LEVEL 2

Advanced

Aligned to Certiport's **MOS Expert** Certification Exam

LEARN -BY- DOING

Microsoft 365 Excel

A Visual Approach to Learning Advanced Microsoft Excel Skills

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at B.E. Publishing
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Introduction

Learn-by-Doing: Microsoft 365 - Excel (Level 2)

The Learn-by-Doing: Microsoft 365 Series consists of Level 1 and Level 2. As the name implies, the Learn-by-Doing Series gets students learning Microsoft 365 by using its applications to communicate and collaborate in the real world of work and life. This series uses step-by-step instructions and illustrative screenshots to introduce and reinforce essential skills needed to demonstrate workplace productivity principles in Word, Excel, and PowerPoint.

Designed for today's interactive, visual learner, **Learn-by-Doing: Microsoft 365 - Excel (Level 2)** uses a graphical, screenshot-based approach to support students in mastering the **advanced tools and features** of Microsoft Excel. Students already familiar with the basics of Excel will explore advanced skills—such as using logical functions, recording macros, and creating PivotTables and advanced charts—in an illustrated, step-by-step format, helping them gain valuable workplace skills and master this essential business application.

This text is designed to be used by students enrolled in a computer applications course that includes using spreadsheets in its curriculum and assumes students have already mastered beginner to intermediate skills, including those presented in Level 1 of this series. This text is also designed for learners looking to learn and practice all the advanced skills assessed on the **Microsoft Office Specialist (MOS) Excel Expert Certification Exam**. The lessons in this book present groups of related Excel skills and features according to their function within the application and build upon knowledge as it is acquired. Therefore, lessons should be completed in the order presented.

Microsoft Office Specialist Certification

Microsoft Office Specialist (MOS) is an industry-leading certification by Certiport designed to assess mastery of Microsoft 365 applications. Candidates are evaluated on their ability to apply their knowledge of important application features in a project-based environment. Certified Microsoft Office Specialists demonstrate internationally-recognized skills that can be leveraged for future success in both the classroom and the workplace. To support students seeking advanced MOS certification, this text provides detailed instruction and assessment in all the skills assessed on the **MOS Excel Expert Certification Exam**.

What Is Microsoft 365?

Microsoft 365 is a subscription service (offered by Microsoft) providing users with a suite of some of the most commonly used productivity applications, including Word, Excel, PowerPoint, and more. It also offers users cloud storage and online collaboration features via OneDrive, providing one central online location to save and manage work. To help users create and share documents across all devices, Microsoft 365 includes simplified, web-based versions of Excel and other applications. Working in this online environment, however, does not offer the full, robust features available in the desktop version of Excel.

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Because several of the application's more complex tools and features are unavailable when using Excel for the web, advanced users typically utilize the **desktop version of Excel**. Additionally, saving files to OneDrive may make it difficult to work with spreadsheets involving macros.

Prerequisite Skills

Learn-by-Doing: Microsoft 365 - Excel (Level 2) should be used by students who are already familiar with beginner to intermediate Excel skills. Because mastering Microsoft Excel's advanced tools and features requires prior knowledge of workbook basics and core spreadsheet skills and concepts, students should have experience with skills such as those presented in Level 1 of this series. Click the link below for a complete list of skills you should understand before completing the lessons in this book.

Learn-by-Doing: Microsoft 365 - Excel (Level 1) Curriculum Guide

How to Use This Book

The instructions and screenshots included in each lesson have been authored to correspond to the most recent **desktop version of Microsoft Excel**. Using this version of Excel—and not the online version of the application included with Microsoft 365 subscriptions—will allow you to use the advanced features described in this text and ensure lesson instructions and screenshots align with your application.

Throughout this text, you will be instructed to access Lesson Source Files, which will be provided by your instructor. **Lesson Source Files** provide the initial data, layout, and structure of the spreadsheet required to begin each lesson, allowing you to focus on learning the advanced skills presented rather than on keying data and constructing basic spreadsheets. Since these lessons are designed to reduce start-up time before encountering the key skills, this book can be completed in approximately 25-31 hours.

Note: The content and data presented in these Lesson Source Files are for instructional purposes only and do not necessarily represent factual information.

You will also be guided on where to save your completed work. Before you begin completing any lessons, you will create a folder on your local or network drive called **My Advanced Excel Projects**. You will save all Lesson Source Files and completed work to this local folder—and not to a cloud server such as OneDrive—except where noted.

Note: Your instructor will also provide you with specific instructions on where to create your My Advanced Excel Projects folder and preferences for how to share or submit your completed work. Some skills presented in this text can only be measured through teacher observation rather than in the production of a final workbook. In these instances, you may be required to demonstrate your successful completion of the skill as your instructor views your screen.

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Understanding the Format of This Book

This book is divided into four units, each containing individual lessons pertaining to advanced tools and features available in Excel. Lessons in this book have been organized into an easy-to-read, self-guided, visual format where you encounter and practice new skills and learn by doing.

Review the following features and components to become familiar with the structure of the lessons in Learn-by-Doing: Microsoft 365 - Excel (Level 2).

Features & Components

1 Lesson Title

2 Lesson Overview

Explains the core Microsoft Excel tools and spreadsheet concepts that will be explored in the lesson. Lesson overviews offer important background about the skills introduced in the lesson and present a clear explanation as to why and how those skills are utilized in particular workbooks. Reading these overviews will prepare you with the knowledge you need to use advanced tools and features of Excel within the real-world context featured in the lesson.

3 Skills

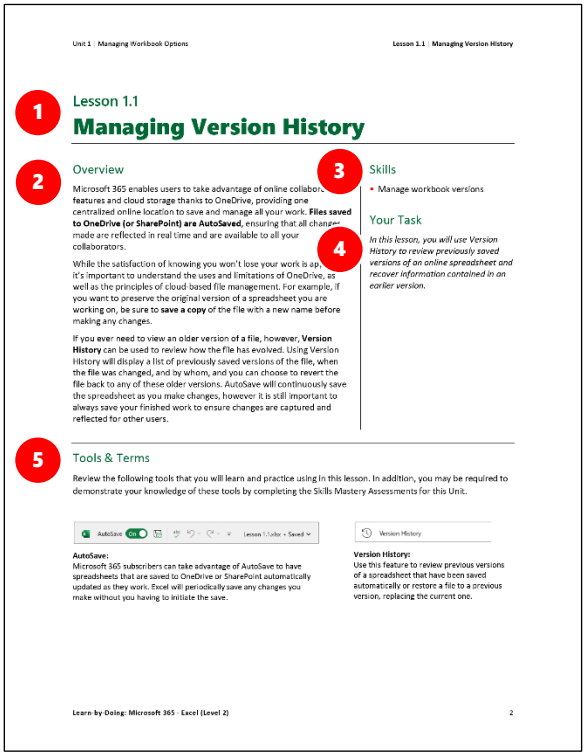
Lists the new skills introduced in the lesson. All skills assessed in the MOS Excel Expert Certification Exam are taught in this text.

4 Your Task

Describes how you will utilize the new skills in a workbook.

5 Tools & Terms

Illustrates the icons, features, functions, and menu descriptions related to the core concepts explored in the lesson.



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6 Instructions

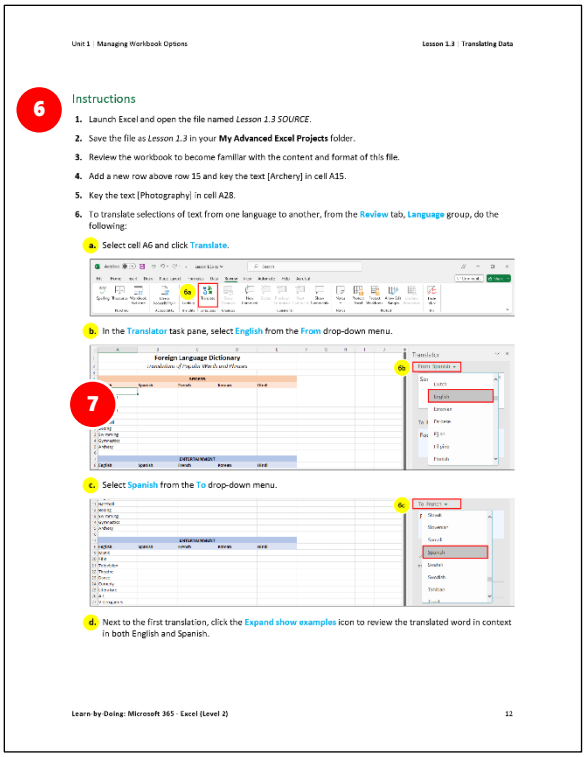
Step-by-step instructions allow you to complete lessons accurately and learn and master how to use advanced tools. Notes providing learning opportunities (in shaded areas) are also included to expand instruction on new skills and offer context for a feature's real-world use.

7 Screenshots

Instructions that are illustrated with corresponding drop-down menus and dialog boxes are indicated by a yellow # icon. Match each instruction with its corresponding screenshot as you complete the step.

Note: Once a new skill has been presented, visual step-by-step instructions for that skill are no longer provided in subsequent lessons.

Note: Since Microsoft 365 subscriptions provide regular, frequent application updates, screenshots presented may differ and instructions may require minor modifications.


Unit 1 | Managing Workbook Options Lesson 1.3 | Translating Data

6 Instructions

1. Launch Excel and open the file named *Lesson 1.3 SOURCE*.
2. Save the file as *Lesson 1.3* in your **My Advanced Excel Projects** folder.
3. Review the workbook to become familiar with the content and format of this file.
4. Add a new row above row 15 and key the text [Archery] in cell A15.
5. Key the text [Photography] in cell A28.
6. To translate selections of text from one language to another, from the **Review** tab, **Language** group, do the following:

a. Select cell A6 and click **Translate**.

b. In the **Translator** task pane, select **English** from the **From** drop-down menu.

7

c. Select **Spanish** from the **To** drop-down menu.

d. Next to the first translation, click the **Expand show examples** icon to review the translated word in context in both English and Spanish.

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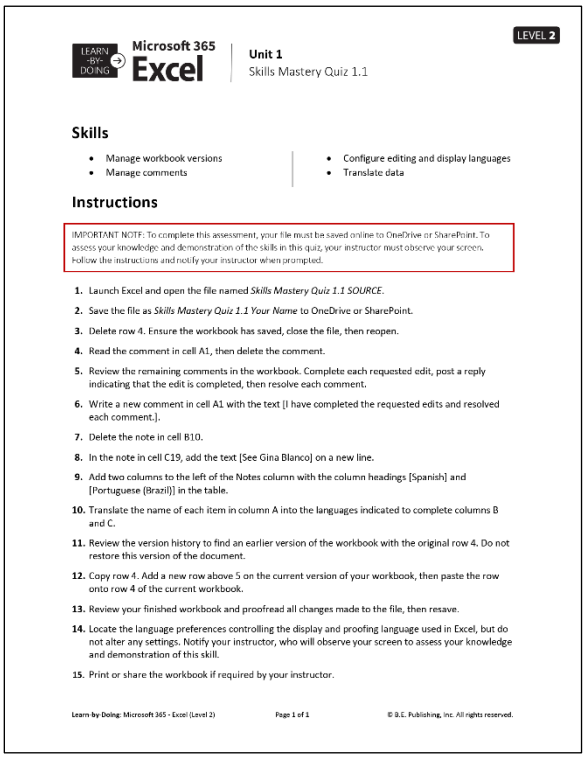
Skills Mastery

Upon completion of all the lessons in each unit, you may be required to complete a series of Skills Mastery Assessments. These quizzes and tests offer you the opportunity to demonstrate mastery of new skills and assess your knowledge of the advanced features of Excel. Skills Mastery Assessments for each unit are located with the Instructor Resources.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LEARN -by- DOING Microsoft 365 Excel | Unit 1 Skills Mastery Quiz 1.1

Skills

- Manage workbook versions
- Manage comments
- Configure editing and display languages
- Translate data

Instructions

IMPORTANT NOTE: To complete this assessment, your file must be saved online to OneDrive or SharePoint. To assess your knowledge and demonstration of the skills in this quiz, your instructor must observe your screen. Follow the instructions and notify your instructor when prompted.

1. Launch Excel and open the file named *Skills Mastery Quiz 1.1 SOURCE*.
2. Save the file as *Skills Mastery Quiz 1.1 Your Name* to OneDrive or SharePoint.
3. Delete row 4. Ensure the workbook has saved, close the file, then reopen.
4. Read the comment in cell A1, then delete the comment.
5. Review the remaining comments in the workbook. Complete each requested edit, post a reply indicating that the edit is completed, then resolve each comment.
6. Write a new comment in cell A1 with the text [I have completed the requested edits and resolved each comment.].
7. Delete the note in cell B10.
8. In the note in cell C19, add the text [See Gina Blanco] on a new line.
9. Add two columns to the left of the Notes column with the column headings [Spanish] and [Portuguese (Brazil)] in the table.
10. Translate the name of each item in column A into the languages indicated to complete columns B and C.
11. Review the version history to find an earlier version of the workbook with the original row 4. Do not restore this version of the document.
12. Copy row 4. Add a new row above 5 on the current version of your workbook, then paste the row onto row 4 of the current workbook.
13. Review your finished workbook and proofread all changes made to the file, then resave.
14. Locate the language preferences controlling the display and proofing language used in Excel, but do not alter any settings. Notify your instructor, who will observe your screen to assess your knowledge and demonstration of this skill.
15. Print or share the workbook if required by your instructor.

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Curriculum Guide

Lesson		Skills	Approximate Completion Time (in hours)
Unit 1: Managing Workbook Options			
1.1	Managing Version History	▪ Manage workbook versions	.75
1.2	Collaborating Using Comments	▪ Manage comments	.75
1.3	Translating Data	▪ Configure editing and display languages ▪ Translate data	.75
1.4	Creating External References	▪ Reference data in other workbooks	.75
1.5	Protecting Your Data	▪ Restrict editing ▪ Protect worksheets and cell ranges ▪ Protect workbook structure	.75
Unit 1 Skills Mastery	Skills Mastery Quizzes and Tests are located with the Instructor Resources		
Unit 2: Managing and Formatting Data			
2.1	Filling Data in a Series	▪ Fill cells by using Flash Fill ▪ Fill cells by using advanced Fill Series options ▪ Generate numeric data by using the RANDARRAY function	.75-1
2.2	Using Custom Number Formats	▪ Create custom number formats	.75-1
2.3	Setting Data Validation	▪ Configure data validation	1
2.4	Outlining Data	▪ Group and ungroup data ▪ Calculate data by inserting subtotals and totals ▪ Remove duplicate records	1
2.5	Using Conditional Formatting	▪ Create custom conditional formatting rules ▪ Manage conditional formatting rules	.75-1
2.6	Recording and Running Macros	▪ Record simple macros ▪ Name simple macros	.75-1
2.7	Modifying and Copying Macros	▪ Enable macros in a workbook ▪ Edit simple macros ▪ Copy macros between workbooks	.75
Unit 2 Skills Mastery	Skills Mastery Quizzes and Tests are located with the Instructor Resources		

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Lesson		Skills	Approximate Completion Time (in hours)
Unit 3: Creating Advanced Formulas			
3.1	Using Logical Functions	▪ Perform logical operations by using the IF, AND, OR, and NOT functions ▪ Create conditional formatting rules that use formulas ▪ Validate formulas by using error checking rules	1-1.5
3.2	Building Nested Formulas	▪ Perform logical operations by using nested formulas including the IF, AND, OR, and NOT functions ▪ Evaluate formulas	1-1.5
3.3	Testing for Multiple Conditions	▪ Perform logical operations by using nested formulas including the IFS and SWITCH functions ▪ Monitor cells and formulas by using the Watch Window	1
3.4	Using Conditional Functions	▪ Perform logical operations by using the SUMIF, AVERAGEIF, COUNTIF, SUMIFS, AVERAGEIFS, COUNTIFS, MAXIFS, and MINIFS functions	1-1.5
3.5	Using the LET Function	▪ Perform logical operations by using nested formulas including the LET function ▪ Trace precedents and dependents	1-1.5
3.6	Using Lookup Functions	▪ Look up data by using the XLOOKUP, VLOOKUP, HLOOKUP, MATCH, and INDEX functions	1-1.5
3.7	Working with Dates and Times	▪ Reference date and time by using the NOW and TODAY functions ▪ Calculate dates by using the WEEKDAY and WORKDAY functions ▪ Configure formula calculation options	1
3.8	Consolidating Data	▪ Summarize data from multiple ranges by using the Consolidate feature	.75
3.9	Performing What-If Analysis	▪ Perform what-if analysis by using Goal Seek and Scenario Manager	1
3.10	Performing Financial Calculations	▪ Calculate financial data by using the PMT function ▪ Forecast data by using the AND, IF, and NPER functions	1-1.5
3.11	Using Functions to Sort and Filter Data	▪ Filter data by using FILTER ▪ Sort data by using SORTBY	.75
Unit 3 Skills Mastery		Skills Mastery Quizzes and Tests are located with the Instructor Resources	

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Lesson		Skills	Approximate Completion Time (in hours)
Unit 4: Managing Advanced Charts and Tables			
4.1	Creating Advanced Charts	▪ Create and modify charts including Box & Whisker, Funnel, Histogram, and Waterfall charts	1-1.5
4.2	Creating More Advanced Charts	▪ Create and modify dual-axis charts ▪ Create and modify charts including Combo and Sunburst charts	1-1.5
4.3	Generating and Modifying PivotTables	▪ Create PivotTables ▪ Modify field selections and options ▪ Group PivotTable data	1-1.5
4.4	Configuring PivotTable Value Fields	▪ Create slicers ▪ Add calculated fields ▪ Configure value field settings	1-1.5
4.5	Creating PivotCharts	▪ Create PivotCharts ▪ Manipulate options in existing PivotCharts ▪ Apply styles to PivotCharts ▪ Drill down into PivotChart details	1
Unit 4 Skills Mastery	Skills Mastery Quizzes and Tests are located with the Instructor Resources		
		Total Approximate Completion Time:	**25-31 hrs.**

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Skills Correlations

Microsoft Office Specialist Excel 365 Expert Certification (Exam MO-211)

Learn-by-Doing: Microsoft 365 - Excel (Level 2) is 100% aligned to the skills assessed in Certiport's **Microsoft Office Specialist Excel Expert Certification Exam**. The following includes the Objective Domains (skills) covered on the certification exam, the correlating lesson(s) in which the skills are taught, and Skills Mastery quizzes and tests in which they are assessed.

Objective Domain (Skill)	Textbook Lesson Number	Skills Mastery Quiz/Test
Manage Workbook Options and Settings		
Manage workbooks		
Copy macros between workbooks	2.7	Quiz 2.5 Test 2
Reference data in other workbooks	1.4	Quiz 1.3 Test 1
Enable macros in a workbook	2.7	Quiz 2.5 Test 2
Manage workbook versions	1.1	Quiz 1.1 Test 1
Prepare workbooks for collaboration		
Restrict editing	1.5	Quiz 1.2 Test 1
Protect worksheets and cell ranges	1.5	Quiz 1.2 Test 1
Protect workbook structure	1.5	Quiz 1.2 Test 1
Configure formula calculation options	3.7	Quiz 3.6 Test 3
Manage and Format Data		
Fill cells based on existing data		

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Objective Domain (Skill)	Textbook Lesson Number	Skills Mastery Quiz/Test
Fill cells by using Flash Fill	2.1	Quiz 2.1 Test 2
Fill cells by using advanced Fill Series options	2.1	Quiz 2.1 Test 2
Generate numeric data by using RANDARRAY()	2.1	Quiz 2.1 Test 2
Format and validate data		
Create custom number formats	2.2	Quiz 2.2 Test 2
Configure data validation	2.3	Quiz 2.3 Test 2
Group and ungroup data	2.4	Quiz 2.4 Test 2
Calculate data by inserting subtotals and totals	2.4	Quiz 2.4 Test 2
Remove duplicate records	2.4	Quiz 2.4 Test 2
Apply advanced conditional formatting and filtering		
Create custom conditional formatting rules	2.5	Quiz 2.2 Test 2
Create conditional formatting rules that use formulas	3.1	Quiz 3.2 Test 3
Manage conditional formatting rules	2.5	Quiz 2.2 Test 2
Create Advanced Formulas and Macros		
Perform logical operations in formulas		
Perform logical operations by using nested functions including the IF(), IFS(), SWITCH(), SUMIF(), AVERAGEIF(), COUNTIF(), SUMIFS(), AVERAGEIFS(), COUNTIFS(), MAXIFS(), MINIFS(), AND(), OR(), NOT(), and LET() functions	3.1, 3.2, 3.3, 3.4, 3.5	Quiz 3.1, 3.3 Test 3
Look up data by using functions		
Look up data by using the XLOOKUP(), VLOOKUP(), HLOOKUP(), MATCH(), and INDEX() functions	3.6	Quiz 3.2 Test 3

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Objective Domain (Skill)	Textbook Lesson Number	Skills Mastery Quiz/Test
Use advanced date and time functions		
Reference date and time by using the NOW() and TODAY() functions	3.7	Quiz 3.6 Test 3
Calculate dates by using the WEEKDAY() and WORKDAY() functions	3.7	Quiz 3.6 Test 3
Perform data analysis		
Summarize data from multiple ranges by using the Consolidate feature	3.8	Quiz 3.4 Test 3
Perform what-if analysis by using Goal Seek and Scenario Manager	3.9	Quiz 3.4 Test 3
Forecast data by using the AND(), IF(), and NPER() functions	3.10	Quiz 3.7 Test 3
Calculate financial data by using the PMT() function	3.10	Quiz 3.7 Test 3
Filter data by using FILTER()	3.11	Quiz 3.5 Test 3
Sort data by using SORTBY()	3.11	Quiz 3.5 Test 3
Troubleshoot formulas		
Trace precedents and dependents	3.5	Quiz 3.2 Test 3
Monitor cells and formulas by using the Watch Window	3.3	Quiz 3.3 Test 3
Validate formulas by using error checking rules	3.1	Quiz 3.4 Test 3
Evaluate formulas	3.2	Quiz 3.3 Test 3
Create and modify simple macros		
Record simple macros	2.6	Quiz 2.5 Test 2
Name simple macros	2.6	Quiz 2.5 Test 2

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Objective Domain (Skill)	Textbook Lesson Number	Skills Mastery Quiz/Test
Edit simple macros	2.7	Quiz 2.5 Test 2
Manage Advanced Charts and Tables		
Create and modify advanced charts		
Create and modify dual axis charts	4.2	Quiz 4.2 Test 4
Create and modify charts including Box & Whisker, Combo, Funnel, Histogram, Sunburst, and Waterfall charts	4.1, 4.2	Quiz 4.1, Quiz 4.2 Test 4
Create and modify PivotTables		
Create PivotTables	4.3	Quiz 4.3 Test 4
Modify field selections and options	4.3	Quiz 4.3 Test 4
Create slicers	4.4	Quiz 4.3 Test 4
Group PivotTable data	4.3	Quiz 4.3 Test 4
Add calculated fields	4.4	Quiz 4.3 Test 4
Configure value field settings	4.4	Quiz 4.3 Test 4
Create and modify PivotCharts		
Create PivotCharts	4.5	Quiz 4.4 Test 4
Manipulate options in existing PivotCharts	4.5	Quiz 4.4 Test 4
Apply styles to PivotCharts	4.5	Quiz 4.4 Test 4
Drill down into PivotChart details	4.5	Quiz 4.4 Test 4

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Lesson 3.1
Using Logical Functions

Overview

Learning and mastering Excel's **logical functions** is a great way to place the full power of the software in your hands. This useful and popular category of functions allows you to test your data for certain characteristics, then perform specific tasks based on the results. What makes logical functions unique is that they are built around the mathematical concept of logical operators, evaluating an expression (such as "A5>10") as either **TRUE or FALSE**.

Logical operators such as "and," "or," and "not" are a fundamental concept in computer science used to test whether an expression is true or false based on various conditions. They are used in programming, search engine queries, and even in everyday language like "I will subscribe to Netflix *or* Hulu this month." In Excel, these logical operators correspond to functions, all of which test conditions in your spreadsheet and return a value of either *TRUE* or *FALSE*.

The **AND function** allows you to test whether several different conditions are all true. For example, you may want to check that the value of one cell is equal to another and that it is greater than a certain number. If *both* of those conditions are met, the function will return a value of *TRUE*; otherwise, it will return *FALSE*. The **OR function** works in a similar way, but it will return *TRUE* as long as *at least one* of the conditions you set is met.

Unlike AND and OR, the **IF function** only tests one condition, however it allows you to set a specific string of text to return if the condition is true and another if it is false. **NOT** is used to reverse the result of a logical expression from *TRUE* to *FALSE* and vice versa. While each of these logical functions can be useful on their own, combining them into complex nested formulas allows you to take advantage of the full power of Excel's logical functions.

Skills

- Perform logical operations by using the IF, AND, OR, and NOT functions
- Create conditional formatting rules that use formulas
- Validate formulas by using error checking rules

Your Task

In this lesson, you will build formulas using the logical operators AND, OR, IF, and NOT and use logical functions in custom conditional formatting rules. You will also review error checking rules that impact formulas.

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Tools & Terms

Review the following tools that you will learn and practice using in this lesson. In addition, you may be required to demonstrate your knowledge of these tools by completing the Skills Mastery Assessments for this Unit.

Logical Functions:
In Excel, logical functions are a category of functions that test for specific conditions, evaluate them as TRUE or FALSE, and perform a specific action as a result. Like most functions in Excel, each logical function has specific *arguments*, or components of the function's syntax required to work correctly. In logical functions, the key arguments are *expressions* to be tested. Expressions are combinations of values, cell references, and operators like >, <, and = that are evaluated as either TRUE or FALSE. As you work with logical functions, pay attention to the required arguments, and remember that each function works by evaluating expressions as either TRUE or FALSE, and each expression, or condition to be tested, is separated by a comma.

AND:
Use this function to test whether **all** the conditions you set are true. If so, it will return *TRUE*; if not, it will return *FALSE*.

```
=AND(B5>=C5,B5>=D5,B5>=E5)
```

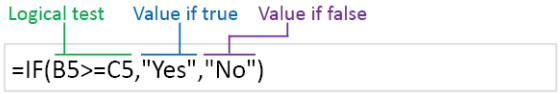
NOT:
Use this function to reverse the value of a logical expression. It will return *FALSE* if the condition you set is met and *TRUE* if the condition is not met.

```
=NOT(B5>=500)
```

OR:
Use this function to test whether **at least one** of the conditions you set is true. If so, it will return *TRUE*; if not, it will return *FALSE*.

```
=OR(B5>=C5,B5>=D5,B5>=E5)
```

IF:
Use this function to test for a condition and return a specific value if the condition is met or not met.

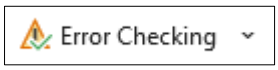


Logical test: The expression to be tested

Value if true: The response to return if the expression is true

Value if false: The response to return if the expression is false

Error Checking:
Use this feature to validate formulas in your spreadsheet and address any issues or errors.



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Instructions

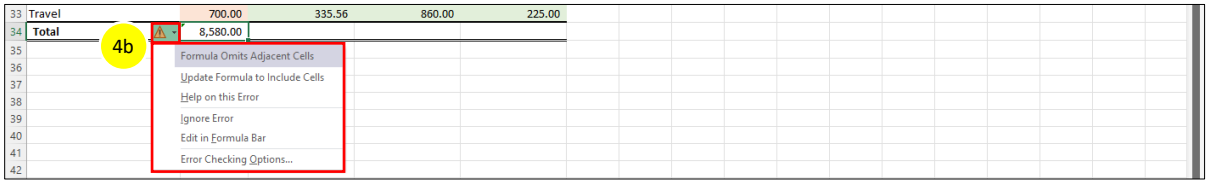
1. Launch Excel and open the file named *Lesson 3.1 SOURCE*.
2. Save the file as *Lesson 3.1* in your **My Advanced Excel Projects** folder.
3. Review the workbook to become familiar with the content and format of this file. Notice the budgeted amounts in column B compared with the money actually spent in columns C through E.

When working with formulas in Excel, it's not uncommon to create errors with the syntax of functions and the arguments they require to work, or to create formulas that don't produce the results you intend. In these instances, Excel attempts to recognize errors with your formulas and alert you by placing a small green flag in the upper left corner of the cell. The Error Checking feature can provide some clues as to what may be wrong and offer suggestions for fixing formulas.

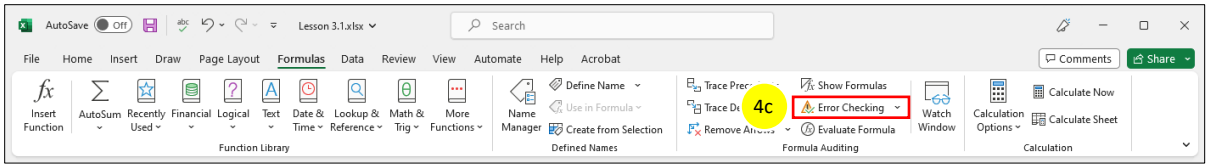
4. To use the **Error Checking** feature to validate formulas in your workbook, do the following:

   a. In cell B34, key the formula [=SUM(B5:B32)] exactly as shown. Notice that this formula leaves out cell B33 when calculating the total of the amount budgeted in column B.

   b. Select cell B34 and notice the **green flag** that appears in the upper left corner of the cell. Click the drop-down menu and notice the options for investigating the error.

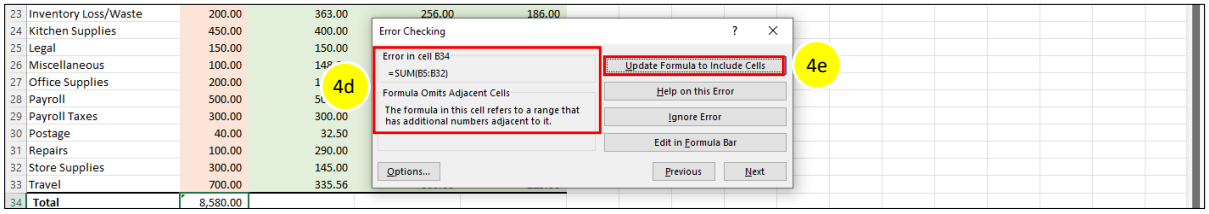


   c. To review the error in detail, from the **Formulas** tab, **Formula Auditing** group, click **Error Checking**.



   d. In the **Error Checking** dialog box, read the explanation provided for the error, indicating that some cells have been left out of the formula.

   e. Click **Update Formula to Include Cells** to fix the error, then click **OK** to return to the worksheet.



   ➔ *Note: You can review additional error checking rules from the Excel Options dialog box, Formulas tab.*

   f. Copy the corrected formula in cell B34 into cells C34 through E34.

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In Excel, logical operators such as "and," "or," and "not" correspond to functions you can use to test your data for various conditions. Understanding the logic behind how each of these functions work will help you better use these tools to build complex formulas, and Excel also includes some features to help you with formulas. For example, as you begin to key a function, the formula bar will display text guiding you to enter the expected arguments. Pay attention to this help text as you use a variety of logical functions in this lesson to quickly analyze your data based on different factors.

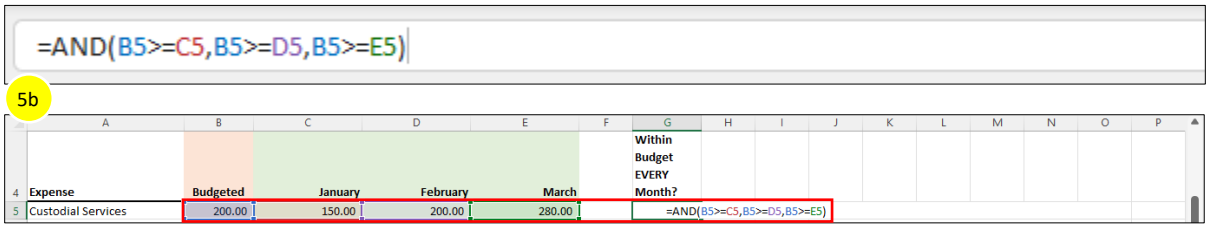
5. To use the **AND** function to test whether the amounts spent in January through March were **all** more than what was budgeted, do the following:

   a. In cell G4, key the text [Within Budget EVERY Month?].

   b. In cell G5, key the following formula:

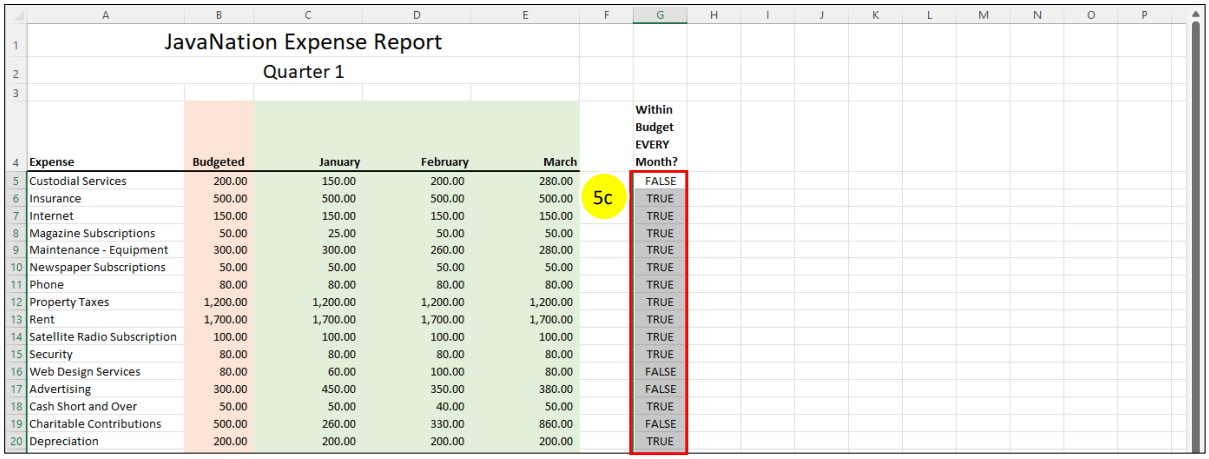
   =AND(B5>=C5,B5>=D5,B5>=E5)

   ➔ *Note: This will check whether the amount budgeted in B5 is greater than or equal to **all** the values in cells C5 through E5 (January through March). If the expense is within budget all three months, it will return "TRUE"; otherwise, it will return "FALSE". A comma separates each expression that must be met in order to return "TRUE".*



   c. Copy the formula down through row 34 and review the results to **analyze the logic** of the AND function resulting in a TRUE or FALSE value.

   ➔ *Note: When working with functions in Excel, it is important to always check cell number formats to ensure that the results display correctly according to the value you expect each function to return (text, numbers, dates, etc.). Throughout this text, adjust number formatting as needed.*



6. To use the **OR** function to test whether **at least one** of the amounts spent in January through March was more than what was budgeted, do the following:

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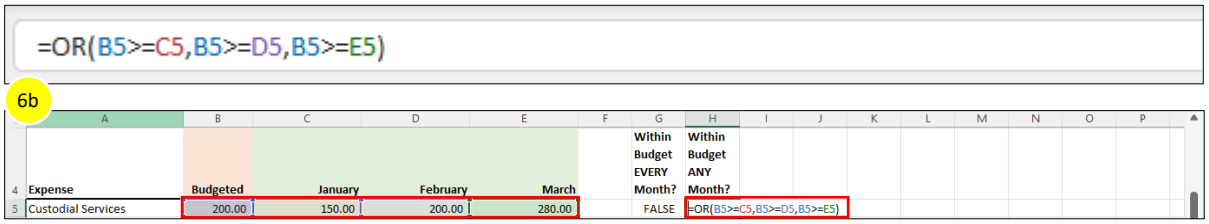
a. In cell H4, key the text [Within Budget ANY Month?].

b. In cell H5, key the following formula:

=OR(B5>=C5,B5>=D5,B5>=E5)

➔ *Note: This will check whether the amount budgeted in cell B5 is greater than or equal to **at least one** of the values in cells C5 through E5 (January through March). If the expense was within budget in **any** of the three months, it will return "TRUE"; otherwise, it will return "FALSE".*



	A	B	C	D	E	F	G	H
4	Expense	Budgeted	January	February	March		Within Budget EVERY Month?	Within Budget ANY Month?
5	Custodial Services	200.00	150.00	200.00	280.00		FALSE	=OR(B5>=C5,B5>=D5,B5>=E5)

c. Copy the formula down through row 34 and review the results to **analyze the logic** of the OR function resulting in a TRUE or FALSE value.

	A	B	C	D	E	F	G	H
4	Expense	Budgeted	January	February	March		Within Budget EVERY Month?	Within Budget ANY Month?
5	Custodial Services	200.00	150.00	200.00	280.00		6c	TRUE
6	Insurance	500.00	500.00	500.00	500.00			TRUE
7	Internet	150.00	150.00	150.00	150.00		TRUE	TRUE
8	Magazine Subscriptions	50.00	25.00	50.00	50.00		TRUE	TRUE
9	Maintenance - Equipment	300.00	300.00	260.00	280.00		TRUE	TRUE
10	Newspaper Subscriptions	50.00	50.00	50.00	50.00		TRUE	TRUE
11	Phone	80.00	80.00	80.00	80.00		TRUE	TRUE
12	Property Taxes	1,200.00	1,200.00	1,200.00	1,200.00		TRUE	TRUE
13	Rent	1,700.00	1,700.00	1,700.00	1,700.00		TRUE	TRUE
14	Satellite Radio Subscription	100.00	100.00	100.00	100.00		TRUE	TRUE
15	Security	80.00	80.00	80.00	80.00		TRUE	TRUE
16	Web Design Services	80.00	60.00	100.00	80.00		FALSE	TRUE
17	Advertising	300.00	450.00	350.00	380.00		FALSE	FALSE
18	Cash Short and Over	50.00	50.00	40.00	50.00		TRUE	TRUE
19	Charitable Contributions	500.00	260.00	330.00	860.00		FALSE	TRUE
20	Depreciation	200.00	200.00	200.00	200.00		TRUE	TRUE

While the AND and OR functions can test for multiple conditions, each separated by a comma, the NOT function only tests one condition. Since the NOT function is used to *negate* an expression, it will return "TRUE" if the condition is **not** met and "FALSE" if the condition **is** met. On its own, the NOT function has limited use, but it can be a powerful tool when used in combination with other logical operators (explored in a later lesson).

7. To use the **NOT** function to reverse the logic of a statement from TRUE to FALSE and vice versa (to check if the amount budgeted was **not** more than 500), do the following:

a. In cell I4, key the text [NOT a Major Expense?].

b. In cell I5, key the following formula:

=NOT(B5>=500)

➔ *Note: This will check whether the value of cell B5 is greater than or equal to 500, making it a major expense. Since the NOT function is used to negate an expression, it will return "TRUE" if the value is **under** 500 and "FALSE" if the value is over 500.*

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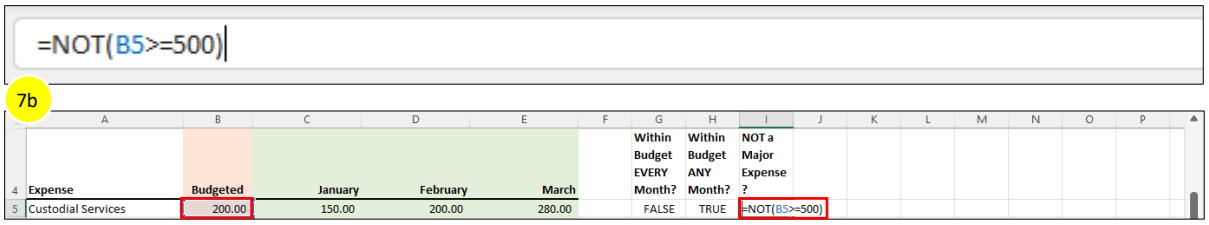
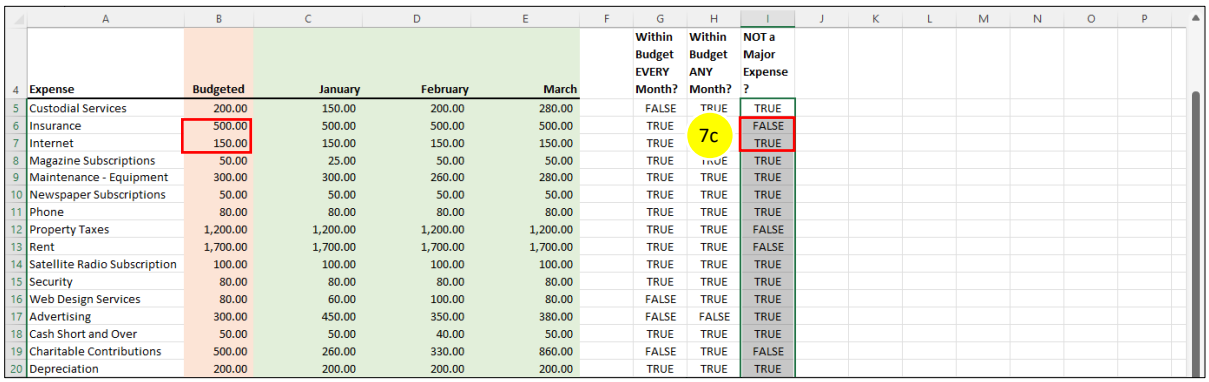


c. Copy the formula down through row 34. Notice that cell I6 returns [FALSE] because cell B6 indicates that it ***is*** a major expense (500). Cell I7, meanwhile, shows [TRUE] because cell B7 indicates that it ***is not*** a major expense (only 150).



The IF function is a useful logical function in Excel that tests whether a condition is true, then returns any value you specify if the condition is met or not met. On its own, the IF function only tests for one condition (unlike AND and OR), however when used in combination with other logical operators in complex nested logical formulas (explored in a later lesson) it can be extremely powerful and flexible.

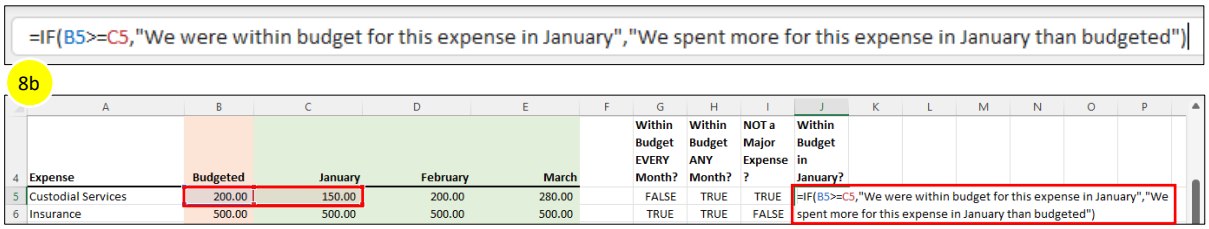
8. To use the **IF** function to test whether the amount spent in January was **within the amount budgeted**, and return a specific value if the condition is met or not met, do the following:

a. In cell J4, key the text [Within Budget in January?].

b. In cell J5, key the following formula:

=IF(B5>=C5,"We were within budget for this expense in January","We spent more for this expense in January than budgeted")

➔ *Note: This will check whether the amount budgeted in cell B5 is **greater than or equal** to the value of cell C5 (what was spent in January). If the condition is met, it will return the first string of text in quotations; if it is not met, it will return the second string of text in quotations.*



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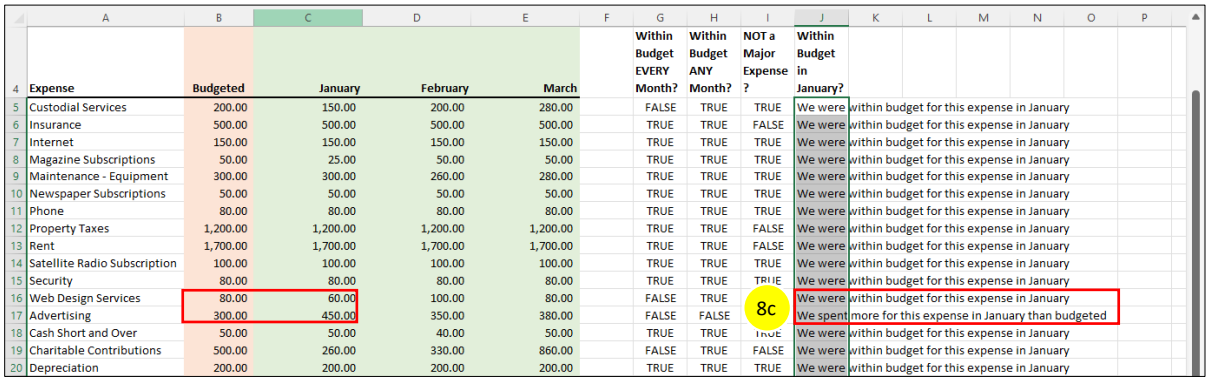
c. Copy the formula down through row 33. Notice that cell J16 shows that the expense for January (cell C16) *was* within budget (cell B16), while cell J17 shows that the expense *was not* within budget in January.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
4	Expense	Budgeted	January	February	March		Within Budget EVERY Month?	Within Budget ANY Month?	NOT a Major Expense ?	Within Budget in January?						
5	Custodial Services	200.00	150.00	200.00	280.00		FALSE	TRUE	TRUE	We were within budget for this expense in January						
6	Insurance	500.00	500.00	500.00	500.00		TRUE	TRUE	FALSE	We were within budget for this expense in January						
7	Internet	150.00	150.00	150.00	150.00		TRUE	TRUE	TRUE	We were within budget for this expense in January						
8	Magazine Subscriptions	50.00	25.00	50.00	50.00		TRUE	TRUE	TRUE	We were within budget for this expense in January						
9	Maintenance - Equipment	300.00	300.00	260.00	280.00		TRUE	TRUE	TRUE	We were within budget for this expense in January						
10	Newspaper Subscriptions	50.00	50.00	50.00	50.00		TRUE	TRUE	TRUE	We were within budget for this expense in January						
11	Phone	80.00	80.00	80.00	80.00		TRUE	TRUE	TRUE	We were within budget for this expense in January						
12	Property Taxes	1,200.00	1,200.00	1,200.00	1,200.00		TRUE	TRUE	FALSE	We were within budget for this expense in January						
13	Rent	1,700.00	1,700.00	1,700.00	1,700.00		TRUE	TRUE	FALSE	We were within budget for this expense in January						
14	Satellite Radio Subscription	100.00	100.00	100.00	100.00		TRUE	TRUE	TRUE	We were within budget for this expense in January						
15	Security	80.00	80.00	80.00	80.00		TRUE	TRUE	TRUE	We were within budget for this expense in January						
16	Web Design Services	80.00	60.00	100.00	80.00		FALSE	TRUE	TRUE	We were within budget for this expense in January						
17	Advertising	300.00	450.00	350.00	380.00		FALSE	FALSE	8c	We spent more for this expense in January than budgeted						
18	Cash Short and Over	50.00	50.00	40.00	50.00		TRUE	TRUE	TRUE	We were within budget for this expense in January						
19	Charitable Contributions	500.00	260.00	330.00	860.00		FALSE	TRUE	FALSE	We were within budget for this expense in January						
20	Depreciation	200.00	200.00	200.00	200.00		TRUE	TRUE	TRUE	We were within budget for this expense in January						

Logical functions can also be used in combination with conditional formatting. If the formula you enter in a new custom conditional formatting rule evaluates as true, it will format the cells according to your specifications; if the formula evaluates as false, the cell will not be formatted.

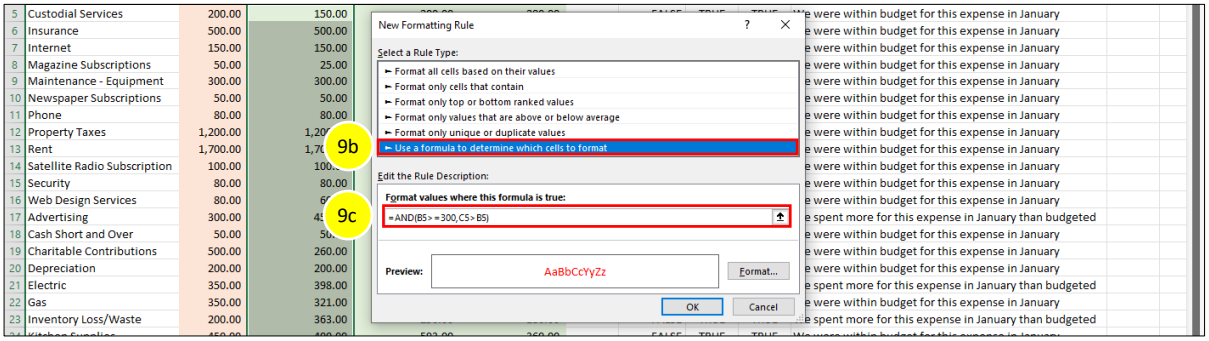
9. To create a new custom conditional formatting rule using logical functions, select cells C5 through C33, then do the following:

a. From the **Home** tab, **Styles** group, **Conditional Formatting** drop-down menu, click **New Rule…**.

b. In the **New Formatting Rule** dialog box, **Select a Rule Type** section, select **Use a formula to determine which cells to format**.

c. In the **Format values where this formula is true** field, key the following formula:

=AND(B5>=300,C5>B5)



➔ *Note: This will check whether the value in column B of each row within the range is greater than or equal to 300, and if the value in column C of each row is greater than that value.*

d. Set the conditional formatting rule to format cells that match the rule with Red font, then click **OK**.

e. Create similar conditional formatting rules for cells D5 through D33 and cells E5 through E33 that apply red font to values that are over budget and were budgeted greater than or equal to 300.

10. Review your finished workbook and proofread all changes made to the file, then resave.

11. Print or share the workbook if required by your instructor.

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Lesson 3.2
Building Nested Formulas

Overview

Each logical function in Excel has a variety of uses for many different real-world scenarios, however building complex formulas that utilize many different functions together will unlock the full power of these tools. When one function is used inside another it is called *nesting*. In **nested formulas**, the primary function (after the equal sign) uses the result of another function as one of its *arguments*, or components.

To build nested formulas, you must first **understand all of the arguments required** by the functions you are using (usually separated by commas). For example, the IF function requires three arguments: an expression to be checked, the text to return if it is true, and the text to return if it is false. By replacing the first argument of the IF function—the expression to be tested—with the result returned by the AND function, you can use the IF function to check for multiple conditions and return any value that you want. Combining these functions together expands the power of both the IF function and the AND function.

Reading and writing nested formulas can be tricky, so pay close attention to the **parentheses** required by each function. It may also be helpful to read the formula "inside out," beginning with the innermost function. Think about the *value* that function will return (which in the case of logical functions is either TRUE or FALSE), then determine what effect that value has as the *argument* for the surrounding function. Another helpful tool is the **Evaluate Formula** feature, which allows you to inspect how each element of a formula is calculated to fix any issues or learn more about how the functions work.

Skills

- Perform logical operations by using nested formulas including the IF, AND, OR, and NOT functions
- Evaluate formulas

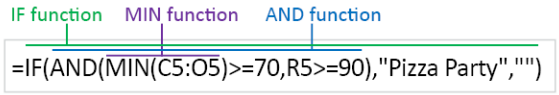
Your Task

In this lesson, you will build nested formulas by combining the logical functions AND, OR, IF, and NOT. You will also use the Evaluate Formula feature to inspect how complex formulas are calculated.

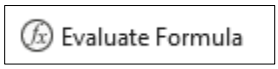
Tools & Terms

Review the following tools that you will learn and practice using in this lesson. In addition, you may be required to demonstrate your knowledge of these tools by completing the Skills Mastery Assessments for this Unit.

Nested Formulas:
Combining two or more functions into one formula can help you perform a wide range of powerful tasks. When reading nested formulas, pay close attention to the parentheses of each function and the arguments required.



Evaluate Formula:
Use this feature to help inspect or correct nested formulas by revealing how each component is calculated.



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Instructions

1. Launch Excel and open the file named *Lesson 3.2 SOURCE*.
2. Save the file as *Lesson 3.2* in your **My Advanced Excel Projects** folder.
3. Review the workbook to become familiar with the content and format of this file. Notice that the grade book contains grades for each student. Notice that the Semester 1 Averages in column P refer to the grades in columns C through H, while the Semester 2 Averages in column Q refer to the grades in columns I through N.

The logical functions you have previously learned can be combined to build complex nested formulas that test your data for various characteristics. One function can be used within another (typically the IF function) to expand and enhance the power of each function.

In this lesson, you will create nested formulas testing the grade book data for various conditions, determining whether each student is eligible to receive a prize based on their performance. When building nested formulas, pay careful attention to the parentheses belonging to each function and be sure that each argument required by the function is present and expressed correctly.

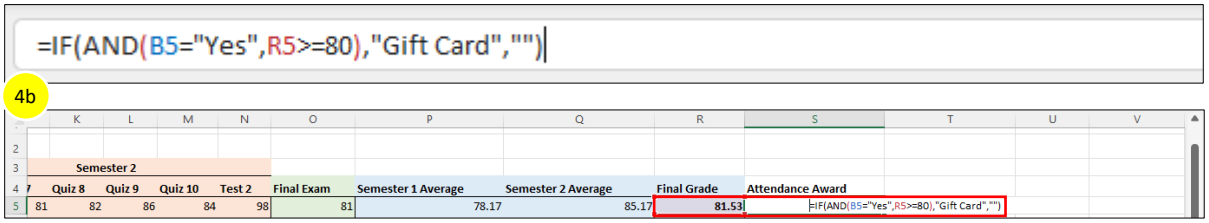
4. To use a nested formula with the **IF and AND functions** to test whether a student will earn a gift card if they had perfect attendance **and** a final grade score of 80 or higher, do the following:

   a. In cell S4, key the text [Attendance Award].

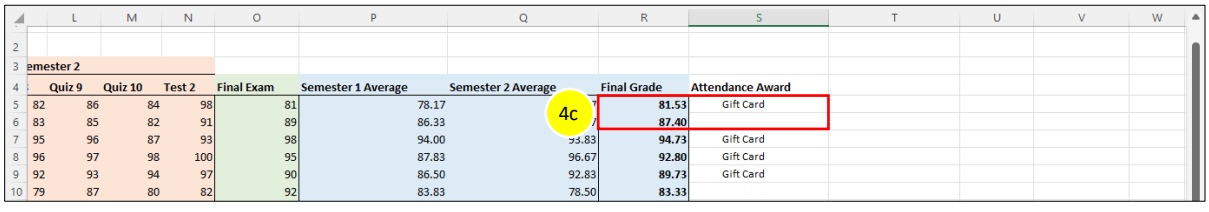
   b. In cell S5, key the following formula:

   =IF(AND(B5="Yes",R5>=80),"Gift Card","")

   ➔ *Note: This will check whether the value in cell B5 is "Yes" (indicating perfect attendance) **and** that the student's Final Grade (column R) is greater than or equal to 80. It will return the student's prize "Gift Card" if true and nothing (indicated by the final set of empty quotation marks) if false.*



   c. Copy the formula down through row 24. Notice that Alexander Martin will receive a gift card (cell S5) because his final grade was 81.53 and he recorded perfect attendance. Ava Lee will not receive a gift card (cell S6). She had a final grade of 87.40 but did not record perfect attendance.



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➔ *Note: When working with functions in Excel, it is important to always check cell number formats to ensure that the results display correctly according to the value you expect each function to return (text, numbers, dates, etc.). Throughout this text, adjust number formatting as needed.*

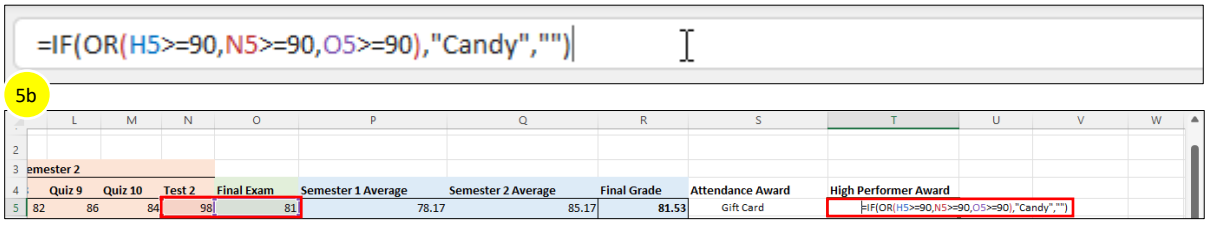
5. To use a nested formula with the **IF and OR functions** to test whether each student had **any** test or exam score of 90 or higher, do the following:

   a. In cell T4, key the text [High Performer Award].

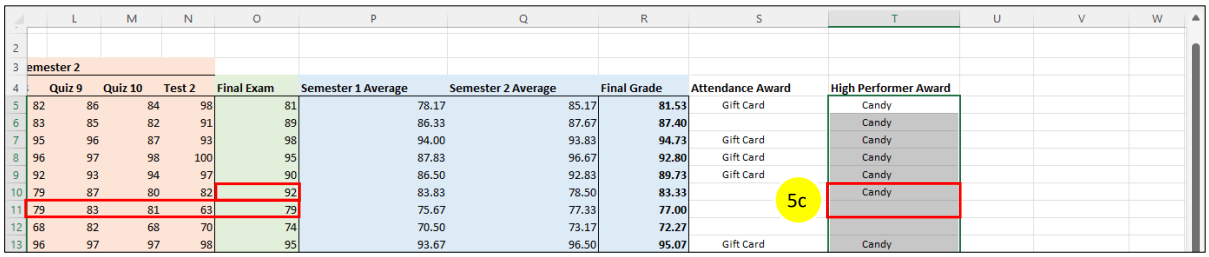
   b. In cell T5, key the following formula:

   =IF(OR(H5>=90,N5>=90,O5>=90),"Candy","")

   ➔ *Note: This will check whether **any ONE** of the student's test or exam scores (columns H, N, and O) are greater than or equal to 90. It will return "Candy" if true and nothing if false.*



   c. Copy the formula down through row 24. Notice that Emily Johnson will receive candy (cell T10) because she had at least one test or exam score of 90 or more. Emma Taylor will not receive candy (cell T11) because she had no test or exams of at least 90.



6. To use a nested formula with the **IF, AND, and NOT functions** to test whether each student had a higher second semester average than first semester average **and** got a final exam score higher than 80, do the following:

   a. In cell U4, key the text [Improvement Award].

   b. In cell U5, key the following formula:

   =IF(AND(Q5>P5,NOT(O5<=80)),"Certificate","")

   ➔ *Note: This will check whether the student's semester 2 average (column Q) is greater than their semester 1 average (column P) **and** that their final exam score is **not** less than or equal to 80 (higher than 80). It will return "Certificate" if true and nothing if false.*

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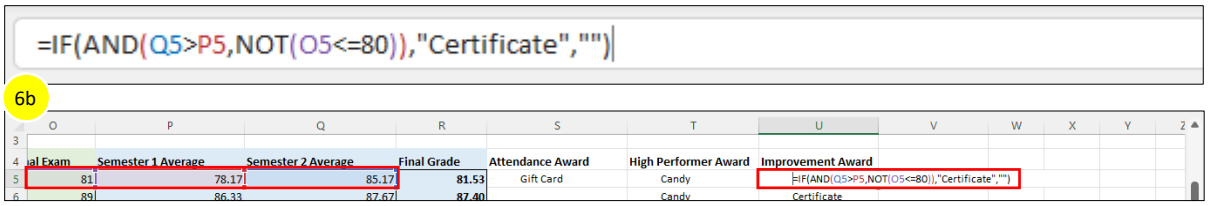
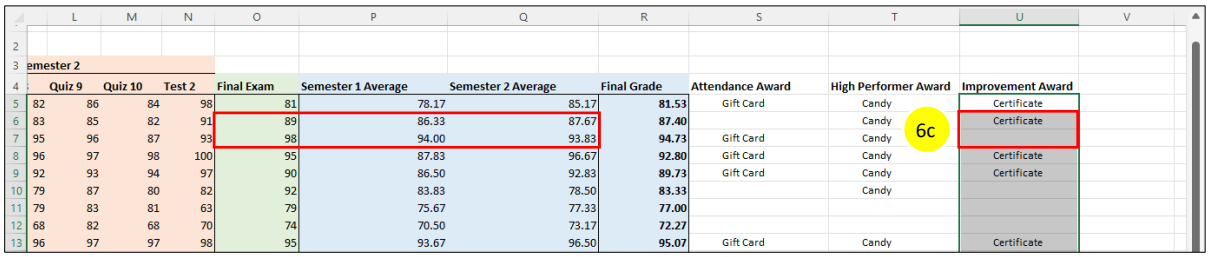


c. Copy the formula down through row 24. Notice that Ava Lee will receive a certificate (cell U6) because her Semester 2 Average was greater than her Semester 1 Average **and** she received an 89 on the Final Exam (which was higher than 80). Benjamin Miller will not receive a certificate (cell U7) because his Semester 2 Average was less than his Semester 1 Average.



Nested formulas can contain other functions besides logical functions. Combining functions of different types such as this is a great way to have Excel perform a range of different tasks, sometimes even inside a single formula.

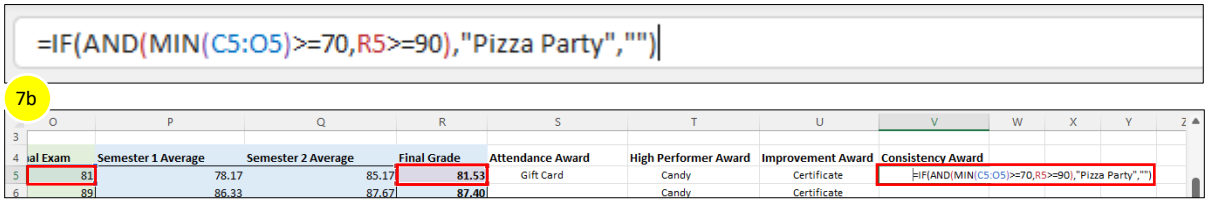
7. To build a nested formula with the **IF, AND, and MIN functions** to test whether each student got a score of 70 or higher on all grades **and** had a final grade of 90 or higher, do the following:

a. In cell V4, key the text [Consistency Award].

b. In cell V5, key the following formula:

=IF(AND(MIN(C5:O5)>=70,R5>=90),"Pizza Party","")

➔ *Note: This will check whether the lowest value of **ALL** the student's scores (using the MIN function for columns C through O) is greater than or equal to 70 **and** that their final grade (column R) is greater than or equal to 90. It will return "Pizza Party" if true and nothing if false.*



c. Copy the formula down through row 24. Notice that Benjamin Miller will receive a pizza party (cell V7) because his Final Grade was 94.73 **and** he had no grades below 70. Christopher Robinson will not receive a pizza party (cell V8) because one of his quiz scores (cell C8) was below 70.

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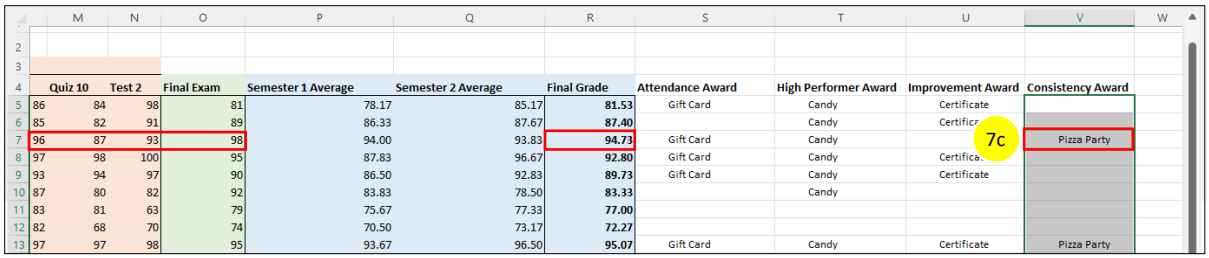


	Quiz 10	Test 2	Final Exam	Semester 1 Average	Semester 2 Average	Final Grade	Attendance Award	High Performer Award	Improvement Award	Consistency Award
5	86	84	98	81	78.17	85.17	**81.53**	Gift Card	Candy	Certificate	
6	85	82	91	89	86.33	87.67	**87.40**		Candy	Certificate	
7	96	87	93	98	94.00	93.83	**94.73**	Gift Card	Candy		Pizza Party
8	97	98	100	95	87.83	96.67	**92.80**	Gift Card	Candy	Certificate	
9	93	94	97	90	86.50	92.83	**89.73**	Gift Card	Candy	Certificate	
10	87	80	82	92	83.83	78.50	**83.33**		Candy		
11	83	81	63	79	75.67	77.33	**77.00**				
12	82	68	70	74	70.50	73.17	**72.27**				
13	97	97	98	95	93.67	96.50	**95.07**	Gift Card	Candy	Certificate	Pizza Party

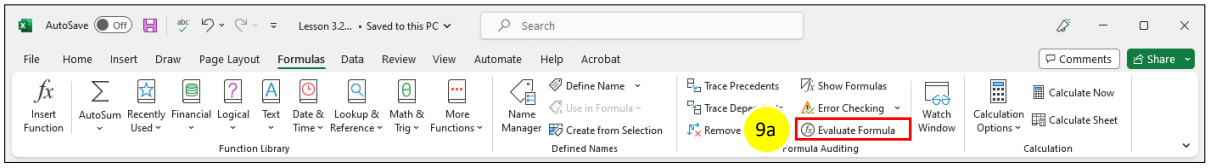
7c

8. Use cell shading or borders of your choice to format the related awards information in columns S through V.

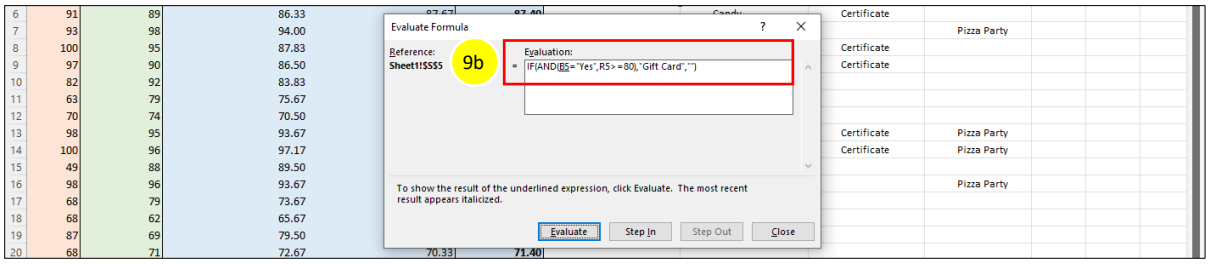
If you are working on a spreadsheet with long, complicated formulas (especially ones you didn't create yourself), it may be difficult to understand at a glance exactly what each one is calculating. The Evaluate Formula feature allows you to inspect a formula the way Excel itself calculates it. You can review each expression independently to study which element the software calculates first and see the results along the way. You can also "step into" expressions that reference other cells or ranges to see how those original cells are calculated as well.

9. To use the **Evaluate Formula** feature to review how each expression in a nested formula is being calculated, select cell S5, then do the following:

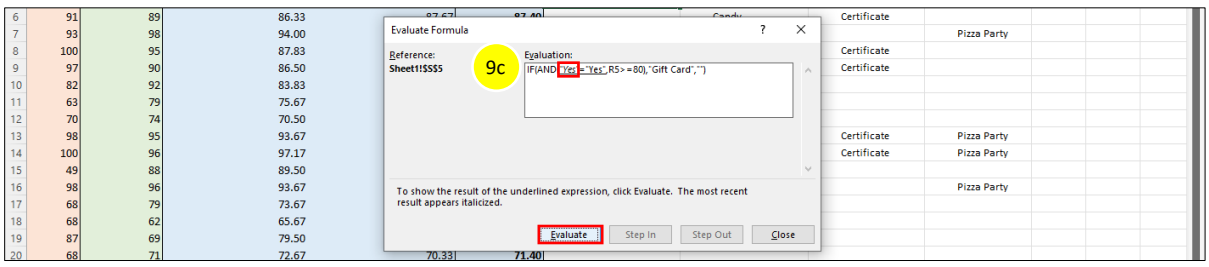
a. From the **Formulas** tab, **Formula Auditing** group, click **Evaluate Formula**.



b. In the **Evaluate Formula** dialog box, notice that the formula selected is displayed in the **Evaluation** field. The first expression of the formula being evaluated is underlined.



c. Click **Evaluate** and notice that B5 is filled in with the cell's value ("Yes").



d. Click **Evaluate** again and notice that the expression "Yes"="Yes" is simplified to TRUE.

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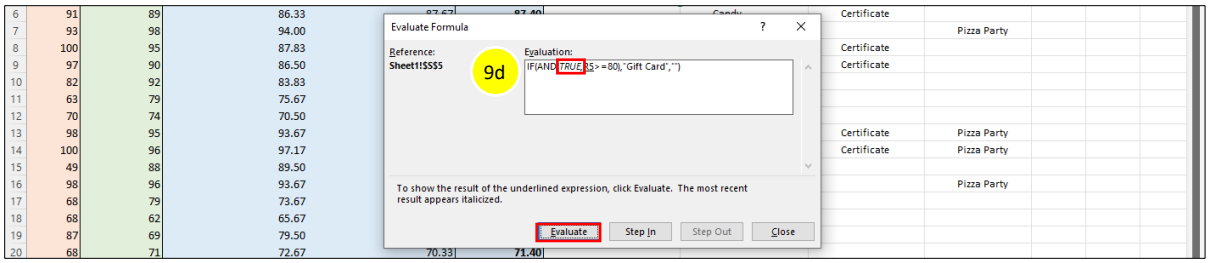
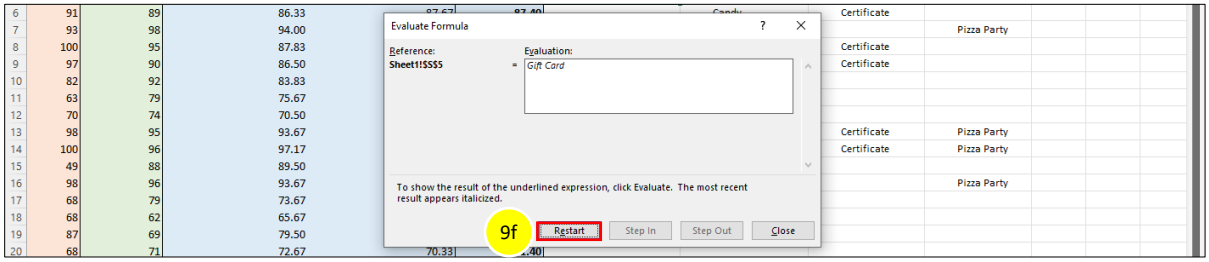
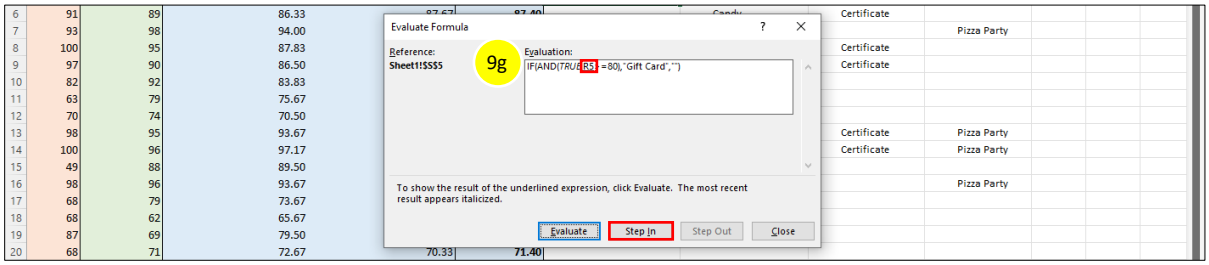


e. Continue to click **Evaluate** to review how each step of the formula is completed, resulting in "Gift Card" being returned in cell S5.

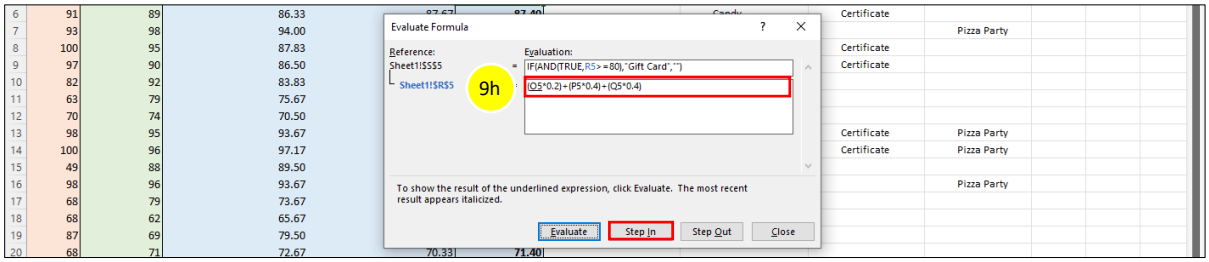
f. Click **Restart** to begin the process again.



g. Continue to click **Evaluate** in the **Evaluate Formula** dialog box until the expression [R5] is underlined, then click **Step In**.



h. Notice that a new level is displayed showing how the value in cell R5 is calculated. Continue to click **Step In** to evaluate each expression.



i. Use the **Evaluate Formula** feature to review how other formulas in columns T through V are calculated.

10. Review your finished workbook and proofread all changes made to the file, then resave.

11. Print or share the workbook if required by your instructor.

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Lesson 4.3
Generating and Modifying PivotTables

Overview

PivotTables are an extremely powerful advanced Excel feature that allows you to quickly and easily analyze information and generate summaries to answer a variety of important questions about your data. The benefit of using PivotTables over regular tables in Excel (or other features that summarize data like Outline and Consolidate Data) is that PivotTables are designed to be rearranged and reorganized to perform whatever task you require.

PivotTables work by listing all the columns in your original source data in the **PivotTable Fields task pane**, allowing you to intuitively drag and drop them to build the precise PivotTable you need. Each field can become a column or row in the resulting PivotTable, or it can become the values that fill in the data of the table. Fields can also be used as filters to let the user control exactly what the PivotTable reports. As you drag and drop fields, the PivotTable automatically updates on the fly.

It can sometimes be challenging to find the perfect configuration of fields to build PivotTables when you first learn the feature, however the drag and drop interactivity of the PivotTable Fields task pane makes it easy to quickly try new combinations until you arrive at the most useful and meaningful result. PivotTables can be used to find totals of values in rows or columns, flip or "pivot" the rows and columns of your data to analyze the information by different categories, and more.

Skills

- Create PivotTables
- Modify field selections and options
- Group PivotTable data

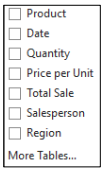
Your Task

In this lesson, you will generate PivotTables from data, modify the selections and options of fields to create new configurations, and group values to create subsets.

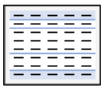
Tools & Terms

Review the following tools that you will learn and practice using in this lesson. In addition, you may be required to demonstrate your knowledge of these tools by completing the Skills Mastery Assessments for this Unit.

PivotTable:
This feature analyzes and summarizes data by enabling users to create flexible tables and easily modify their structure on the fly.



PivotTable Fields:
Use this task pane to add, remove, and modify fields to build a PivotTable. Each column of the source data becomes a field that can be combined in a variety of ways to display different results.



PivotTable Styles:
This feature changes the style of PivotTables.

Refresh:
This feature refreshes your PivotTable if the source data changes.

Report Layout:
This feature changes the way PivotTables summarize data, including adding total rows or condensing the layout of information.

Group:
This feature creates subsets of values to display a list that is easier to view and analyze.

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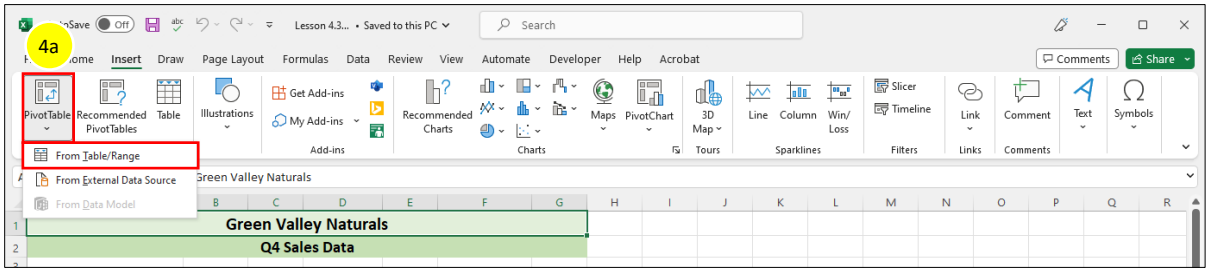
Instructions

1. Launch Excel and open the file named *Lesson 4.3 SOURCE*.
2. Save the file as *Lesson 4.3* in your **My Advanced Excel Projects** folder.

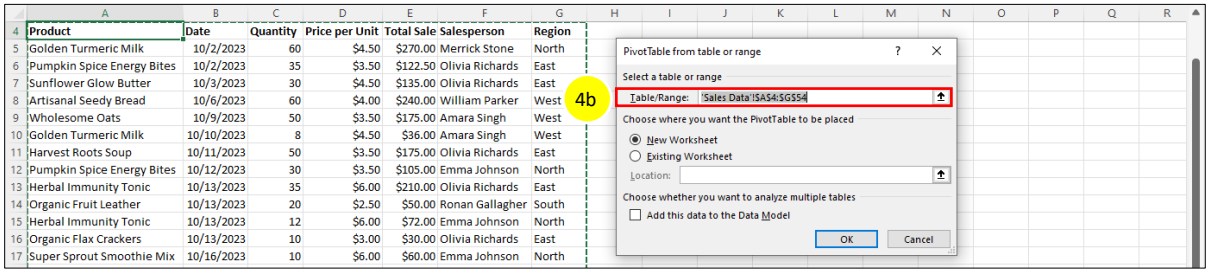
PivotTables are a powerful tool in Excel to create summaries of data that can be easily changed, updated, and adjusted to analyze and display information in different combinations for different purposes. PivotTables can be created from any table or cell range, however they are most useful and illuminating when working with data that conveys a range of both numerical and text-based information. The resulting PivotTables can perform calculations with the numerical data, and the text data can be used to manipulate the PivotTable to display useful information about different categories contained within your data.

3. Review the workbook to become familiar with its content and format. Notice the various types of sales data including dates (column B), numerical information (columns C through E), and text data (columns A, F, and G).
4. To create a **PivotTable** from the data in your worksheet, select cell A4, then do the following:

a. From the **Insert** tab, **Tables** group, **PivotTable** drop-down menu, select **From Table/Range**.



b. In the **PivotTable from table or range** dialog box, notice that Excel has automatically selected the range A4 through G54, then click **OK**.



Product	Date	Quantity	Price per Unit	Total Sale	Salesperson	Region
Golden Turmeric Milk	10/2/2023	60	$4.50	$270.00	Merrick Stone	North
Pumpkin Spice Energy Bites	10/2/2023	35	$3.50	$122.50	Olivia Richards	East
Sunflower Glow Butter	10/3/2023	30	$4.50	$135.00	Olivia Richards	East
Artisanal Seedy Bread	10/6/2023	60	$4.00	$240.00	William Parker	West
Wholesome Oats	10/9/2023	50	$3.50	$175.00	Amara Singh	West
Golden Turmeric Milk	10/10/2023	8	$4.50	$36.00	Amara Singh	West
Harvest Roots Soup	10/11/2023	50	$3.50	$175.00	Olivia Richards	East
Pumpkin Spice Energy Bites	10/12/2023	30	$3.50	$105.00	Emma Johnson	North
Herbal Immunity Tonic	10/13/2023	35	$6.00	$210.00	Olivia Richards	East
Organic Fruit Leather	10/13/2023	20	$2.50	$50.00	Ronan Gallagher	South
Herbal Immunity Tonic	10/13/2023	12	$6.00	$72.00	Emma Johnson	North
Organic Flax Crackers	10/13/2023	10	$3.00	$30.00	Olivia Richards	East
Super Sprout Smoothie Mix	10/16/2023	10	$6.00	$60.00	Emma Johnson	North

c. Notice that a new sheet is created prompting you to choose from the list of fields in the **PivotTable Fields** task pane.

PivotTables are built from combinations of Fields. Each column of your data is a field that you can assign to several categories—including Rows, Columns, Values, and Filters—to build your PivotTable. Simply dragging and dropping fields into each area of the PivotTable Fields task pane builds your PivotTable and updates it on the fly as fields are added, removed, and reordered. Each combination of fields can display a different summary of your data and provide valuable insight to the reader.

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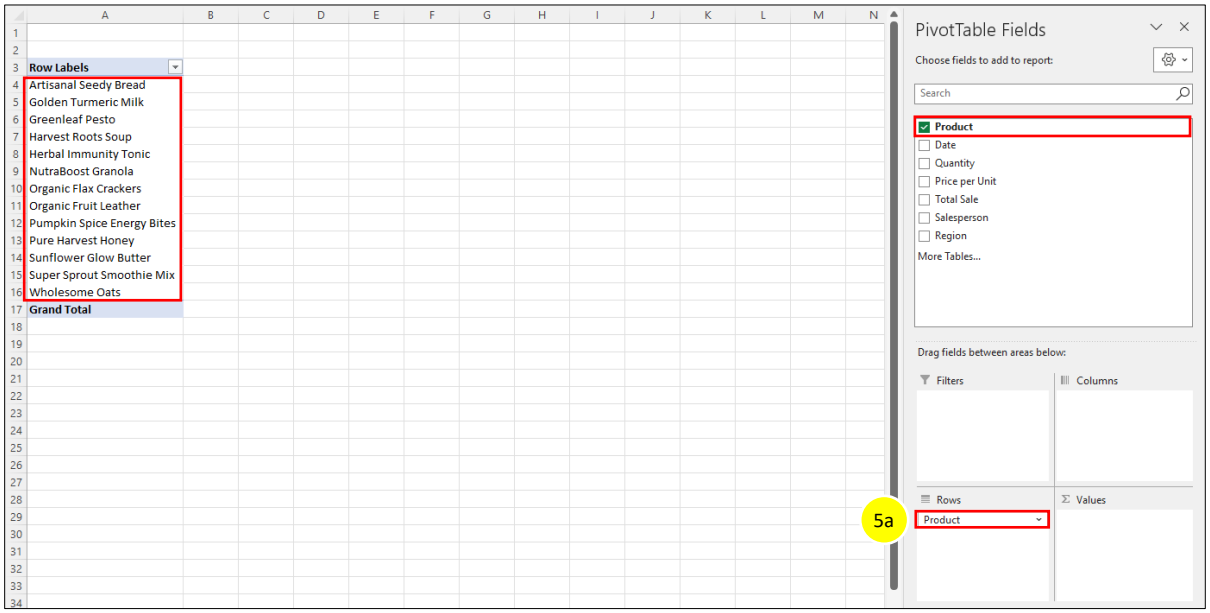
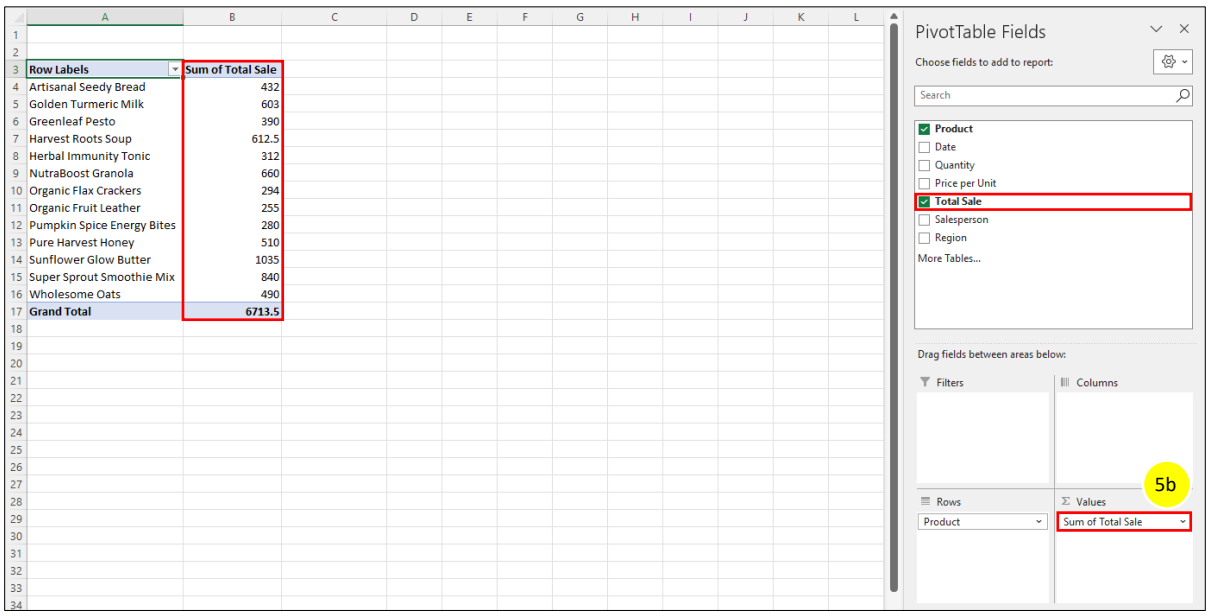
5. To begin building your PivotTable from the list of available fields, from the **PivotTable Fields** task pane on the [Sheet1] worksheet, do the following:

a. Notice the columns in the original data are available as filters. Click and drag the **Product** field to the **Rows** area of the task pane. Notice that the PivotTable has generated a list of each product as a row.

➔ *Note: Double clicking fields will also assign them to areas of the PivotTable, however clicking and dragging offers more precision and flexibility.*



b. To display a value next to each product to summarize the data, click and drag the **Total Sale** field to the **Values** area. Notice that a column is added to the PivotTable displaying the sum of all the values in the Total Sale column of the original data related to each product. A Grand Total is displayed at the bottom of the PivotTable.



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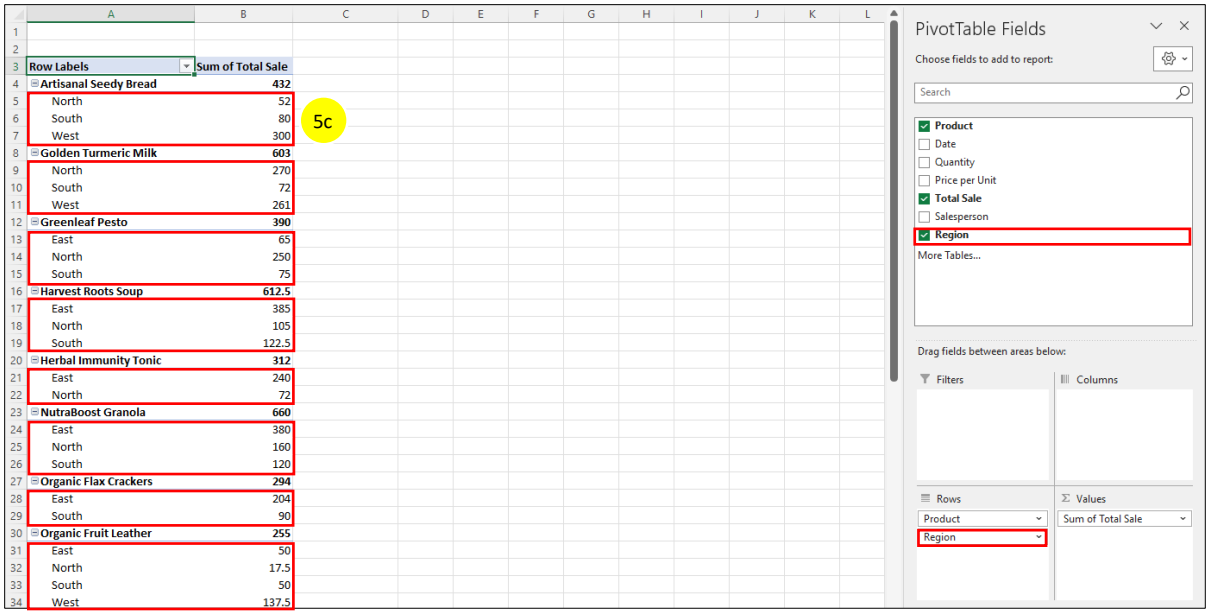
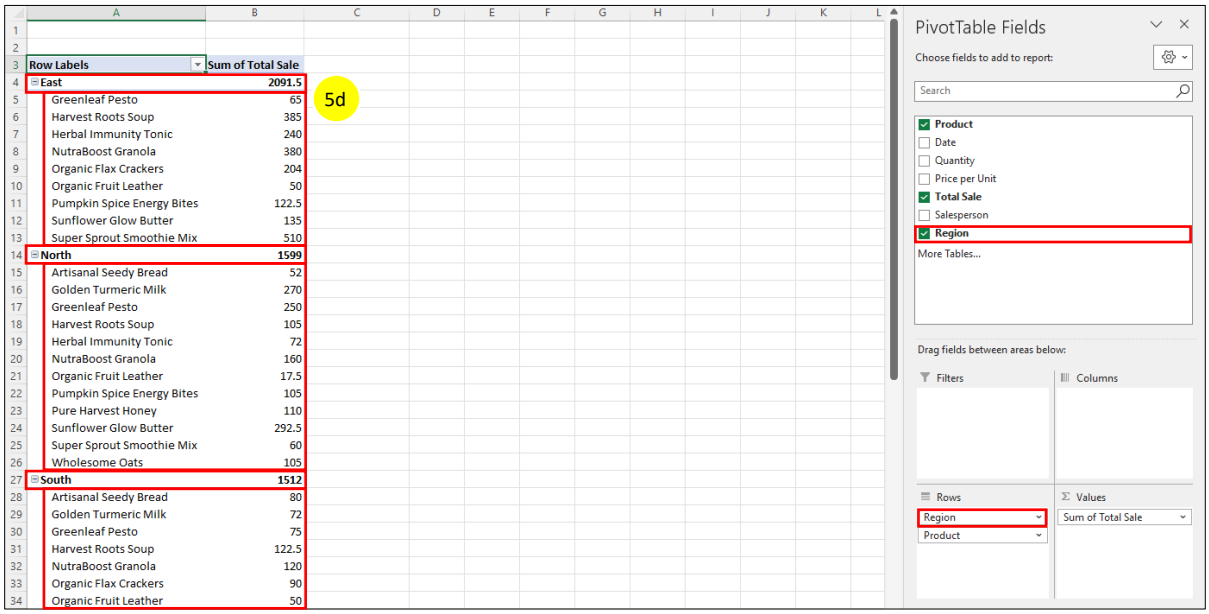
c. To add an additional level of information, click and drag the **Region** field below **Product** in the **Rows** area. Notice that each product appears broken down by Region, showing the sum total of sales made in each region, for each product.



Row Labels	Sum of Total Sale
Artisanal Seedy Bread	432
North	52
South	80
West	300
Golden Turmeric Milk	603
North	270
South	72
West	261
Greenleaf Pesto	390
East	65
North	250
South	75
Harvest Roots Soup	612.5
East	385
North	105
South	122.5
Herbal Immunity Tonic	312
East	240
North	72
NutraBoost Granola	660
East	380
North	160
South	120
Organic Flax Crackers	294
East	204
South	90
Organic Fruit Leather	255
East	50
North	17.5
South	50
West	137.5

d. In the **Rows** area of the **PivotTable Fields** task pane, drag the **Region** field above **Product** in the list. Notice that the PivotTable updates to display the total of each region, subsequently broken down by product.



Row Labels	Sum of Total Sale
East	2091.5
Greenleaf Pesto	65
Harvest Roots Soup	385
Herbal Immunity Tonic	240
NutraBoost Granola	380
Organic Flax Crackers	204
Organic Fruit Leather	50
Pumpkin Spice Energy Bites	122.5
Sunflower Glow Butter	135
Super Sprout Smoothie Mix	510
North	1599
Artisanal Seedy Bread	52
Golden Turmeric Milk	270
Greenleaf Pesto	250
Harvest Roots Soup	105
Herbal Immunity Tonic	72
NutraBoost Granola	160
Organic Fruit Leather	17.5
Pumpkin Spice Energy Bites	105
Pure Harvest Honey	110
Sunflower Glow Butter	292.5
Super Sprout Smoothie Mix	60
Wholesome Oats	105
South	1512
Artisanal Seedy Bread	80
Golden Turmeric Milk	72
Greenleaf Pesto	75
Harvest Roots Soup	122.5
NutraBoost Granola	120
Organic Flax Crackers	90
Organic Fruit Leather	50

➔ *Note: Much of the power of PivotTables to create meaningful summaries of your data comes from the flexibility of adding and rearranging fields. Fields can be dragged and dropped into each area to "pivot" the resulting table to display a new set of relevant information.*

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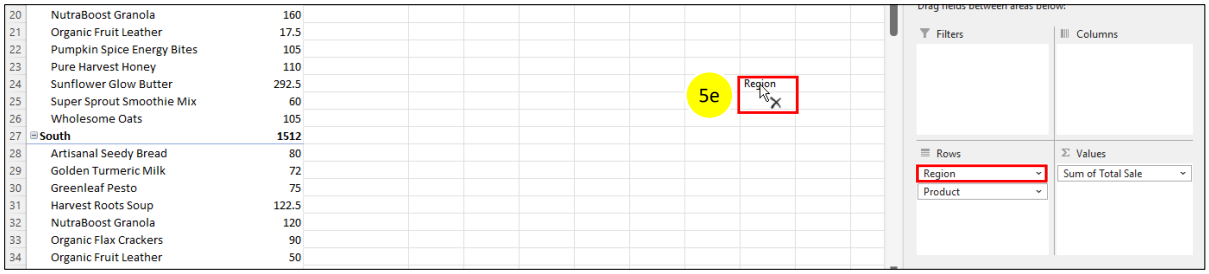
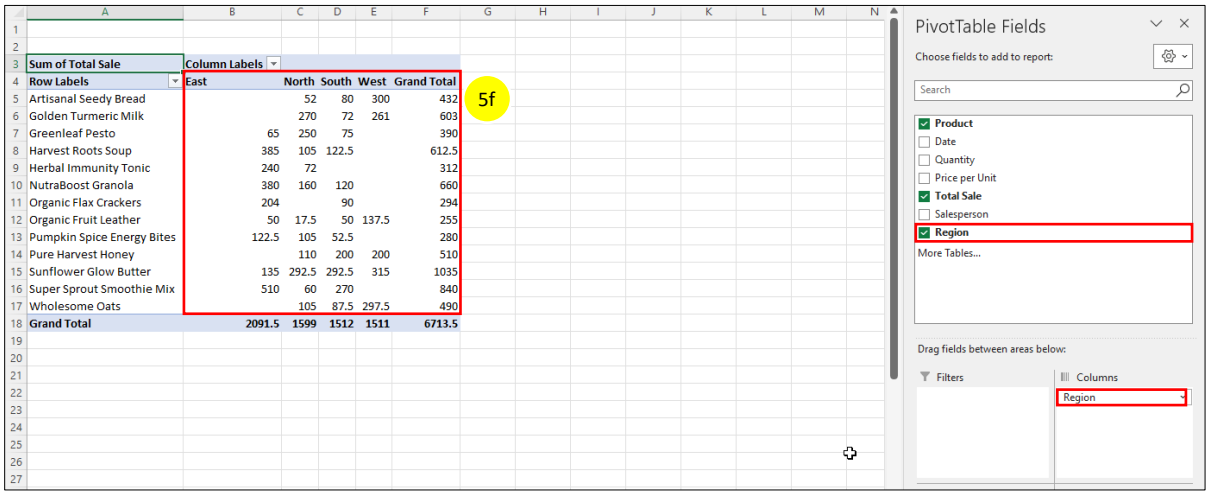
e. To remove a field from the PivotTable, select the **Region** field in the **Rows** area of the **PivotTable Fields** task pane and drag it over an empty cell in the worksheet. When your mouse displays an **X** icon, release to delete the field.



f. Drag the **Region** field from the list of available fields into the **Columns** area. Notice that the PivotTable displays a column for each Region with the sum of sales for each product displayed.



g. Remove the **Sum of Total Sale** field from the **Values** area. Notice that the PivotTable now appears as a structure of rows and columns, but without numerical information to display in each cell.

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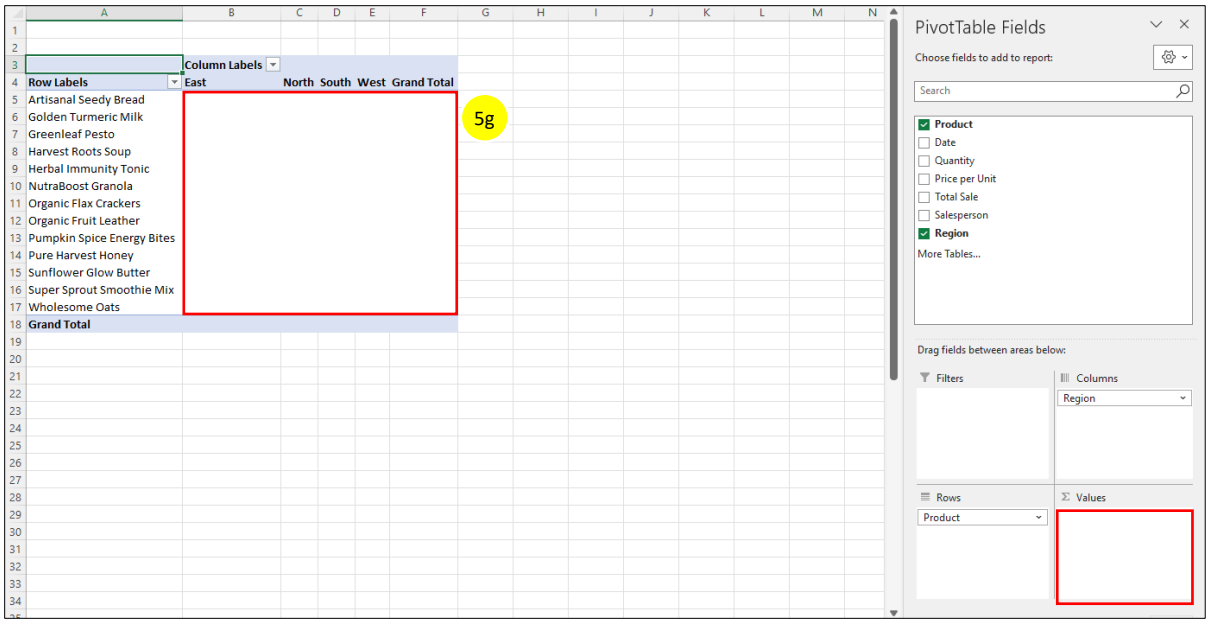
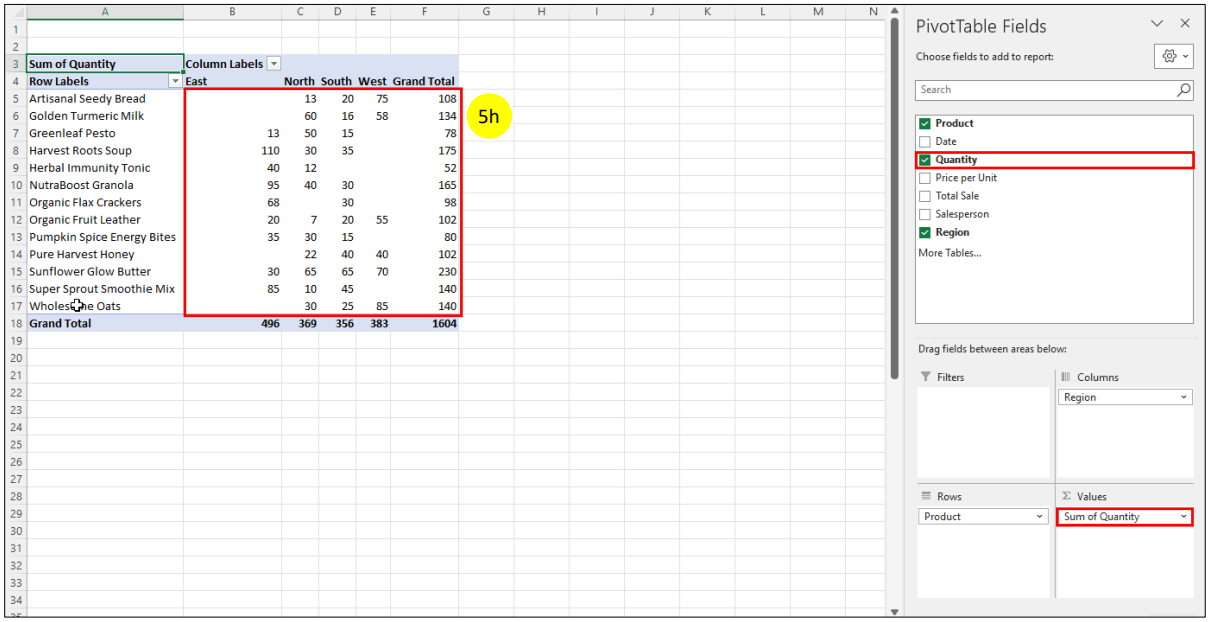


h. To fill the structure of the PivotTable with values, drag the **Quantity** field to the **Values** area. Notice that the PivotTable displays the sum of quantities of each product sold in each region.



i. Rename the sheet [Product Totals], key the text [Product Quantities Sold by Region] in cell A1, and merge the cell across cells A1 through F1.

6. To change the layout and style of a PivotTable, select the PivotTable and do the following:

a. From the **Design** tab, **Layout** group, **Report Layout** drop-down menu, select **Show in Tabular Form**.

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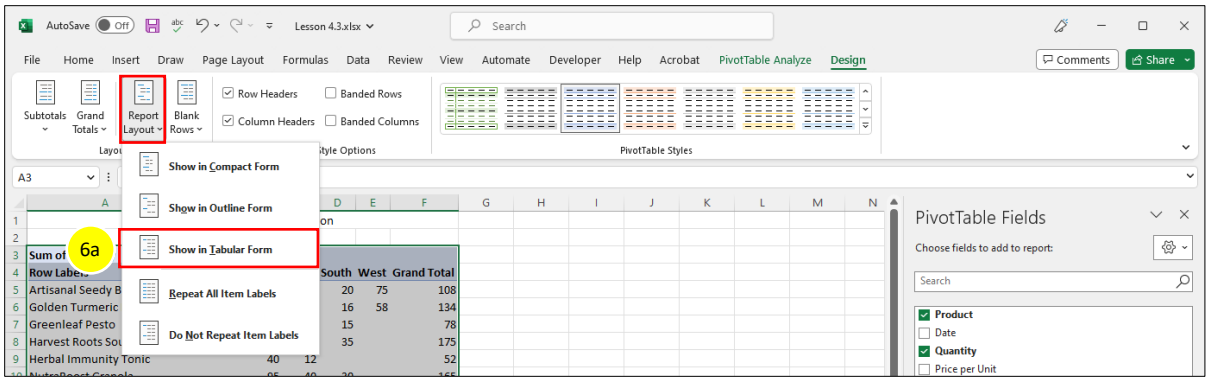
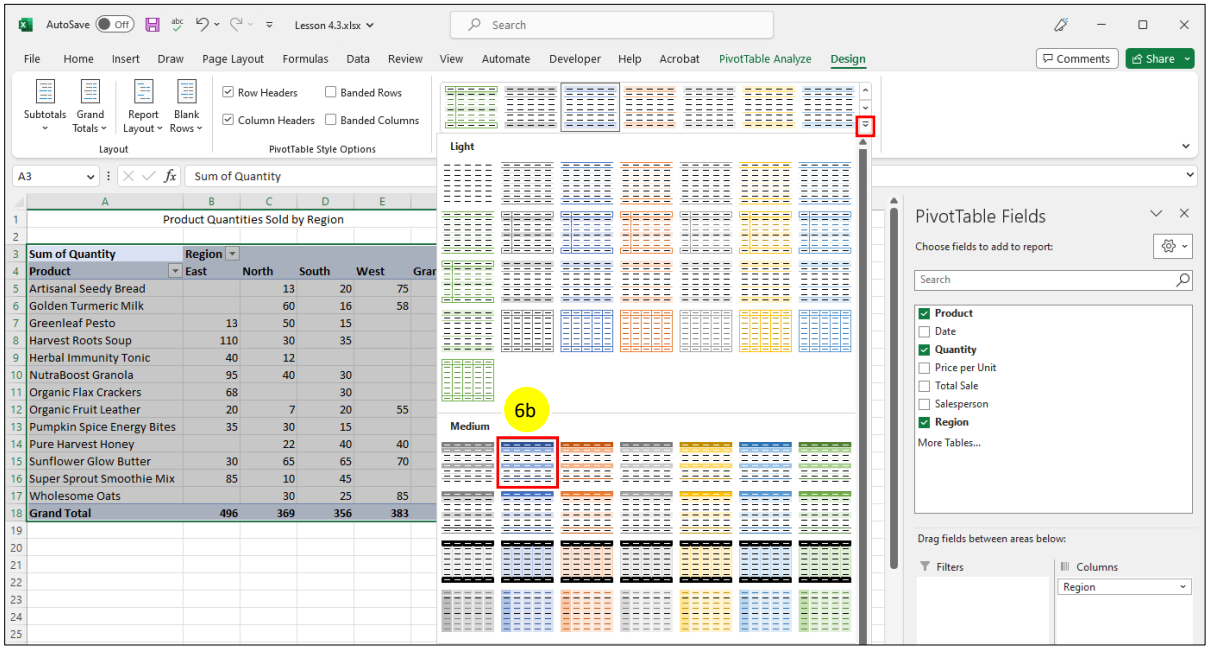


➔ *Note: This may make the information easier to read than the default Compact Form option.*

b. From the **Design** tab, **PivotTable Styles** group, **More** drop-down menu, select **Light Blue, Pivot Style Medium 2**.



One of the advantages of using a PivotTable is that information can be displayed in a variety of ways without altering the source data itself. If the values of the source data ever change, the PivotTable can be updated as well to display the changes.

7. To update a PivotTable to include new values or information, do the following:

a. In the [Sales Data] sheet, update cell A5 to [Garden Veggie Straws] to add a new product not represented elsewhere in the data.

b. In the [Product Totals] sheet, select the PivotTable, then from the **PivotTable Analyze** tab, **Data** group, **Refresh** drop-down menu, select **Refresh**. Notice that [Garden Veggie Straws] is added to the bottom of the PivotTable.

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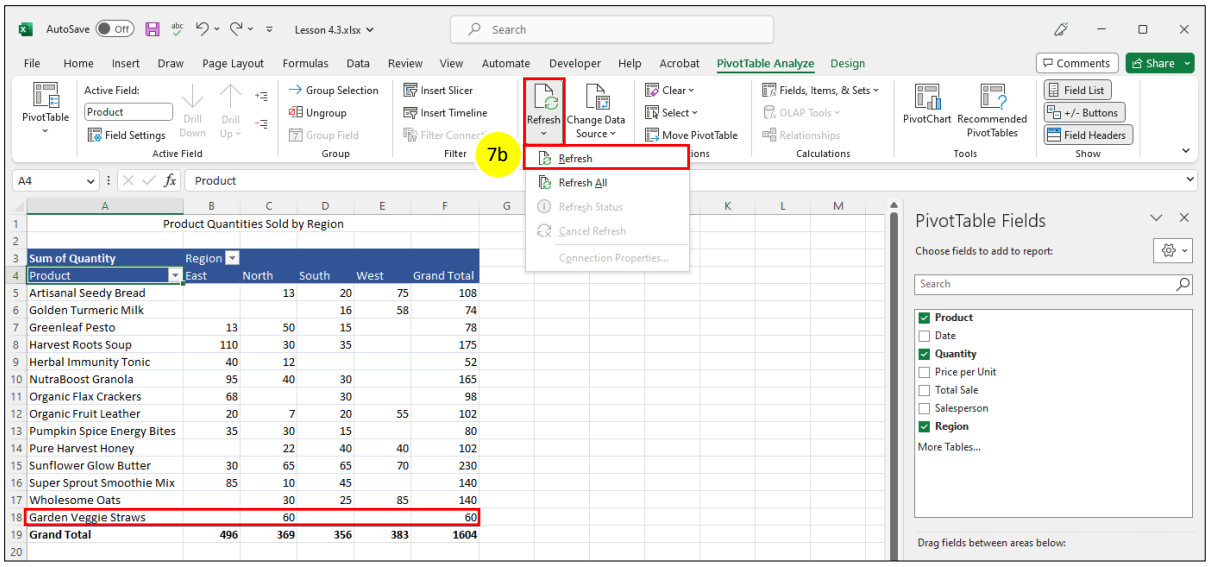
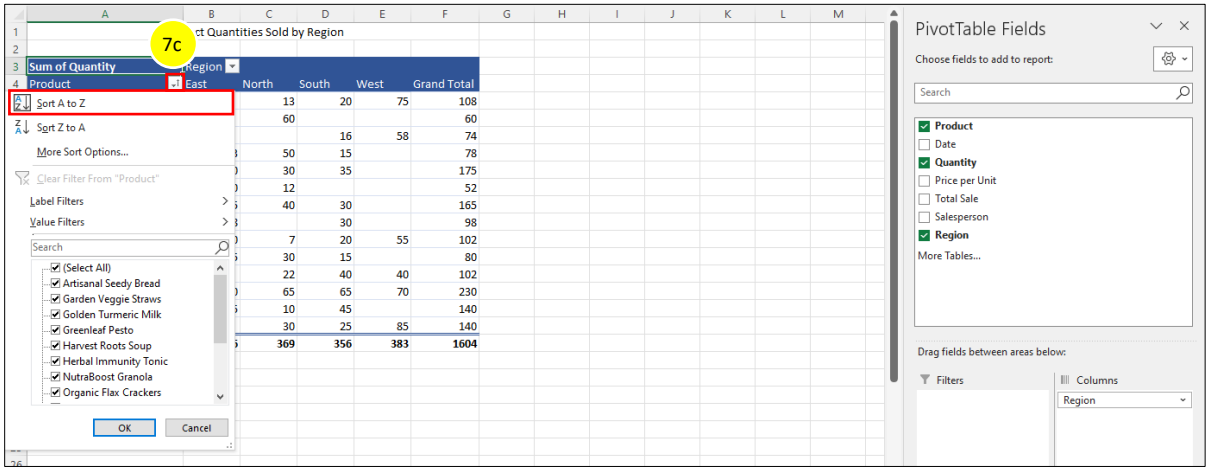


➔ *Note: If multiple PivotTables exist in a workbook connected to multiple sources of data, choose the Refresh All option.*

c. To sort the Product names, from the drop-down menu in cell A4, click **Sort A to Z**.



8. Return to the [Sales Data] sheet and create a new PivotTable on a new worksheet using the data in cells A4 through G54 with the following information:

a. Place the Region and Salesperson fields in the Rows area, in that order.

b. Place the Total Sale and Quantity fields in the Values area, in that order.

c. Notice that the PivotTable shows the sum of Total Sale and Quantity for each region, further broken down by each salesperson.

d. Show the PivotTable in Tabular form.

e. Change the PivotTable style to Light Blue, Pivot Style Medium 2.

f. Rename the sheet [Salesperson Totals].

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g. Key the text [Sales Information by Salesperson] in cell A1 and merge and center across cell D1.

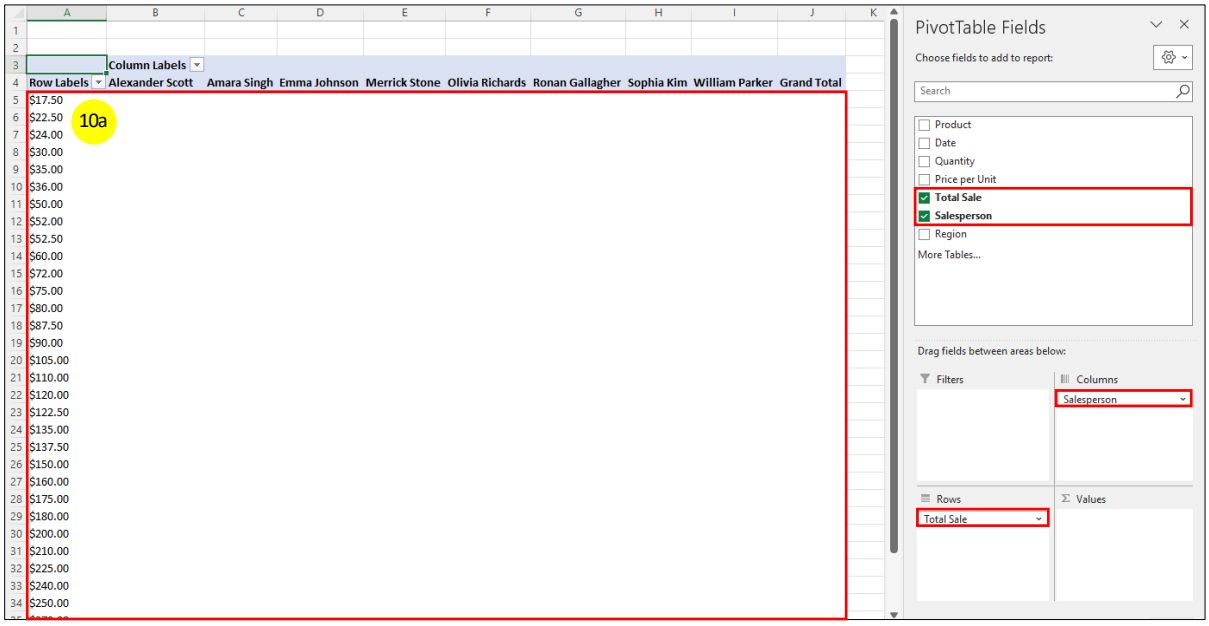
The previous PivotTables in this lesson used expected fields like Product and Salesperson as rows of the resulting table. However, the flexibility of PivotTables allows you to try using other fields in the structure of the PivotTable to analyze the data for different information. For example, if you wanted to see how many sales each salesperson made within a certain dollar range, you could use Total Sale as a row and group the data by the ranges you are interested in. This would take the Total Sale field, a numeric field typically used as a value, and instead use it to create the rows of the PivotTable.

When assigning PivotTable fields in this way, it may be helpful to first create the structure of the PivotTable by assigning rows and columns, then assign fields as values to fill in the data.

9. Return to the [Sales Data] sheet and create a new PivotTable on a new worksheet using the data in cells A4 through G54.

10. To group PivotTable data to display different ranges of values, from the **PivotTable Fields** task pane, do the following:

a. Drag the **Total Sale** field to the **Rows** area and the **Salesperson** field to the **Columns** area. Notice that each row represents a different dollar value contained within the sales data.



b. To group the rows so that data is reported for ranges of values instead of each individual value, right-click any value in column A of the PivotTable and select **Group...**.

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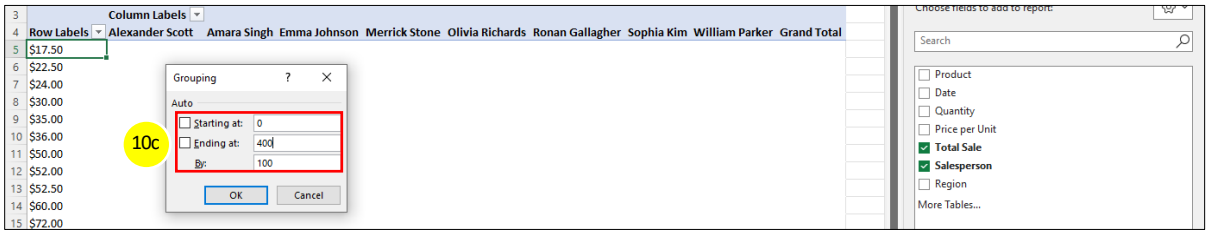
c. In the **Grouping** dialog box, change the **Starting at** value to [0] and the **Ending at** value to [400]. Notice that the values will be grouped **By** every $100, then click **OK**.



Now that the structure of the PivotTable has been created and the rows are grouped to display the desired ranges of values, you can fill in the data by assigning a Values field.

As you saw in previous examples in this lesson, numeric fields like Quantity and Total Sale default to displaying sums when used as PivotTable values. When you assign a text-based field as a value, it will default to showing the count for that field. For example, dragging Product to the Values area will display how many sales each salesperson made within each dollar range, because this will correspond to the number of rows in the dataset (or each individual sale the salesperson made).

d. Drag the **Product** field to the **Values** area. Notice that each cell of the PivotTable displays how many sales each salesperson made within the dollar ranges.

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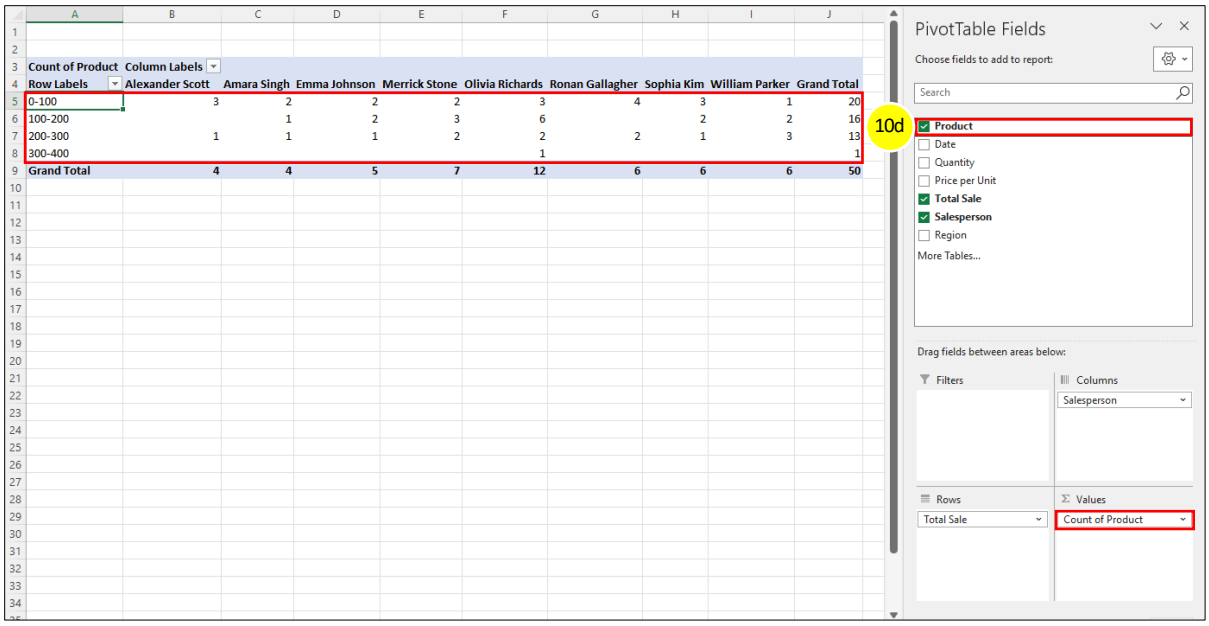
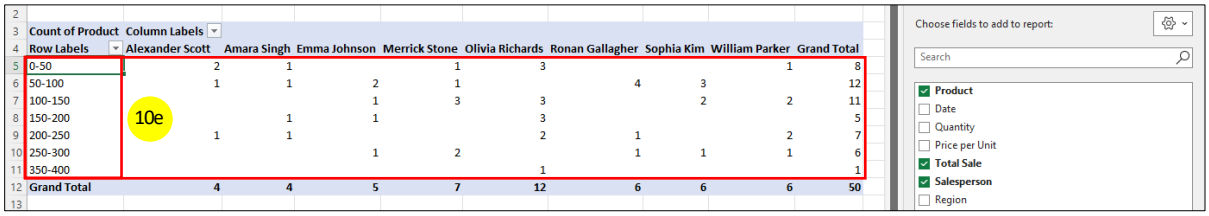


➔ *Note: By assigning the Product field of the original source data as a value in the PivotTable, it will return how many total rows of data (or number of sales) fall within each grouped sales range.*

e. Change the groupings of rows to start at 0 and end at 400, creating new groups at each $50 increment. Notice that new rows of data are displayed.



11. Show the PivotTable in Tabular form and change the PivotTable style to Light Blue, Pivot Style Medium 2.

12. Rename the sheet [Sales by Dollar Range], key [Number of Sales at $50 Increments by Salesperson] in cell A1, and merge and center across cell J1.

13. Review your finished workbook and proofread all changes made to the file, then resave.

14. Print or share the workbook if required by your instructor.

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