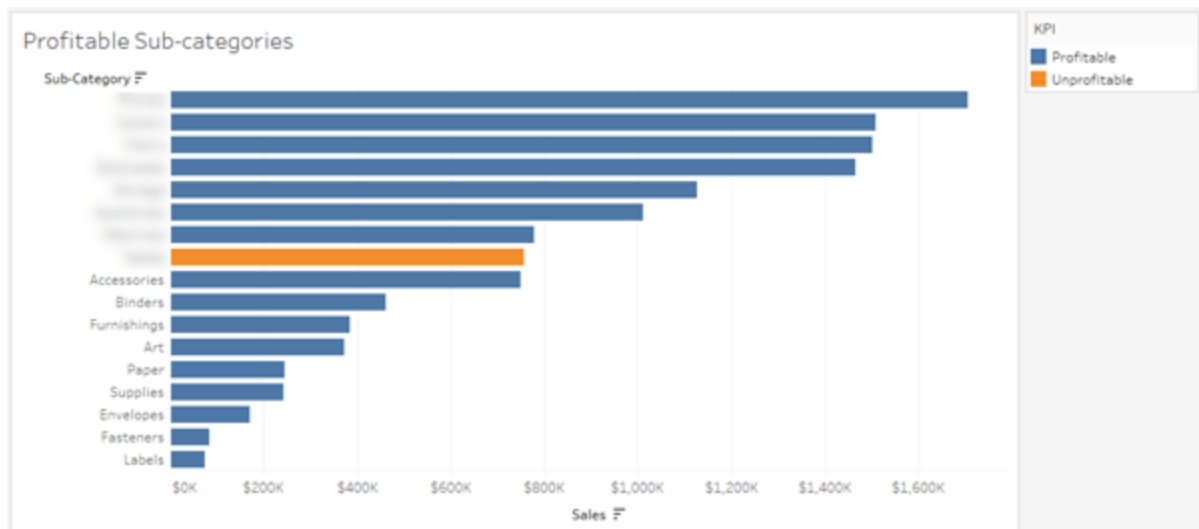
NOTE Some of the image is blurred so some of the sub-category names don't show.

Directions

1. Create a new worksheet called "Profitable Sub-Categories" and then make a bar chart using **Sales** and **Sub-Category**.
2. Use a descending sort by Sum of Sales.
3. Create a new calculated field called **Profitable Sub-Category?**
   ```
   IF [Profit Ratio] > 0 THEN "Profitable"

   ELSE "Unprofitable"

   END
   ```
4. Drag **Profitable Sub-Category?** to **Color** on the **Marks** card.
5. Edit the title of the legend to KPI.
6. Format **Sales** and **Profit** for currency to thousands and no decimals and format the tooltip to include **Profit** and **Profit Ratio**.
7. Save the workbook.

SELF CHECK Which sub-category is the least profitable? How does this relate to the data shown on the **Profit Ratio by Category** worksheet?

Bonus: Create a Simple Dashboard

Use the two views you just created to assemble a simple dashboard.

Profitability

Profit Ratio By Category

Click a cell to filter the Sub-Categories

Year of Order Date	Furniture	Category Office Supplies	Technology
2016	7.10%	12.73%	13.20%
2017	6.77%	12.99%	14.26%
2018	7.52%	14.77%	13.59%
2019	6.48%	13.78%	14.54%

Profit Ratio

6.48%   14.77%

Profitable Sub-categories

KPI
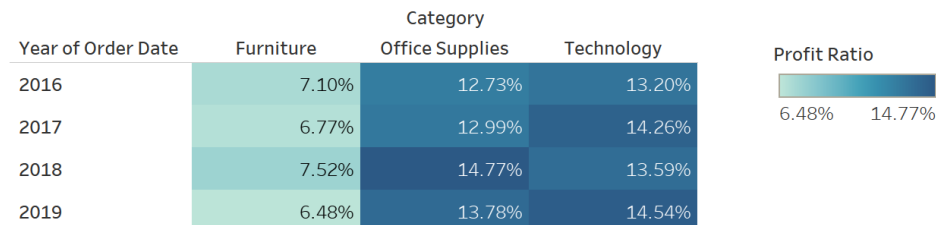
■ Profitable
■ Unprofitable
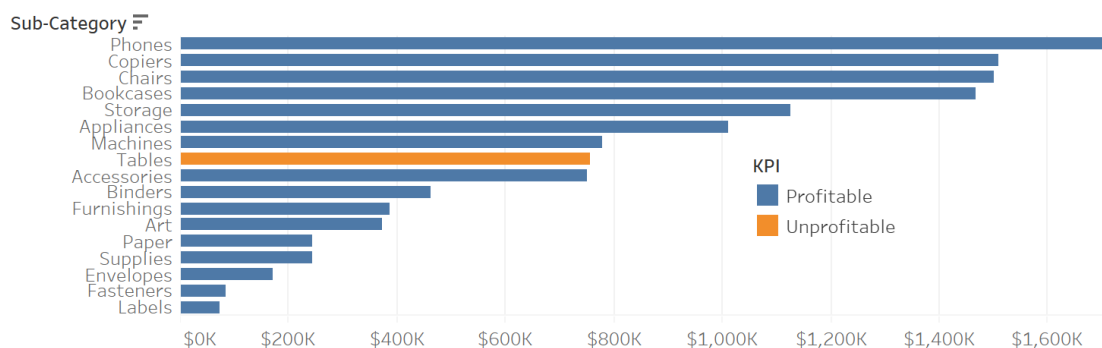
NOTE Dashboards will be covered in more depth later in this course.

Directions

1. Create a new blank dashboard, name its tab "Profitability," and then display and center the dashboard title.
2. Add both views to the dashboard and set the **Profit Ratio by Category** view to act as a filter for the dashboard. Edit its title to add instructions for the filter.
3. Set the dashboard size to 800 x 600 pixels, and float the two sub-menus.

Solution

For the solution to this practice, see "Solution: Calculation and Aggregation in Profit Ratio" on page 83.

✦ Practice: Using Date Calculations

Create a calculated field to determine the average number of days it takes for an order to ship. Then, create a crosstab so you can compare the average days to ship to the average shipping costs by customer segment and order priority.

Order Priority	Segment	Avg. Days to Ship	Avg. Shipping Cost
Critical	Consumer	1.8	$58.25
	Corporate	1.9	$62.07
	Home Office	1.6	$60.10
High	Consumer	3.0	$33.34
	Corporate	3.1	$32.52
	Home Office	3.1	$32.05
Medium	Consumer	4.5	$18.02
	Corporate	4.5	$19.02
	Home Office	4.5	$18.67
Low	Consumer	6.5	$26.26
	Corporate	6.5	$27.41
	Home Office	6.5	$28.47

Directions

1. Open Tableau Desktop and connect to the Excel data source **Global_Superstore_Recent_Dates.xlsx** (in the **Practices\Data** folder).
2. On the **Data Source** tab, in the left pane under **Sheets**, double-click **Orders** (or drag and drop it onto the **Drag tables here** area).
3. Create a calculated field named "Days to Ship" that calculates the number of days between the date an order was placed and the date the order was shipped. Use the DATEDIFF function to create this calculation.
4. Create a crosstab showing **Days to Ship** broken down by **Order Priority** and **Segment**.
5. Change **SUM(Days to Ship)** to use the **Average (AVG)** aggregation.
6. Change the number format of **Days to Ship** to show only one decimal place.
7. Add **Shipping Cost** to your crosstab.
8. Change **SUM(Shipping Cost)** to also use the **Average (AVG)** aggregation.

BONUS Sort the **Order Priority** panes so that they are ordered: **Critical**, **High**, **Medium**, **Low**.

SELF CHECK What is the approximate difference between the average **Days to Ship** for **Critical** priority orders compared to **Low** priority orders? For that same comparison, what is the approximate difference in average shipping costs?

Solution

For the solution to this practice, see "Solution: Using Date Calculations" on page 85.

12. Analyzing Data with Quick Table Calculations

This module contains the following:

Practice: Running Total of Sales

Practice: Year over Year Change

Practice: Running Total of Sales

You have a crosstab that shows yearly sales broken down by category and quarter. Add a running total by quarter, and restart the total for each category. Then use your crosstab to look up specific running totals.

Quarterly Sales by Category

Category1	Quarter of Order Date	2016 Sales	2016 Running Sum of Sal..	2017 Sales	2017 Running Sum of Sal..	2018 Sales	2018 Running Sum of Sal..	2019 Sales	2019 Running Sum of Sal..
Furniture	Q1	109,885	109,885	135,479	135,479	206,246	206,246	217,208	217,208
	Q2	154,694	264,579	199,144	334,623	244,284	450,530	305,043	522,250
	Q3	196,399	460,978	222,301	556,924	311,870	762,399	384,429	906,679
	Q4	295,214	756,192	301,978	858,903	355,324	1,117,724	471,377	1,378,056
Office Supplies	Q1	90,199	90,199	125,283	125,283	178,544	178,544	209,414	209,414
	Q2	157,863	248,062	180,773	306,056	241,935	420,479	299,630	509,044
	Q3	200,995	449,057	222,450	528,506	274,183	694,663	366,765	875,809
	Q4	226,550	675,606	266,589	795,095	316,055	1,010,718	429,842	1,305,652
Technology	Q1	135,696	135,696	138,606	138,606	180,229	180,229	262,585	262,585
	Q2	166,313	302,009	245,676	384,282	348,621	528,850	328,314	590,899
	Q3	215,913	517,922	293,017	677,299	346,984	875,834	445,289	1,036,188
	Q4	309,730	827,652	346,143	1,023,442	401,471	1,277,305	579,970	1,616,159

Directions

1. Open **Running_Total_of_Sales_Starter.twbx**.
2. Edit **Sales** to use a Quick Table Calculation so that it shows the Running Total of **Sales**.

   NOTE The Running Total table calculation defaults to run across the rows instead of down the columns. If the calculation can't run across the rows, then it will default to run down the columns.

3. Edit the table calculation so the Running Total is computed with the total calculated down each column, restarting for each new **Category**.
4. Add **Sales** to the view so that it is before **Running Sum of Sales**.

SELF CHECK What were the running totals for **Furniture** in **Q3** and **Q4** of 2018?

Solution

For the solution to this practice, see "Solution: Running Total of Sales" on page 86.

Practice: Year over Year Change

Create a bar chart that uses color to show the percent difference in year-over-year sales. Add filters to the view for market and sub-category so you can quickly compare the growth of art products within different markets.
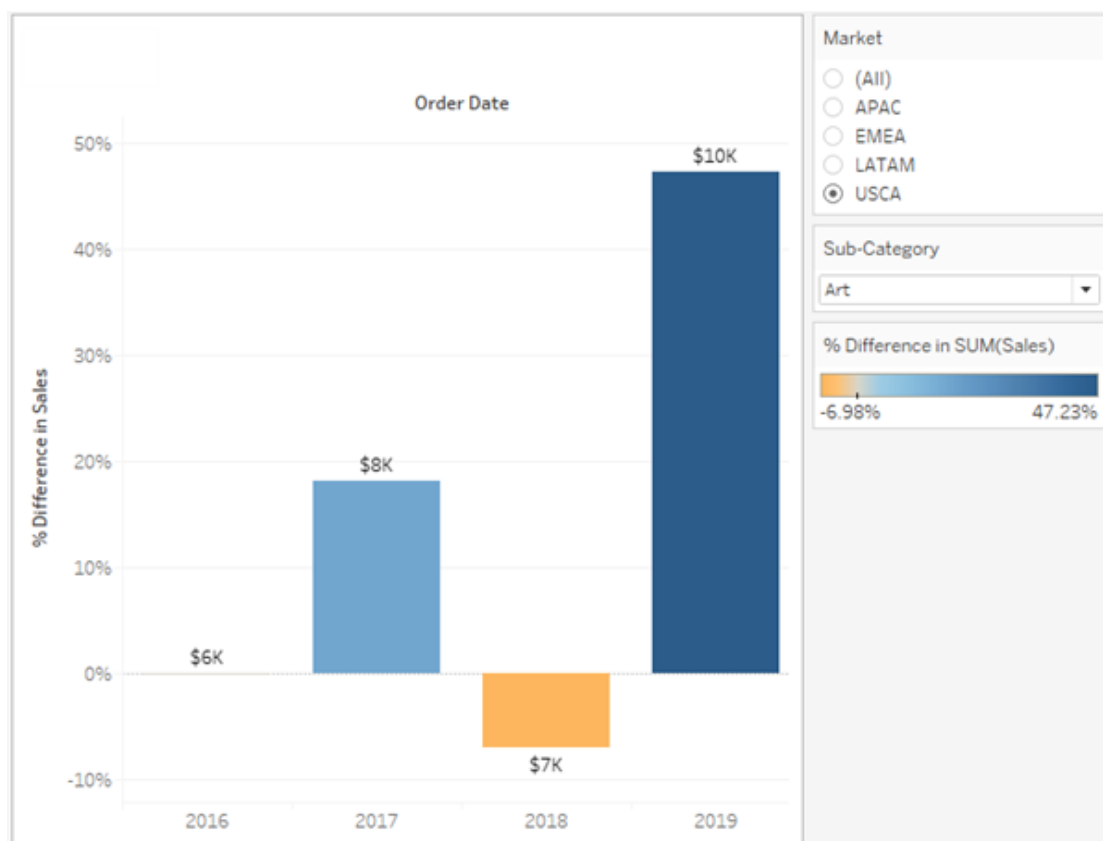
Directions

1. Open Tableau Desktop and connect to the Excel data source **Global_Superstore_Recent_Dates.xlsx** (in the **Practices\Data** folder).
2. On the **Data Source** tab, in the left pane under **Sheets**, double-click **Orders** (or drag and drop it onto the **Drag tables here** area).
3. Create the initial view showing **Sales** by **Order Date**.
4. Use a Quick Table Calculation to edit **Sales** to show it as **Year Over Year Growth**.
5. On the **Marks** card, change the mark type to **Bar**.
6. Show the amount of change year over year using color and edit the color palette to Orange-Blue Diverging.
7. Show a **Single Value (dropdown)** filter for **Sub-Category** and filter to see only **Art**.
8. Show a **Single Value (list)** filter for **Market** and filter to see only **USCA**.
9. Drag another instance of **Sales** to **Label**.
10. Set the Null values to show at the default position (0).

SELF CHECK 1 What was the percent difference in year over year sales between 2017 and 2018 in **USCA** for **Art**?

SELF CHECK 2 Was there a negative percent difference in year over year sales between 2017 and 2018 in any other **Market** for **Art**?

Solution

For the solution to this practice, see "Solution: Year over Year Change" on page 87.

13. Showing Breakdowns of the Whole

This module contains the following:

Practice: Percent of Total Sales

Practice: Tree Map

Practice: Percent of Total Sales

Create a pie chart to show how sales for each segment compare as a percentage of total sales.
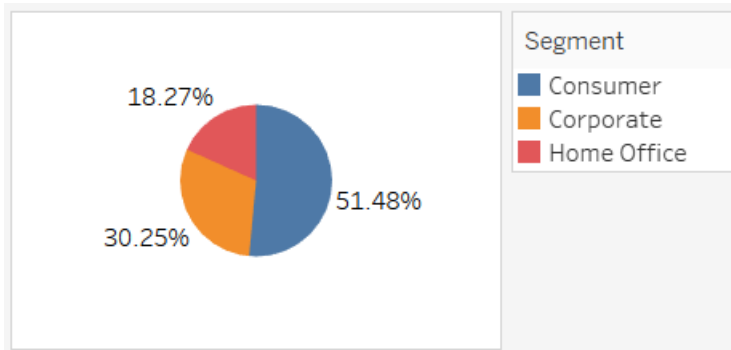
Directions

1. Open Tableau Desktop and connect to the Excel data source **Global Superstore.xlsx** (in the **Practices\Data** folder).
2. Use the **Orders** sheet for your analysis.
3. Change the mark type to **Pie**.
4. Show each **Segment** by **Color** in the pie chart.
5. Use **Sales** to determine the **Angle** for each pie section.
6. **Label** each pie section with the **Sales** amount.
7. Calculate **Sales** for each pie section as a **Percent of Total**. (**HINT**: use the **Sales** field on the label).
8. Resize the chart. (**HINT**: Use the drop-down toolbar to change the view from **Standard** to **Entire View**.)

Solution

For the solution to this practice, see "Solution: Percent of Total Sales" on page 88.

Practice: Tree Map

Create a tree map that uses color for each market and size to visualize sales. Add a highlighter to the view so you can compare sales for specific sub-categories.
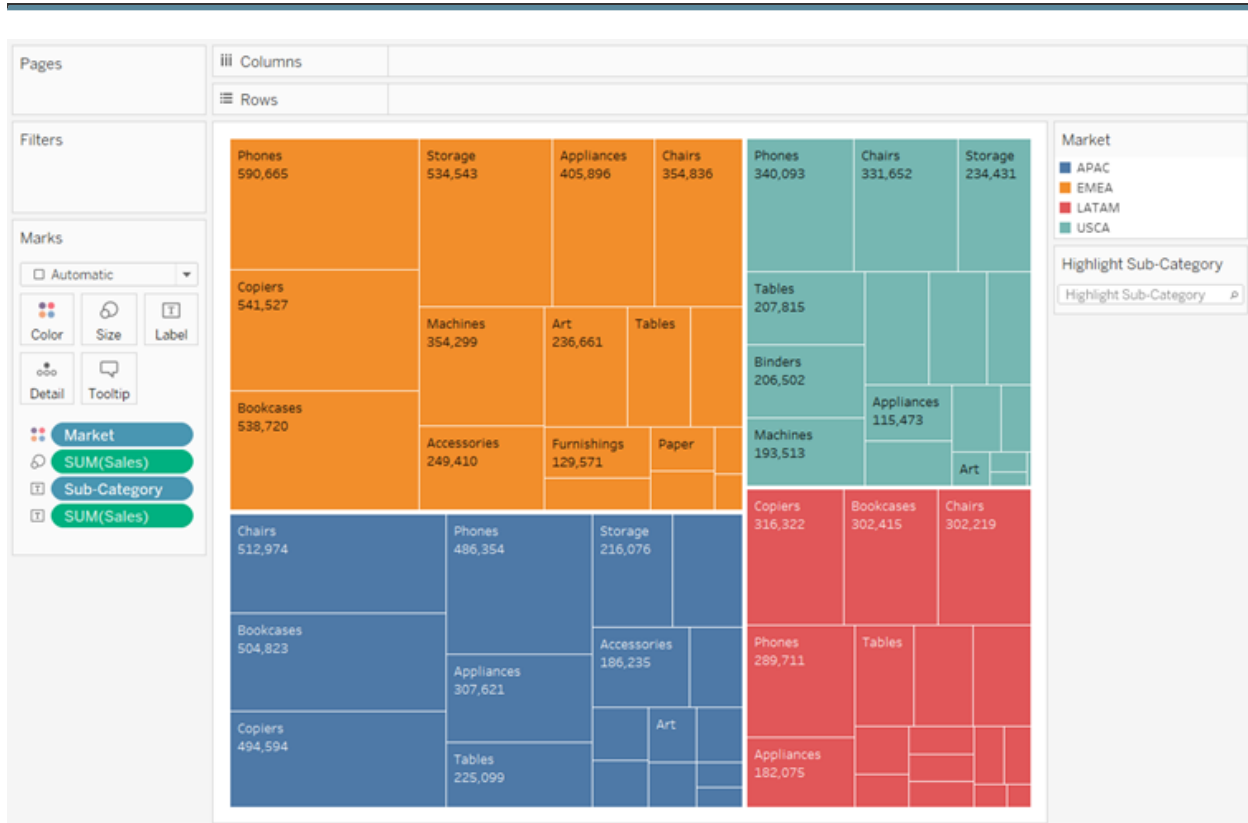
Directions

1. Open Tableau Desktop and connect to the Excel data source **Global Superstore.xlsx** (in the **Practices\Data** folder).
2. Use the **Orders** sheet for your analysis.
3. Create a tree map with **Market** on **Color** and **Sales** on **Size**.
4. Label the tree map with **Sub-Category** and **Sales**.
5. **Show Highlighter** for **Sub-Category**.

SELF CHECK In which market do **Appliances** have higher sales, **EMEA** or **APAC**? What is the approximate difference?

Solution

For the solution to this practice, see "Solution: Tree Map" on page 88.

14. Highlighting Data with Reference Lines

This module contains the following:

Practice: Reference Lines

Practice: Reference Lines

View One

You have a bar chart that shows sales by region. Add a constant reference line that shows the sales quota, so you can easily see where sales have been slow.
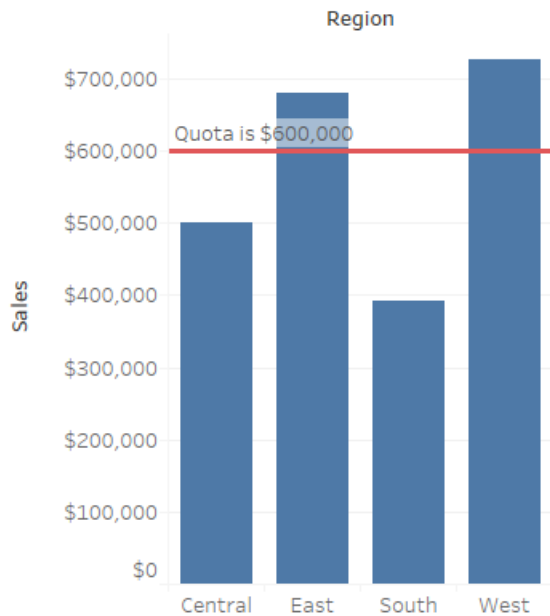
Directions

1. Open **Reference_Line_Starter.twbx**.
2. Add a dark red and bold reference line for the entire table, with a constant value type of $600,000 and a custom label that reads "Quota is $600,000".

View Two

Starting with a duplicate of the first worksheet, delete the quota reference line. Change the view to show sales for each region broken down by segment. Then, add a new reference line so you can compare the average sales.
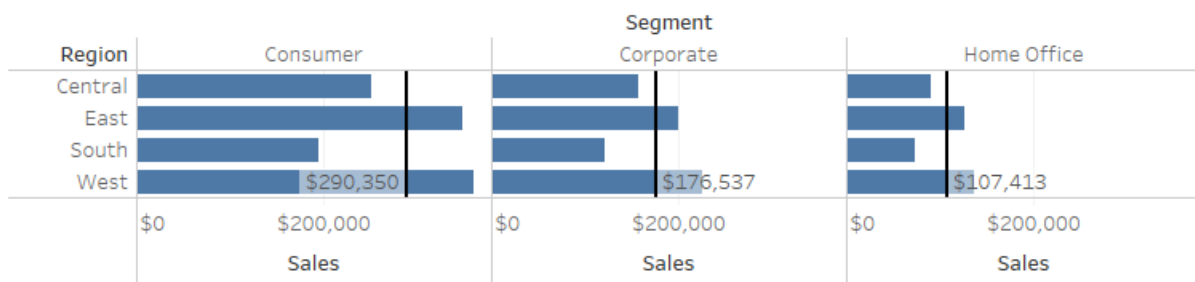
Directions

1. Duplicate the **View One** worksheet and name the new worksheet **View Two**.
2. Remove the Quota reference line.
3. Change the bar chart to show **SUM (Sales)** by **Region**, broken down by **Segment**.
4. Use the **Analytics** pane to add an **Average Reference Line** by **Pane** to the view.
5. Edit the Reference Line to be black and display the value of the Average as a label.
6. Select a custom tooltip and type "Average sales value is " in the text box and then insert **Value** from the menu.
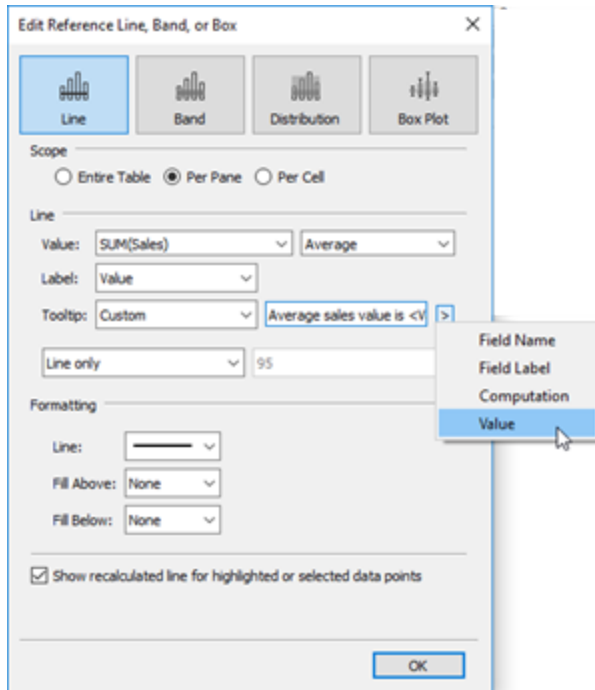
7. Click **OK.**
8. Observe how the reference line recaculates when a region in the view is selected. Hover over a reference line to see its tooltip.

SELF CHECK Which **Region** consistently has the highest above average sales in every **Segment**?

Solution

For the solution to this practice, see "Solution: Reference Lines" on page 89.

15. Making Your Views Available

This module contains the following:

Practice: Building a Dashboard

Practice: Creating an Interactive Dashboard

61

Practice: Building a Dashboard

Create a dashboard for laptops that shows all of the worksheets in the starter workbook. Remove unnecessary legends, and change the market filter to apply to all of the worksheets. Then, use the pie chart as a filter for the rest of the dashboard.
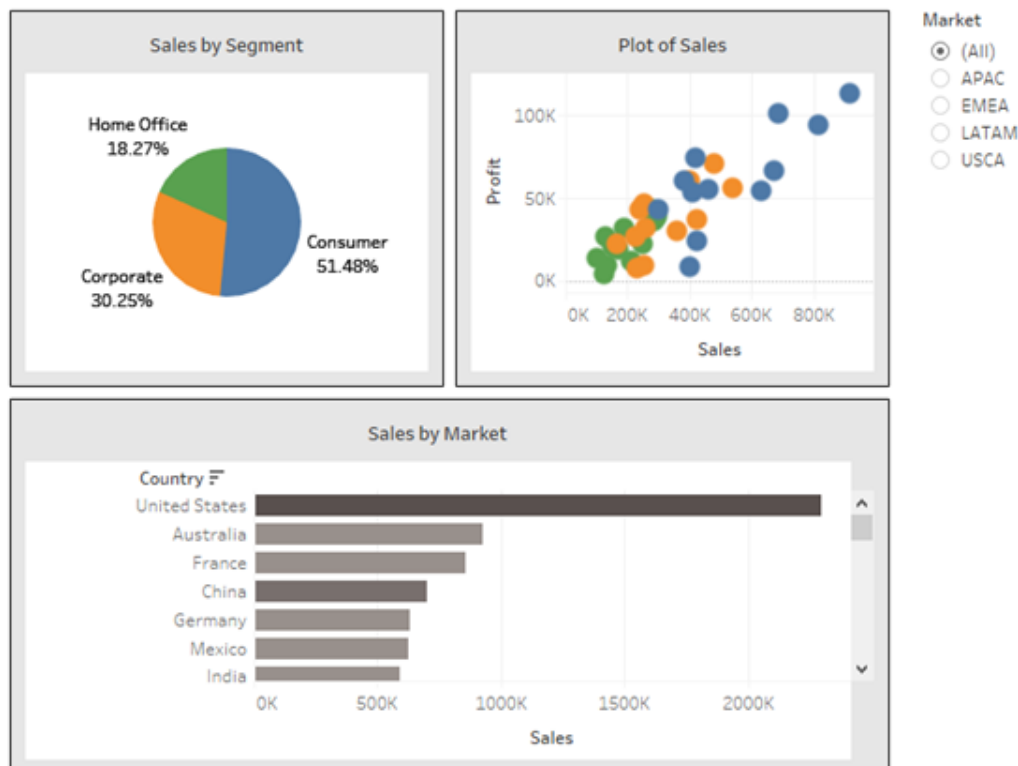
Directions

1. Open **Building_a_Dashboard_Starter.twbx**.
2. Use the **Format** menu on the **Sales by Market** sheet to open the animations pane.
3. On the animations pane, under **Workbook Default**, click the **On** button, and then select the duration of **0.50 seconds (Medium)**.
4. Close the animations pane.
5. Add a **Dashboard** sheet and name it "Sales Dashboard."
6. Change the settings for size to **Laptop Browser**, and select **Show Title**.
7. Drag the three worksheets onto the dashboard space as shown, or in another way that is visually appealing.
8. Set the top two views to fit the **Entire View** within their layout containers.
9. Set **Sales by Market** to **Standard** fit.
10. Remove unnecessary legend items, or move them closer to the view they reference.

11. To each view (**Sales by Segment**, **Plot of Sales**, and **Sales by Market**), add a black border, a light gray background, and set inner padding to "10".
12. To the **Market** filter, set the top inner padding to "40" and the left inner padding to "15".
13. Make the **Market** filter global (that is, the filter applies to all worksheets using this data source).
14. Make the pie chart interactive by choosing **Use as Filter**.

Solution

For the solution to this practice, see "Solution: Building a Dashboard" on page 90.

Practice: Creating an Interactive Dashboard

Create a dashboard for a custom screen size that shows all of the worksheets in the starter workbook. Add dashboard filters to support the following interactions:

- Filter all other worksheets when you select a mark on the map.
- Filter the text table when you select a mark on the bar chart.
- Show a web page with more information about individual Olympic sports and athletes when you click on a tooltip context menu link.

Then, add instructive text and field name references to titles to support user interaction.

Create the Dashboard

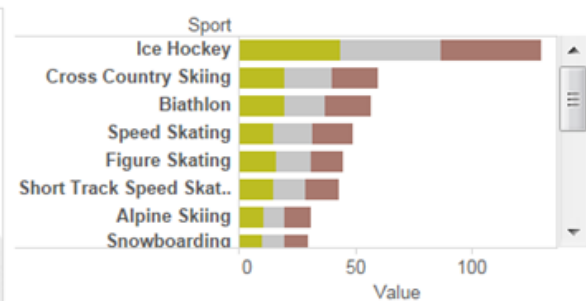1. Open **Creating_an_Interactive_Dashboard_Starter.twbx**.
2. Add a new dashboard tab named "2014 Sochi Olympics Results."
3. Change the dashboard size to **Custom**, with a width = 900, height = 600.
4. Drag the three worksheets onto the dashboard space as shown, or in another way that is visually appealing.
5. Adjust the fit of the views, as desired.

Add Dashboard Actions

1. Add a dashboard filter action to the map that runs when a mark is selected and targets all other worksheets. Change the settings so that clearing the selection will show all values again.
2. Create a similar filter action for the bar chart that targets the text table.
3. Test both dashboard filter actions.
4. Create a dashboard URL action to look up a specific sport on Wikipedia from the tooltip context menu on the bar chart and the text table:

   "http://en.wikipedia.org/wiki/**<Sport>**"

   NOTE A field value can be referenced by surrounding the field name with the "<" and ">" symbols.

   ---

5. Add another URL action to look up a specific athlete from the tooltip context menu on the text table:

   "http://www.bing.com/search?q='**<Athlete>**' +Olympics"
6. Test both URL actions.

Edit Titles to Support User Interaction

1. Show the dashboard title.
2. Edit the title for the map to add instructive text:

   Click a country

   and format to fit, as needed.
3. Similarly, edit the bar chart title to add instructive text:

   Next, choose a sport to see the list of athletes

   and format to fit, as needed.
4. Edit the title for the bar chart to leave the reference for the sheet name, and add a reference for the country:

   "**<Sheet Name>** for **<Country>**"
5. Similarly, edit the title for the text table to read:

   "**<Sheet Name>** for **<Sport>**"
6. Test the interactive titles.

SELF CHECK 1 How many medals did **Canada** win in **Speed Skating**? Which athlete(s) won those medals?

SELF CHECK 2 If the list of all athletes is taking longer to load than desired, how can you improve the dashboard performance by only displaying athletes for selected events?

Solution

For the solution to this practice, see "Solution: Creating an Interactive Dashboard" on page 94.

16. Appendix A: Practice Solutions

This section contains the solutions for all practices contained in this training manual.

Solution: Exploring Tableau and the Data

The following is a solution to "Practice: Exploring Tableau and the Data" on page 8.

Connect to Data

1. Open Tableau Desktop, and under **Connect** click **Microsoft Excel**.
2. Navigate to the **Practices** folder and open the **Data** folder.
3. Select the **libraries.xlsx** file and click **Open**.

   You should now see the data from the Excel file on the lower half of the screen, with the **Libraries Public and Academic** sheet in the area above.

4. In the bottom left corner, click **Sheet 1** tab to go to the worksheet.

Analyze the Data and Build Two Views

Question 1: Which state has the most Carnegie public libraries?

1. Create a bar chart using the dimension **State** and measure **Public libraries**.

Drag this field	To
From the **Data** pane, under **Measures**: **Public libraries**	**Columns**
From the **Data** pane, under **Dimensions**: State	**Rows**

2. On the toolbar, click the **Sort Descending** icon ↓📊. This sorts the values from highest to lowest.
3. Double-click the tab **Sheet 1**, and type a name for your view. For example: "Number of public libraries by state"

The state with the most Carnegie public libraries: Indiana.

Question 2: Which state was granted the most money to build libraries?

1. Click the **New Worksheet** tab to add a second worksheet:

2. Create a text table (also referred to as a crosstab):

Drag this field	To
From the **Data** pane, under **Measures**: **Total amount of grants**	The middle of the view, labeled **Drop field here**
From the **Data** pane, under **Dimensions**: **State**	**Rows**

3. From the **Data** pane, add more measures to the view: drag **Public libraries** to the text table, and when Desktop displays **Show Me**, drop the field.
4. Repeat the previous step for the fields **Public grants** and **Academic libraries**.
5. On the toolbar, use the drop-down to change from **Standard** to **Fit Width**. This expands the view so you can read the column headings.
6. Hover your pointer over the **Total amount of grants** column header, and click the **Sort Descending**

    Total amount of grants ⊳

    icon that displays.
7. Give your worksheet a title. Double-click the tab **Sheet 2**, and type a name for your view. For example: "Total amount of grants"

The state with the highest total amount of grant money: New York.

Build a Dashboard

1. Click the **New Dashboard** tab to add a dashboard.

2. Under **Sheets**, drag the worksheet **Number of public libraries by state** to the dashboard on **Drop sheets here**.
3. Drag the worksheet **Total amount of grants** to the bottom half of the dashboard and drop when you see the gray box.

4. Click the **Number of public libraries by state** sheet to select it, and then click the **Use as Filter** button.
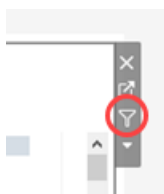
5. Use CTRL + click to select both Indiana and New York.

    *Notice how the **Total amount of grants** sheet now displays only the results for Indiana and New York.*

6. Name the dashboard **Carnegie Libraries in the US** and, on the **Dashboard** menu, click **Show Title**.
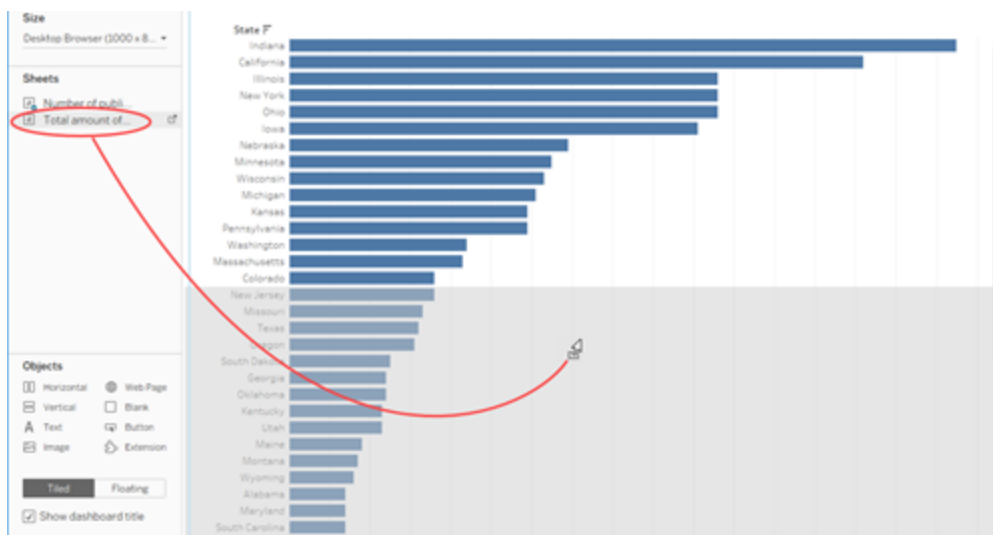
NOTE For an example of a complete solution to this practice, see **Exploring Tableau and the Data Solution.twbx**.

Solution: Creating a Local Data Connection

The following is a solution to "Practice: Creating a Local Data Connection" on page 12.

Create the Connection

1. Open Tableau Desktop.
2. In the **Connect** pane, under **To a File**, click **Microsoft Excel**.
3. In the dialog box that opens, browse to the **Data Connection Practice.xlsx** data source, located in the **Data** folder within the **Practices** folder and click **Open**.
4. Double-click the **Orders** table, and then open **Sheet 1**.

Change the Metadata

1. Click and hold the **Row** field, and rename the field **Row ID**.
2. In the **Data** pane, drag the **Row ID** field from **Measures** (below the gray line) to **Dimensions** (above the gray line).
3. Click and hold the **Global Area** field, and rename the field **Country**.
4. To the left of the **Country** field, click the icon, choose **Geographic Role**, and then select **Country/Region**.
5. In the **Data** pane, right-click the **Profit** field, select **Default Properties**, and choose **Number Format**.
    - On the **Default Number Format** screen, select **Currency (Custom)**, set **Decimal place** to 0 (zero), and click **OK**.
6. Repeat step 5 for the **Sales** field.
7. In the **Data** pane, on the **Discount** field:
    - Right-click **Discount**, select **Default Properties**, and for **Aggregation**, choose **Average**.
    - Right-click **Discount** again, select **Default Properties** and choose **Number Format**.
        - On the **Default Number Format** screen, select **Percentage**, set the **Decimal place** to 1, and click **OK**.
    - Right-click **Discount** again, select **Default Properties**, and choose **Comment**.
        - In the **Edit Comment** dialog box, type "Average Discount Percentage" and click **OK**.

Save the Data Source and Test the Connection

1. In the **Data** pane, right-click **Orders (Data Connection Practice)**, and then click **Add to Saved Data Sources**.
2. Name the data source "My Superstore" and save it in My Tableau Repository\Datasources, located in the Documents folder of your computer.
3. On the **File** menu, click **Close**, and close the workbook without saving any changes.
4. On the **Start** page, under **Saved Data Sources**, select the new **My Superstore** data source, and observe the metadata changes for the fields that were saved.

Create a Visualization

1. Build the bar chart:

Drag this field	To
Discount	Columns
Category	Rows
Sub-Category	Rows (place it to the right of Category)
Profit	Color on the Marks card

NOTE For an example of a complete solution to this practice, see **Creating_a_Local_Data_Connection_Solution.twbx**.

Solution: Filtering

The following is a solution to "Practice: Filtering" on page 16.

1. Open **Filtering_Starter.twbx**.
2. On the **Data** pane, right-click **Market**, and click **Show Filter**.
3. On the **Market** filter in the view, click the drop-down arrow, and choose **Single Value (List).**
4. Click the drop-down arrow for the **Market** filter in the view again, select **Customize**, and clear the check mark next to **Show "All" Value**.
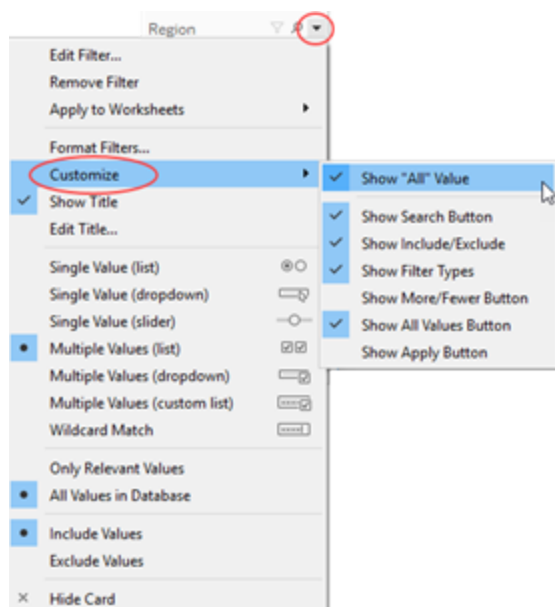
5. Click the drop-down arrow for the **Market** filter in the view again, and choose **Edit Title**.
6. Name the filter "Select a Market" and then click **OK** to close the dialog box.
7. From **Measures**, drag **Sales** to **Filters**.
8. In the **Filter Field** dialog box, click **Sum**, click **Next**, and then click **OK**.
9. Right-click the **SUM(Sales)** filter, and choose **Show Filter**.
10. Click the drop-down arrow for the **SUM(Sales)** filter in the view, and choose **Edit Title**.
11. Name the filter "Adjust View by Sales" and click **OK**.
12. Experiment with the sliders and notice the "AND" logic being used. The results shown are those that match the criteria of both filters.

SELF CHECK ANSWER **Consumer Furniture** had the greatest sales for the **EMEA Market** when the sum of sales was between $300K and $800K.

NOTE For an example of a complete solution to this practice, see **Filtering_Solution.twbx**.

Solution: Sorting

The following is a solution to "Practice: Sorting" on page 16.

View One
1. Open **Sorting_Starter.twbx**.
2. On the **View One** worksheet, on the **Format** menu, click **Animations**.
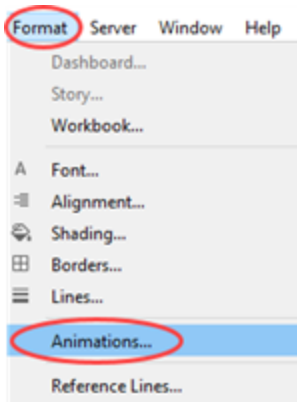
69

3. In the **Animations** pane, under **Workbook Default**, do the following:
    ■ Click **ON**.
    ■ Under **Duration**, use the dropdown menu to select **1.00 seconds (Slow)**.
    ■ Under **Style**, keep the selection set to **Simultaneous**.
    ■ In the top right corner of the **Animations** pane, click the X to close it.
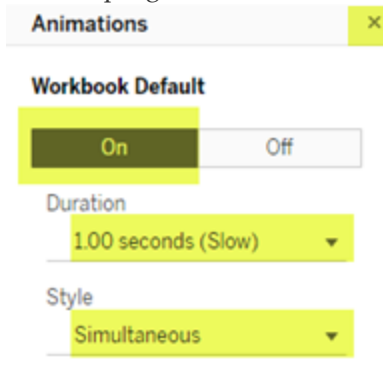
4. Hover on the **Sales** axis, and click the **Sort** icon ⚐ to toggle between the default sort (**Data source order**), and an ascending or descending sort by Sum of Sales. Leave it as a descending sort.

5. In the view, drag the **Technology** category header so it is first, before **Furniture**.
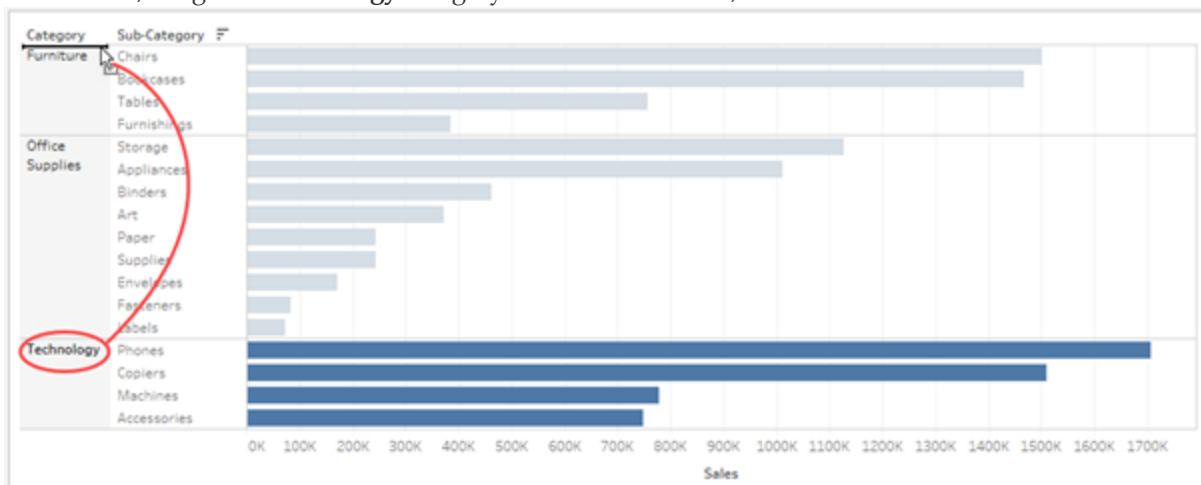
SELF CHECK 1 ANSWER In **Office Supplies**, the **Paper Sub-Category** has slightly higher sales than **Supplies**, which can be seen in the view since the data is sorted descending by **Sales**.

View Two

1. Right-click the **View One** worksheet tab, and then click **Duplicate Sheet**.
2. Right-click the **Sheet 2** worksheet tab, click **Rename Sheet**, type "View Two" and press the **ENTER** key.
3. From **Measures**, drag **Profit** to **Color** on the **Marks** card.
4. On the **SUM(Profit)** legend, click the drop-down arrow, click **Edit Colors**, and, on the **Edit Colors** dialog box, choose **Orange-Blue Diverging** from the **Palette** drop-down. Click **OK**.
5. In the view, right-click the **Sub-Category** label, and click **Sort**.
6. In the **Sort** dialog box, under **Sort By**, select **Field**, and then choose **Profit** with an aggregation of **Sum**. Click the **X** to close the dialog box.

SELF CHECK 2 ANSWER The **Tables Sub-Category** is the least profitable, which you can see using the color of the bars. It has higher sales than the **Furnishings Sub-Category**, which you can see because the length of the bar is longer.

NOTE For an example of a complete solution to this practice, see **Sorting_Solution.twbx**.

Solution: Creating Groups and Hierarchies

The following is a solution to "Practice: Creating Groups and Hierarchies" on page 20.

1. Open **Creating_Groups_and_Hierarchies_Starter.twbx**.
2. On the worksheet, near the bottom of the vertical axis, CTRL + click to select these items by label: **Envelopes**, **Fasteners**, and **Labels**. (Be sure to select the sub-category labels, not the bars that represent their sales amounts.)
3. Hover over the selected items, and then, in the tooltip menu, click the **Group** (✏) icon.

4. In the **Data** pane, right-click **Sub-Category (group)**, and then click **Edit Group**.
5. Click the new **Envelopes, Fasteners, Labels** group and then click **Rename.**
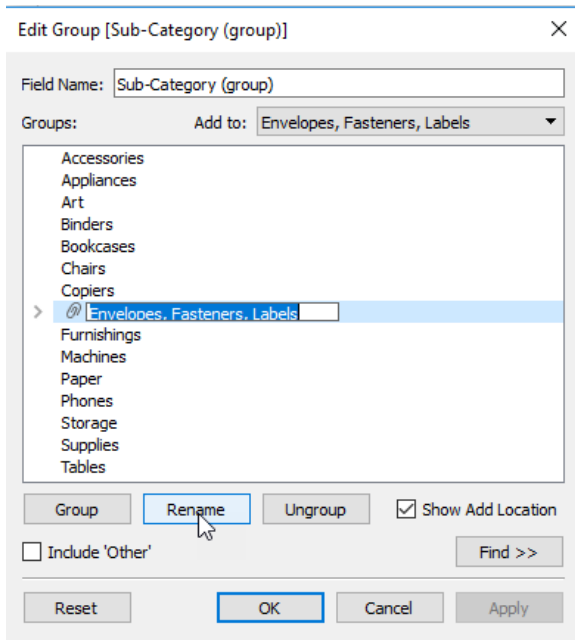
6. Type "Desk Supplies" as the name, and then click **OK**.
7. In the **Data** pane, select and drag **Sub-Category (group)** onto **Category** to create a hierarchy.
8. In the **Create Hierarchy** dialog box, type "Products" and click **OK**.
9. Click and drag **Sub-Category** into the **Products** hierarchy, placing it below **Sub-Category (group)**.
10. Click and drag **Product Name** into the **Products** hierarchy, placing it below **Sub-Category**.
11. Drag the **Products** hierarchy to **Rows**, placing it to the left of **Sub-Category**.
12. On **Rows**, click the plus (+) next to **Sub Category (group)** to expand to **Sub-Category**.

SELF CHECK ANSWER The **Technology Category** has the greatest sales. The total sales for the **Desk Supplies** group are $327,551.

NOTE For an example of a complete solution to this practice, see **Creating_Groups_and_Hierarchies_Solution.twbx**.

Solution: Date Parts and Date Values

The following is a solution to "Practice: Date Parts and Date Values" on page 22.

Create a Bar Chart to Show Seasonal Sales Trends

SELF CHECK 1 ANSWER The date part format would better show seasonal trends.

Directions for Seasonal Trends View

1. Open Tableau Desktop.
2. In the **Connect** pane, under **To a File**, click **Microsoft Excel**.

3. In the **Open** dialog box, navigate to the **Data** folder (in the **Practices** folder) and open **Global_Superstore_Recent_Dates.xlsx**.

4. On the **Data Source** tab, in the left pane under **Sheets**, double-click **Orders** (or drag and drop it onto the **Drag tables here** area).

5. Verify that **Sheet 1** is selected.

6. Right-click the **Sheet 1** worksheet tab, click **Rename Sheet**, type "Seasonal Trends" and press the **ENTER** key.

7. Build the view:

Drag this field	To
Sales	Rows
Order Date	Columns

8. On the **Marks** card, click the mark type drop-down list and change it from **Automatic** to **Bar**.

9. On **Columns**, right-click **Order Date**, and select the **Month** date part format (May), as shown below.
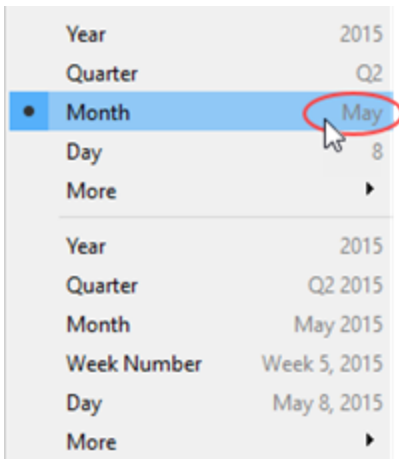
Year		2015
Quarter		Q2
• Month		May
Day		8
More		▸
Year		2015
Quarter		Q2 2015
Month		May 2015
Week Number		Week 5, 2015
Day		May 8, 2015
More		▸

10. On the date on columns, use the plus and minus sign icons to drill down and up to different levels of detail.

iii Columns	⊞ MONTH(Order Da...

iii Columns	⊟ MONTH(Order Da...	DAY(Order Date)

11. From **Dimensions**, drag **Order Date** to **Filters**.

12. In the **Filter Field** window, select **Years** and click **Next**.

13. In the **Filter [Year of Order Date]** dialog box, select **All** and press **OK**.

14. On the **Filters** shelf, right-click **Year(Order Date)** and select **Show Filter**.

SELF CHECK 2 ANSWER In the **Filter** card, select the check box for All. December has the highest total sales for all years at $1,580,781 while February has the lowest total sales for all years at $543,739. In the **Filter** card, deselect the check box for 2019. December still has the highest total sales for all years at $1,077,637 while February remains the lowest selling month for all years at $358,902.

Create a Timeline to Show Sales Over Time

1. Select **Sheet 2**.
2. Right-click the **Sheet 2** worksheet tab, click **Rename Sheet**, type "Sales Timeline" and press the **ENTER** key.
3. Build the view:

Drag this field	To
Sales	Rows
Order Date	Columns

4. On **Columns**, right-click **Order Date**, and select the **Month** date value format (May 2015), as shown below:

Year	2015
Quarter	Q2
Month	May
Day	8
More	▸
Year	2015
Quarter	Q2 2015
● Month	May 2015
Week Number	Week 5, 2015
Day	May 8, 2015
More	▸
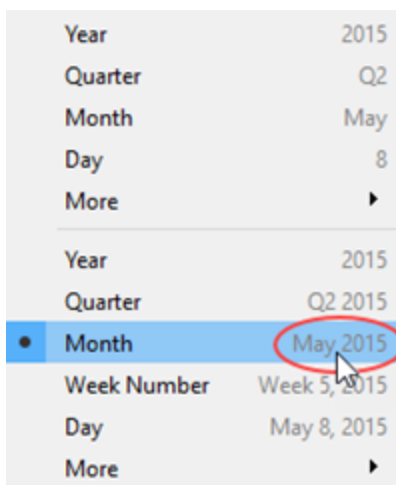
5. On the **Order Date** axis, click the plus and minus sign icons to drill down and up to different levels of detail.
6. From **Dimensions**, drag **Order Date** to **Filters**.
7. In the **Filter Field** window, select **Years** and click **Next**.
8. In the **Filter [Year of Order Date]** dialog box, select **All** and press **OK**.
9. On the **Filters** shelf, right-click **Year(Order Date)** and select **Show Filter**.

SELF CHECK 4 ANSWER In the **Filter** card, select the check box for All. November 2019 has the highest sales so far at $555,279. Comparatively, the month of December has the highest total sales for all years. In the **Filter** card, deselect the check box for 2019. December 2018 has the highest sales so far at $405,454. Comparatively, the month of December also has the highest total sales for all years.

NOTE For an example of a complete solution to this practice, see **Using_Discrete_and_Continuous_Dates_Solution.twbx**.

Solution: Custom Dates

The following is a solution to "Practice: Custom Dates" on page 24.

Discrete Custom Dates

1. Switch to the sheet named **Discrete Quarters**.
2. In the **Data** pane, right-click on **Order Date**, click **Create**, and then click **Custom Date**.
3. In the **Create Custom Date** dialog box, name the custom date "Order Date (Discrete Quarters)", select **Quarters** from the **Detail** drop-down list, select **Date Part**, and then click **OK**.
4. Drag the newly created **Order Date (Discrete Quarters)** to **Columns**, and remove the other instance of **Order Date** from **Columns**.
5. On the **Marks** card, change the mark type to **Bar**.

Discrete Custom Date Hierarchy (Years to Quarters)

1. Switch to the sheet named **Year to Quarter Custom Date Hierarchy**.
2. In the **Data** pane, right-click **Order Date**, click **Create**, and then click **Custom Date**.
3. In the **Create Custom Date** dialog box, name the custom date "Order Date (Discrete Years)", select **Years** from the **Detail** drop-down list, select **Date Part**, and then click **OK**.
4. In the **Data** pane, drag **Order Date (Discrete Quarters)** on top of **Order Date (Discrete Years)** to create a hierarchical group.
5. Double-click the hierarchical group name and type "Order Date (Discrete Years to Quarters)".
6. On **Columns**, replace **MONTH(Order Date)** with the newly created hierarchy **Order Date (Discrete Years to Discrete Quarters)**, and expand to show both years and quarters.
7. On the **Marks** card, change the mark type to **Bar**.

SELF CHECK ANSWER 1 Use the custom date hierarchy to drill up and down to determine the total sales in all of 2019 is $4,299,866, and the total sales in Q4 of 2019 is $1,481,189.

SELF CHECK ANSWER 2 Possible answers include: Sales are increasing over time; sales increase over each complete quarter within each year.

NOTE For an example of a complete solution to this practice, see **Custom_Dates_Solution.twbx**.

Solution: Combined Axis Chart

The following is a solution to "Practice: Combined Axis Chart" on page 28.

1. Open Tableau Desktop.
2. In the **Connect** pane, under **To a File**, click **Microsoft Excel**.
3. In the **Open** dialog box, navigate to the **Data** folder (in the **Practices** folder) and open **Global Superstore.xlsx**.
4. On the **Data Source** tab, in the left pane under **Sheets**, double-click **Orders** (or drag and drop it onto the **Drag tables here** area).
5. Create an initial view showing **Sales** broken down by **Category** and **Segment**:

Drag this field	To
Sales	**Rows**
Category	**Rows**
Segment	**Columns**

6. From **Measures**, drag **Profit** to the vertical **Sales** axis.

Drop the field when the mouse icon changes into a double ruler.

7. From **Dimensions**, drag **Measure Names** to **Color** on the **Marks** card.
8. On the axis marked **Value**, right-click, select **Edit Axis**, in the **Title** box, type "Dollars" and then click **X** to close the dialog box.
9. Save your workbook.

SELF CHECK ANSWER Compare the height of the bars to see that the **Furniture Category** looks like it made less **Profit** for the amount of **Sales** compared to other categories.

NOTE For an example of a complete solution to this practice, see **Combined Axis Chart _Solution.twbx**.
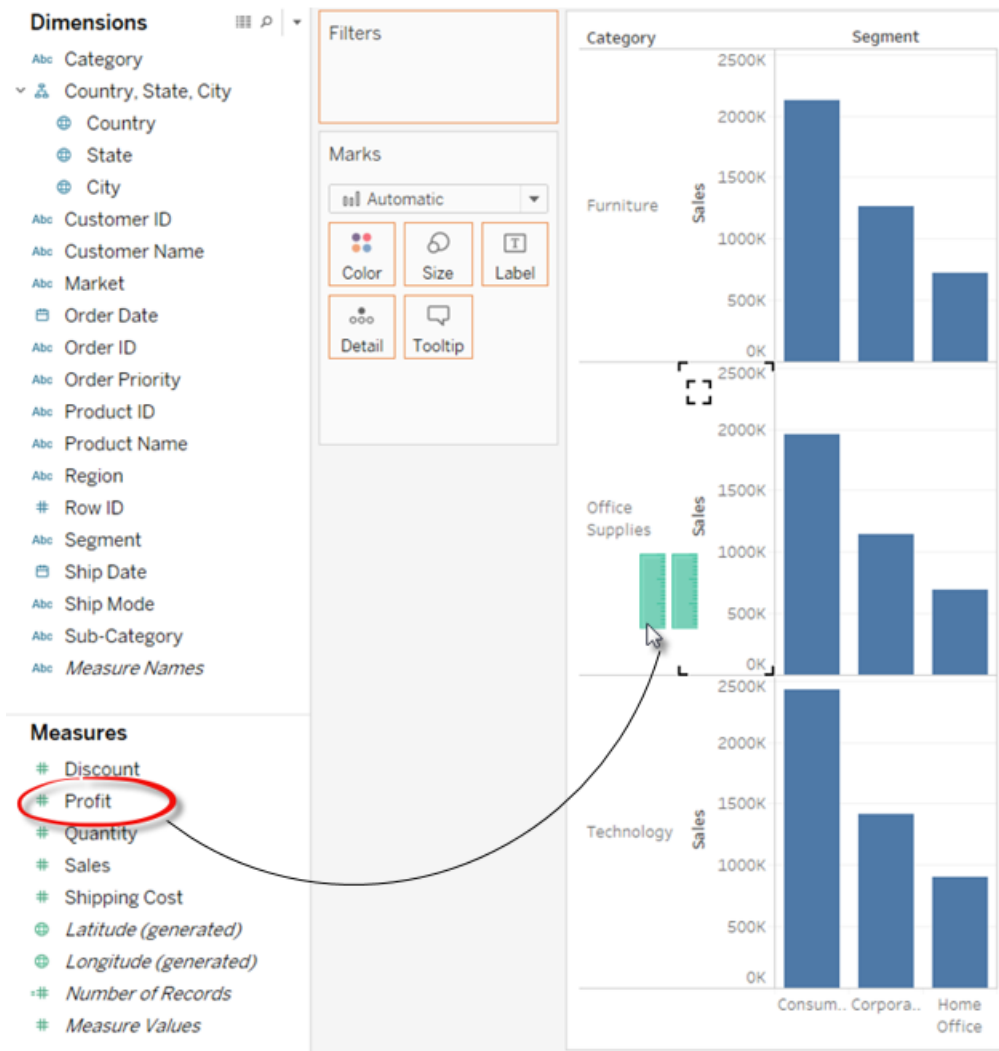
Solution: Dual Axis Chart

The following is a solution to "Practice: Dual Axis Chart" on page 29.

1. Open Tableau Desktop.
2. In the **Connect** pane, under **To a File**, click **Microsoft Excel**.
3. In the **Open** dialog box, navigate to the **Data** folder (in the **Practices** folder) and open **Global_ Superstore_Recent_Dates.xlsx**.
4. On the **Data Source** tab, in the left pane under **Sheets**, double-click **Orders** (or drag and drop it onto the **Drag tables here** area).
5. Create the following view:

Drag this field	To
Sales	Rows
Order Date	Columns

6. On **Columns**, right-click **YEAR(Order Date)** and select the **Month** date value (May 2015) format.
7. On the **Marks** card, select **Bar** from the mark type drop-down list.
8. From **Measures**, drag **Profit** to the right side of the view, opposite **Sales**, to create another vertical axis on the right side.
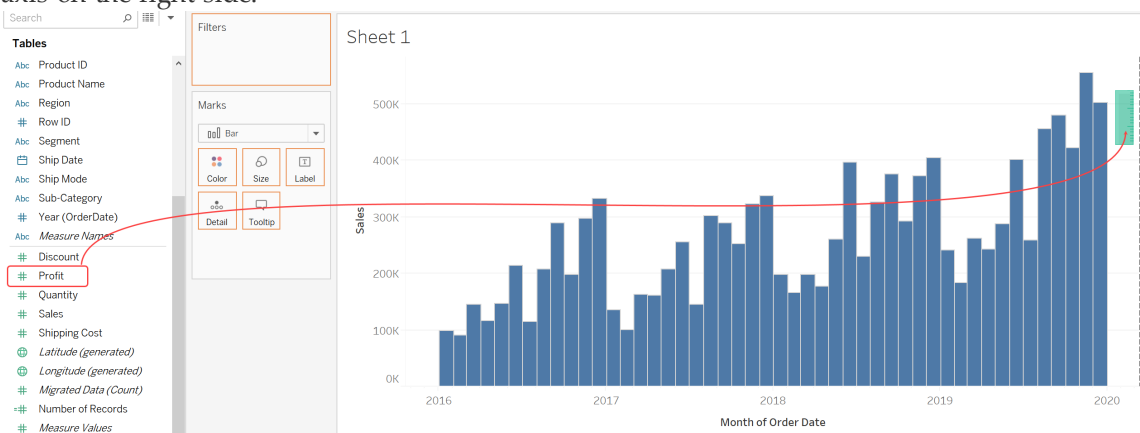
9. On the **Marks** card, select **SUM(Profit)**, and, on the mark type drop-down list, select **Line**.
10. Right-click the **Profit** axis, and select **Synchronize Axis**.

   NOTE You can only synchronize the second axis to the first.

11. Click the **Measure Names** color legend drop-down arrow, and choose **Edit Colors**.
12. Under **Select Data Item**, click **Sales**.
13. In the **Select Color Palette** drop-down list, select **Tableau Classic 20**, and then select the light gray color.
14. Click **OK**.

SELF CHECK ANSWER September 2019 had the greatest profit and November 2019 had the greatest sales.

NOTE For an example of a complete solution to this practice, see **Dual Axis Chart_Solution.twbx**.

Solution: Totals and Aggregation

The following is a solution to "Practice: Totals and Aggregation" on page 32.

View One

1. Open Tableau Desktop.
2. In the **Connect** pane, under **To a File**, click **Microsoft Excel**.
3. In the **Open** dialog box, navigate to the **Data** folder (in the **Practices** folder) and open **Global Superstore.xlsx**.
4. On the **Data Source** tab, in the left pane under **Sheets**, double-click **Orders** (or drag and drop it onto the **Drag tables here** area).
5. Click **Sheet 1** to select it, and then double-click it to rename it to **Total Sales**.
6. Use the worksheet named **Total Sales** and create the following view:

Drag this field	To
Market	Columns
Category	Rows
Sub-Category	Rows to the right of Category
Sales	Text on the Marks card

7. On the **Analysis** menu:
   - Choose **Totals**, and click **Show Row Grand Totals**.
   - Choose **Totals** again, and click **Show Column Grand Totals**.
   - Choose **Totals** again, and click **Add All Subtotals**.

SELF CHECK ANSWER 1 The **EMEA Market** had a higher **Grand Total** for **Sales** of $4,528,024 than the entire **Furniture Category** which made $4,110,874.

View Two

1. Right-click the **Total Sales** worksheet tab and choose **Duplicate**.
2. Double-click the new worksheet tab, and then type "Maximum Sales" to rename it.
3. On the **Marks** card, click the **SUM(Sales)** drop-down arrow, select **Measure (Sum)**, and click **Maximum**.
4. On the **Analysis** menu:
   - Choose **Totals**, and click **Row Totals to Left**.
   - Choose **Totals**, and click **Column Totals to Top**.

SELF CHECK ANSWER 2 The **USCA Market** had the **Maximum Sales** of $22,638 for the **Machines** product in the **Technology Category**.

NOTE For an example of a complete solution to this practice, see **Crosstabs_and_Totals_Solution.twbx**.

Solution: Highlight Table

The following is a solution to "Practice: Highlight Table" on page 33.

1. Open Tableau Desktop.
2. In the **Connect** pane, under **To a File**, click **Microsoft Excel**.
3. In the **Open** dialog box, navigate to the **Data** folder (in the **Practices** folder) and open **Global Superstore.xlsx**.
4. On the **Data Source** tab, in the left pane under **Sheets**, double-click **Orders** (or drag and drop it onto the **Drag tables here** area).
5. Create the starting view:

Drag this field	To
Profit	**Text** on the **Marks** card
Profit	**Color** on the **Marks** card
Category	**Rows**
Sub-Category	**Rows** (to right of **Category**)
Market	**Columns**
Region	**Columns** (to the right of **Market**)

6. On the **Marks** card, change the mark type to **Square**.
7. On the **Analysis** menu, choose **Totals**, and click **Show Row Grand Totals**.
8. On the **Marks** card, click **Color**, and then click **Edit Colors**.
9. In the **Edit Colors** dialog, select **Include Totals**, and then click **OK**.
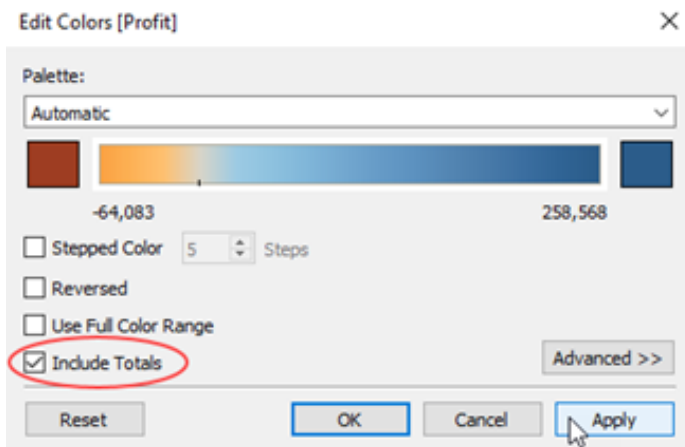
SELF CHECK ANSWER The **Copiers** product **Sub-Category** was the most profitable with a total profit of $258,568. **Tables** was the least profitable product with a total profit of -$64,083.

NOTE For an example of a complete solution to this practice, see **Highlight_Table_Solution.twbx**.

Solution: Marketing Expenses Scatter Plot

The following is a solution to "Practice: Marketing Expenses Scatter Plot" on page 36.

1. Open Tableau Desktop.
2. In the **Connect** pane, under **To a File**, click **Microsoft Excel**.
3. In the **Open** dialog box, navigate to the **Data** folder (in the **Practices** folder) and open **CoffeeChain_ Query.xlsx**.
4. From **Measures**, drag **Marketing** to **Columns**.
5. From **Measures**, drag **Sales** to **Rows**.
6. Right-click the **SUM(Marketing)** field on **Columns**, point to **Measure (Sum)**, and click **Average**.
7. Right-click the **SUM(Sales)** field on **Rows**, point to **Measure (Sum)**, and click **Average**.
8. From **Dimensions**, drag **Area Code** to **Detail** on the **Marks** card.
9. From **Dimensions**, drag **State** to **Detail** on the **Marks** card.
10. From **Dimensions**, drag **Product Type** to **Color** on the **Marks** card.
11. Right-click **Area Code** on the **Marks** card, and choose **Show Highlighter**.

SELF CHECK 1 ANSWER Espresso

12. In the **Highlighter** drop down, select 530.
13. Click the mark for espresso and select the **Explain Data** icon in its tooltip.
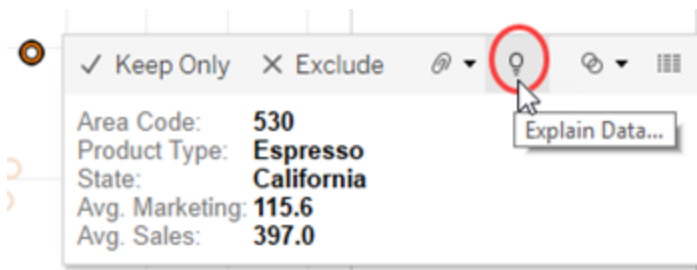
14. In the upper left of the **Explain Data** window, confirm that **530, Espresso, California** is the selected mark, and that **AVG(Sales)** is the selected measure.
15. Below the **AVG(Sales)** tab, read the expected value summary, and then mouse over it to read about the expected value range.
16. Below the summary is a clickable list of possible explanations on the left, and a description of the selected explanation on the right. Notice that Explain Data only surfaced a single explanation for this data set. Examine the information shown.
17. In the upper left of the **Explain Data** window, click the **AVG(Marketing)** tab and repeat this process, if desired.

SELF CHECK 2 ANSWER One record with a value of 628 is increasing the average of Sales.

NOTE For an example of a complete solution to this practice, see **Marketing_Expenses_Scatter_Plot_ Solution.twbx**.

Solution: Airport Geographic Mapping

The following is a solution to "Practice: Airport Geographic Mapping" on page 40.

1. Open Tableau Desktop.
2. In the **Connect** pane, under **To a File**, click **Microsoft Excel**.

3. In the **Open** dialog box, navigate to the **Data** folder (in the **Practices** folder) and open **European Airports 2019.xlsx**.
4. Click **Sheet 1** to select it, and then double-click it and rename it to **European Airports**.
5. From **Dimensions**, drag the **IATA** airport code to **Detail** on the **Marks** card.
6. Click the **1 unknown** notification on the map, click **Edit Locations**, and correct the misspelled location **MADMAD** by selecting (or typing) the correct **MAD** on the **Matching Location** drop-down list. Click **OK**.
7. Update the view using the following table:

Drag this	Here
Airport Name	**Label** on the **Marks** card
Country	**Detail** on the **Marks** card
2019 Passengers	**Size** on the **Marks** card
2019 Passengers	**Color** on the **Marks** card

8. On the **Marks** card, click **Size**, and move the slider to increase the size of the marks.
9. On the **Marks** card, click **Color**:
   - Set the **Opacity** to 75%.
   - On the **Border** drop-down list, select the black color square.
10. On the **Map** menu, click **Map Layers** and in the **Map Layers** window, set the following options:

Section	Option
Background	In the **Style** drop-down menu, select **Normal**.
Map Layers	Check **Coastline**.
Map Layers	Clear **Country/Region Names**.
Map Layers	Clear **State/Province Borders**.
Map Layers	Clear **State/Province Names**.

NOTE You may need to adjust the level of zoom of the map in order to check or clear certain layer options.

11. Click **X** to close the **Map Layers** window.
12. Use the Zoom controls to select and zoom in to see more details on the map.
13. From **Measures**, right-click **2019 Passengers** and choose **Show Filter**.

SELF CHECK ANSWER Use the **SUM**(**2019 Passengers**) filter slider to determine the five busiest airports in 2019: **London Heathrow**, **Paris CDG** (Charles de Gaulle), **Amsterdam**, **Istanbul Ataturk**, and **Frankfurt**.

BONUS Reset the **SUM**(**2019 Passengers**) filter slider to show all airports. Then, add a filter for **Airport Name** using **Top** 5 by the **SUM** of the **2019 Passengers** field. Verify that the five busiest airports in 2019 were: **London Heathrow**, **Paris CDG** (Charles de Gaulle), **Amsterdam**, **Istanbul Ataturk**, and **Frankfurt**.

NOTE For an example of a complete solution to this practice, see **European Airports Solution.twbx**.

Solution: Creating Geographic Groups

The following is a solution to "Practice: Creating Geographic Groups" on page 41.

Create a Map

1. Open Tableau Desktop.
2. In the **Connect** pane, under **To a File**, click **Microsoft Excel**.
3. In the **Open** dialog box, navigate to the **Data** folder (in the **Practices** folder) and open **school data.xlsx**.
4. Click the **Sheet 1** tab to select it, and then double-click it to rename it to **Geographic Groups**.
5. Create the view using the following table:

Drag this	To
State	**Detail** on the **Marks** card
County Name	**Detail** on the **Marks** card
Schools	**Label** on the **Marks** card

6. On the **Marks** card, click the mark type drop-down list and change it from **Automatic** to **Map**.

Create Geographic Groups

1. Use the map selection tools or **CTRL+click** to select counties on the map for the **Eastern** geographic group.
2. On the toolbar, with these counties selected, click the **Group** icon (🖉) and then select **All Dimensions** so that the group uses both **State** and **County Name** as the level of detail.

3. Repeat steps 1 and 2 to create the other geographic groups.

   NOTE It is not necessary to create the territories exactly as shown. A reasonable resemblance will suffice.

See Number of Schools by Geographic Group

1. In **Dimensions** in the **Data** pane, right-click **County Name & State (group)**, and choose **Edit Group**.
2. In the **Edit Group** dialog box, change the **Field Name** to "Custom Territories."
2. In the **Edit Group** dialog box select the first group, and click **Rename**.
3. In the activated text box for the group, type in the name of the sales territory as shown.
4. Repeat steps 2 and 3 to rename all of the territories.
5. Click **OK**.

6. Drag **County Name** off of the **Marks** card to remove the dimension from the view.
   Note that the number of schools is now aggregated for each territory and when you click on the map, each territory acts as a geographical group.
7. Drag **Custom Territories** from **Dimensions** to **Label** on the **Marks** card.

SELF CHECK ANSWER Sample: Consider splitting the Central territory because it has many more schools than the other territories. Note that you may have a different answer if your groups are different.

NOTE For an example of a complete solution to this practice, see **Geographic_Groups_Solution.twbx**.

Solution: Calculation and Aggregation in Profit Ratio

The following is a solution to "Practice: Calculations and Aggregations in Profit Ratio" on page 44.
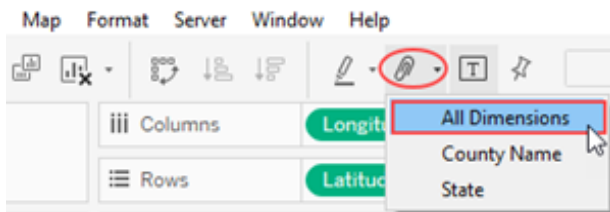
Create the View

1. Open Tableau Desktop.
2. In the **Connect** pane, under **To a File**, click **Microsoft Excel**.
3. In the **Open** dialog box, navigate to the **Data** folder (in the **Practices** folder) and open **Global_Superstore_Recent_Dates.xlsx**.
4. On the **Data Source** tab, in the left pane under **Sheets**, double-click **Orders** (or drag and drop it onto the **Drag tables here** area).
5. Right-click the **Sheet 1** worksheet tab, click **Rename**, type "Profit Ratio by Category" and press the **ENTER** key.
6. Create the starting view:

Drag this field	To
Order Date	Rows
Category	Columns
Profit	Color on the Marks card

7. On the **Analysis** menu, click **Show Mark Labels**.

Add a Calculation to the View

1. On the **Analysis** menu, select **Create Calculated Field**.
2. Name the calculated field "Profit Ratio" and, in the white space, type the following formula:
   [Profit]/[Sales]
   TIP You can also right-click on white space in the **Data** pane and select **Create Calculated Field**.
3. Click **OK** to complete the calculation.
   TIP **Apply** applies the calculation, but allows you to continue revising the calculation until you click **OK**.
4. From **Measures**, drag **Profit Ratio** to **Color** on the **Marks** card to replace the original **Profit** field.
5. Under **Measures**, right-click the **Profit Ratio** field, select **Default Properties** and then click **Number Format**.

6. In the **Default Number Format** dialog box, select **Percentage** and confirm that decimal places are set to 2. Press **OK**.

> **SELF CHECK ANSWER 1** The **Profit Ratio** numbers are so large because Tableau is evaluating **SUM (Profit/Sales)**. This means the ratio is being calculated at the row level, and then the **Sum** aggregation is being applied, adding up the ratios.
>
> To fix this, use the aggregated sums to determine the ratio, for example: **SUM(Profit)/SUM(Sales)**.

7. Under **Measures**, right-click the **Profit Ratio** field and select **Edit**.
8. In the **Calculated Field** editor, revise the calculation to SUM([Profit])/SUM([Sales]) and then click **OK**.
9. From **Measures**, drag the edited calculation to **Color** on the **Marks** card to replace the original **Profit Ratio** calculation.

> **SELF CHECK ANSWER 2** The **Furniture Category** has the lowest profit ratio.

Bonus: Use Profitability Ratio in a Logic Calculation

1. Click the **New Worksheet** button.
2. Right-click the **Sheet Two** worksheet tab, click **Rename**, type "Profitable Sub-Categories" and press the **ENTER** key.
3. Create the starting view:

Drag this field	To
Sub-Category	Rows
Sales	Columns

4. On the toolbar, click the **Sort Descending** icon ⬇️.
5. On the **Analysis** menu, click **Create Calculated Field**.
6. In the **Calculated Field** editor do the following:
   - Name the calculation "Profitable Sub-category?"
   - In the white space, type this formula:
     ```
     IF [Profit Ratio] > 0 THEN "Profitable"

     ELSE "Unprofitable"

     END
     ```
   - Click **OK**.
7. From **Measures**, drag **Profitable Sub-Category?** to **Color** on the **Marks** card.
8. On the **AGG(Profitable Sub-Category?)** legend, click the drop-down arrow and select **Edit Title**.
9. In the **Edit Legend** dialog box, delete everything, and then type "KPI."
10. Right-click the **Sales** axis and select **Format**.
11. In the **Format** pane, on the **Axis** tab, click the **Numbers** drop-down list, select **Currency (Custom)**, set **Decimal places** to 0, and set **Display Units** to **Thousands (K)**.
12. Click the X to close the **Format** pane.
13. Under **Measures**, right-click the **Profit** field, select **Default Properties** and then click **Number Format**.

14. In the **Default Number Format** dialog box, select **Currency (Custom)**, set **Decimal places** to 0, and set **Display Units** to **Thousands (K)**.
15. From **Measures**, drag **Profit** and **Profit Ratio** to **Tooltip** on the **Marks** card.
16. Save the workbook.

SELF CHECK ANSWER The **Tables Sub-Category** is the only sub-category with a negative (or unprofitable) profit ratio of (8.46%). This provides insight as to why the **Furniture Category** has the lowest profit ratio.

Bonus: Create a Simple Dashboard

1. On the status bar, click the **New Dashboard** button.
2. Double-click the new dashboard tab to retitle it. Type "Profitability" and press ENTER.
3. On the menu, click **Dashboard**, and then click **Show Title**.
4. At the top of the dashboard, double-click the title to open the **Edit Title** dialog box.
5. In the dialog box, on the menu bar, click the **Center** button to center the title, and then click **OK**.
6. From the left pane, under **Sheets**, drag the **Profit Ratio by Category** view and drop it onto the blank dashboard canvas.
7. Drag the other view onto the canvas and drop it below the first view.
8. Click and drag the black line that separates the two views to optimize their placement.
9. In the left pane, under **Size**, set the drop-down menu to **Laptop Browser (800 x 600)**.
10. For each of the visible legends (**Profit Ratio** and **KPI**), click the legend to select it, and then, in its drop-down menu, click **Floating**. Drag each floating legend to a suitable location.
11. Double-click the title of the top view, and then, it its **Edit Title** diaglog box, below the existing title of **<SheetName>**, enter the text "Click a cell to filter the Sub-Categories" and set its font size to 10 and its style to italic. Click **OK** to close the dialog box.
12. With the top view still selected, click the small funnel icon in the view container menu to the upper right (when you mouse over this icon, it will display the tooltip "Use as Filter").
13. Save the workbook, and then try out your new dashboard.

NOTE For an example of a complete solution to this practice, see **Calculations and Aggregations Profit Ratio Solution.twbx**.

Solution: Using Date Calculations

The following is a solution to "Practice: Using Date Calculations" on page 46.

1. Open Tableau Desktop.
2. In the **Connect** pane, under **To a File**, click **Microsoft Excel**.
3. In the **Open** dialog box, navigate to the **Data** folder (in the **Practices** folder) and open **Global_ Superstore_Recent_Dates.xlsx**.
4. On the **Data Source** tab, in the left pane under **Sheets**, double-click **Orders** (or drag and drop it onto the **Drag tables here** area).
5. In **Dimensions**, right-click the **Order Date** field, and choose **Create** and then click **Calculated Field**.
6. In the **Calculated Field** dialog box, build the following calculation, and name it "Days to Ship":
   DATEDIFF ('day', [Order Date], [Ship Date])

7. Click **OK**.
8. Create a crosstab:

Drag this field	To
Order Priority	Rows
Segment	Rows to the right of Order Priority
Days to Ship	Text on the Marks card

9. On the **Marks** card, right-click **SUM(Days to Ship)**, point to **Measure (Sum)**, and select **Average**.
10. In the **Data** pane, right-click the **Days to Ship** field, select **Default Properties**, and choose **Number Format**. In the **Default Number Format** dialog box, select **Number (Custom)**, set **Decimal places** to 1, and click **OK**.
11. From **Measures**, drag **Shipping Cost** into the view, and drop it over the existing **Avg. Days to Ship** measure when **Show Me** appears.
12. On the **Marks** card, right-click **SUM(Shipping Costs)**, point to **Measure (Sum)**, and select **Average**.

BONUS: In the view, drag the header for the **Medium Order Priority** field so that its pane is between **High** and **Low**.

SELF CHECK ANSWER The approximate difference between the average **Days to Ship** for **Critical** priority orders compared to **Low** priority orders is about four and a half days. For that same comparison, the approximate difference in average shipping costs is about $30.

NOTE For an example of a complete solution to this practice, see **Using_Date_Calculations_ Solution.twbx**.

Solution: Running Total of Sales

The following is a solution to "Practice: Running Total of Sales" on page 50.

1. Open **Running_Total_of_Sales_Starter.twbx** and use the **Quarterly Sales by Category** worksheet.
2. On the **Marks** card, right-click the **SUM(Sales)** field, select **Quick Table Calculation**, and click **Running Total**. Note that the calculation defaults to computing across the table.
3. Right-click on the **Sales** field, select **Compute Using**, and then click **Pane (Down)**.
4. From the Data Pane, drag another instance of **Sales** and drop it into the center of the view.
5. On the **Measure Values** legend, move the **SUM(Sales)** field with the table calculation icon underneath **SUM(Sales)**.

6. On **Columns**, move the **Measure Names** field to the right of the **YEAR(Order Date)** field.

SELF CHECK ANSWER The running totals for **Furniture** were $762,399 and $1,117,724 for **Q3** and **Q4** in 2018.

NOTE For an example of a complete solution to this practice, see **Running_Total_of_Sales_ Solution.twbx**.
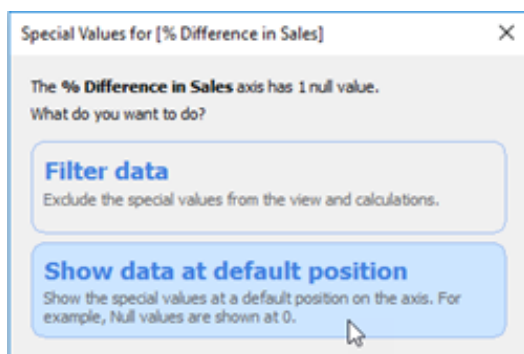
Solution: Year over Year Change

The following is a solution to "Practice: Year over Year Change" on page 50.

1. Open Tableau Desktop.
2. In the **Connect** pane, under **To a File**, click **Microsoft Excel**.
3. In the **Open** dialog box, navigate to the **Data** folder (in the **Practices** folder) and open **Global_ Superstore_Recent_Dates.xlsx**.
4. On the **Data Source** tab, in the left pane under **Sheets**, double-click **Orders** (or drag and drop it onto the **Drag tables here** area).
5. Create the initial view:

Drag this field	To
Sales	Rows
Order Date	Columns

6. Click the drop-down arrow on **SUM(Sales)**, select **Quick Table Calculation**, and choose **Year over Year Growth**.
7. On the **Marks** card, in the drop-down, change the mark type to **Bar**.
8. Press and hold **CTRL** while you drag the **SUM(Sales)△** field from **Rows** to **Color** on the **Marks** card.
9. On the **% Difference in SUM(Sales)** legend, click the drop-down arrow, click **Edit Colors**, and, on the **Edit Colors** dialog box, choose **Orange-Blue Diverging** from the **Palette** drop-down. Click **OK**.
10. From **Measures**, drag **Sales** to **Label** on the **Marks** card.
11. From **Dimensions**, right-click **Sub-Category** and select **Show Filter**.
12. In the **Sub-Category** filter in the view, click the drop-down menu and select **Single Value (dropdown)**.
13. In the **Sub-Category** filter in the view, choose to show only **Art**.
14. From **Dimensions**, right-click **Market** and select **Show Filter**.
15. In the **Market** filter in the view, click the drop-down menu and select **Single Value (list)**.
16. In the **Market** filter in the view, choose to show only **USCA**.
17. Click the **null** indicator (appears on the lower right corner of the view).
18. In the **Special Values** dialog box, select **Show data at default position**.

SELF CHECK ANSWER 1 The percent difference in year-over-year sales between 2017 and 2018 in **USCA** for **Art** was -6.98%.

SELF CHECK ANSWER 2 No other **Market** had a negative percent difference in year over year sales between 2017 and 2018 for **Art**.

NOTE For an example of a complete solution to this practice, see **Year_Over_Year_Change_ Solution.twbx**.

Solution: Percent of Total Sales

The following is a solution to "Practice: Percent of Total Sales" on page 54.

1. Open Tableau Desktop.
2. In the **Connect** pane, under **To a File**, click **Microsoft Excel**.
3. In the **Open** dialog box, navigate to the **Data** folder (in the **Practices** folder) and open **Global Superstore.xlsx**.
4. On the **Data Source** tab, in the left pane under **Sheets**, double-click **Orders** (or drag and drop it onto the **Drag tables here** area).
5. On the **Marks** card, click the drop-down list of marks, and choose **Pie**.
6. Create the initial view:

Drag this field	To
Segment	**Color** on the **Marks** card
Sales	**Angle** on the **Marks** card
Sales	**Label** on the **Marks** card

7. On the **Marks** card, right-click the **SUM(Sales)** field that is a label, point to **Quick Table Calculations** and click **Percent of Total**.
8. On the toolbar, use the drop-down to change from **Standard** to **Entire View**. This will resize the chart.

NOTE For an example of a complete solution to this practice, see **Percent_of_Total_Solution.twbx**.

Solution: Tree Map

The following is a solution to "Practice: Tree Map" on page 54.

1. Open Tableau Desktop.
2. In the **Connect** pane, under **To a File**, click **Microsoft Excel**.
3. In the **Open** dialog box, navigate to the **Data** folder (in the **Practices** folder) and open **Global Superstore.xlsx**.
4. On the **Data Source** tab, in the left pane under **Sheets**, double-click **Orders** (or drag and drop it onto the **Drag tables here** area).

5. Create the Tree Map:

Drag this field	To
Market	**Color** on the Marks card
Sales	**Size** on the Marks card
Sub-Category	**Labels** on the Marks card
Sales	**Labels** on the Marks card

6. Right-click **Sub-Category** in the **Marks** card, and choose **Show Highlighter**.

SELF CHECK ANSWER Use the highlighter on **Sub-Category** to see that **Appliances** sales are about $100K higher in **EMEA** than **APAC**.

NOTE For an example of a complete solution to this practice, see **Tree_Map_Solution.twbx**.

Solution: Reference Lines

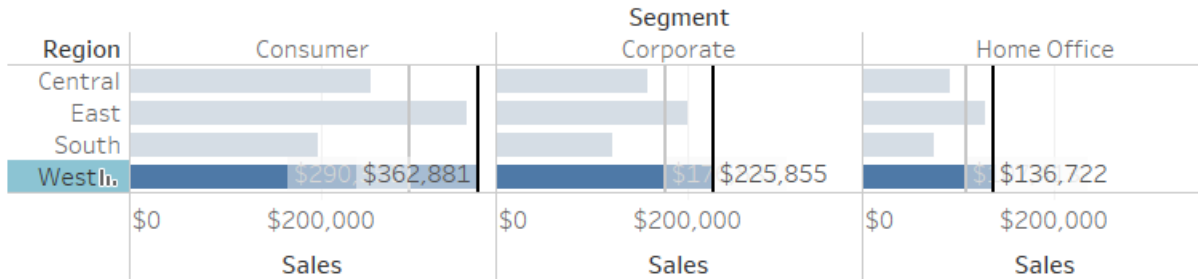The following is a solution to "Practice: Reference Lines" on page 58.

View One

1. Open **Reference_Line_Starter.twbx**.
2. Right-click the vertical axis (**Sales**) and select **Add Reference Line**.
3. Set the values (as shown below) in the **Add Reference, Line, Band, or Box** dialog box:
   - **Reference Type**: **Line**
   - **Scope**: **Entire Table**
   - **Line Value**: **600,000 Constant**.
     To type a value in the **Value:** text box, first select **Constant** in the drop-down list to the right of the text box
   - **Line Label**: **Custom** "Quota is <Value>".
     For the Label, type "Quota is" in the text box and then select <Value> in the list that is exposed by the right facing arrow next to the text box
   - **Formatting**: Thick Red Line, no fill above or below.
4. Click **OK**.

View Two

1. On the **View One** worksheet tab, right-click and choose **Duplicate**.
2. On the new worksheet tab, double-click to activate editing and type "View Two".
3. Right-click the Quota reference line and choose **Remove**.
4. From **Dimensions**, drag **Segment** to **Columns** and drop it to the left of **Region**.
5. From **Columns**, drag **Region** to **Rows**.
6. From **Rows**, drag **SUM(Sales)** to **Columns**, to the right of **Segment**.
7. From the **Analytics** pane, drag **Average Line** to the view, and drop it on **Pane**.
8. Right-click on the Average Reference line (any of them will work) and click **Edit**.

9. In the **Edit Reference Line, Band or Box** dialog box, edit the following:
   - Under **Line**, click the **Label** drop-down and select **Value**.
   - Under **Line**, click the **Tooltip** drop-down and select **Custom**.
   - In the text box to the right of the **Tooltip** drop-down, type "Average sales value is "
   - Click the menu to the right of the text box and select **Value**.
   - Under **Formatting,** click the **Line** drop-down, and choose the black color for the line.
10. Click **OK**.
11. To compare average sales for each segment by region, select **Region** labels. Hover over a reference line to see its tooltip.

Region	Consumer	Segment Corporate	Home Office
Central			
East			
South			
West	$290 $362,881	$17 $225,855	$ $136,722

$0 ... $200,000 — Sales (Consumer)
$0 ... $200,000 — Sales (Corporate)
$0 ... $200,000 — Sales (Home Office)

SELF CHECK ANSWER Select **Region** labels to see the **West** consistently has the highest above average sales in every **Segment**.
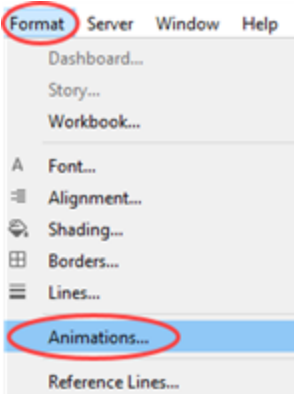
NOTE For an example of a complete solution to this practice, see **Reference_Line_Solution.twbx**.

Solution: Building a Dashboard

The following is a solution to "Practice: Building a Dashboard" on page 62.

Create the Dashboard

1. Open **Building_a_Dashboard_Starter.twbx**.
2. On the **Sales by Market** worksheet, on the **Format** menu, click **Animations**.

Format   Server   Window   Help

Dashboard...
Story...
Workbook...

A   Font...
⌐≡   Alignment...
🖌   Shading...
⊞   Borders...
≡   Lines...

Animations...

Reference Lines...

3. In the **Animations** pane, under **Workbook Default**, do the following:
   - Click **On**.
   - Under **Duration**, use the dropdown menu to select **0.50 seconds (Medium)**.

- Under **Style**, keep the selection set to **Simultaneous**.
- In the top right corner of the **Animations** pane, click the X to close it.

Animations ✕

Workbook Default

On | Off

Duration

0.50 seconds (Medium) ▾

Style

Simultaneous ▾
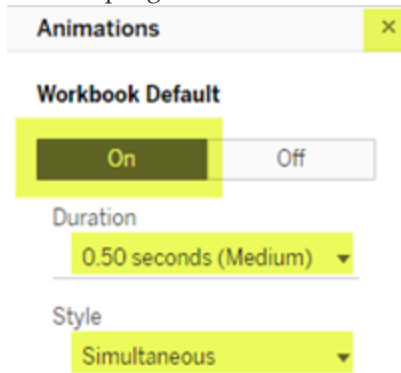
4. In the View, on the bottom of the screen, click the **New Dashboard** tab to add a new dashboard sheet.

5. Double-click the new dashboard tab to activate editing, and type "Sales Dashboard".
6. In the **Dashboard** pane, click the **Size** drop-down menu, and then click the drop-down arrow to the right of **Desktop Browser (1000 x 800)** and choose **Laptop Browser (800 x 600)**.
7. At the bottom of the **Dashboard** pane, select **Show Dashboard title**.
8. Drag and drop each worksheet onto the dashboard, in the following order:
   - **Sales by Market**. This will take up the whole dashboard until you place the other worksheets.
   - **Sales by Segment**, place above **Sales by Market**.
   - **Plot of Sales**, placed to the right of **Sales by Segment**.
9. Select **Sales by Segment**, click the drop-down arrow on the view's toolbar, and then choose **Fit** and **Entire View** on the menu.
10. Repeat Step 6 for **Plot of Sales**.
11. To remove the **Profit**, **Sales**, and **Segment** legends: click to select, and then click **X** on the legend's toolbar.

## Add Padding, Borders, and Background Colors Around Items

1. Select **Sales by Segment**, and then do the following in the **Layout** tab on the left:
   - Click the drop-down arrow to the right of **Border**, and then select a black line. Click the drop-down arrow again to close the line menu.
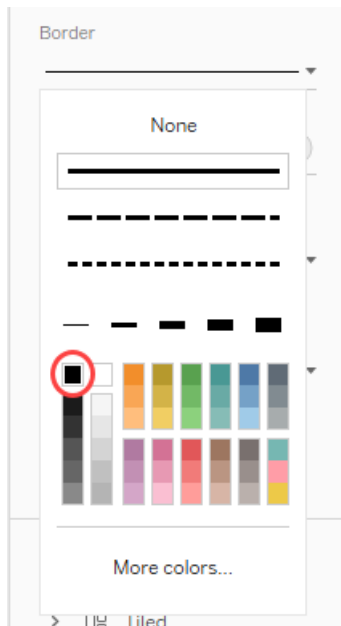
- Click the round color sample to the right of **Background**, and then select a light gray. Click the round color sample again to close the color menu.
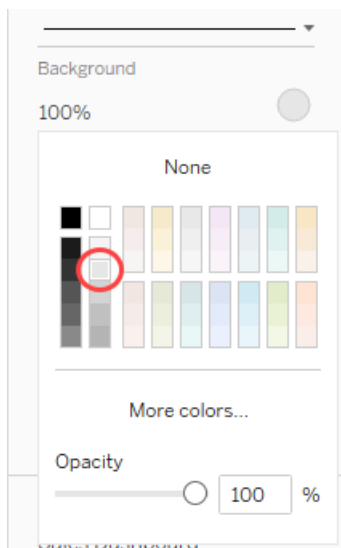
- Click the drop-down arrow to the right of **Inner Padding**, and then, with **All sides equal** selected, enter "10" into one of the specifiers (for example, **top**). This will cause all of the specifiers to display **10**.
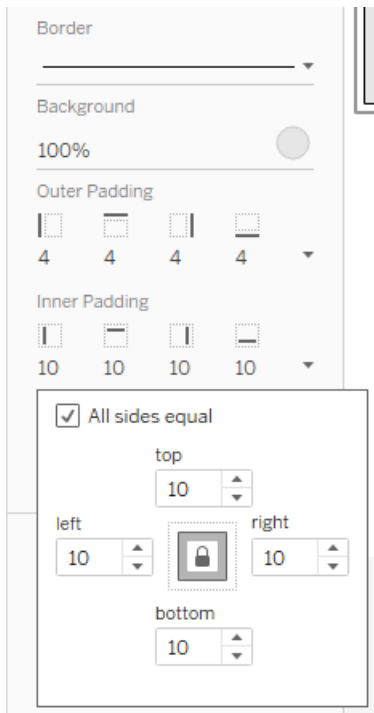
2. Repeat Step 1 for **Plot of Sales** and **Sales by Market**.
3. Select the **Market** filter, and in the **Layout** tab on the left, do the following steps:
   - Click the drop-down arrow to the right of **Inner Padding**, and then clear the **All sides equal** check box.
   - For **top**, enter "40".
   - For **left**, enter "15".
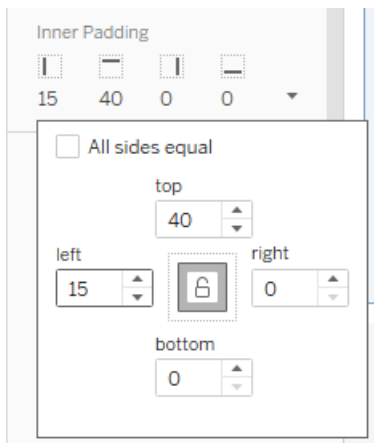
Create the Dashboard Filters

1. On the **Market** filter in the view, click the drop-down arrow on the filter's toolbar, select **Apply to Worksheets**, and click **All Using this Data Source**.

2. Click the **Sales by Segment** view to select it, and then click the **Use as Filter** button.
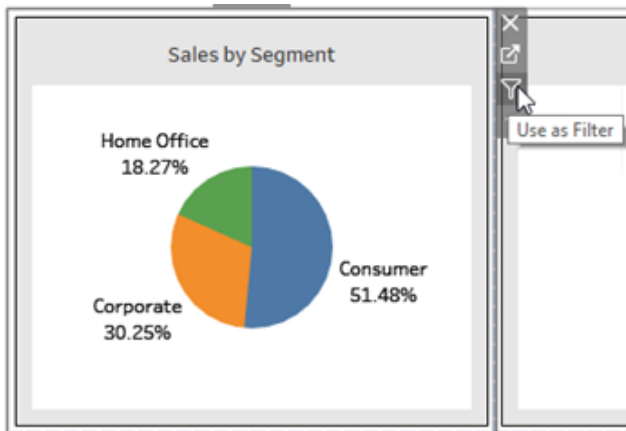
3. On the toolbar, click the **Presentation Mode** icon and test the filters in the dashboard.

NOTE For an example of a complete solution to this practice, see **Building_a_Dashboard_Solution.twbx**.

Solution: Creating an Interactive Dashboard

The following is a solution to "Practice: Creating an Interactive Dashboard" on page 63.

Create the Dashboard

1. Open **Creating_an_Interactive_Dashboard_Starter.twbx**.

2. Click the **New Dashboard** tab.

3. Double-click the new dashboard tab and name it "2014 Sochi Olympics Results".

4. From the **Size** drop-down list, select **Custom**, and set **Width** to 900 and **Height** to 600.

5. Drag the **Medals by Country** worksheet onto the dashboard.

6. In the **Dashboard** window, click **Vertical** and drag a vertical layout container to the far right of the dashboard, and drop it when you see a vertical gray area from top to bottom on the far right.

7. Drag the **Total Medals by Sport** worksheet into the layout container.

8. Drag the **Medals by Athlete** worksheet into the layout container beneath **Total Medals by Sport**.

9. Click the **Medals by Country** map, and resize it to occupy just over half the dashboard space.

10. Click to select the **Medals by Athlete** view. On its toolbar, click the drop-down arrow, select **Fit**, and then choose **Fit Width**.

Add Dashboard Filter Actions

1. On the **Dashboard** menu at the top of the screen, click **Actions**, then click **Add Action**, and choose **Filter**.

2. Use the following settings for the map filter:

Setting	Value
Name	"Map Filter"
Source Sheets	**2014 Sochi Olympics Results** dashboard / **Medals by Country**
Run action on	**Select**
Target Sheets	Ensure that all available sheets are selected.
Clearing the selection will	**Show all values**

3. Click **OK**.
4. Create another filter action for the bar chart with the following settings:

Setting	Value
Name	"Filter for Athletes"
Source Sheets	**Total Medals by Sport**
Run action on	**Select**
Target Sheets	**Medals by Athlete**
Clearing the selection will	**Show all values**

5. Click **OK**, and then click **OK** again to close the **Actions** dialog box.
6. Test the filter actions you just added:
   - Click on the map to filter the other views.
   - Click a blank area in the map to show all values.
   - Click on a sport in the bar chart to build a list of athletes.
   - Click a blank area in the bar chart to show all values.

Add Dashboard URL Actions

1. On the **Dashboard** menu, choose **Actions**.
2. Click **Add Action**, and choose **Go to URL**.
3. Create a URL action with these settings:

Setting	Value
Name	Look up information about <Sport>
Source Sheets	**Medals by Athlete** and **Total Medals by Sport**
Run Action On	**Menu**
URL	http://en.wikipedia.org/wiki/<Sport>

4. Repeat these steps to create another URL action with the following settings:

Setting	Value
Name	Look up information about <Athlete>
Source Sheets	**Medals by Athlete**
Run Action On	**Menu**
URL	http://www.bing.com/search?q='<Athlete>' +Olympics
URL Options	**URL Encode Data Values**

5. Test the URL actions you just added:
   - Click on a sport in the bar chart, then click on the URL link in the tooltip context menu to test.
   - Click on an athlete in the text table, then click on the URL link in the tooltip context menu to test.

Edit Titles to Support User Interaction

1. On the **Dashboard** menu, click **Show Title**.
2. Right-click the title for **Medals by Country**, click **Edit Title**, and on the next line below the title, type "Click a country", and then format the font to size 10. Click **OK**.
3. Right-click the title for **Total Medals by Sport**, and choose **Edit Title**.
4. Leave the reference for the sheet name, and then add "for <Country>", so the title looks like this:
   <Sheet Name> for **<Country>**
5. Press **ENTER** and on the next line, type:
   "Next, choose a sport to see the list of athletes" and format to font size 10.
6. Use the same method for the title for **Medals by Athlete** to read: **<Sheet Name> for <Sport>**.
7. Test the titles you just edited:
   - Click on a mark for a country in the map to check the title on the bar chart.
   - Click on a sport in the bar chart to check the title on the text table.

SELF CHECK ANSWER 1 **Canada** won two medals, a silver and a bronze, in **Speed Skating**. **Denny Morrison** won both of those medals.

SELF CHECK ANSWER 2 To improve the dashboard performance by only displaying athletes for selected events, change the sports event filter to **Exclude All Values** in the **Clearing the selection will** setting.

NOTE For an example of a complete solution to this practice, see **Creating_an_Interactive_Dashboard_Solution.twbx**.

17. Appendix B: Reference

Accessibility Compliance

Accessibility typically describes how easily someone with a disability can use or access a system, such as a website or a software application. Incorporating good design practices (listed below) into your visualizations can benefit all users, regardless of ability, and can help make your workbooks and dashboards more effective and easy to use.

However, to create views that are compliant with accessibility requirements, for example, the Web Content Accessibility Guidelines (WCAG 2.0 AA) and U.S. Section 508 requirements, you must follow these steps:

1. Create views in Tableau Desktop following best practice guidelines.
2. Publish the views to Tableau Server or Tableau Online.
3. Embed the views in an accessibility-compliant web page for users to access the content.

These embedded views will be accessible to users who operate assistive technology, such as screen readers, and/or use accessibility techniques such as keyboard-only navigation.

Accessibility Principles
The WCAG principles help support authors to create accessible visualizations.

WCAG 2.0 AA Principle	Description
Perceivable	Information and user interface components must be presented to users in a way that they can perceive. Consider including text alternatives and alternate ways to present the content.
Operable	The user interface components and navigation must be accessible to users from the different devices or methods that they use to interact with the view. This is accomplished by publishing your view to Tableau Server or Tableau Online and then embedding your view in an accessibility compliant web page.
Understandable	The information presented in the view must be understandable to your users. For example, using clear names and labels for different elements shown in your view.

Best Practices
When creating your views, follow these guidelines:

Guidelines	Principles	Technique Examples
Keep it simple	Understandable	Limit the number of marks. Orient labels and headers horizontally for legibility. Limit the number of colors and shapes.
Show more text and make it helpful	Perceivable, Understandable	Provide descriptive text in titles and captions to provide context. Use mark labels. Add explanatory text.
Use color thoughtfully and provide contrast	Perceivable, Understandable	Select the color-blind palette for dimensions or discrete marks. Use the blue or orange-blue diverging palette with stepped color for measures or continuous marks. Use contrast analyzer tools to select the text and color backgrounds with sufficient contrast ratios of 4.5:1 (large text 3:1)
Provide visual cues beyond color	Perceivable, Understandable	Use additional encoding, such as size and shape, to differentiate marks. Identify spatial relationships of marks using location, for example, with reference lines, trend lines, calculated fields to identify quadrants. Add mark labels to help distinguish marks, for example line endpoints and/or minimum and maximum values.

More Information

For more information on these topics and the common keystrokes for navigation in a Tableau embedded view, please search for "accessibility compliant" in the Tableau Online Help.

Further Assistance

Want to learn more? Tableau offers a variety of training and enablement solutions designed to meet the needs of your organization.

eLearning

With guided, role-based learning paths, Tableau eLearning allows you to easily educate your team in a consistent and scalable way. Learning paths help users learn the ins and outs of Tableau at their own pace, when their schedules allow. Skills assessments, knowledge checks, and hands-on activities ensure that information is retained.

To find out more, visit tableau.com/learn/learning-paths.

Classroom Training

Classroom training offers in-depth learning experiences with expert instructors. Training is offered across the globe, at your location or in virtual classrooms.

To find out more, visit tableau.com/learn/classroom.

Consulting

Tableau consultants deliver a wide range of services, including remote coaching sessions, on-site rapid deployments, and ongoing consulting to enable Tableau adoption at your organization.

To find out more, visit tableau.com/support/consulting.

Other resources

Knowledge Base—Access a compilation of the top online resources for different topical areas at tableau.com/support/knowledgebase.

Community Forums—Explore a place to connect with other users and find answers to your Tableau-related questions at tableau.com/community.

Tableau Blueprint—Discover an enablement framework for becoming a data-driven organization at tableau.com/blueprint.

Whitepapers—Access a library of whitepapers covering data visualization, best practices and industry trends at tableau.com/learn/whitepapers.

Tableau Viz Gallery —See the possibilities when visualizing data in Tableau at tableau.com/solutions/gallery.

Tableau Public—Explore how users are building unique, informative stories with their data with Tableau Public. Visit public.tableau.com/s/.

Sample workbooks—Access workbooks through Tableau Desktop by clicking on the **Help** menu and selecting **Sample workbooks**.

Technical Support—Search for an answer in the support resources and if you don't find an answer, create a support case at tableau.com/support.

Ready to test your skills?

Show off your Tableau knowledge and experience by earning badges. Our skills assessments and certification programs test a wide range of skills, whether you're just beginning or an expert.

Skills Assessments

Skills Assessments help determine whether you have the necessary skills to be productive in your Tableau role. You can access skills assessments through Tableau's eLearning platform. Users in every Tableau role in your organization can pass one of these low-stakes assessments and earn a Role Badge to build confidence in their skills.

To find out more, visit tableau.com/learn/learning-paths.

Certification

Build your resume, advance your career, and showcase your skills by becoming #CertifiablyTableau. Tableau Certification allows you to communicate your skills confidently and clearly and to join a community of skilled Tableau users. We offer multiple levels of exams for Tableau Desktop and Tableau Server.

Exam	Exam Focus
Tableau Desktop Specialist	Foundational functionality and product comprehension
Tableau Desktop Certified Associate	Comprehensive functionality and product expertise
Tableau Desktop Certified Professional	Advanced functionality and application of visual best practices
Tableau Server Certified Associate	Administrative functionality and platform knowledge
Tableau Server Certified Professional	Architectural knowledge and platform integration expertise

To learn more about the exams, visit tableau.com/learn/certification.

Training Feedback Survey

Our training team relies on customer feedback from students to evaluate performance and help improve our educational offerings. Please take five minutes after class to complete a brief but important online survey to share your thoughts on the instructor, the training facility, and the learning materials.

Survey Link

To open the survey on your computer, either click the **Training Feedback Survey** link in the **Materials** folder, or navigate to: https://www.tableau.com/training-csat

NOTE Be sure to enter the class code provided by your instructor, and the email address you used to register for the class.

For Mobile Devices

To complete the survey on a mobile device, point your device's camera at the QR code below.