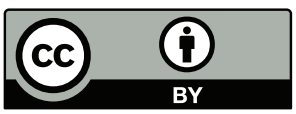
EXCEL

Center for Lifelong Learning

GEORGE SELF

March 2020 – Edition 1

George Self: *Excel,* Center for Lifelong Learning, March 2020



FOREWORD

Microsoft Excel is a spreadsheet program developed by Microsoft for Windows, MacOS, Android and iOS and is part of the Office suite of software. It features calculation, graphing tools, pivot tables, and a macro programming language called *Visual Basic for Applications*. Excel is used widely for many financially-related activities from simple quarterly forecasts to full corporate annual reports. Excel is also used for common information organization like contact lists and inventory tracking. Finally, Excel helps researchers perform statistical analysis tasks like variance analysis, chi-square testing, and charting complex data.

I've used Excel for both business and personal use for more than 20 years. For the Cochise College Center for Lifelong Learning class, I started with an "open source" book since those are available free of charge and I could modify it to meet the objectives of this class. I found two books:

- *Beginning Excel* by Noreen Brown, Barbara Lave, Julie Romey, Mary Schatz, Diane Shingledecker. I found it at *Open Oregon Educational Resources*, https://ecampusontario.pressbooks.pub/beginningexcel/.
- *How to Use Microsoft Excel: The Careers in Practice Series*, adapted by *The Saylor Foundation* without attribution as requested by the work's original creator. It was downloaded from https://resources.saylor.org/wwwresources/archived/site/textbooks/How%20to%20Use%20Microsoft%20Excel.pdf

While the book is useful in its current form, I will continually update it based on emerging trends in research. It is my hope that students can use this book to learn about Excel and other instructors can adapt it for their own classes.

— George Self

BRIEF CONTENTS

CONTENTS

Part I

BASIC SKILLS

Part 1 is a basic introduction to Excel. Topics include using toolbars and worksheets, selecting cells and entering data, creating spreadsheets and formulas, formatting cells, handling and saving files.

Part II

INTERMEDIATE SKILLS

Part 2 builds on your skills from Part 1. It covers worksheet tables, selecting and formatting objects, text boxes, shapes and charts, conditional formatting and printing tips.

1

TABLES

Excel workbooks are designed to store lots of information and organizing this information so that they display meaningful data can be challenging. Excel has many features that can help organize data and find needed information efficiently. Setting up data as a table from the onset will allows users to sort, filter, total, and subtotal the data easily. In Excel, a table is a collection of data about a particular subject stored in adjacent rows and columns. Tables can improve the look and feel of a workbook. This chapter explores how to best set up Excel tables, how to edit them, and then how to work with them effectively. These skills will be demonstrated in the context of a multi-sheet file that shows national average weather for two very different cities in the United States. Weather data is often voluminous and difficult to summarize since so much is collected every hour of every day and providing meaningful summaries of such data is a useful skill. The skills learned using weather data in this chapter can be be transferred to data found in any discipline or field.

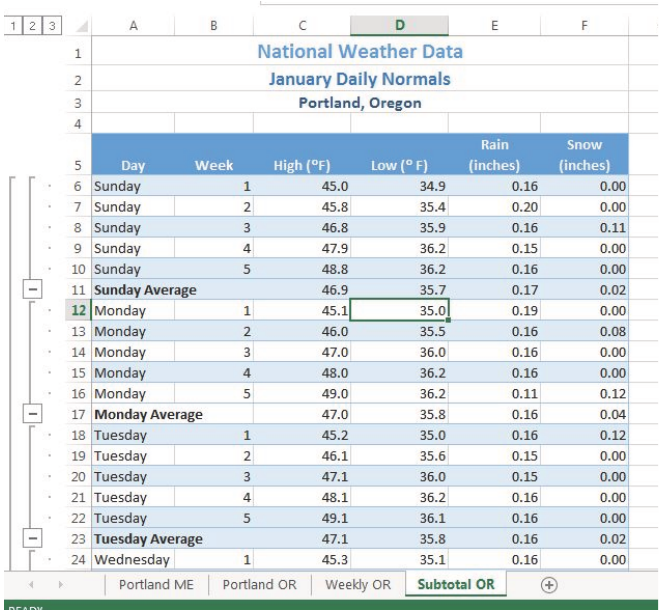
1.1 TABLE BASICS

Learning Objectives

- Understand table structure.
- Plan, create, and edit a table.
- Freeze rows and columns.
- Sort data in a table.

This section reviews the fundamental skills for setting up and maintaining an Excel table. The objective used for this chapter is the construction of a multi-sheet file to keep track of two cities' national weather data for the month of January. Organizing, maintaining, and reporting data are essentials skills for employees in most industries.

Figure 1 shows the completed workbook that will be demonstrated in this chapter. Notice that this workbook contains three worksheets. The first worksheet lists average weather for January in Portland, Maine. The second sheet lists average weather data for January in a very different climate, Portland, Oregon. The third sheet adds a weekly column to the Portland, Oregon data so that it can be subtotaled by week.



	A	B	C	D	E	F
1	National Weather Data					
2	January Daily Normals					
3	Portland, Oregon					
4						
5	Day	Week	High (°F)	Low (° F)	Rain (inches)	Snow (inches)
6	Sunday	1	45.0	34.9	0.16	0.00
7	Sunday	2	45.8	35.4	0.20	0.00
8	Sunday	3	46.8	35.9	0.16	0.11
9	Sunday	4	47.9	36.2	0.15	0.00
10	Sunday	5	48.8	36.2	0.16	0.00
11	**Sunday Average**		46.9	35.7	0.17	0.02
12	Monday	1	45.1	35.0	0.19	0.00
13	Monday	2	46.0	35.5	0.16	0.08
14	Monday	3	47.0	36.0	0.16	0.00
15	Monday	4	48.0	36.2	0.16	0.00
16	Monday	5	49.0	36.2	0.11	0.12
17	**Monday Average**		47.0	35.8	0.16	0.04
18	Tuesday	1	45.2	35.0	0.16	0.12
19	Tuesday	2	46.1	35.6	0.15	0.00
20	Tuesday	3	47.1	36.0	0.15	0.00
21	Tuesday	4	48.1	36.2	0.16	0.00
22	Tuesday	5	49.1	36.1	0.16	0.00
23	**Tuesday Average**		47.1	35.8	0.16	0.02
24	Wednesday	1	45.3	35.1	0.16	0.00

Figure 1: Completed National Weather Workbook

1.1.1 *Creating a Table*

Data file: CH5 Data

When data is presented in long lists or columns, it helps if the table is set up well. Here are some rules of data-entry etiquette to follow when creating a table from scratch.

1. Whenever possible, organize information using adjacent (neighboring) columns and rows.
2. Start the table in the upper-left corner of the worksheet and work down the sheet.
3. Do not skip columns and rows just to "space out" the information. (To place white space between information in adjacent columns and rows, widen columns, heighten rows, and change the alignment.)
4. Reserve a single column at the left edge of the table for the table's row headings or identifying information.
5. Reserve a single row at the top of the table for the table's column headings.
6. If the table requires a title, put the title in the row(s) above the column headings.

Following these rules will help insure that the sorts, filters, totals, and subtotals applied to the table with return the desired results.

With these rules in mind, begin working on the Portland ME worksheet in the National Weather workbook. Notice that the data is in adjacent columns and rows. The upper-left corner of the table is in A5 and the titles are above the column headings in Row 5. Since the set-up of the data looks good, it is time to turn the data range into an Excel table.

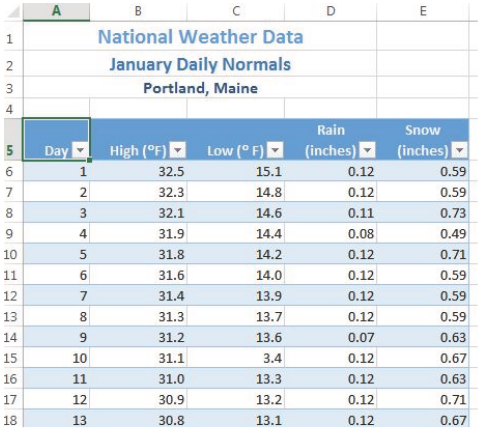
1. Open data file **CH5 Data** and save the file as **CH5 National Weather**.
2. Click on A5 in the Portland ME sheet.
3. Click the Table button in the Insert tab of the Ribbon.

Figure 2 will appear on the screen.

Figure 2: Create Table

1. Make sure "My table has headers" is checked. Click OK.
2. Click in A5 again.
3. Adjust all column widths so that the complete headings are visible in row 5 with the filter arrows showing. The filter arrows are the down-arrow buttons that will appear in row 5 when the table is created. The procedure to use these to sort and filter is later in this chapter.

After this, the spreadsheet will look like Figure 3.



	A	B	C	D	E
1	National Weather Data				
2	January Daily Normals				
3	Portland, Maine				
4					
5	Day	High (°F)	Low (° F)	Rain (inches)	Snow (inches)
6	1	32.5	15.1	0.12	0.59
7	2	32.3	14.8	0.12	0.59
8	3	32.1	14.6	0.11	0.73
9	4	31.9	14.4	0.08	0.49
10	5	31.8	14.2	0.12	0.71
11	6	31.6	14.0	0.12	0.59
12	7	31.4	13.9	0.12	0.59
13	8	31.3	13.7	0.12	0.59
14	9	31.2	13.6	0.07	0.63
15	10	31.1	3.4	0.12	0.67
16	11	31.0	13.3	0.12	0.63
17	12	30.9	13.2	0.12	0.71
18	13	30.8	13.1	0.12	0.67

Figure 3: Weather Table

Notice that a new ribbon tab, Table Tools Design, appears when the mouse is clicked inside the table. This ribbon tab contains controls to edit, style, and add functionality to the table. Try these steps again.

1. Click on the Portland OR sheet and click in cell A5.
2. Click the Table button in the Insert tab of the Ribbon.
3. Make sure "My table has headers" is checked. Click OK.
4. Click in A5 again.
5. Adjust all columns widths so that the complete headings in row 5 with the filter arrows showing.

Skill Refresher

Create a Table

- Click on the top left cell in the data.
- Click the Table button in the Insert tab of the Ribbon.
- Make sure "My table has headers" is checked. Click OK.
- Click on the top left cell again.
- Adjust all columns widths so the complete headings with the filter arrows are showing.

1.1.2 *Formatting Tables*

There are many ways to format an Excel table. There are preset colored Table Styles with Light, Medium, and Dark colors. There are also a variety of Table Style Options listed in Table 1.

Table Style	Description
Header Row	Top row of the table that includes column headings
Total Row	Row added to the bottom that applies column summary calculations
First Column	Formatting added to the left-most column in the table
Last Column	Formatting added to the right-most column in the table
Banded Rows	Alternating rows of color added to make it easier to see rows of data
Banded Columns	Alternating columns of color added to make it easier to see columns of data
Filter Button	Button that appear at the top of each column that lists options for sorting and filtering

Table 1: Table Style Options

Add formatting to both of of the Portland weather tables in the following steps.

1. Click on the Portland ME sheet.
2. In the Table Tools Design tab, in the Table Styles group, click the More down-arrow button.

A gallery of table styles will appear as in Figure 4.

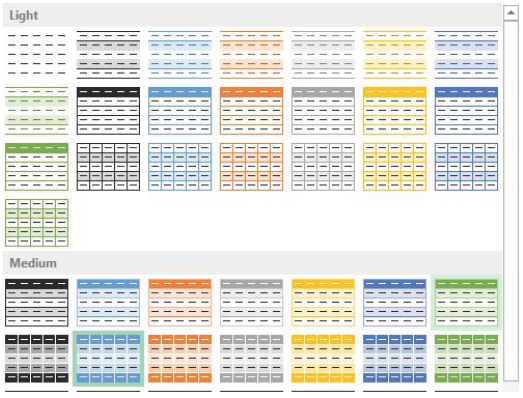


Figure 4: Table Styles

3. In the Table Styles gallery, in the Medium Section, click Table Style Medium 7.
4. In the Table Style Options group in the Ribbon, click Banded Rows.

The alternating colored rows will disappear. The data in the table is now more difficult to read.

1. Try some of the other options in the Table Style Options group. When finished, check just Header Row, Banded Rows, and Filter Button as in Figure 5 below.

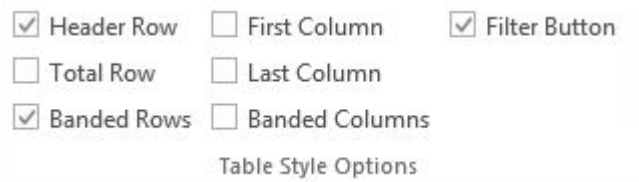


Figure 5: Ribbon Table Style Options

1.1.3 *Adding Data to Tables*

Over time, new data will need to be added to an Excel table. Add that data to the table in a blank row. The easiest way to do this is to enter the data in the first blank row below the last row in the table. Then the table can be arranged by sorting. If data must be added in a specific place in the middle of a table, insert a blank row and add the data there.

Add the last three days of the months to the Portland, Maine and Portland, Oregon tables. The following steps will walk through this process.

1. Click on the **Portland ME** worksheet.
2. Click on A34 (the left-most cell below the last row in the table).
3. Enter the following data.

Day	**High** (°F)	**Low** (°F)	**Rain** (inches)	**Snow** (inches)
29	31.4	13.3	0.12	0.59
30	31.6	3.4	0.08	0.47
31	31.7	13.5	0.12	0.63

Table 2: Portland, Maine data

Notice that the banded row formatting continues as additional rows are added to the tables.

1. Click on the **Portland OR** worksheet.
2. Click on A34 (the left-most cell below the last row in the table).

3. Enter the following data.

Day	**High** (°F)	**Low** (°F)	**Rain** (inches)	**Snow** (inches)
29	48.8	36.2	0.16	0
30	49.0	36.2	0.11	0.32
31	49.1	36.1	0.16	0

Table 3: Portland, Oregon data

1.1.4 *Finding and Editing Data*

It is inevitable that data errors which need to be corrected will appear in a table. While it is possible to visually scan through a table to find errors, this can be a tedious and tiresome process. Excel can help with this through the Find command. When using Find, the best practice is to start with the cell pointer in cell A1 to ensure that all the data is included in the search.

A temperature of 3.4 degrees was entered erroneously in the **Portland ME** sheet. It should have been 13.4. To fix this error, complete the following steps.

1. Click on the **Portland ME** sheet.
2. Press the Ctrl + Home keys together to go to the top of the sheet (A1).
3. In the Home tab of the ribbon, click on Find & Select in the Editing Group and then click Find.
4. In the Find box, type 3.4, and then click Find Next.

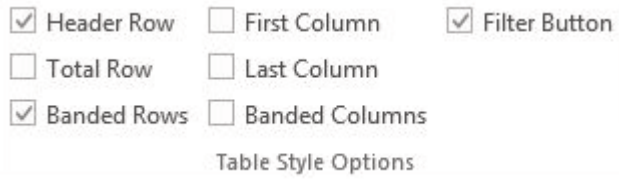


Figure 6: Find and Replace

1. Click the Close button.
2. Replace 3.4 in the Low column for Day 10 with 13.4.
3. Now switch to the **Portland OR** sheet and find the Snow error of .32 in Day 3. Change it to 0.12.

Skill Refresher

Finding and Replacing Data

- In the Home tab of the ribbon, click on Find & Select in the Editing Group and then click Find.
- In the Find box, type the phrase to find then click Find Next.
- Continuing click Find Next until the phrase is found.
- Click Close and edit the data.
- one
- two

1.1.5 *Freeze Rows and Columns*

When panes are "frozen" in a worksheet, Microsoft Excel keeps specific rows or columns visible in the table when it is scrolled on the screen. For example, if the first row in the spreadsheet contains labels, that row might be frozen to make sure that the column labels remain visible as the sheet is scrolled. When scrolling through the weather data, it would be nice to keep column headings visible on the screen.

To freeze the headings:

1. Click in A6, the left-most cell below the headings row. 2. Click the View tab in the ribbon. 3. Select Freeze Panes and then Freeze Panes again. 4. Scroll up and down the sheet and notice that the headings are always displayed at the top of the table.

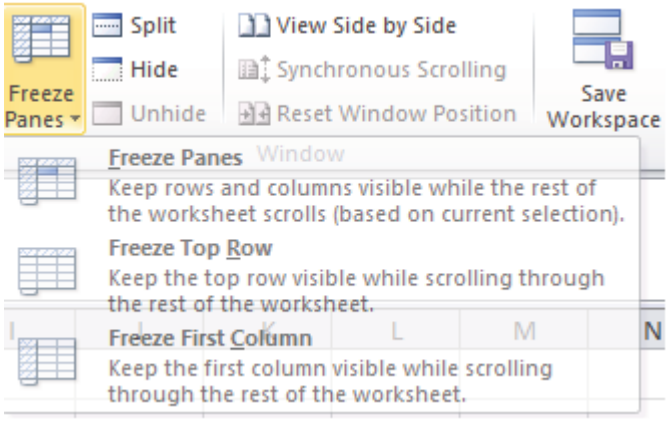


Figure 7: Freeze Pane

To unfreeze the headings:

1. Click on the View tab in the ribbon. 2. Select Unfreeze Panes.

1.1.6 *Simple Sort*

Content in a table can be sorted alphabetically, numerically, and in many other ways. Sorting helps organize data by one or more columns in the table. Table 4 describes the different sort orders available for each column of data.

Sort Order	**Text**	**Numbers**	**Dates**
Ascending	Alphabetical (A-Z)	Smallest to Largest	Chronological (oldest to newest)
Descending	Reverse Alphabetical (Z-A)	Largest to Smallest	Reverse Chronological (newest to oldest)

Table 4: Sort Options

Suppose it is important to know what the snowiest day was in January in Portland, Maine; so the Snow column must be sorted in Descending order to find the snowiest day at the top of the table.

1. Click on the filter Click arrow to the right of the header Snow (inches) in the Portland ME worksheet. 2. Click on the choice Click ZA↓ Sort Largest to Smallest. See Figure 5.8 below.

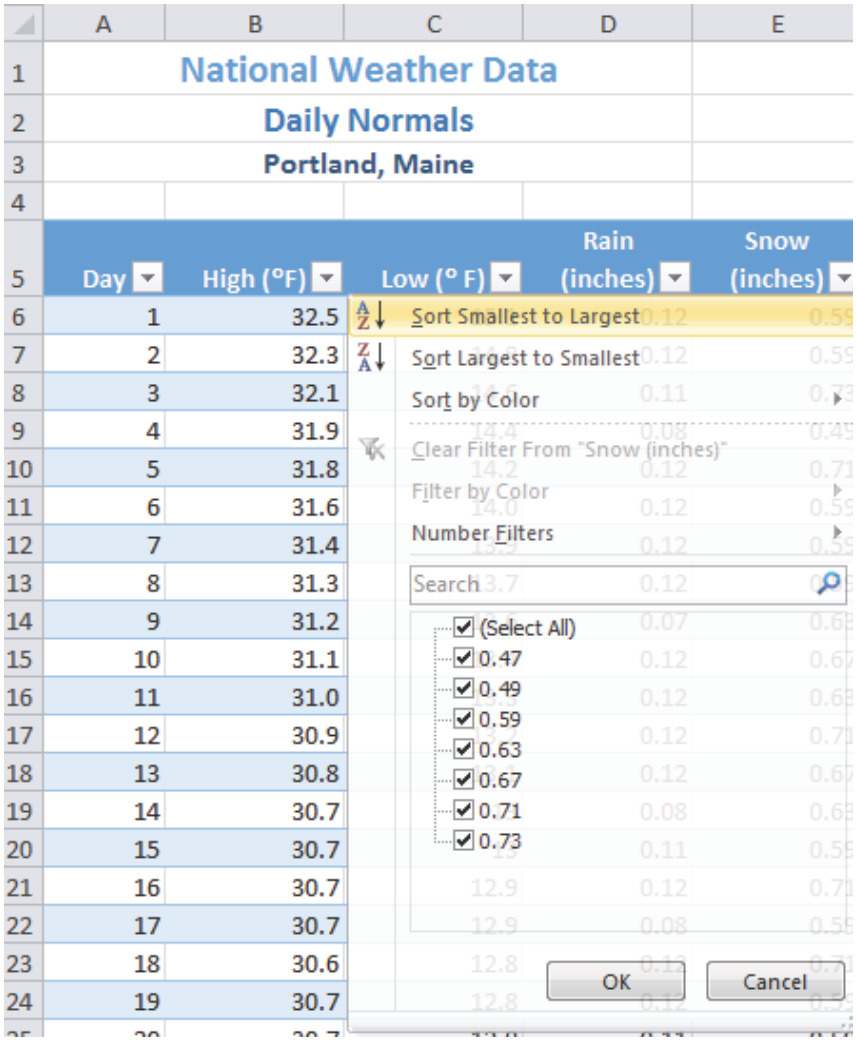


Figure 8: Sort by One Column

If this is done correctly, the snowiest day will be at the top of the list in January 3rd (in row 6) with 0.73 inches of snow! Notice the filter arrow changes in the snow column to a downward pointing arrow to indicate that the column is sorted in descending order (largest to smallest).

	A	B	C	D	E
1	National Weather Data				
2	January Daily Normals				
3	Portland, Maine				
4					
5	Day	High (°F)	Low (° F)	Rain (inches)	Snow (inches)
6	3	32.1	14.6	0.11	0.73
7	5	31.8	14.2	0.12	0.71
8	12	30.9	13.2	0.12	0.71
9	16	30.7	12.9	0.12	0.71
10	18	30.6	12.8	0.12	0.71
11	22	30.8	12.8	0.08	0.71
12	10	31.1	13.4	0.12	0.67

Figure 9: Snowiest Days in Maine

3. Now switch to the Portland Oregon sheet and repeat these sort steps to find the snowiest day in Oregon. Check the worksheet with Figure 5.10.

	A	B	C	D	E
1	National Weather Data				
2	January Daily Normals				
3	Portland, Oregon				
4					
5	Day	High (°F)	Low (° F)	Rain (inches)	Snow (inches)
6	30	49.0	36.2	0.11	0.32
7	3	45.2	35.0	0.16	0.12
8	15	46.8	35.9	0.16	0.11
9	9	46.0	35.5	0.16	0.08
10	25	48.3	36.2	0.12	0.08
11	1	45.0	34.9	0.16	0.00
12	2	45.1	35.0	0.19	0.00

Figure 10: Snowiest Days in Oregon

Skill Refresher

Sort a Column

- Click on the filter down arrow to the right of the header in the column to be sorted.
- Click on the choice AZ↓ or ZA↓ to sort the data in that column.

1.1.7 *Multi-Level Sort*

Sometimes a table needs to be sorted by more than one column at a time in order to efficiently analyze the data. For example, if the data included several different types of loans from several bank offices, it would need to be sorted by the type of loan and then by bank office name to clearly see the different groups of loans. As another example, if a worksheet included a list of grades for students over their time in high school, the data should be sorted first by student name, then by grade level (freshman, sophomore, junior, and senior) so that each student's grades appear in chronological order.

For the weather data, look at the snow days in Oregon and see how cold they were!

1. Click on the Portland OR sheet, then click on a cell in the table. 2. Click on the Data tab in the ribbon and then click the Sort button. 3. Click the down-arrow for Column and select Snow (inches). 4. Click the down-arrow for Order and select Largest to Smallest. 5. To add 2nd level sort, click on the Add Level button in the top left corner of the dialog box. 6. In the new Then by row, click the down-arrow for Column and select Low (°F). 7. In the same row, click the down-arrow for Order and select Smallest to Largest. The dialog box should look like Figure 5.11.

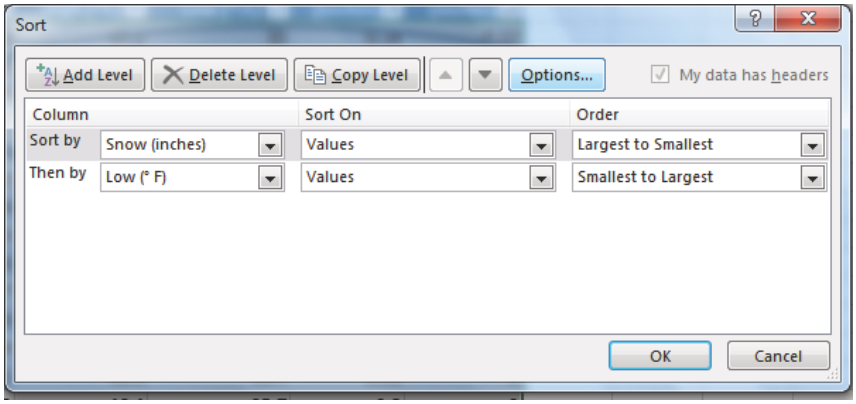


Figure 11: Multi-Level Sort

8. Click OK. The table sort results should look like Figure 5.12. Notice for the two days with 0.08 inches of snow, the low temp of 35.5 on Day 9 is displayed before the low temp of 36.2 on Day 25. The lowest of the two was listed first. Also notice that the filter arrows changed on the sorted columns to show how they are sorted.

	A	B	C	D	E
1	National Weather Data				
2	January Daily Normals				
3	Portland, Oregon				
4					
5	Day	High (°F)	Low (° F)	Rain (inches)	Snow (inches)
6	30	49.0	36.2	0.11	0.32
7	3	45.2	35.0	0.16	0.12
8	15	46.8	35.9	0.16	0.11
9	9	46.0	35.5	0.16	0.08
10	25	48.3	36.2	0.12	0.08
11	1	45.0	34.9	0.16	0.00
12	2	45.1	35.0	0.19	0.00
13	4	45.3	35.1	0.16	0.00
14	5	45.4	35.2	0.20	0.00

Figure 12: Multi-Level Sort Results

1.1.8 *Custom Sorts*

In most cases, the data should be sorted in "typical" sort order: numbers sorted highest to lowest, words sorted alphabetically, etc. Some data does not make sense when sorted this way. For example, if the days of the week are sorted alphabetically, the result would be : Friday, Monday, Saturday, Sunday, Thursday, Tuesday, and Wednesday. This order would be of no use to anyone! Similarly, the months of the year would not make sense alphabetically.

In the weather data, a column was added for the week in the Weekly OR sheet and changed the days to Sunday through Saturday. This sheet facilitates further analysis of Portland, Oregon's data to see if there are weekly trends in the weather. To look for those trends, sort the Weekly OR sheet by Week and then by Day.

1. Click on the Weekly OR worksheet. 2. Click on A5 and insert a table. 3. Click on Sort in the Data tab in the ribbon. 4. Click the down-arrow for Column and select Week. 5. Click the down-arrow for Order and select Smallest to Largest. 6. To add 2nd level sort, click on the Add Level button in the top right corner of the dialog box. 7. In the new Then by row, click the down-arrow for Column and select Day. 8. Click the down-arrow for Order and select Custom List. The dialog box in Figure 5.13 will appear on the screen.

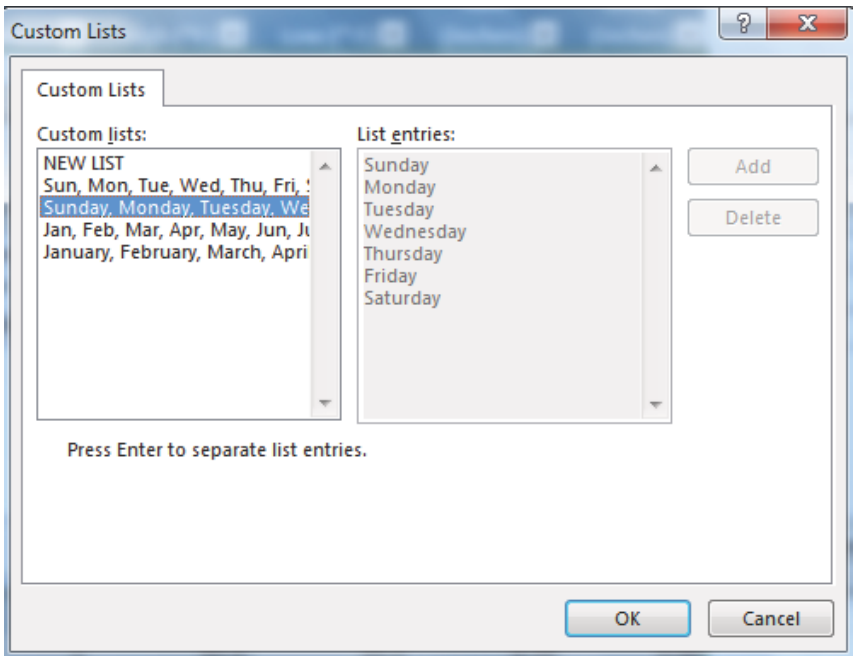


Figure 13: Custom Lists

9. Click on Sunday, Monday, Tuesday, etc. in the Custom lists on the left-side of the dialog box. NOTE: Make sure to select the days of the week spelled out, not the abbreviations for the days of the week. 10. Click OK. The Sort dialog box should look like Figure 5.14.

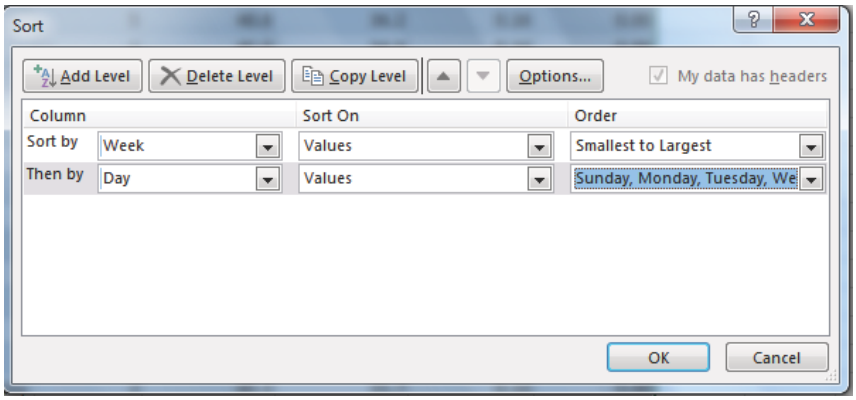


Figure 14: Sort Dialog Box

11. Click OK again. The sorted table should now look like Figure 5.15. Notice the data is in Week order and, within each week, in Day order. 12. Save the workbook.

	A	B	C	D	E	F
1	National Weather Data					
2	January Daily Normals					
3	Portland, Oregon					
4						
5	Day	Week	High (°F)	Low (° F)	Rain (inches)	Snow (inches)
6	Sunday	1	45.0	34.9	0.16	0.00
7	Monday	1	45.1	35.0	0.19	0.00
8	Tuesday	1	45.2	35.0	0.16	0.12
9	Wednesday	1	45.3	35.1	0.16	0.00
10	Thursday	1	45.4	35.2	0.20	0.00
11	Friday	1	45.6	35.3	0.15	0.00
12	Saturday	1	45.7	35.4	0.16	0.00
13	Sunday	2	45.8	35.4	0.20	0.00
14	Monday	2	46.0	35.5	0.16	0.08
15	Tuesday	2	46.1	35.6	0.15	0.00
16	Wednesday	2	46.3	35.7	0.16	0.00
17	Thursday	2	46.4	35.7	0.20	0.00
18	Friday	2	46.5	35.8	0.15	0.00
19	Saturday	2	46.7	35.9	0.16	0.00
20	Sunday	3	46.8	35.9	0.16	0.11

Figure 15: Custom Sort

Key Take-Aways

Save

- Tables are made up of adjacent rows and columns of data with a single row of column headings at the top.
- Tables are created by clicking in the top left-most cell in the data and selecting Table in the Insert tab of the ribbon.
- There are a gallery of styles and options to choose from to format a table.
- To add data it is best to add it one row below the bottom of the table. The table can then be resorted to organize the data.
- Freezing heading keeps column headings displayed while scrolling through the table data.
- Filter arrows in the table headings sort the data by a single column. Use Sort in the Data tab in the ribbon to sort by two or more columns at a time.
- Custom Sorts can be used when data needs to be sorted in a special way (i. e.Days of the Week).
- one
- two

1.2 INTERMEDIATE TABLE SKILLS

Learning Objectives

- Filter table data.
- Add a total row to a table.
- Insert subtotals into a table.

1.2.1 *Filtering Data*

When an Excel table is first created, filter arrows appear in all the column headings. Those arrows can be used to sort the data by a single column. These same arrows can also be used to filter or limit the data by narrowing the displayed data within a column. There are many ways to filter data within a column depending on whether the data in the column is text or numeric. Table 5 contains a few filter examples.

Desired Results	Filter Column	Filter	Checkbox
Text Filters			
Data for the State of New Jersey (NJ)	State	Equals NJ	NJ
Data for Books that Have Gardening in Their Title	Title	Contains Gardening	
Data for Weather on the Weekend	Day	Equals Saturday or equals Sunday	Saturday and Sunday
Numeric Filters			
Data for Income Greater Than $1,000	Income	Greater than 1000	
Data for Amount Paid Equal to Zero	Amount Paid	Equals 0.00	0.00
Data for Mortgage and Auto Loans	Loan Type	Equals Mortgage or equals Auto	Mortgage and Auto

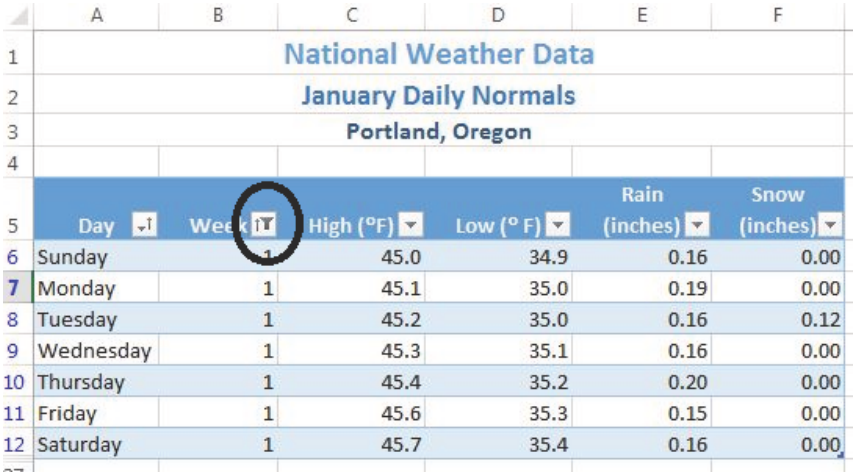
Table 5: Filter Examples

Notice there are sometimes more than one way to filter data (i. e.– with a filter choice or a checked box). There are also single criteria filters, as well as multi-criteria filters. All of these are explored next.

To start filtering, look at just the first week of data in the Weekly OR sheet:

1. Click on the Weekly OR sheet and click on a cell in the table. 2. Click the filter arrow to the right of the Week heading. 3. Click the Select All checkbox to deselect all of the checkbox choices. 4. Click on 1 to select Week 1. 5. Click OK.

The table should look like Figure 5.16. Only 7 rows of Week 1 data should be visible in the table. Notice in the Status Bar at the bottom of the screen the message "7 of 31 records found". Also notice that the filter arrow in the Week heading has changed to a funnel which indicates that this column is currently filtered.



	A	B	C	D	E	F
1	National Weather Data					
2	January Daily Normals					
3	Portland, Oregon					
4						
5	Day	Week	High (°F)	Low (° F)	Rain (inches)	Snow (inches)
6	Sunday	1	45.0	34.9	0.16	0.00
7	Monday	1	45.1	35.0	0.19	0.00
8	Tuesday	1	45.2	35.0	0.16	0.12
9	Wednesday	1	45.3	35.1	0.16	0.00
10	Thursday	1	45.4	35.2	0.20	0.00
11	Friday	1	45.6	35.3	0.15	0.00
12	Saturday	1	45.7	35.4	0.16	0.00

Figure 16: Filter

To remove the filter:

1. Click the funnel next to the Week heading. 2. Select "Clear filter from Week".

Skill Refresher

Filter a Column

- Click the filter arrow to the right of the heading in the column to be filtered.
- Click the Select All checkbox to deselect all of the checkbox choices.
- Click on the checkboxes to filter by.
- Click OK.

Un-Filter a Column

1. Click the funnel to the right of the heading in the column to be filtered. 2. Select Clear filter.

Now try a numeric filter. To find days in Portland ME when it is warmer than 32 degrees in January:

1. Click in the Portland ME sheet, then click on a cell in the table. 2. Click on the filter arrow next to the High heading. 3. Click on Number filters, then select Greater than. The Custom AutoFilter dialog box will appear on the screen. 4. Enter 32 in the space to the right of "is Greater than". The Custom AutoFilter dialog box should now match Figure 5.17.

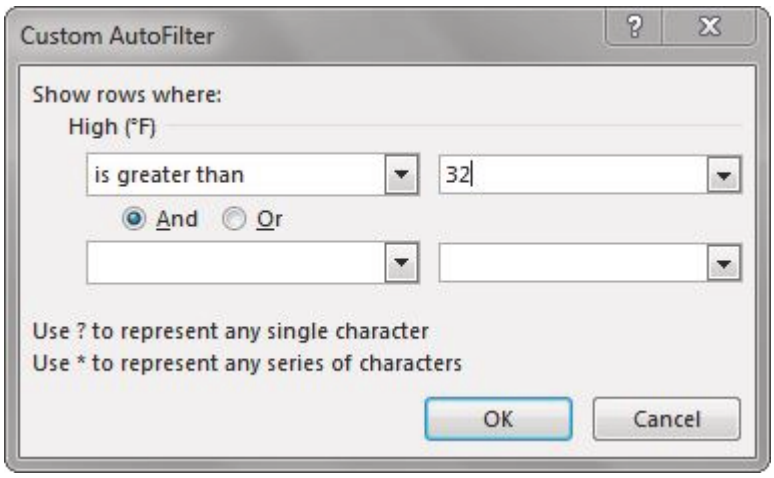


Figure 17: AutoFilter Dialog Box

5. Click OK.

It is now easy to see that it was only above 32 degrees three days in January in Maine – the first three! Check the table against Figure 5.18.

	A	B	C	D	E
1	National Weather Data				
2	January Daily Normals				
3	Portland, Maine				
4					
5	Day	High (°F)	Low (° F)	Rain (inches)	Snow (inches)
6	3	32.1	14.6	0.11	0.73
21	1	32.5	15.1	0.12	0.59
22	2	32.3	14.8	0.12	0.59

Figure 18: Maine Filter Results

Review sorting and filtering in the following steps:

1. Click on the Weekly OR sheet and clear the Day column filter. 2. Sort the table by Week (smallest to largest). 3. Filter the table to only show Mondays. 4. Compare the table results to Figure 5.19.

	A	B	C	D	E	F
1	National Weather Data					
2	January Daily Normals					
3	Portland, Oregon					
4						
5	Day	Week	High (°F)	Low (° F)	Rain (inches)	Snow (inches)
7	Monday	1	45.1	35.0	0.19	0.00
14	Monday	2	46.0	35.5	0.16	0.08
21	Monday	3	47.0	36.0	0.16	0.00
28	Monday	4	48.0	36.2	0.16	0.00
35	Monday	5	49.0	36.2	0.11	0.12
37						

Figure 19: Oregon Filter Results

1.2.2 *Filtering Using the Slicer*

Beginning in Excel 2013, slicers were added to the software as another way to filter table data. A slicer is really useful because it clearly indicates what data is shown in the table after the data has been filtered.

Try using the Slicer to filter the Portland OR data table:

1. Click on the Portland OR sheet and click in the table. 2. In the ribbon's Table Tools Design tab, click Insert Slicer. 3. Click on Day in the Insert Slicers dialog box, and then click OK. 4. Drag the slicer so that the upper left-hand corner lines up with the top corner of cell G5. 5. Notice that when a Slicer is inserted, a Slicer Options tab appears on the ribbon. This tab contains links to change the style and size of the entire slicer or the individual slicer buttons. 6. Click on the Slicer options tab, then click on the More button next to Slicer Styles. The choices in Figure 5.20 will show on the screen.

Figure 20: Slicer Styles

1. Select the first choice under Dark.

2. In the Size group on the Slicer Options ribbon (NOT the Buttons group), change the width to 1". 3. Click in the table and scroll down to Day 15 and click the 15 button to show only the data for January 15th in the table. 4. Hold down the Ctrl key and click on the Slicer buttons for Days 10 through 14. The table should now show the data from Days 10-15. 5. Sort the Day column in Ascending order to show the days in order as in Figure 5.21.

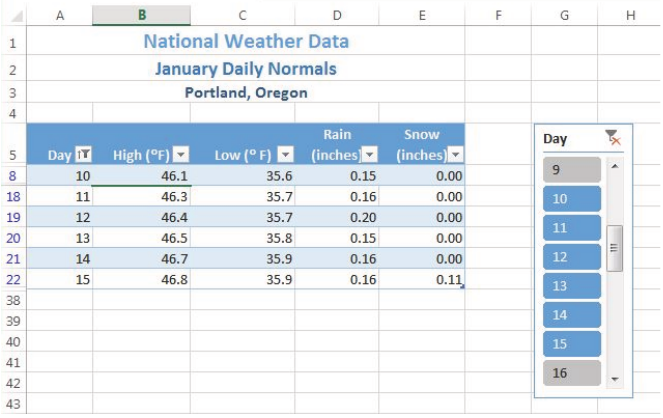


Figure 21: Slicer Results

1.2.3 *Total Rows*

By adding a total row to the bottom of the table, summary data is easily seen for one or more of the columns. Total rows can be added

to tables as a whole, or those that are filtered. Total rows can easily be toggled on and off as the need for summary data arises.

1. Click on the Portland ME sheet and clear the filter from the High column. 2. Click on the Total Row check box in the Table Style Options group in the Table Tools Design tab in the ribbon. 3. Scroll to the bottom of the table to the Total Row. Notice the total for the Snow data. 4. Click on D37 (in the Rain column), and then click the down-arrow that appears to the right of the cell. 5. Choose Sum to add a sum to the Total Row in the Rain column. 6. To see the Average rainfall for the month of January, click on the arrow again and choose Average. 7. Repeat this step in E37 to see the Average snowfall. 8. Use the Decrease Decimal button in the Home tab of the ribbon to change the decimal places in D37 and E37 to 2. Compare the Total Row to Figure 5.22.

	A	B	C	D	E
26	15	30.7	13	0.11	0.59
27	17	30.7	12.9	0.08	0.59
28	19	30.7	12.8	0.12	0.59
29	20	30.7	12.8	0.11	0.59
30	21	30.7	12.8	0.12	0.59
31	23	30.9	12.9	0.12	0.59
32	25	30.9	13	0.22	0.59
33	26	31.0	13	0.11	0.59
34	27	31.2	13.1	0.08	0.59
35	4	31.9	14.4	0.08	0.49
36	30	31.6	3.4	0.08	0.47
37	**Total**			**0.11**	**0.62**

Figure 22: Total Row

1. Now switch to the Weekly OR sheet and attempt to successfully add a Slicer and Total Row to this table: 2. Clear the filter from the Day column. 3. Add a Slicer for the Day column to the sheet. 4. Move the top left corner of the slicer to H5. Resize it as needed and choose a Slicer Style. 5. Select Monday through Friday in the Slicer so that Saturday and Sunday data do NOT show in the table. 6. Add a Total Row that averages the High and Low columns. The averages should be High: 47.0 and Low: 35.8. Change the label "Total" to "Average" by clicking A37 and typing Average.

Skill Refresher

Add a Total Row

- Click on the Total Row check box in the Table Style Options group in the Table Tools Design tab in the ribbon.
- Scroll to the bottom of the table to find the Total Row.
- Click in one of the columns in the Total Row, and then click the down-arrow that appears to the right of the cell.
- Choose Sum to add a sum to the Total Row in the column.
- To see the Average for column, click on the arrow again and choose Average. Some other choices in the Total Row are Count (for words), Count Numbers, Max, and Min.

Skill Refresher

Add a Slicer

- Click on Insert Slicer in the Table Tools Design tab in the ribbon.
- Check the box for the column to which a Slicer is added.
- Click OK.
- one
- two

1.2.4 *Subtotaling*

Subtotals and grand totals can be easily calculated for a column in a table. This is a powerful tool that to quickly display multiple levels of summary data within the table. This can provide Management with a report of higher level summary data one minute, and then can be easily switched back to detailed data the next minute. It is important to save often during this process and follow the steps carefully. It is recommended to make a copy of the data to be subtotaled and place it in a new sheet, so the summary subtotaled data can be separately saved if desired.

In order to subtotal successfully, complete the following steps in order.

1. Sort by the column to subtotal on. 2. Convert the table back to a normal Excel range since a table cannot contain a subtotal. 3. Subtotal

in the Data tab in the ribbon. 4. To limit the displayed data further, Filter in the Data tab in the ribbon.

The next task is to determine what the weather looks like for each day of the week. Start by to saving data to a new sheet, sort by the days of the week, and then convert the table in order to get ready to see the subtotal.

1. Click on the Weekly OR sheet. 2. Point at the Weekly OR sheet tab at the bottom of the screen, hold the Ctrl key down, and left-drag the sheet to the right until it is past all the existing sheets. 3. When a sheet icon with a + sign is visible, let go of the mouse button and then the Ctrl key. A Weekly OR (2) sheet will appear. 4. Right-click on the new Sheet tab, select Rename, type Subtotal OR, and then press Enter. 5. Save the file before starting Subtotaling! 6. Remove all filters in the table by clicking the Data tab and then choosing Clear. 7. Now Sort the table by the Day column using a Custom Sort in the Sort button in the ribbon to sort in the order Sunday, Monday, Tuesday, etc. (See Figure 5.13 through 5.15 for a review of Custom Sorting.) 8. Before adding can subtotals, convert the table back to a regular range. To do this, click Convert to Range in the Table Tools Design tab on the ribbon. (See Figure 5.23)

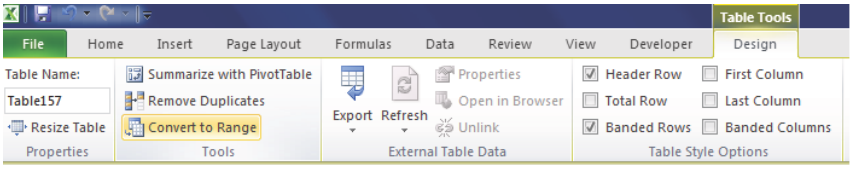


Figure 23: Convert to Range

9. When a box pops up with a warning about converting the table, click Yes. 10. Because the data is no longer formatted as a table, the slicer will disappear; and the Table Tools Design tab in the ribbon will no longer be available. 11. Under the Data tab in the ribbon, click Subtotal. 12. In the Subtotal Window, make the choices shown in the Figure 5.24. It is essential to select the column sorted by in the "At each change in" field at the top of the window. Click OK.

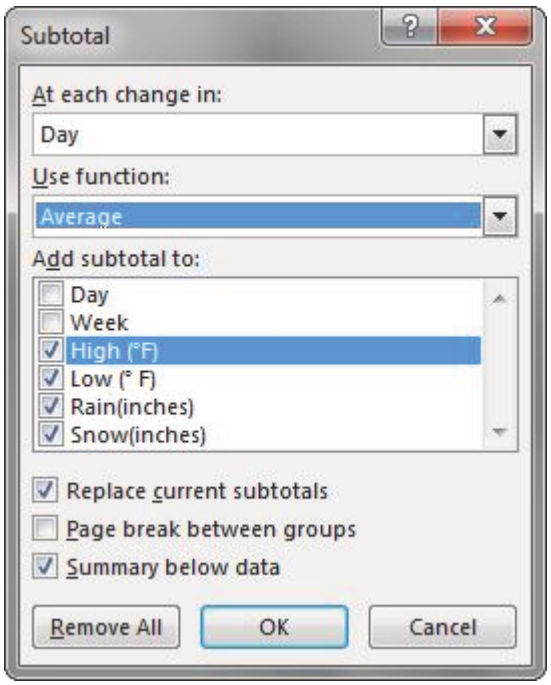
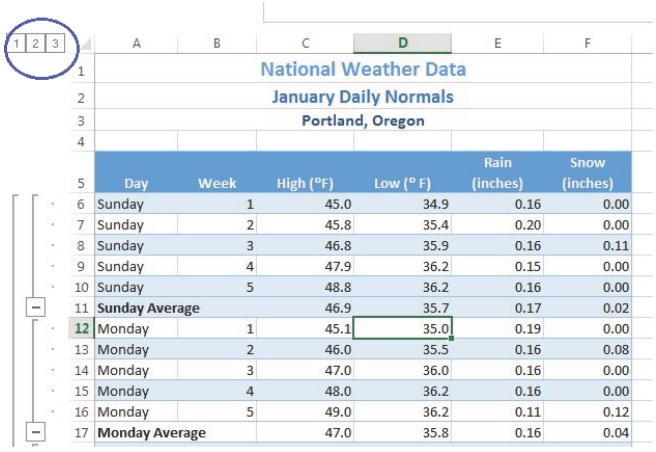


Figure 24: Subtotal Window

The data should look like Figure 5.25. Successful subtotaling shows only one subtotal for each group in the column sorted by. (HINT: If there is more than one Subtotal for the same group (i.e – one of the days of the week in the example), then the column was not sorted before subtotaling. Remove the subtotals using the Remove All button in Figure 5.24, sort the table, and then try subtotaling again.)



	A	B	C	D	E	F
1	National Weather Data					
2	January Daily Normals					
3	Portland, Oregon					
4						
5	Day	Week	High (°F)	Low (° F)	Rain (inches)	Snow (inches)
6	Sunday	1	45.0	34.9	0.16	0.00
7	Sunday	2	45.8	35.4	0.20	0.00
8	Sunday	3	46.8	35.9	0.16	0.11
9	Sunday	4	47.9	36.2	0.15	0.00
10	Sunday	5	48.8	36.2	0.16	0.00
11	**Sunday Average**		46.9	35.7	0.17	0.02
12	Monday	1	45.1	35.0	0.19	0.00
13	Monday	2	46.0	35.5	0.16	0.08
14	Monday	3	47.0	36.0	0.16	0.00
15	Monday	4	48.0	36.2	0.16	0.00
16	Monday	5	49.0	36.2	0.11	0.12
17	**Monday Average**		47.0	35.8	0.16	0.04

Figure 25: Subtotal Results

Notice the three Outline buttons circled in the upper-left corner of the spreadsheet. These control the amount of subtotaled data that is displayed. Table 6 describes the different Outline buttons.

Button	Content Displayed
Level 1	Only the grand total
Level 2	Subtotals and grand total
Level 3	Individual records, subtotals, and grand total

Table 6: Subtotal Outline Buttons

Try the three Outline buttons to see the difference in the data displayed:

1. Click on the 1 Outline button in the upper left-hand corner of the sheet. 2. Only the Grand Average row with averages for High, Low, Rain, and Snow should be visible. 3. Click on the 2 Outline button. 4. The average for each day of the week along with the Grand Average are now visible. 5. Click on the + Sign button to the left of the Sunday Average row. 6. This expands just the Sunday Day data and displays the individual records for this subset of the data. Clicking on + Sign buttons will expand a portion of the data at a time. Clicking on – Sign buttons hide a portion of the data at a time. 7. Click on the 3 Outline button. 8. All the individual records along with the subtotals, and Grand Average should be displayed. 9. Save the worksheet.

Key Take-Aways

Save

- Filtering is an easy way to see a subset of the data. Filtering arrows appear to the right of each column heading when the table has a header row.
- Data can be filtered by text or numerically.
- A slicer is another way to filter in Excel that provides a set of filtering buttons on the sheet.
- Adding a total row to a table is a quick, efficient way to see summary statistics for one or more columns in a table.
- Subtotaling provides a way to quickly add totals to groups within a column along with providing a grand total at the bottom of the table.
- Subtotal Outline buttons allow users to see add of the subtotaled data, just the totals and grand total, or simply the grand total.
- Plus and minus buttons within subtotaling allow a user to expand and hide portions of the subtotaled data.
- one
- two

1.3 PREPARING TO PRINT

Learning Objectives

- Review options for professional page setup for printing.
- Understand how to insert a picture to enhance the visual appearance of a worksheet.
- Preview worksheets containing tables to ensure they will print in a professional manner.

1.3.1 *Previewing a Worksheet*

Data file: Continue with CH5 National Weather

Now that the weather data has been sorted, filtered, and subtotaled as needed, it is time to print the worksheets. Start with the Portland ME worksheet.

1. Click on the Portland ME worksheet. If needed, use Ctrl-Home to move to cell A1.

Notice that cells A1, A2, and A3 are not merged and centered over the entire table of data. To fix this, unmerge each of the merged cells, and then merge them again, making sure to include E1, E2, and E3 in the selection.

1. Select cell A1 and click the Merge & Center button. This should split A1 into four cells (A1:D1). 2. Select the range A1:E1 and click the Merge & Center button. Cell A1 should now be merged across A1:E1. 3. Repeat steps 1 and 2 for A2 and A3.

Next preview the worksheet in Print Preview and determine what page setup options need to be set.

1. Go to Backstage view and select Print from the menu.

Notice that the table is to the far left of the page, with quite a bit of white space on the left. It would look better centered on the page.

1. In the Settings section, click the link for Page Setup. This opens the Page Setup dialog box. See Figure 5.26.

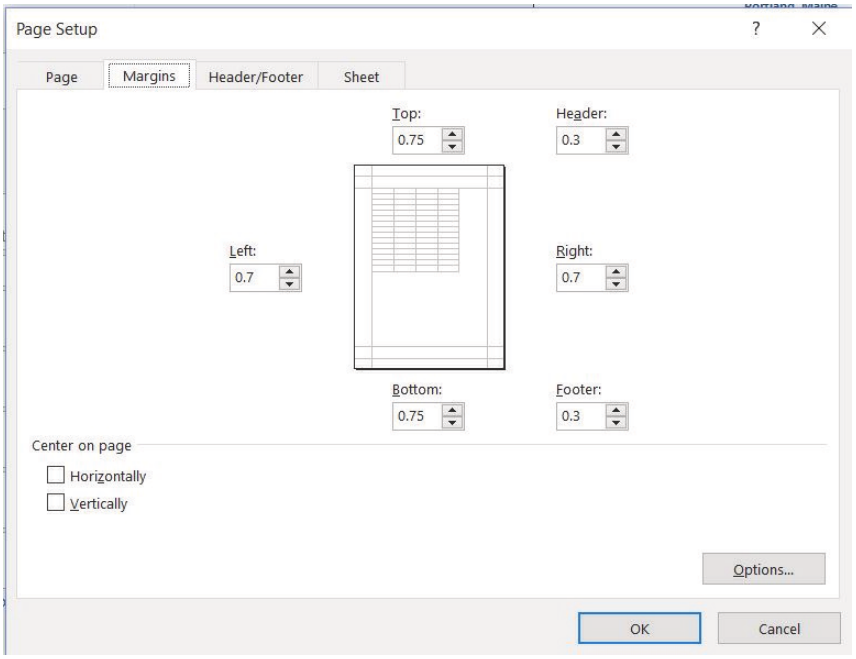


Figure 26: Page Setup

2. Click on the Margins tab. 3. In the Center on page section, check the box for Horizontally. 4. Click OK. The table should now be centered horizontally on the page. 5. Next, add a footer with the workbook filename as well as the worksheet name. 6. Open the Page Setup dialog box again (see Step 1 above). 7. Click the Header/Footer tab then click the Custom Footer button. 8. In the Left section: box type File:. 9. Making sure to leave a space after the colon, click the Insert File Name button. 10. In the Right section: box type Worksheet:. 11. Making sure to leave a space after the colon, click the Insert Sheet Name button. 12. The Footer dialog box should look like Figure 5.27. Click the OK button twice to return to Print Preview. Confirm that the footer appears correctly, then exit Backstage View.

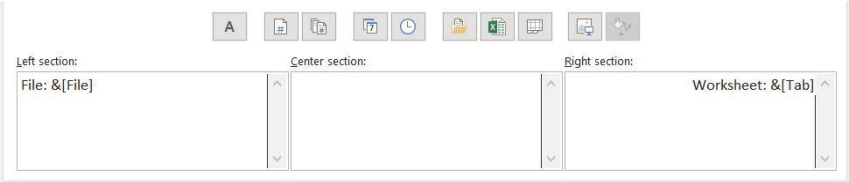


Figure 27: Custom Footer

Inserting an Image to Enhance a Worksheet

Next add a small weather related graphic to the worksheet to enhance its appearance. In Excel, either an image file on the local hard drive or an online image can be used. In this example, there is a graphic saved in the data files for this chapter.

1. Click the Insert tab on the ribbon. 2. Click the Pictures button from the Illustrations group. (This inserts an image on the local com-

puter. To search for an online image, click the Online Pictures button.) (See Figure 5.28.)

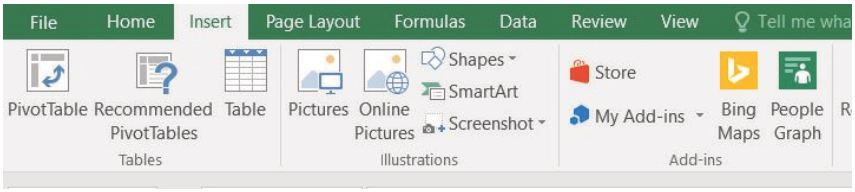


Figure 28: Insert Pictures

3. Navigate to the location where the data files for Chapter 5 are located and double-click on the Weather image file.

The image now appears on the worksheet, but not in the desired location. It is also slightly larger than desired. (See Figure 5.29.) Move the image to cell E1, then resize it so it does not cover up part of the table.

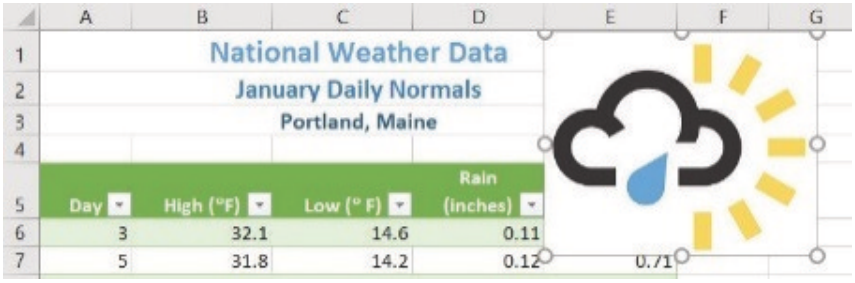


Figure 29: Inserted Image

1. Place the pointer in the image so that the (Note: ch05_fig98 is here) appears. Drag the image so that the top left corner is in cell E1. 2. Using the resizing handle in the bottom right corner of the image, resize the image so that it does not cover any of the table. Hint: drag diagonally to the left and up. 3. Check Print Preview again to make sure the worksheet with the image added looks good. 4. Exit Backstage View and save the Excel file.

1.3.2 *Previewing the Remaining Worksheets*

Before considering this workbook complete finished, confirm that the remaining worksheets are all printing appropriately.

1. Click the Portland OR worksheet and go to Print Preview. No changes need to be made to this worksheet. Exit Backstage View. 2. Click the Weekly OR worksheet and go to Print Preview. Notice that the Slicer is printing on a second page. To fix this, set the Page Scaling to Fit All Columns on One Page.

Notice that the last Slicer button (Saturday) is being cut off. This is because the Slicer height needs to be adjusted.

1. Exit Backstage View. 2. Resize the Slicer so that all of the buttons display. 3. Return to Print Preview and confirm the worksheet, including the slicer, is printing appropriately. Exit Backstage View. 4. Click the Subtotal OR worksheet and go to Print Preview. 5. Using the Page Setup dialog box, center this worksheet horizontally on the page. 6. Exit Backstage View. 7. Save the CH5 National Weather workbook. 8. Compare the worksheet with the self-check answer key (found in the Course Files) and then submit the CH5 National Weather workbook as directed by the instructor.

Key Take-Aways

Save

- When working with Excel workbooks, the final step should always be to review the worksheets in Print Preview to make sure they are printing appropriately.
- Images can be added to a worksheet to enhance its appearance. Be sure to resize and move them appropriately so they do not detract from the data.
- one
- two

1.4 CHAPTER PRACTICE

1.4.1 *Tables for a Tourism Company*

Download Data File: PR5 Data

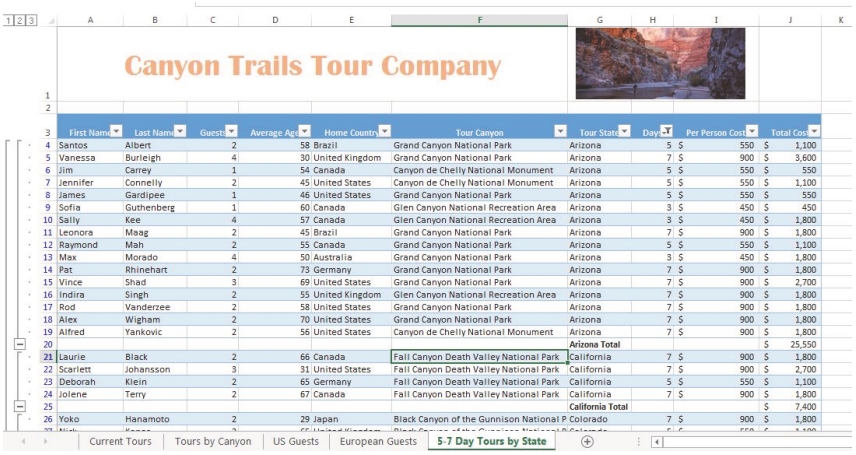


Figure 30: Chapter Practice Completed Exercise

Travel and tour companies need to keep track of client data, as well as, travel/tour options and tour guides. Keeping up-to-date, accurate

records is essential to their bottom line. To run a tour company, employees must be able to manipulate their data quickly and easily. This exercise illustrates how to use the skills presented in this chapter to generate the data needed on a daily basis by a tourism company. See Figure 5.30 above.

1. Open the data file PR5 Data and save the file as PR5 Canyon Trails. 2. In Column J, calculate Total Cost (number of Guests *Per Person Cost). Copy the formula down the column. 3. Format Columns I and J with Currency and no decimal places. 4. Center all headings in Row 3. 5. Click in cell A3. Insert a table with headers for the range A3:J53. 6. Adjust column widths within the table so that all the headings are completely visible. 7. Rename Sheet 1 Current Tours. Sort this sheet alphabetically (A to Z) by Last Name. 8. Make a copy of the Current Tours sheet and rename it Tours by Canyon. Place the Tours by Canyon sheet to the right of the Current Tours sheet. Sort this sheet by Tour Canyon (A to Z), then Home Country (A to Z), and then Last Name (A to Z). 9. Make another copy of the Current Tours sheet and rename it US Guests. Place the US Guests sheet to the right of the Tours by Canyon sheet. Filter this sheet so that only guests with a Home Country of the United States show. Sort the filtered data alphabetically (A to Z) by Tour State. Add a Total Row that sums the Guests and Total Cost columns. 10. Make another copy of the Current Tours sheet and rename it European Guests. Place the European Guests sheet to the right of the US Guests sheet. Hide the Average Age column. 11. Insert a slicer in the European Guests sheet for Home Country. Move the top left corner of the slicer to the top left-hand corner of cell K3. Change the width of the entire slicer to 1.65″. 12. Select both Germany and the United Kingdom on the slicer. Sort the filtered sheet by Home Country (A to Z) and then Last Name (A to Z). 13. Make one more copy of the Current Tours sheet and rename it Tours by State. Place the Tours by State sheet to the right of the European Guests sheet. Subtotal the sheet by State, summing the Total Cost column. 14. Change the name of the Tours by State sheet to 5-7 Day Tours by State. Filter out 3 day tours in the table. 15. On each worksheet, make the following print setup changes:

1. Add a footer with the worksheet name in the center. 2. Change to Landscape Orientation 3. Set the scaling to Fit All Columns on One Page

16. For any worksheets that print on more than one page, add Print Titles to repeat the first three rows at the top of each page. 17. Save the PR5 Canyon Trails workbook. 18. Make sure the sheets are in the following order from left to right: Current Tours, Tours by Canyon, US Guests, European Guests, and 5-7 Day Tours by State. 19. Compare the workbook with the self-check answer key (found in the Course Files) and then submit the PR5 Canyon Trails workbook as directed by the instructor.

1.5 SCORED ASSESSMENT

1.5.1 *Tables for a Retail Company*

Download Data File: SC5 Data

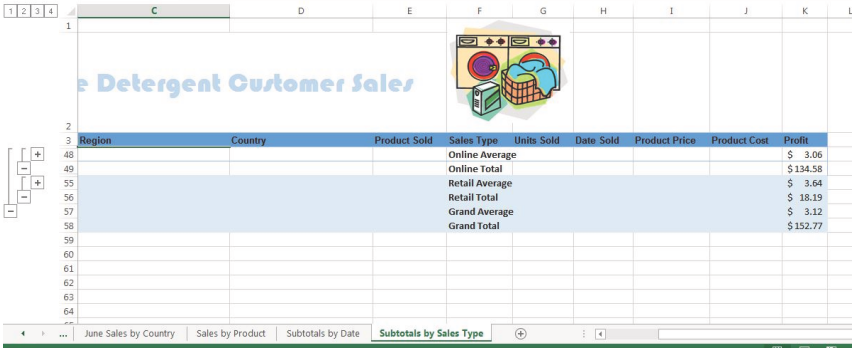


Figure 31: Scored Assessment Completed Exercise

Retail companies with online and in-store sales have a lot of data to keep track of! Keeping track of sales, costs, and profits on a daily basis is essential to making the most of a business. This exercise illustrates how to use the skills presented in this chapter to generate the data needed on a daily basis by a retail company. See Figure 5.31 above.

1. Open the data file SC5 Data and save the file as SC5 Dynamite Customer Sales. 2. Click on the Sales sheet. In I4 , enter a *Vlookup* function that will find the Product Price for the Product in E4 in the table in the Product Table sheet and return it to I4. In the *Vlookup* function, fill in the required parameters using Figure 5.32 below. Copy the *Vlookup* function down column I.

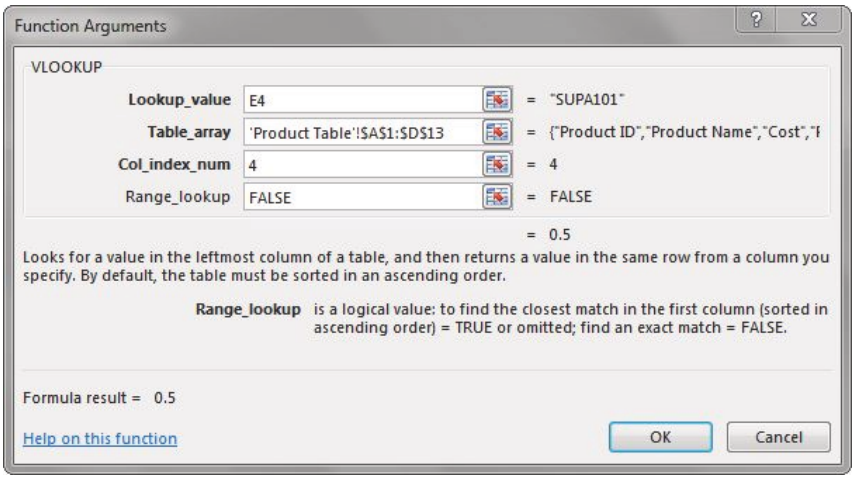


Figure 32: *Vlookup* window

3. In J4 , enter a *Vlookup* function that will find the Product Cost for the Product in E4 in the table in the Product Table sheet and return it

to J4. This *Vlookup* function will be the same as the *Vlookup* function in I4 EXCEPT THE COL_INDEX_NUM will be 3 instead of 4. Copy the function down column J. 4. In K4, calculate Profit (Product Price – Product Cost). Copy this formula down column K. 5. Format columns I, J, and K as currency with two decimal places. 6. Click in cell A3. Insert a table with headers for the range A3:K52. BE CAREFUL HERE: Excel will try to insert a table starting with A2. Be certain the range starts with A3 here. 7. Make a copy of the Sales sheet and rename it Online Sales by Date. Place this sheet to the right of the Sales sheet. Filter out Retail in Sales Type, so that only Online Sales are displayed. Sort the filtered data by Date Sold (oldest to newest). 8. Make a copy of the Sales sheet and rename it June Sales by Country. Place this new sheet to the right of the Online Sales by Date sheet. Filter this sheet to only show June dates by using the Date Filter Between. Sort this sheet alphabetically (A to Z) by Country and then alphabetically by Name. 9. Make another copy of the Sales sheet and rename it Sales by Product. Place this new sheet to the right of the June Sales by Country sheet. Hide the Region column. 10. Insert a slicer in the Sales by Product sheet for Product Sold. Move the top left corner of the slicer to the top left-hand corner of cell M1. Resize the height of the entire slicer to 2.09 inches. 11. Select both DETA100 and DETA200 in the slicer. Sort the filtered sheet by Product Sold. Add a Total Row that includes the overall average for the Product Price, Product Cost, and Profit columns. Change the heading in A53 to Average. 12. Make a copy of the Sales sheet and rename it Subtotals by Date. Place this new sheet to the right of the Sales by Product sheet. Subtotal the sheet by Date (Oldest to Newest), summing the Profit column. Click the 2 Outline button to show just the subtotals by date and the grand total.

13. Make one final copy of the Sales sheet and rename it Subtotals by Type. Place this new sheet to the right of the Subtotals by Date sheet. Subtotal the sheet by Sales Type, summing the Profit column. 14. Add a 2nd subtotal to the Subtotals by Type sheet that subtotals by Type and averages the Profit column. (Hint: uncheck Replace Current Subtotals in the Subtotal dialog box.) Notice that 4 Outline buttons appear with the 2nd subtotal. Figure out which Outline button to click to display both subtotals for Online and Retail and two Grand Totals. 15. For each worksheet, add a footer with the worksheet name in the center. 16. Preview each worksheet in Print Preview and make any necessary changes for professional printing. (Hint: Orientation, page scaling, and print titles might need to be used) 17. Double-check that the sheets are in the following order from left to right: Sales, Online Sales by Date, June Sales by Country, Sales by Product, Subtotals by Date, Subtotals by Sales Type, and Product Table. 18. Save the SC5 Dynamite Customer Sales workbook. 19. Submit the SC5 Dynamite Customer Sales workbook as directed by the instructor.

Part III

ADVANCED SKILLS

Part 3 moves on to advanced Excel skills. You can learn to create macros, develop multi-sheet and multi-file formulas and discover pivot tables.

COLOPHON

This document was typeset using the typographical look-and-feel classicthesis developed by André Miede. The style was inspired by Robert Bringhurst's seminal book on typography "*The Elements of Typographic Style*". classicthesis is available for both LaTeX and LyX:

https://bitbucket.org/amiede/classicthesis/

Happy users of classicthesis usually send a real postcard to the author, a collection of postcards received so far is featured here:

http://postcards.miede.de/

Final Version as of April 10, 2020 (classicthesis Edition 1).