Microsoft Office 365 in Practice

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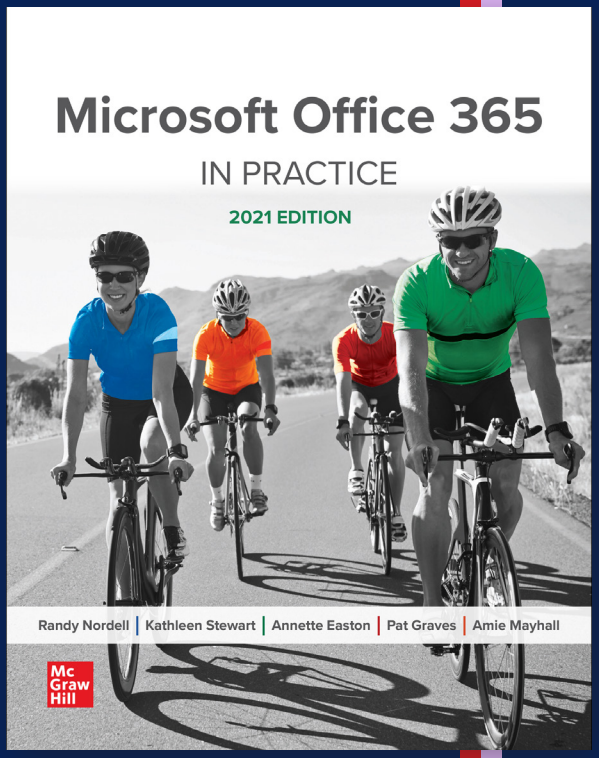


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Microsoft® Office 365

IN PRACTICE

2021

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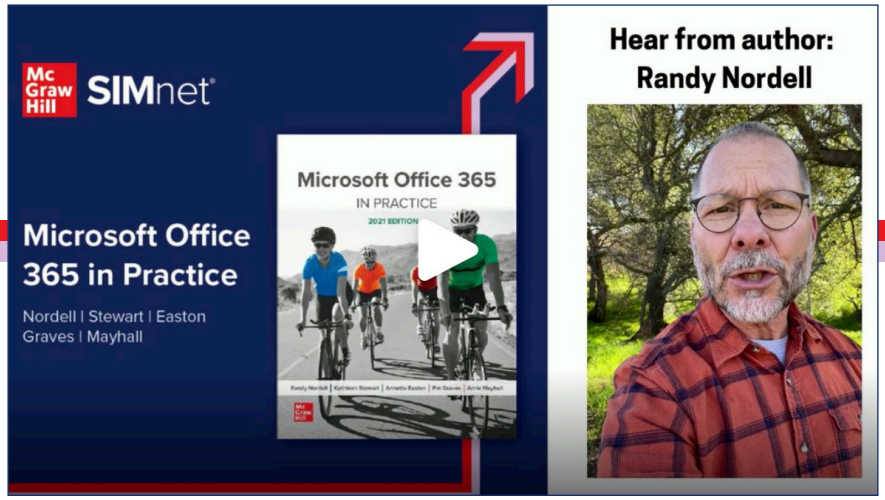
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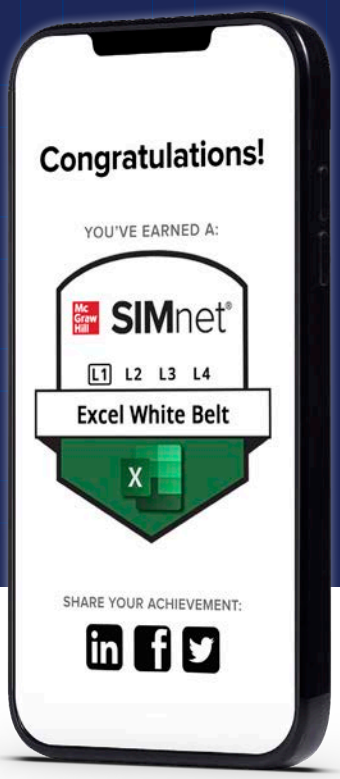
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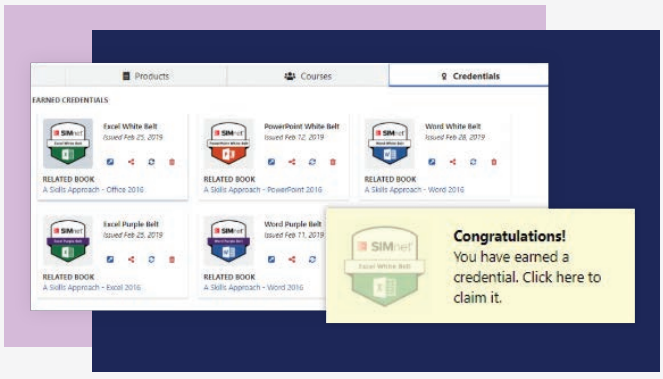
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MOS Excel Associate SIMbook



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MOS Word Associate SIMbook



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dedication

Many thanks to our talented and dedicated author team: Kathleen, Annette, Pat, Amie, and MB. Thank you also to the McGraw-Hill team (Wyatt, Brian, Dean, and Alan) for your continued support of this project. You all are a pleasure to work with. Kelly, thank you for your daily love, support, and encouragement. I could not have done this without you. I'm looking forward to spending more time together traveling, hiking, riding our tandem, and paddle boarding!

—Randy

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—Kathleen Stewart

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—Amie Mayhall

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preface

What We're About

We wrote *Microsoft Office 365: In Practice, 2021 Edition* to meet the diverse needs of both students and instructors. Our approach focuses on presenting Office topics in a logical and structured manner, teaching concepts in a way that reinforces learning with practice projects that are transferrable, relevant, and engaging. Our pedagogy and content are based on the following beliefs.

Students Need to Learn and Practice Transferable Skills

Students must be able to transfer the concepts and skills learned in the text to a variety of projects, not simply follow steps in a textbook. Our material goes beyond the instruction of many texts. In our content, students practice the concepts in a variety of current and relevant projects *and* are able to transfer skills and concepts learned to different projects in the real world. To further increase the transferability of skills learned, this text is integrated with SIMnet so students also practice skills and complete projects in an online environment.

Your Curriculum Drives the Content

The curriculum in the classroom should drive the content of the text, not the other way around. This book is designed to allow instructors and students to cover all the material they need to in order to meet the curriculum requirements of their courses no matter how the courses are structured. *Microsoft Office 365: In Practice, 2021 Edition* teaches the marketable skills that are key to student success. McGraw-Hill's Custom Publishing site, **Create,** can further tailor the content material to meet the unique educational needs of any school.

Integrated with Technology

Our text provides a fresh and new approach to an Office applications course. Topics integrate seamlessly with SIMnet with 1:1 content to help students practice and master concepts and skills using SIMnet's interactive learning philosophy. Projects in SIMnet allow students to practice their skills and receive immediate feedback. This integration with SIMnet meets the diverse needs of students and accommodates individual learning styles. Additional textbook resources found in SIMnet (Resources and Library sections) integrate with the learning management systems that are widely used in many online and onsite courses.

Reference Text

In addition to providing students with an abundance of real-life examples and practice projects, we designed this text to be used as a Microsoft Office 365 reference source. The core material, uncluttered with exercises, focuses on real-world use and application. Our text provides clear step-by-step instructions on how readers can apply the various features available in Microsoft Office in a variety of contexts. At the same time, users have access to a variety of both online (SIMnet) and textbook practice projects to reinforce skills and concepts. Both SIMnet and this text are updated with the most current Office 365 features. For the most current updates, please refer first to SIMnet.

instructor walkthrough

Textbook Learning Approach

Microsoft Office 365: In Practice, 2021 Edition uses the *T.I.P. approach:*

- **T**opic
- **I**nstruction
- **P**ractice

Topic

- Each Offi application section begins with foundational skills and builds to more complex topics as the text progresses.
- Topics are logically sequenced and grouped by topics.
- Student Learning Outcomes (SLOs) are thoroughly integrated with and mapped to chapter content, projects, end-of-chapter review, and test banks.
- Reports are available within SIMnet for displaying how students have met these Student Learning Outcomes.

Instruction (How To)

- *How To* guided instructions about chapter topics provide transferable and adaptable instructions.
- Because *How To* instructions are not locked into single projects, this textbook functions as a reference text, not just a point-and-click textbook.
- Chapter content is aligned 1:1 with SIMnet.

Practice (Pause & Practice and End-of-Chapter Projects)

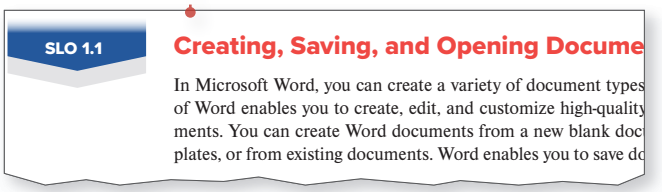
- Within each chapter, integrated Pause & Practice projects (three to fiv per chapter) reinforce learning and provide hands-on guided practice.
- In addition to Pause & Practice projects, each chapter has 10 comprehensive and practical practice projects: Guided Projects (three per chapter), Independent Projects (three per chapter), Advanced Project (one per chapter), and Challenge Projects (three per chapter). Additional projects can also be found in the Library or Resources section of SIMnet.
- Pause & Practice and end-of-chapter projects are complete content-rich projects, not small examples lacking context.
- Select auto-graded projects are available in SIMnet.



Chapter Features

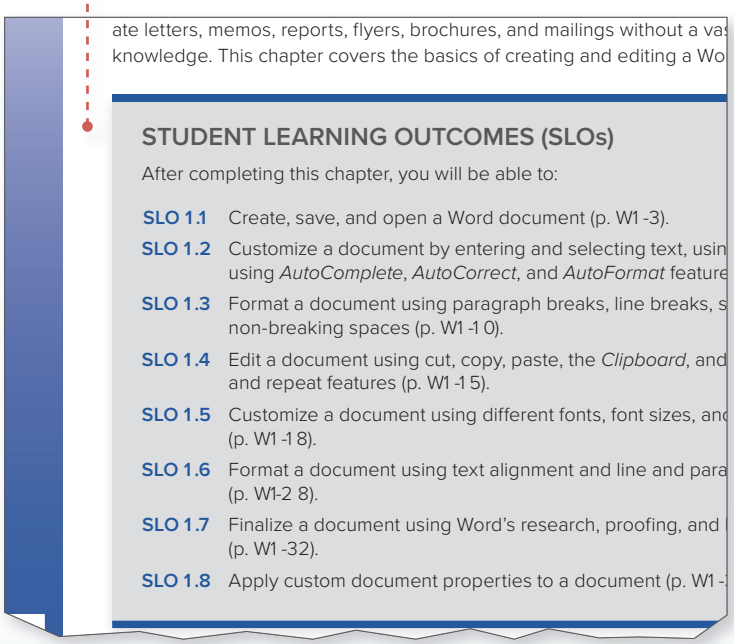
All chapters follow a consistent theme and instructional methodology. Below is an example of chapter structure.

Main headings are organized according to the ***Student Learning Outcomes (SLOs).***


SLO 1.1

Creating, Saving, and Opening Docume

In Microsoft Word, you can create a variety of document types
of Word enables you to create, edit, and customize high-quality
ments. You can create Word documents from a new blank doc
plates, or from existing documents. Word enables you to save dc

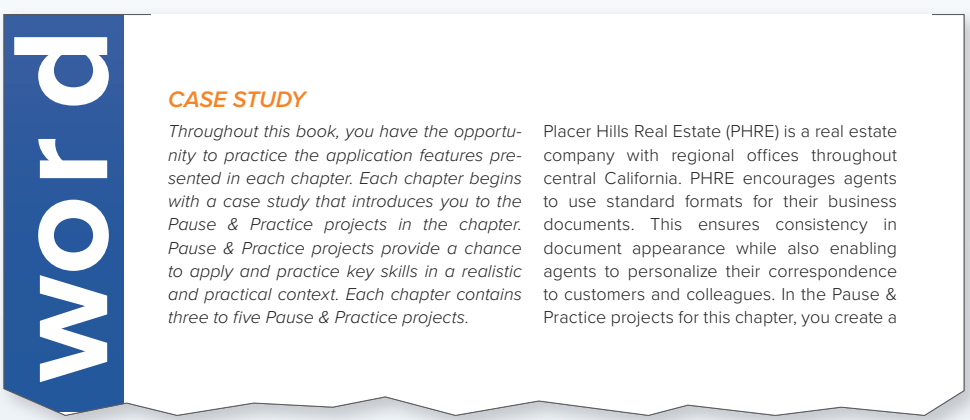

ate letters, memos, reports, flyers, brochures, and mailings without a va
knowledge. This chapter covers the basics of creating and editing a Wo

STUDENT LEARNING OUTCOMES (SLOs)

After completing this chapter, you will be able to:

SLO 1.1 Create, save, and open a Word document (p. W1 -3).
SLO 1.2 Customize a document by entering and selecting text, usin
using *AutoComplete*, *AutoCorrect*, and *AutoFormat* feature
SLO 1.3 Format a document using paragraph breaks, line breaks, s
non-breaking spaces (p. W1 -1 0).
SLO 1.4 Edit a document using cut, copy, paste, the *Clipboard*, and
and repeat features (p. W1 -1 5).
SLO 1.5 Customize a document using different fonts, font sizes, an
(p. W1 -1 8).
SLO 1.6 Format a document using text alignment and line and para
(p. W1-2 8).
SLO 1.7 Finalize a document using Word's research, proofing, and
(p. W1 -32).
SLO 1.8 Apply custom document properties to a document (p. W1 -

A list of Student Learning Outcomes begins each chapter. All chapter content, examples, and practice projects are organized according to the chapter SLOs.


word

CASE STUDY

Throughout this book, you have the opportunity to practice the application features presented in each chapter. Each chapter begins with a case study that introduces you to the Pause & Practice projects in the chapter. Pause & Practice projects provide a chance to apply and practice key skills in a realistic and practical context. Each chapter contains three to five Pause & Practice projects.

Placer Hills Real Estate (PHRE) is a real estate company with regional offices throughout central California. PHRE encourages agents to use standard formats for their business documents. This ensures consistency in document appearance while also enabling agents to personalize their correspondence to customers and colleagues. In the Pause & Practice projects for this chapter, you create a

The *Case Study* for each chapter is a scenario that establishes the theme for the entire chapter. Chapter content, examples, figures, Pause & Practice projects, SIMnet skills, and projects throughout the chapter closely related to this case study content. The three to five Pause & Practice projects in each chapter build upon each other and address key case study themes.

How To instructions enhance transferability of skills with concise steps and screen shots.

SLO 1.4

Moving and Copying Text

Editing is an important phase in document creation. Editing involves not only proofreading and correcting grammar and spelling mistakes but also arranging text within a document, which includes cutting, copying, and pasting. Word provides tools to easily move and copy information within a document or between multiple documents.

Move Text

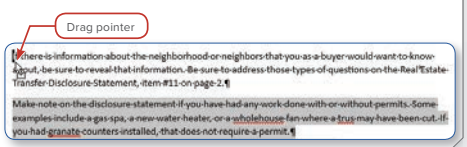
Moving text removes it from one location (cut) and places it in another location (paste). Two methods used to move text are ***drag and drop*** or ***cut and paste***.

ANOTHER WAY

Press **Ctrl+C** to copy.
Press **Ctrl+X** to cut.
Press **Ctrl+V** to paste.

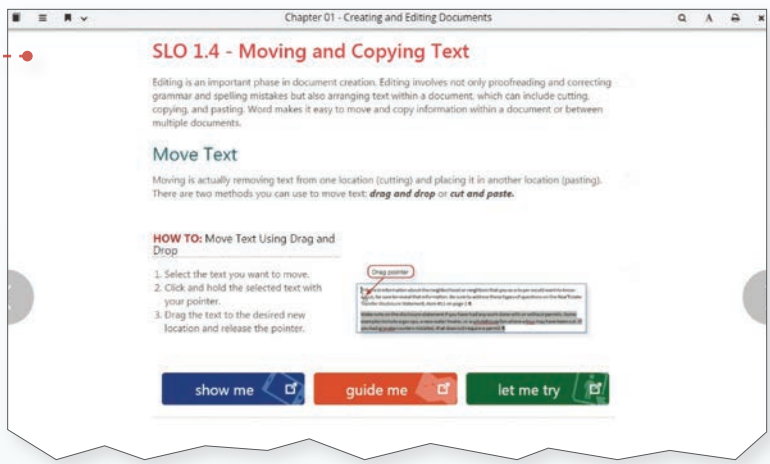
HOW TO: Move Text Using Drag and Drop

1. Select the text you want to move.
   - Refer to the "Select Text" section in *SLO 1.2: Entering and Selecting Text* for methods of selecting text.
2. Click and hold the selected text with your pointer.



How To instructions are easy-to-follow concise steps. Screen shots and other figures fully illustrate How To topics.

Students can complete hands-on exercises in either the Office application or in SIMnet.



Pause & Practice 1-1: Create a business letter in block format with mixed punctuation.

Pause & Practice 1-2: Edit the business letter using copy, paste, and *Format Painter*. Modify

Pause & Practice 1-3: Finalize the business letter by modifying line spacing and paragraph spacing, changing paragraph alignment, translating text, using research and proofing tools, and adding document properties.

Pause & Practice projects, which each cover two to three of the student learning outcomes in the chapter, provide students with the opportunity to review and practice skills and concepts. Every chapter contains three to five Pause & Practice projects.

MORE INFO

The ***launcher*** (also referred to as the ***dialog box launcher***) is referred to throughout this text. Click the launcher in the bottom-right corner of a group to open a dialog box or pane for additional options.

More Info provides readers with additional information about chapter content.

Another Way notations teach alternative methods of accomplishing the same task or feature, such as keyboard shortcuts.



Marginal notations present additional information and alternative methods.

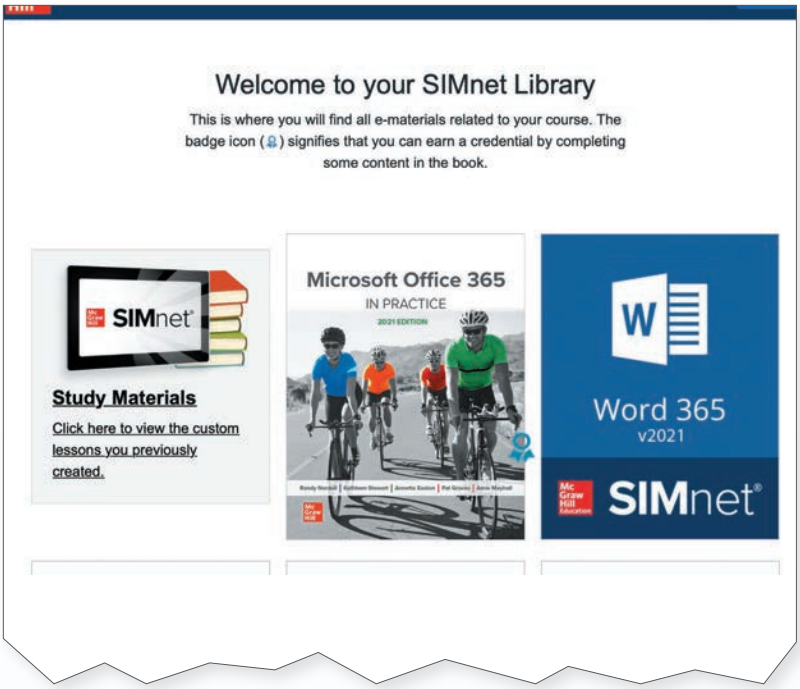
End-of-Chapter Projects

Ten learning projects at the end of each chapter provide additional reinforcement and practice for students. Many of these projects are available in SIMnet for completion and automatic grading.

- ***Guided Projects (three per chapter):*** These projects provide guided step-by-step instructions to apply Offi features, skills, and concepts from the chapter. Screen shots guide students through the more challenging tasks. End-of-project screen shots provide a visual of the completed project.
- ***Independent Projects (three per chapter):*** These projects provide students further opportunities to practice and apply skills, instructing students what to do, but not how to do it. These projects allow students to apply previously learned content in a different cont xt.
- ***Advanced Project (one per chapter):*** These projects provide students with another opportunity to apply their knowledge and skills in an advanced context with limited instructional assistance.
- ***Challenge Projects (three per chapter):*** These projects are open-ended and encourage creativity and critical thinking by integrating Offi concepts and features into relevant and engaging projects.

Appendix

- ***Office 365 Shortcut*** Appendix A covers the shortcuts available in Microsoft Offi and within each of the specifi Offi applications. Information is in table format for easy access and reference.



Additional Resources in SIMnet

Students and instructors can find the following resources in the Library or Resources sections in SIMnet.

Student Resources

- ***Data Files:*** Files contain start file for all Pause & Practice, Capstone, and end-of-chapter projects.
- ***SIMnet Resources:*** Resources provide getting started and informational handouts for instructors and students.
- ***Check for Understanding:*** A combination of multiple choice, fill-in matching, and short answer questions are available at the end of each SIMbook chapter in SIMnet to assist students in their review of the skills and concepts covered in the chapter.

Capstone Projects

- ***Integrating Applications:*** Projects provide students with the opportunity to learn, practice, and transfer skills using multiple Offi applications.
- ***Integrating Skills:*** Projects provide students with a comprehensive and integrated review of all of the topics covered in each application (Word, Excel, Access, and PowerPoint). Available in individual application texts.

Appendix

- ***Business Document Formats:*** Appendix B is a guide to regularly used business document formatting and includes numerous examples and detailed instructions.

Instructor Resources

- ***Instructor's Manual:*** An Instructor's Manual provides teaching tips and lecture notes aligned with the PowerPoint presentations for each chapter. The manual also includes the solutions for online Check for Understanding questions.
- ***Test Bank:*** The extensive test bank integrates with learning management systems (LMSs) such as Blackboard, WebCT, Desire2Learn, and Moodle.
- ***PowerPoint Presentations:*** PowerPoint presentations for each chapter can be used in onsite course formats for lectures or can be uploaded to LMSs.
- ***SIMnet Resources:*** These resources provide getting started and informational handouts for instructors.
- ***Solution Files:*** Files contain solutions for all Pause & Practice, Capstone, Check for Understanding, and end-of-chapter projects.
- ***Office In Practice website (http://officeinprac .com/):*** This website accompanies the *Office In Practice* series of texts and provides many instructor, student, and SIMnet resources.

acknowledgments

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—Randy, Kathleen, Annette, Amie, and Pat

CHAPTER 2

excel

Working with Formulas and Functions

CHAPTER OVERVIEW

With its capabilities in mathematical, scientific, engineering, and other calculations, Excel is a valuable tool for business, government, education, and you. Use Excel to create a simple addition formula or a sophisticated calculation with layers of arithmetic. In this chapter, you learn how to build a basic formula and how to use mathematical rules. You also explore Excel function categories.

STUDENT LEARNING OUTCOMES (SLOs)

After completing this chapter, you will be able to:

- **SLO 2.1** Build and edit basic formulas (p. E2-106).
- **SLO 2.2** Set mathematical order of operations in a formula (p. E2-109).
- **SLO 2.3** Use absolute, mixed, relative, and 3D references in a formula (p. E2-111).
- **SLO 2.4** Use formula auditing tools in a worksheet (p. E2-120).
- **SLO 2.5** Work with *Statistical* and *Date & Time* functions (p. E2-127).
- **SLO 2.6** Use functions from the *Financial*, *Logical*, and *Lookup & Reference* categories (p. E2-135).
- **SLO 2.7** Work with *Text* functions (p. E2-150).
- **SLO 2.8** Build functions from the *Math & Trig* category (p. E2-152).

CASE STUDY

In the Pause & Practice projects in this chapter, you work with a multi-sheet workbook for Perfect Vacation Rentals. You build formulas to complete a break even analysis, calculate start-up costs for a property, and track information about clients.

Pause & Practice 2-1: Build and audit formulas in a worksheet.

Pause & Practice 2-2: Insert *Statistical*, *Date & Time*, *Financial*, *Logical*, and *Lookup* functions in a workbook.

Pause & Practice 2-3: Use *Text* and *Math & Trig* functions in a workbook.

SLO 2.1

Building and Editing Formulas

An Excel ***formula*** is an expression or statement that uses arithmetic operations to perform a calculation. Basic arithmetic operations are addition, subtraction, multiplication, and division. The formula is entered in a cell and refers to other cells or ranges in the worksheet or workbook. The formula appears in the *Formula* bar, but the results appear in the cell.

You learned in Chapter 1 that a function is a built-in formula. Like a function, a formula begins with an equals sign (=). After the equals sign, you enter the address of the first cell, followed by the arithmetic operator, followed by the next cell in the calculation. An example of an addition formula is **=B5+B6** which adds the values in cells B5 and B6.

Basic arithmetic operators are listed in Table 2-1. Type arithmetic operators using the numeric keypad or the symbols on the number keys at the top of the keyboard.

Table 2-1: Arithmetic Operators

Character	Operation
+	Addition
–	Subtraction
*	Multiplication
/	Division

In the multiplication formula **=C5*C6**, the value in cell C5 is multiplied by the value in cell C6. Use cell references in a formula or a value known as a ***constant***. You type a constant; it is not a cell in the workbook. In the formula **=D5*85%**, the constant is 85%.

Type a Formula

For a simple formula, click the cell, type the equals sign, type the first cell address, type the operator, type the next cell address, and so on. Press any completion key when the formula is finished. Formulas are not case sensitive, so you can type cell addresses in lowercase letters. Excel automatically converts cell references to uppercase when the formula is completed. If you press **Esc** before completing a formula, it is canceled, and nothing is entered in the cell.

As you type a cell address after the equals sign, ***Formula AutoComplete*** displays a list of functions and range names that match the character that you typed. You can ignore the list and continue typing. In addition, the ***Range Finder*** highlights and color codes each cell as you type its address.

HOW TO: Type a Formula

1. Click the cell for the formula.
2. Type an equals sign (=) to begin the formula.
3. Type the column letter for the first cell reference.
   - *Formula AutoComplete* displays a list of functions and range names.
   - Ignore the list when typing a cell address.
   - You can type a lowercase or uppercase character (Figure 2-1).

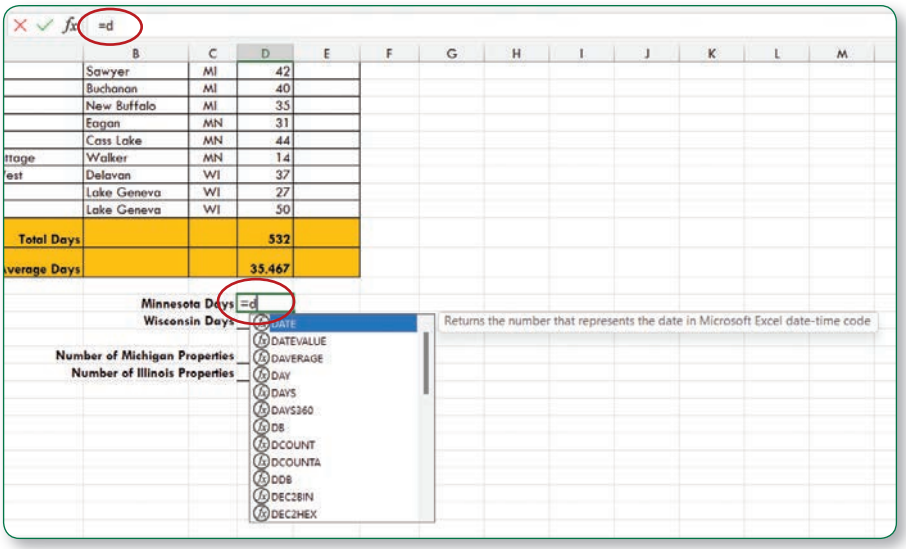


Figure 2-1 ***Formula AutoComplete*** **while typing a formula**

4. Type the row number for the cell reference.
   - The *Range Finder* color codes the cell and its reference.
5. Type the arithmetic operator.
6. Type the cell address for the next reference (Figure 2-2).
7. Press **Enter**.
   - The result displays in the formula cell.
   - The *Formula* bar displays the formula.
   - One way to complete a formula is to click the **Enter** button (the check mark) in the *Formula* bar.
   - Press **Ctrl+Enter** to complete a formula, too.

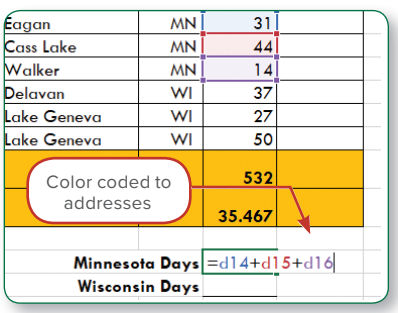


Figure 2-2 Type each cell reference and arithmetic operator

Point and Click to Build a Formula

It is often easier to point to and click the cell to enter its address in a formula. This method also guards against your typing the wrong address. You will not see a *Formula AutoComplete* list, but the *Range Finder* will highlight and color code the cells.

HOW TO: Point and Click to Build a Formula

1. Click the cell for the formula.
2. Type an equals sign (=) to start the formula.
3. Point to and click the first cell for the formula.
   - The reference is entered in the cell and in the *Formula* bar.
   - The *Range Finder* highlights and color codes the reference.
   - If you click the wrong cell, click the correct cell to replace the address.

4. Type the arithmetic operator.
5. Point to and click the next cell for the formula (Figure 2-3).
   - The reference is entered in the cell and in the *Formula* bar.
   - The *Range Finder* highlights and color codes the reference.
6. Press **Enter**.
   - The result displays in the cell.
   - The *Formula* bar displays the formula.
   - Click the **Enter** button in the *Formula* bar or press **Ctrl+Enter** to complete a formula.

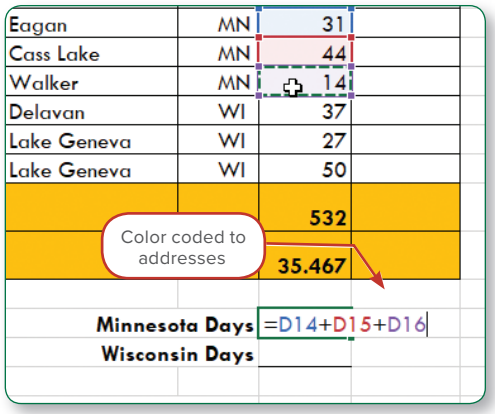


Figure 2-3 Point and click to build a formula

Edit a Formula

Edit a formula by double-clicking its cell or by clicking the *Formula* bar while the cell is active to start *Edit* mode. The *Range Finder* highlights and color codes the formula cell and the argument cells. Add, remove, or change cells and operators to build a new formula in the cell or in the *Formula* bar.

ANOTHER WAY

Click the cell and press **F2** (**FN+F2**) to start *Edit* mode.

HOW TO: Edit a Formula

1. Double-click the formula cell.
   - The *Range Finder* highlights and color codes the cells.
2. Edit the formula in the cell (Figure 2-4).
   - Edit the cell address or type a different operator.
   - Select a cell address and click a different cell to replace the reference.
   - Use the *Formula* bar to edit a formula.

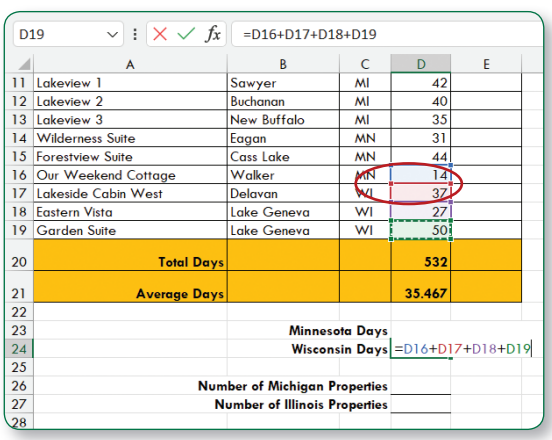


Figure 2-4 Delete the reference to cell D16 to correct the formula for Wisconsin

3. Press **Enter**.
   - Click the **Enter** button in the *Formula* bar or press **Ctrl+Enter** to complete a formula.

SLO 2.2

Setting Mathematical Order of Operations

A formula can have multiple operators, such as both addition and multiplication. Figure 2-5 illustrates two formulas to calculate income for seven properties. The formula in cell B4 calculates the multiplication first (B2*B3=$175) and then adds the value in cell B3; the total of $475 is incorrect. The formula in cell B6 has the same arguments except for the parentheses; the correct amount is $2,275.

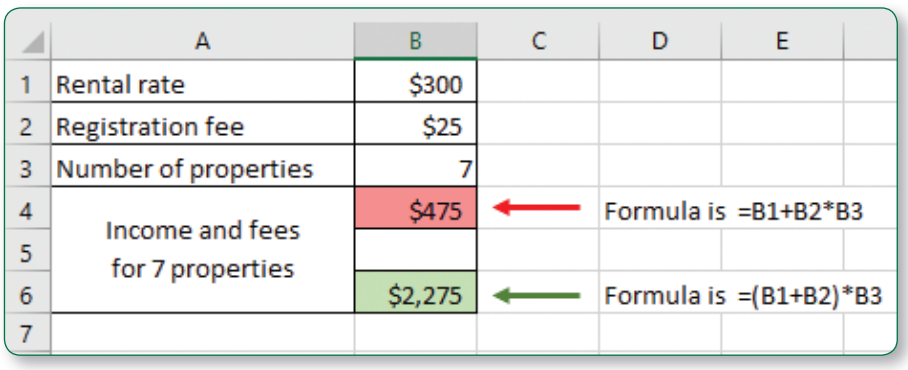


Figure 2-5 Formulas with multiple operators

Excel follows ***mathematical order of operations***, which is the sequence of arithmetic calculations. The order in which arithmetic in a formula is carried out depends on the operator as well as left-to-right order. The basic sequence is left to right, but multiplication and division are done before addition and subtraction. This concept is also known as ***order of precedence*** or ***math hierarchy***.

Use parentheses to control the order of operations. The formula in cell B6 (see Figure 2-5) uses parentheses to reorder the calculation. The parentheses group the addition ($300 + $25) which results in $325. That sum is multiplied by 7 (cell B3) for the correct results.

In a formula with multiple operators, references enclosed in parentheses are calculated first. If a value with an exponent exists, it is calculated next. Multiplication and division follow and finally addition and subtraction. When two operators have the same precedence, Excel calculates them from left to right.

Table 2-2 shows the mathematical order of predecence.

Table 2-2: Mathematical Order of Precedence

Operator	Operation	Order of Precedence
()	**P**arentheses	First
^	**E**xponent	Second
*	**M**ultiplication	Third
/	**D**ivision	Third
+	**A**ddition	Fourth
–	**S**ubtraction	Fourth

MORE INFO

Use the following acronym to recall the arithmetic order of operations: **P**lease **E**xcuse **M**y **D**ear **A**unt **S**ally.

An exponent raises a number to a power. The formula **3^3** multiplies 3 * 3 * 3, 27. Use the caret symbol (^) to build a formula with an exponent.

Multiple Operators in a Formula

When different operators are used in a formula, you must determine how the calculation should be completed and if parentheses are necessary. Here are formulas with two operators. Because addition and subtraction are equal in priority, Excel calculates from left to right.

$$5 + 1 - 3 = 3 \qquad 5 - 1 + 3 = 7$$

Below are formulas with two operators with different priority. Without parentheses, Excel calculates the multiplication first and then follows left to right order.

$$2 + 5 * 3 = 17 \qquad 2 * 5 + 3 = 13$$

Consider this formula with three different operators and no parentheses. Because multiplication and division are equal priority but are higher than addition, the multiplication is first (2*5), followed by the division (left to right). The result of those calculations is added to 5.

$$=2 * 5 / 2 + 5 = 10$$

HOW TO: Use Multiple Operators in a Formula

1. Type = to start the formula.
   - The calculation in parentheses can occur anywhere in the formula.
2. Type ((left parenthesis) to start the calculation that should have priority.
3. Click the first cell for the calculation to be enclosed in parentheses.
4. Type the arithmetic operator.
5. Click the next cell for the calculation to be enclosed in parentheses.
6. Type) (right parenthesis) to end the calculation with priority (Figure 2-6).
   - You must have matching parentheses.
7. Complete the formula.
8. Press **Enter**.

	A	B	C
1	Perfect Vacation Rentals		
2	Break Even Analysis (Monthly)		
3			
4	**Fees and Monthly Operating Costs**	**Monthly Operating Costs (%)**	
5	Registration and local fees	5.3%	
6	Cleaning fee	10.0%	
7	Onsite utilities	8.0%	
8	Replenishment of supplies	8.0%	
9	Onsite visits and follow-up	12.0%	
10	**Total Variable Costs**	31%	
11			
12	**Routine and Fixed Costs**		**Monthly Fixed Costs ($)**
13	Salaries and wages		$ 6,000
14	Payroll taxes		$ 895
15	Web hosting and marketing		$ 350
16	Accounting and legal services		$ 200
17	Office rent		$ 1,500
18	Office utilities		$ 250
19	Insurance		$ 350
20	Real estate taxes		$ 20,000
21	**Total Fixed Costs**		$ 29,545
22			
23	**Rent Necessary to Break Even**		=C21/(1-B10)
24			

Figure 2-6 Set the order of operation with parentheses

SLO 2.3

Using Absolute, Mixed, Relative, and 3D References

Cell references in a formula are identified in different ways. How a cell reference is identified affects how the formula adjusts when copied.

- A ***relative cell reference*** is the location of a cell, such as cell **B2**. In column B, the formula is **=B5+B7**, but when copied to column C, it becomes **=C5+C7**. When you copy a formula with relative references, copied references are updated to the new locations.
- An ***absolute cell reference*** is indicated with dollar signs as in cell **$B$2**. When an absolute reference is copied, it does not change. In the formula **=$B$6 − C7**, $B$6 would not change when copied anywhere in the workbook. C7, on the other hand, would reflect where the copy is located. You can type the dollar signs in an absolute reference, but it is easier to use the **F4** (**FN+F4**) function key. When building a formula, enter the cell address and then press **F4** (**FN+F4**).
- A ***mixed cell reference*** has one relative and one absolute reference. Cell **$B2** is a mixed reference. When it is copied, it always refers to column B, but the row number updates to the row where the copy is located. The formula **=$B5 + C$6** has two mixed references. When copied, this formula will always show column B for the first address and row 6 for the second address.
- A ***3D cell reference*** is a cell located in another worksheet in the same workbook. It can be absolute, mixed, or relative. A 3D reference includes the name of the sheet as in **Sheet2!B2** or **Inventory!$B2**. The sheet name is followed by an exclamation point. When you point and click to build a 3D reference, the sheet name and the exclamation point are automatically entered. When the sheet name includes special characters (@, #, &, etc.), the name is enclosed in single quotes as in **'Inventory#'!$B2**. When you type a 3D reference, you must spell the sheet name correctly and include the exclamation point and single quotes.

Table 2-3 illustrates each cell reference type.

Table 2-3: Cell Reference Types

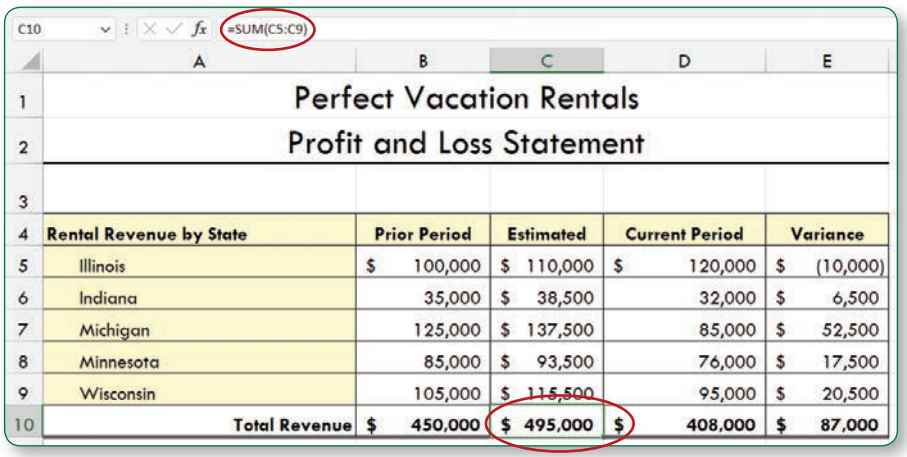
Cell Reference	Reference Type	Behavior When Copied
B2	Relative	Cell address updates to new location(s).
$B$2	Absolute	Cell address does not change.
$B2	Mixed	Column does not change; row updates to new location(s).
B$2	Mixed	Row does not change; column updates to new location(s).
Sheet2!B2	3D Relative	Cell address updates to new location(s).

MORE INFO

When used in a cell reference, the dollar sign ($) and the exclamation point (!) are identifiers. The dollar sign is not treated as a currency symbol, and the exclamation point is not considered punctuation.

Copy a Formula with a Relative Reference

When a formula with relative references is copied, the copied formulas use cell addresses that reflect their locations in the worksheet. In the worksheet shown in Figure 2-7, the formula to calculate rental revenue in cell B10 is **=SUM(B5:B9)**. The copied formula in cell C10 is **=SUM(C5:C9)**.



Rental Revenue by State	Prior Period	Estimated	Current Period	Variance
Illinois	$ 100,000	$ 110,000	$ 120,000	$ (10,000)
Indiana	35,000	$ 38,500	32,000	$ 6,500
Michigan	125,000	$ 137,500	85,000	$ 52,500
Minnesota	85,000	$ 93,500	76,000	$ 17,500
Wisconsin	105,000	$ 115,500	95,000	$ 20,500
Total Revenue	$ 450,000	$ 495,000	$ 408,000	$ 87,000

Figure 2-7 Copied formulas in row 10 use relative column address

HOW TO: Copy a Formula with a Relative Reference

1. Select the cell with the formula.
   - Select multiple adjacent cells as needed.
2. Press **Ctrl+C** to copy the formula(s) or click the **Copy** button [*Home* tab, *Clipboard* group].
   - You can also click and drag the **Fill pointer** if the copies are adjacent to the original formula(s).
3. Select the destination cell or range.
   - Click the first cell in a destination range when pasting multiple cells.
   - When you use the *Fill* pointer, the cells are copied as soon as you release the pointer.
4. Press **Ctrl+V** to paste the formula.
   - The pasted formula reflects its location on the worksheet.
   - Ignore the **Paste Options** button.
5. Press **Esc** to cancel the **Paste** command if a moving border displays.

Build and Copy a Formula with an Absolute Reference

An absolute reference in a formula maintains that address when copied. An example is a worksheet in which expenses are calculated as a percentage of revenue. You type the percentage once in a cell, use an absolute reference to that cell in the first occurrence of the formula, and copy the formula.

To change a cell address to an absolute reference, press the **F4** (**FN+F4**) function key while keying or editing the formula. The first press of the key inserts dollar signs for the row and column reference. Another press of the **F4** (**FN+F4**) key changes to a mixed reference, and each press of the key cycles to the next option.

HOW TO: Build and Copy a Formula with an Absolute Reference

1. Click the cell for the formula.
2. Type an equals sign (=) to begin the formula.
3. Click the cell to be referenced in the formula.
4. Press **F4** (**FN+F4**).
   - The reference becomes absolute (Figure 2-8).

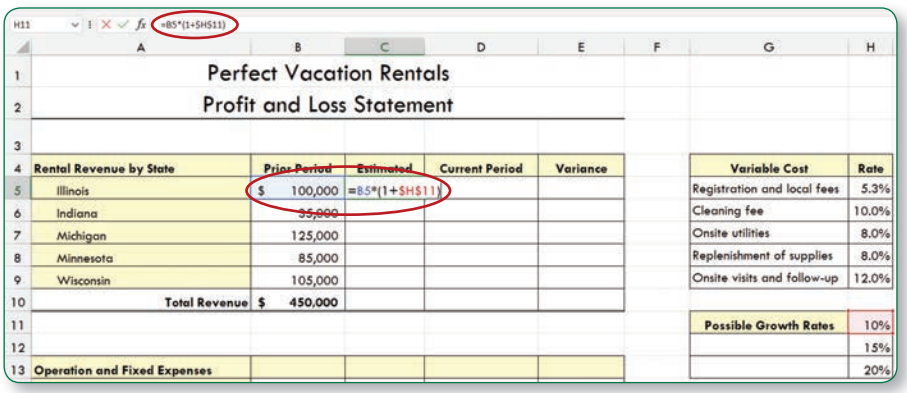


Figure 2-8 Make a reference absolute so that it does not change when copied

5. Complete the formula and press **Enter**.
6. Select the cell with the formula.
7. Press **Ctrl+C** to copy the formula(s) or drag the **Fill pointer** if copies are adjacent to the original formula.
   - Use the **Copy** button on the *Home* tab if you prefer.
8. Select the destination cell and press **Ctrl+V** to paste the formula.
   - The pasted formula uses the same cell reference as the original.
   - Use the **Paste** button on the *Home* tab if you prefer.
   - Ignore the **Paste Options** button.

MORE INFO

A constant in a formula, such as **12** in the formula **=B7*12**, is an absolute value.

Build and Copy a Formula with a Mixed Reference

A mixed cell reference has one relative and one absolute reference in the cell address. Part of the copied formula is unchanged, and part is updated. A mixed cell reference has one dollar sign. You still use the **F4** (**FN+F4**) function key because each press of the function key cycles through different combinations for displaying the dollar signs.

HOW TO: Build and Copy a Formula with a Mixed Reference

1. Click the cell for the formula.
2. Type an equals sign (=) to begin the formula.
3. Click the cell to be referenced in the formula.

4. Press **F4** (**FN+F4**).
   - The reference is absolute.
5. Press **F4** (**FN+F4**) again.
   - The column reference is relative, and the row reference is absolute.
6. Press **F4** (**FN+F4**) again (Figure 2-9).
   - The row reference is relative, and the column reference is absolute.

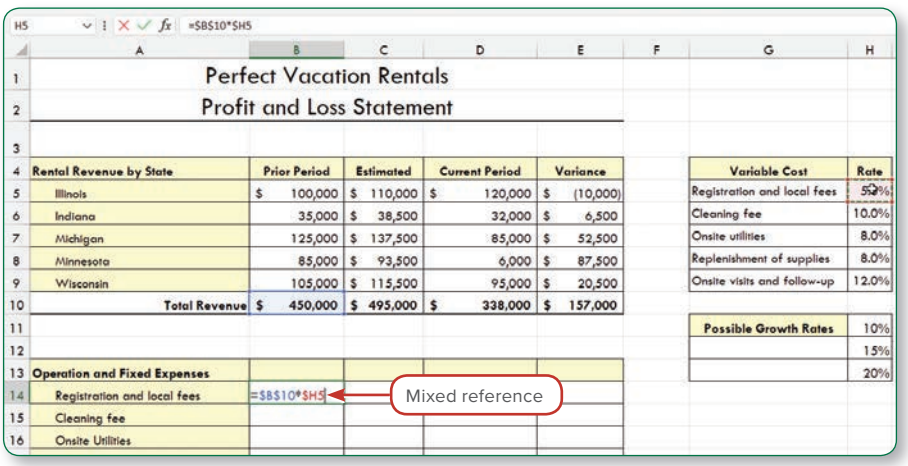


Figure 2-9 Formula with absolute and mixed references

7. Complete the formula and press **Enter**.
8. Select the formula cell.
9. Press **Ctrl+C** to copy the formula(s).
   - You can use the **Copy** button on the *Home* tab.
   - Drag the **Fill pointer** if copies are adjacent to the original formula.
10. Click the destination cell or range.
11. Press **Ctrl+V** to paste the formula.
   - The pasted formula does not change the absolute part of the reference but updates the relative part.
   - Use the **Paste** button on the *Home* tab if you prefer.

Create a Formula with a 3D Reference

An important feature of an Excel workbook is its ability to use data from any sheet in a formula. This type of formula is called a 3D reference because it uses more than one sheet or surface to calculate a result. A 3D reference includes the name of the worksheet and can be absolute, mixed, or relative.

Table 2-4 illustrates sample 3D references.

Table 2-4: Sample 3D References

Cell on Sheet1	Formula on Sheet1	Results
B4	=B3+Sheet2!B3+Sheet3!B3	Adds the values in cell B3 on Sheet1, Sheet2, and Sheet3.
B7	=SUM(B4:B6)+Sheet2!A12	Adds the values in cells B4:B6 on Sheet1 to the value in cell A12 on Sheet2.
C8	=C7*Sheet2!$D$4	Multiplies the value in cell C7 by the value in cell D4 on Sheet2.
D10	=Sheet2!$B$2/Sheet3!B2	Divides the value in cell B2 on Sheet2 by the value in cell B2 on Sheet3.

MORE INFO

An external reference formula refers to a cell in another workbook. It can be absolute, mixed, or relative. An external reference includes the name of the workbook in square brackets as in **[OurBook]SheetName!B$2**.

HOW TO: Create a Formula with a 3D Reference

1. Click the cell for the formula and type =.
2. Click the first cell for the formula.
   - The 3D reference can occur anywhere in the formula.
3. Type the operator.
4. Select the sheet tab with the cell to be used in the formula.
5. Click the cell required in the formula.
   - Press **F4** (**FN+F4**) to make the reference absolute or mixed as needed (Figure 2-10).

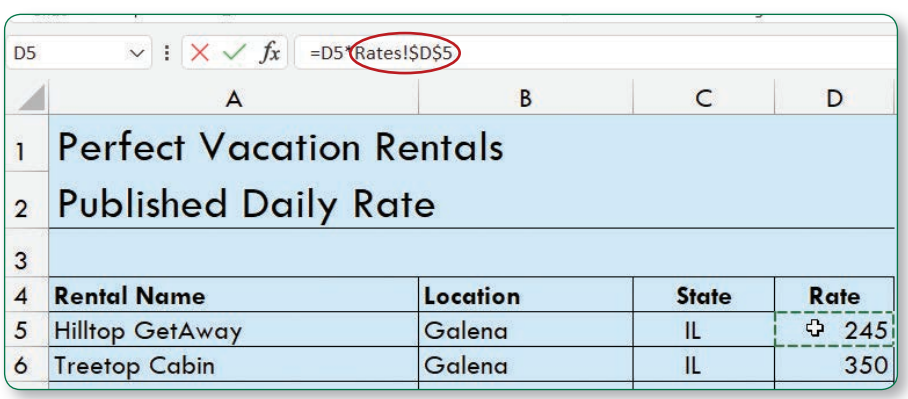


Figure 2-10 A mix ed 3D reference

6. Type the next operator and complete the formula.
   - The next cell can be on the same or another sheet.
7. Press **Enter** or any completion key.

Range Names and Formula AutoComplete

A ***range name*** is a label assigned to a single cell or a group of cells. You can use range names instead of cell references in a formula. Instead of **=B11*110%**, name cell B11 as "Revenue" to build the formula **=Revenue*110%**. Descriptive range names help you interpret a formula. In addition, named cell ranges appear in the *Formula AutoComplete* list for ease in building formulas. A named cell range is an absolute reference in a formula.

You create a range name using the *Name Box* or from the *Defined Names* group on the *Formulas* tab. The *Name Manager* command in this group enables you to create, edit, and delete range names. If you alter a range name, Excel automatically updates formulas that use that range name. The *Apply Names* command (*Define Name* button) enables you to assign a name to existing formulas that refer to the cells identified in the range name.

Follow these basic rules for naming a cell range:

- Begin a range name with a letter.
- Use a short, descriptive name.
- Do not use spaces or special characters in a range name.
- Separate words in a range name with an underscore as in "First_Qtr," or use initial caps for each word such as "FirstQtr."
- Do not name a range with a single character such as "N."
- Do not name a range with a cell reference such as "B2."

To use the name in a formula, type the first character of the name to display the *Formula AutoComplete* list. You may need to type a second character to better filter the list in a workbook that includes many range names. Select the range name in the list and press **Tab** or double-click the name to enter it in the formula. Range names are automatically substituted in formulas when you select the named cell range in the worksheet while building a formula.

HOW TO: Name a Range and Use Formula AutoComplete

1. Select the cell or range to be named.
2. Click the **Name Box** to the left of the *Formula* bar.
3. Type the name and press **Enter** (Figure 2-11).
4. Click the cell for the formula.
5. Type = to start the formula.
6. Type the first one or two letters of the range name.
   - The *Formula AutoComplete* list shows range and function names.
   - The list is alphabetical, and function names are uppercase.
7. Find the range name and double-click it (Figure 2-12).
   - The name displays in the formula.
   - You can also click the name in the list to highlight it and press **Tab**.
8. Complete the formula.
9. Press **Enter** when the formula is complete.

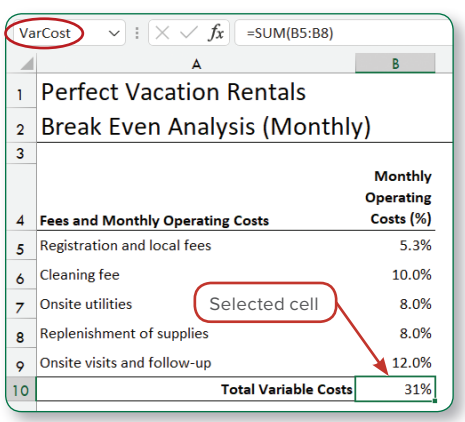


Figure 2-11 Name a range in the *Name* box

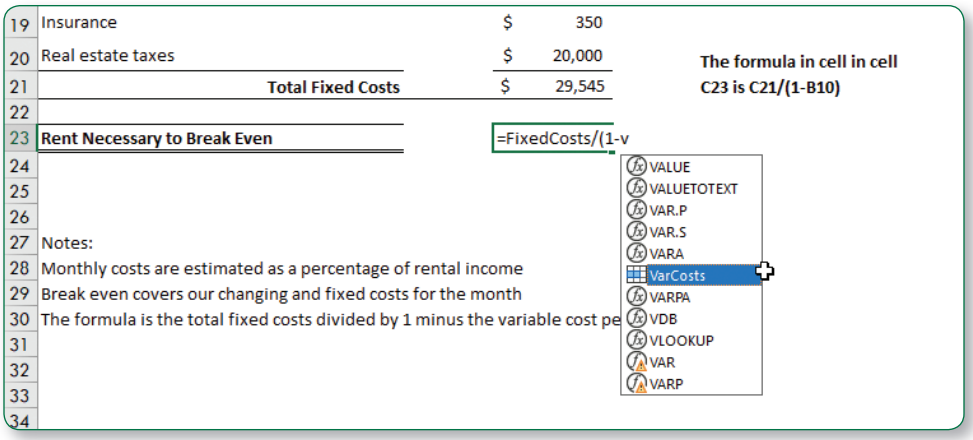


Figure 2-12 Use *Formula AutoComplete* with a range name

In addition to selecting cell ranges to name them, use row and column labels to create range names. The **Create from Selection** button on the *Formulas* tab automatically assigns range names based on labels in the top row, the left column, or both.

HOW TO: Create Names from a Selection

1. Select the range including row or column labels (or both).
   - Values and related labels must be adjacent.
2. Click the **Create from Selection** button [*Formulas* tab, *Defined Names* group].
   - The *Create Names from Selection* dialog box opens.
3. Select the **Top row** or **Left column** box (Figure 2-13).
   - Choose both options if appropriate for the data.
   - Other options include bottom row and right column.
4. Click **OK**.
5. Click the **Name Box** arrow in the *Formula* bar.
   - All range names are listed.

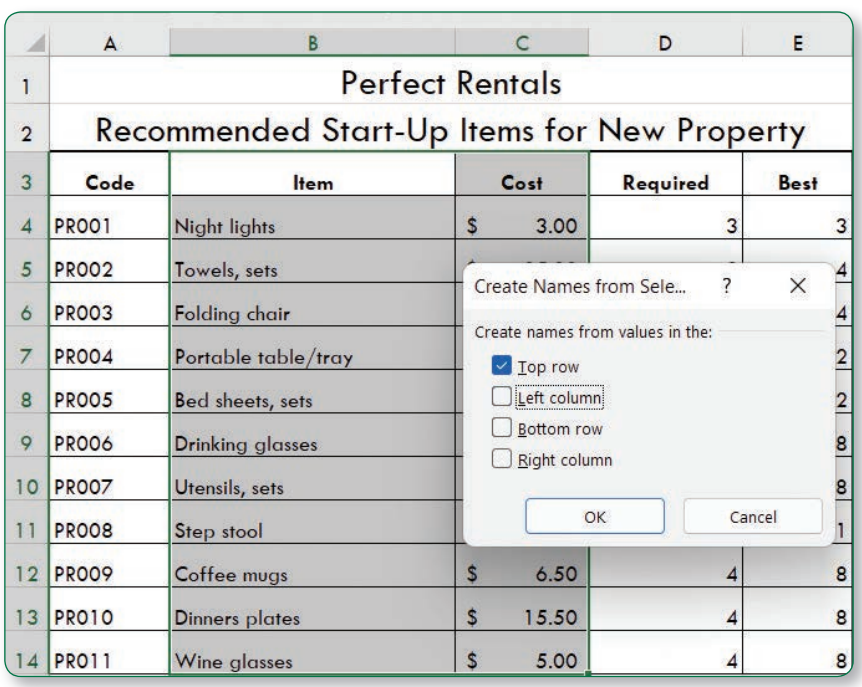


Figure 2-13 *Create Names from Selection* dialog box

The *Define Name* button [*Formulas* tab, *Defined Names* group] opens the *New Name* dialog box. Type the name, enter a comment, select the cells, and specify a ***scope***. The scope determines if the range applies to a particular sheet or to the entire workbook. By default, a range name applies to the workbook. If you use the name "JanSales" on Sheet1, you cannot use it again on Sheet2, unless you scope each name to a particular sheet. When you scope names to a worksheet, you can use a range name multiple times in the workbook.

HOW TO: Define and Scope a Range Name

1. Select the cell range to be named.
2. Click the **Define Name** button [*Formulas* tab, *Defined Names* group].
   - The *New Name* dialog box opens.
3. Type the range name in the *Name Box*.
4. Click the **Scope** drop-down list (Figure 2-14).
   - Choose the name of a worksheet as desired.
5. Select or edit the *Refers to* entry.
   - The selected cell range address displays.
   - If no cells are selected, type or select the range address.
6. Click **OK**.

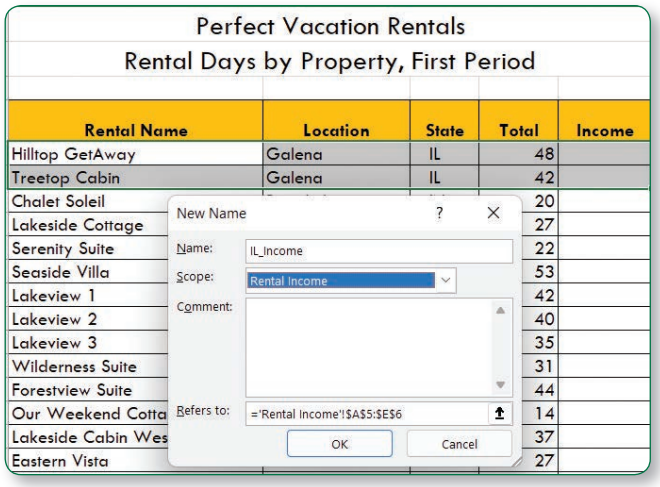


Figure 2-14 *New Name* dialog box and the *Scope* option

The *Use in Formula* button [*Formulas* tab, *Defined Names* group] displays a list of range names for insertion in a formula. You can also display the *Paste Name* dialog box to select a name. From the *Paste Name* dialog box, click the **Paste List** button to generate a list of current range names with cell references as documentation. Press the **F3** (**FN +F3**) function key to open the *Paste Name* dialog box.

HOW TO: Paste a Range Name in a Formula and Paste a List

1. Click the formula cell and type =.
2. Press **F3** (**FN +F3**) to open the *Paste Name* dialog box.
   - Range names appear in alphabetical order.
3. Find the range name and double-click it (Figure 2-15).

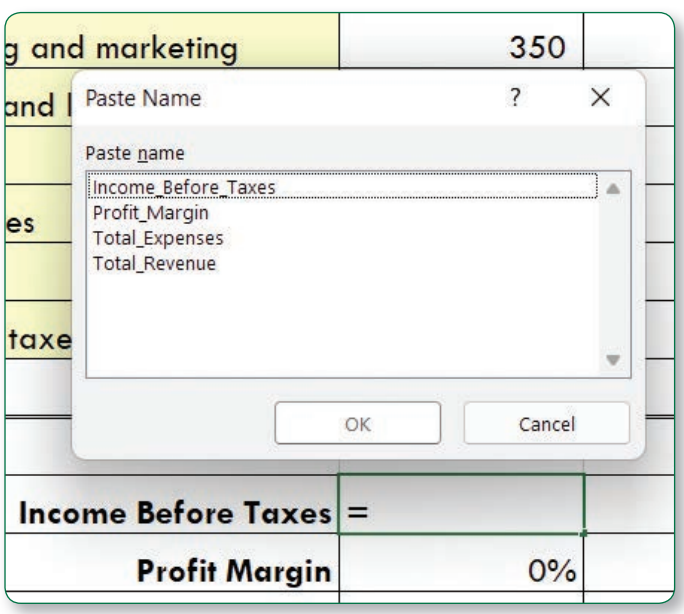


Figure 2-15 Choose a range name for the formula

- Select the range name and press **Enter** or click **OK**.
- The range name displays in the formula.
- The worksheet displays the highlighted range.
- Alternatively, click the **Use in Formula** button [*Formulas* tab, *Defined Names* group] and select the range name.

4. Complete the formula and press **Enter**.
5. Click a blank cell in an unused area of the worksheet.
   - You can paste names on another sheet.
6. Click the **Use in Formula** button [*Formulas* tab, *Defined Names* group].
7. Select **Paste Names** at the bottom of the list.
   - The *Paste Name* dialog box opens.
8. Click **Paste List**.
   - A list of range names and cell references is pasted in the sheet.
   - Edit and format the list of range names as needed.

Navigation Using Range Names

In large worksheets with thousands of rows and columns, using named ranges quickly moves the insertion point to where you want to work. You can use the *Name Box* and the *Go To* command to navigate to a particular range.

MORE INFO

Long range names only partially display in the *Name Box* list.

HOW TO: Navigate Using the Name Box

1. Click the arrow with the the **Name Box**.
   - Named ranges display in alphabetical order.
2. Click the range name (Figure 2-16).
   - The range is selected.
   - The range may be on another sheet (if range names have not been scoped).
3. Press **F5** (**FN+F5**) to open the *Go To* dialog box.
   - Range names are listed below recent cell references.
4. Select a range name and click **OK**.
   - The cell (s) are selected in the worksheet.
   - The *Go To* dialog box closes.

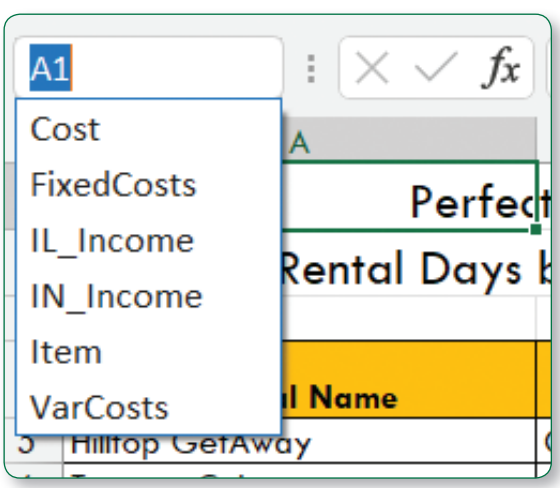


Figure 2-16 The *Name* box list displays range names

SLO 2.4

Using Formula Auditing Tools

Formula auditing is the process of reviewing formulas for accuracy. Excel automatically audits formulas as you enter them and when you open a workbook based on its own error checking rules [*File* tab, *Options*, *Formulas* pane]. Excel recognizes specific types of errors. For example, when you set a *SUM* range, adjacent cells not included in the argument are usually flagged as a potential error. On the other hand, if you type a multiplication formula that should be an addition formula, you must find that error on your own. You will also find that Excel occasionally identifies an error, but the formula is correct.

MORE INFO

Open the Excel *Options* dialog box to set whether automatic error checking is enabled and to select which rules are used.

When Excel finds an error in a formula, it displays a small green error triangle in the top-left corner of the cell. Click the cell to see the *Trace Error* button and point to the button to see a *ScreenTip* about the error. The *Trace Error* button has a drop-down list with options for dealing with the error.

HOW TO: Trace an Error

1. Click the cell with the triangle error.
   - The *Trace Error* button appears.
2. Point to the **Trace Error** button to display a *ScreenTip*.
3. Click the **Trace Error** drop-down list (Figure 2-17).
   - Options for handling the error display.
4. Choose an option for the error.
   - The options depend on the type of error.
   - Select **Ignore Error** if the formula is correct.

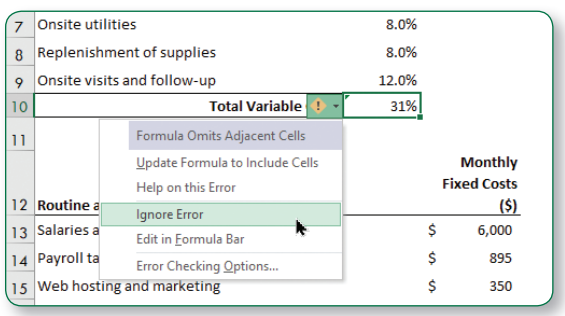


Figure 2-17 ***Trace Error*** **button and its drop-down list**

In addition to the green triangle error, Excel functions can result in a standard error message in the cell. For example, if you create a division formula that divides by a blank cell, the result is *#DIV/0!*, a division by zero error. Excel error messages occur for a syntax error, such as spelling a function name incorrectly, using an incorrect operator or symbol, having the wrong number of arguments, and so on. A standard error message starts with the number sign (**#**) and ends with an exclamation point (**!**).

MORE INFO

Use the *Go to Special* dialog box [*Find & Select* button, *Home* tab, *Editing* group] to highlight cells with formula errors, blank cells, and cells with precedents and dependents. This command helps identify potential problems in a workbook.

The Formula Auditing Group

The *Formula Auditing* group on the *Formulas* tab includes tools to check formulas for logic, consistency, and accuracy. These commands enable you to examine what contributes to a formula and to analyze identified or potential errors. The tools are helpful, but they do require that you correct the problem.

Table 2-5 lists all of the formula auditing buttons.

Table 2-5: Formula Auditing Buttons

Button	Description
Trace Precedents	Displays lines with arrows to identify all cells referenced in the formula in the active cell
Trace Dependents	Displays lines with arrows to all cells that use the active cell directly or indirectly in a formula
Remove Arrows	Removes all lines and arrows from the *Trace Precedents* or *Trace Dependents* buttons
Show Formulas	Displays formulas in the cells
Error Checking	Checks data against the error rules in Excel *Options*
Evaluate Formula	Steps through each part of a formula and displays an outcome for each part so that an error can be isolated
Watch Window	Opens a floating window that displays selected cells and values for monitoring

Trace Precedents and Dependents

A ***precedent*** is a cell that contributes to the formula results. Excel displays lines from the formula cell to each precedent cell for an easy way to audit your formula. A ***dependent*** is a cell that is affected by the active cell. Excel displays lines from the active cell to each cell that depends on the value in that cell. If a precedent or dependent cell is located on a different worksheet, a black line and arrow point to a small worksheet icon, but this does not identify the error cell address.

HOW TO: Use Formula Auditing Tools

1. Click the **Show Formulas** button [*Formulas* tab, *Formula Auditing* group].
   - Each formula displays in its cell.
   - Show or hide formulas by pressing **Ctrl+`** (the grave accent next to the 1 key at the top of the keyboard).
2. Select the formula cell.
   - Only a formula cell has a precedent.
3. Click the **Trace Precedents** button [*Formulas* tab, *Formula Auditing* group].
   - Lines and arrows identify cells that contribute to the formula results (Figure 2-18).
   - You can trace precedents and dependents with formulas shown or hidden.
4. Click a cell that may be referenced in a formula.
   - Trace dependents for cells with or without formulas.

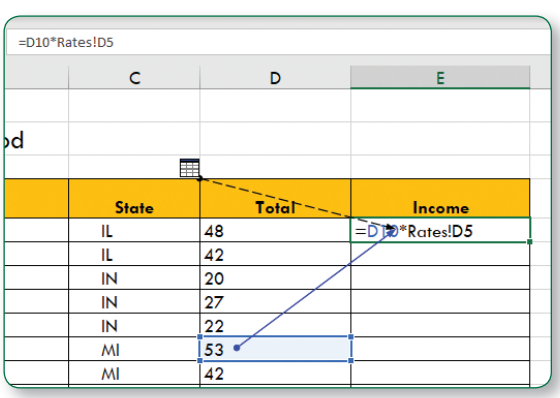


Figure 2-18 ***Trace Precedents*** **arrows show that the formula refers to cell D10 and a cell on another sheet**

5. Click the **Trace Dependents** button [*Formulas* tab, *Formula Auditing* group].
   - Lines and arrows trace to cells that are affected by the active cell.
   - Trace both precedents and dependents as needed.
6. Click the **Remove Arrows** button [*Formulas* tab, *Formula Auditing* group].
   - Clicking the button removes all arrows.
   - Click the **Remove Arrows** drop-down list to specify the type of arrow to remove.
7. Click the **Show Formulas** button [*Formulas* tab, *Formula Auditing* group].
   - Formulas are hidden.
   - Show or hide formulas by pressing **Ctrl+`**.

MORE INFO

In a complex worksheet with sophisticated formulas, click the **Trace Precedents** button [*Formulas* tab, *Formula Auditing* group] once to trace the first layer of precedents. Then click the button again to trace the precedents of the precedents.

The Formula Correction Message Window

Some errors are noted before you complete the entry. When you press **Enter**, Excel displays a message box with a suggested correction as shown in Figure 2-19. For this type of error, review the suggestion and select **Yes** if it is valid. If you click **No**, an alert box paraphrases the error. On occasion, Excel may find an error to which it cannot offer a suggested solution, and you need to solve the problem on your own.

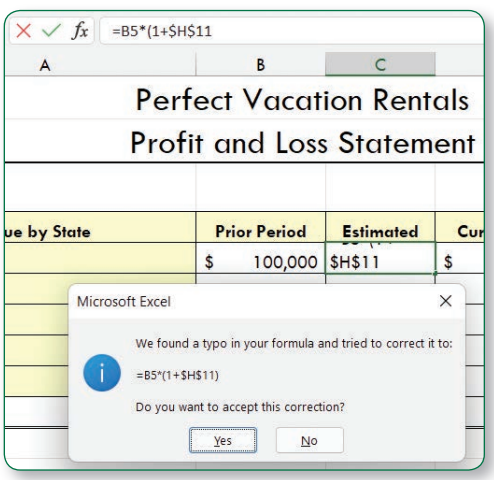


Figure 2-19 Formula correction message window for missing right parenthesis

Circular Reference

A ***circular reference*** error occurs when a formula includes the cell address of the formula. For example, if the formula in cell **B10** is **=B5+B10**, the reference is circular. When you try to complete such a formula, a message box opens as shown in Figure 2-20, but Excel does not correct the error or prevent you from keeping it in the worksheet with inaccurate results. The *Status* bar displays the location of circular references when they exist.

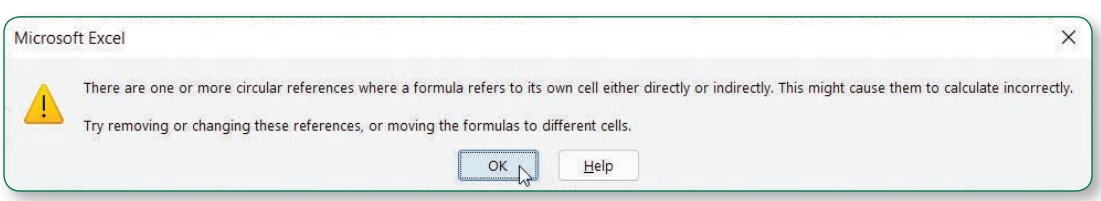


Figure 2-20 Message window when you try to complete a circular reference

MORE INFO

A workbook can be saved with a circular reference. When you open it, you will see the message box, and the error is noted in the *Status* bar.

PAUSE & PRACTICE: EXCEL 2-1

For this project, you build formulas in the Perfect Vacation Rentals workbook. You use relative, mixed, and absolute references, 3D references, and set order of precedence. You also name cell ranges and use auditing tools.

File Needed: ***PerfectRentals-02.xlsx*** *(Student data files are available in the* Library *of your SIMnet account.)*
Completed Project File Name: ***[your initials] PP E2-1.xlsx***

1. Open the ***PerfectRentals-02.xlsx*** workbook from your student data files. (If the workbook opens in *Protected View*, click **Enable Editing**.)
2. Save the workbook as [your initials] PP E2-1.
3. Enter addition formulas.
   a. Select the **Rental Days** sheet and click cell **D23**.
   b. Type = to start a formula.
   c. Click cell **D7** to insert the first value for Minnesota.
   d. Type + as the mathematical operator.
   e. Click cell **D15** to add the next value.
   f. Type + and click cell **D19**. The formula is **=D7+D15+D19** (Figure 2-21).
   g. Press **Enter** or click the **Enter** button in the *Formula* bar. The result is 89.
   h. Select cell **D24** and complete the addition formula for Wisconsin. The result is 114.
4. Create and copy a 3D formula with relative cell references.
   a. Select the **Rental Income** sheet and click cell **E5**.
   b. Type = to start the formula.
   c. Click cell **D5**, the number of rental days for the property.
   d. Type * to indicate multiplication.
   e. Click the **Rates** sheet tab. The sheet name is inserted in the *Formula* bar followed by an exclamation point.
   f. Click cell **D5**, the rental rate for the property; the cell address is added to the formula (Figure 2-22).
   g. Press **Enter**. The formula is complete and the focus returns to the **Rental Income** sheet. The result is 11760.
   h. Select cell **E5** and drag the **Fill pointer** to copy the formula to cells **E6:E19**. Because the property names are in the same order on both sheets, you can use relative references in the formula. (If you double-clicked the **Fill pointer** to copy the formula, click the **Undo** button [*Home* tab, *Undo* group] and try again.
   i. Select cells **E5:E19** and click the **Number Format** drop-down list [*Home* tab, *Number* group].
   j. Choose **Currency** and decrease the decimal twice. *AutoFit* the column as needed.
   k. Select cell **A1**.

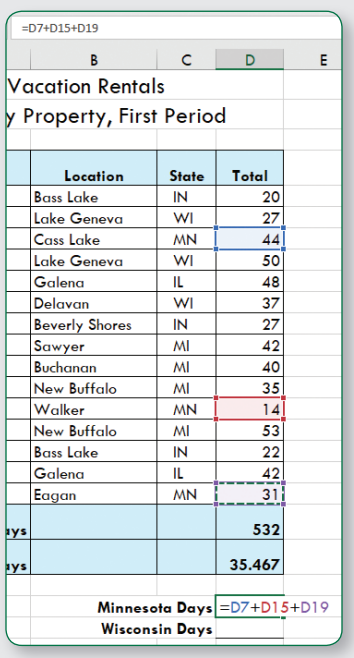


Figure 2-21 P oint and click to build a formula

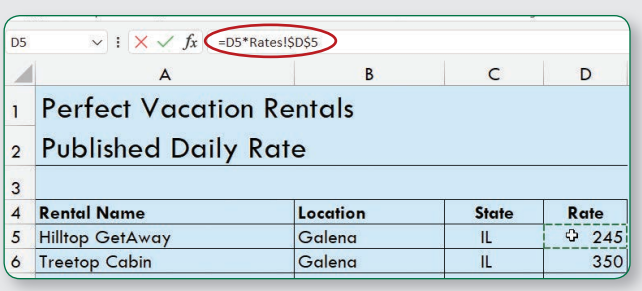


Figure 2-22 3D formula with relative references

5. Create and copy a 3D formula with the *SUM* function.
   a. Click the **P&L** sheet and select cell **B5**. You can now determine the total income by state.
   b. Type =sum and press **Tab**. The *SUM(* function is inserted with the first parenthesis.
   c. Select the **Rental Income** sheet, select cells **E5:E6**, and press **Enter**. The closing parenthesis is provided; the result for Illinois is $26,460.
   d. Select cell **B6**, type =sum, and press **Tab**.
   e. Select the **Rental Income** sheet, select cells **E7:E9** for Indiana, and press **Enter**. The result is $30,650.
   f. In cells **B7**, **B8**, and **B9**, build the formulas to show the income totals for Michigan, Minnesota, and Wisconsin. The total for cell B10 when the sums are entered is $166,990.

6. Create and copy a formula with an absolute reference.
   a. Select cell **B14** on the *P&L* sheet. Five expenses listed in cells B14:B18 are calculated as a percentage of total revenue. This is a multiplication formula.
   b. Type = and click cell **B10**.
   c. Press **F4** (**FN+F4**) to make the reference absolute ($B$10).
   d. Type * for multiplication.
   e. Click cell **H5** for the percentage and press **Enter** (Figure 2-23). The result is $8,767. The *Accounting Number Format* is copied from cell **B10**.
   f. Select cell **B14** and open the *Format Cells* dialog box.
   g. Click the **Number** tab and verify that *Accounting* is selected. Set the *Symbol* to **None**.
   h. Copy the formula in cell **B14** to cells **B15:B18**.

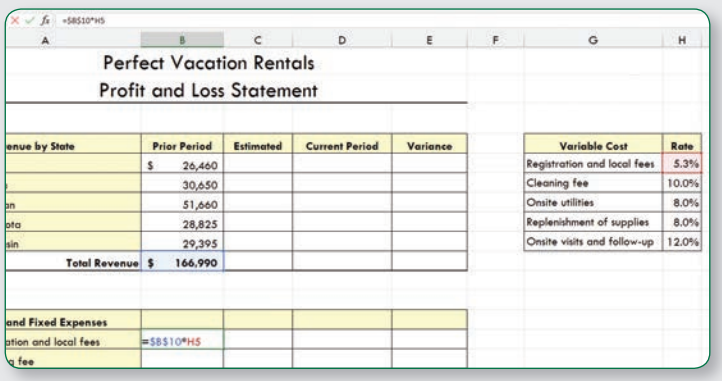


Figure 2-23 Absolute reference to the current total revenue

7. Name cell ranges.
   a. Select cells **A10:B10**.
   b. Press **Ctrl** and select cells **A27:B27**. You will use the labels in the left column as range names.
   c. Press **Ctrl** and add cells **A29:B30** to the selection. This selection will create four range names.
   d. Click the **Create From Selection** button [*Formulas* tab, *Defined Names* group].
   e. Choose **Left column** and click **OK** (Figure 2-24).
   f. Select cell **A4** and click the **Name Box** arrow to see the range names.
   g. Choose **Income_Before**. . . from the list. Cell **B29** is selected.

8. Use range names in a formula.
   a. Type =to to display and filter the *Formula AutoComplete* list.

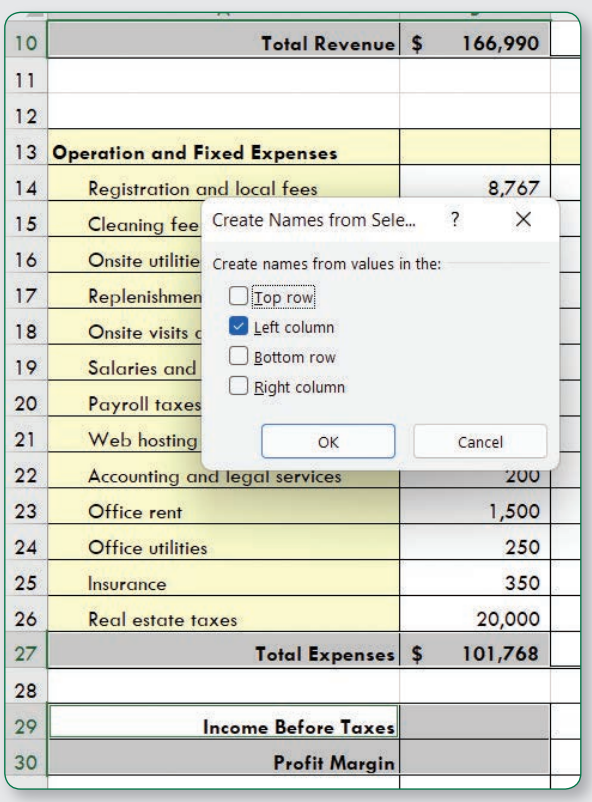


Figure 2-24 *Create From Selection* dialog box for multiple cell ranges

b. Double-click **Total_Revenue** in the list to insert the range name in the formula.
c. Type – (a hyphen) for subtraction. Income before taxes is total revenue minus total expenses.
d. Type to and double-click **Total_Expenses** to insert the range name (Figure 2-25).
e. Press **Enter**. The result is formatted as **General** which displays as many decimal places as will fit in the cell and no other symbols.
f. Select cell **B29** and apply the **Accounting Number Format** [*Home* tab, *Number* group]. Decrease the decimal twice.
g. Select cell **B30**.
h. Type =in to display and filter the *Formula AutoComplete* list. The list includes range and function names.
i. Double-click **Income_Before_Taxes** in the list.
j. Type / (a forward slash or diagonal) for division. Profit margin is income before taxes divided by total revenue.
k. Type to, double-click **Total_Revenue**, and press **Enter**. The result is formatted as a **General** value.
l. Select cell **B30** and apply the **Percent Style** [*Home* tab, *Number* group]. The result is rounded to 39%.

Income Before Taxes	=Total_Revenue-Total_Expenses		
Profit Margin			

Figure 2-25 Use range names to build a formula

9. Trace an error and use *Formula Auditing* tools.
a. Select the **Break Even** sheet tab.
b. Click cell **B10**. The cell displays an error triangle in the top-left corner.
c. Point to the **Trace Error** button for cell **B10** and view its *ScreenTip*.
d. Click the **Trace Error** button to display its context menu.
e. Click the **Trace Precedents** button [*Formulas* tab, *Formula Auditing* group]. The formula does not include cell **B9** (Figure 2-26).
f. Click the **Trace Error** button again to display its menu and select **Update Formula to Include Cells**. The correct result is 43% and the error triangle and trace arrows are removed.

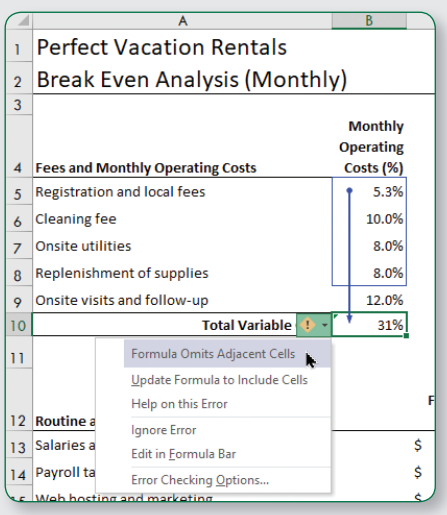


Figure 2-26 Error traces to the missing cell B9

10. Set mathematical order of operations.
a. Select cell **C23**. Break even rent (revenue) is determined by dividing fixed costs by 1 minus the percentage for variable costs. The formula is **=C21/(1-B10)**; the parentheses are necessary so that the subtraction is done before the division.
b. Type =, click cell **C21**, and type / for division.
c. Type ((left parenthesis), type 1– (1 minus).
d. Click cell **B10** and press **Enter**. The message box suggests that Excel supply the missing right parenthesis in your formula (Figure 2-27).
e. Click **Yes** in the message box. The result is $52,061.67.
f. Decrease the decimal twice for cell **C23**. The result is rounded up to the nearest whole dollar amount.
g. Click the **Show Formulas** [*Formulas* tab, *Formula Auditing* group] to see the formulas. This view does not display number formatting.

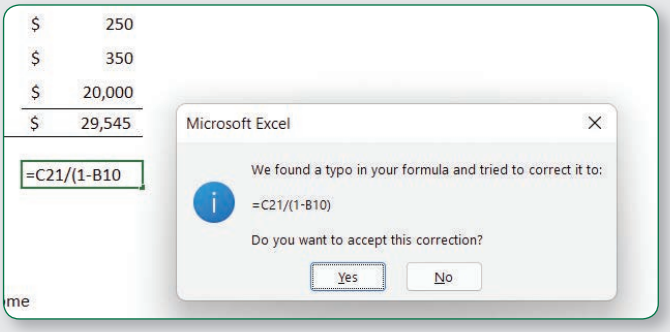


Figure 2-27 Set arithmetic order with a pair of parentheses

11. Press **Ctrl+Home**. Save and close the workbook (Figure 2-28).

	A	B	C
1	Perfect Vacation Rentals		
2	Break Even Analysis (Monthly)		
3			
4	Fees and Monthly Operating Costs	Monthly Operating Costs (%)	
5	Registration and local fees	0.0525	
6	Cleaning fee	0.1	
7	Onsite Utilities	0.08	
8	Replenishment of supplies	0.08	
9	Onsite visits and follow-up	0.12	
10	Total Variable Costs	=SUM(B5:B9)	
11			
12	Routine and Fixed Costs		Monthly Fixed Costs ($)
13	Salaries and wages		6000
14	Payroll taxes		895
15	Web hosting and marketing		350
16	Accounting and legal services		200
17	Office rent		1500
18	Office utilities		250
19	Insurance		350
20	Real estate taxes		20000
21	Total Fixed Costs		=SUM(C13:C20)
22			
23	Rent Necessary to Break Even		=C21/(1-B10)
24			
25			

Perfect Vacation Rentals
Rental Days by Property, First Period

Rental Name	Location	State	Total	Income
Hilltop GetAway	Galena	IL	48	$11,760
Treetop Cabin	Galena	IL	42	$14,700
Chalet Soleil	Bass Lake	IN	20	$7,500
Lakeside Cottage	Beverly Shores	IN	27	$12,150
Serenity Suite	Bass Lake	IN	22	$11,000
Seaside Villa	New Buffalo	MI	53	$12,985
Lakeview 1	Sawyer	MI	42	$11,550
Lakeview 2	Buchanan	MI	40	$7,000
Lakeview 3	New Buffalo	MI	35	$20,125
Wilderness Suite	Eagan	MN	31	$10,075
Forestview Suite	Cass Lake	MN	44	$15,180
Our Weekend Cottage	Walker	MN	14	$3,570
Lakeside Cabin West	Delavan	WI	37	$8,695
Eastern Vista	Lake Geneva	WI	27	$9,450
Garden Suite	Lake Geneva	WI	50	$11,250
Total Days			532	
Average Days			35.4667	

Perfect Vacation Rentals
Profit and Loss Statement

Rental Revenue by State	Prior Period	Estimated	Current Period	Variance
Illinois	$ 26,460			
Indiana	30,650			
Michigan	51,660			
Minnesota	28,825			
Wisconsin	29,395			
Total Revenue	$ 166,990			

Operation and Fixed Expenses				
Registration and local fees	8,767			
Cleaning fee	16,699			
Onsite utilities	13,359			
Replenishment of supplies	13,359			
Onsite visits and follow-up	20,039			
Salaries and wages	6,000			
Payroll taxes	895			
Web hosting and marketing	350			
Accounting and legal services	200			
Office rent	1,500			
Office utilities	250			
Insurance	350			
Real estate taxes	20,000			
Total Expenses	$ 101,768			

Income Before Taxes	$ 65,222			
Profit Margin	39%			

Perfect Vacation Rentals
Rental Days by Property, First Period

Rental Name	Location	State	Total
Chalet Soleil	Bass Lake	IN	20
Eastern Vista	Lake Geneva	WI	27
Forestview Suite	Cass Lake	MN	44
Garden Suite	Lake Geneva	WI	50
Hilltop GetAway	Galena	IL	48
Lakeside Cabin West	Delavan	WI	37
Lakeside Cottage	Beverly Shores	IN	27
Lakeview 1	Sawyer	MI	42
Lakeview 2	Buchanan	MI	40
Lakeview 3	New Buffalo	MI	35
Our Weekend Cottage	Walker	MN	14
Seaside Villa	New Buffalo	MI	53
Serenity Suite	Bass Lake	IN	22
Treetop Cabin	Galena	IL	42
Wilderness Suite	Eagan	MN	31
Total Days			532
Average Days			35.4667

Minnesota Days 89
Wisconsin Days 114

Number of Michigan Properties _____
Number of Illinois Properties _____

Figure 2-28 PP E2-1 completed

SLO 2.5

Working with Statistical and Date & Time Functions

Excel functions are arranged into categories on the *Formulas* command tab in the *Function Library* group. This group includes the *AutoSum* button and an *Insert Function* button which opens the *Insert Function* dialog box. From the *Insert Function* dialog box, you can search for a function by name, by category, or by a brief description of what you want to do. For example, type "rate of return" to list *Financial* functions that calculate a rate of return for an investment.

MORE INFO

A formula such as **=B2+B3−B6** is usually not called a function because it has no function name.

The Insert Function and the Function Arguments Dialog Boxes

You can insert a function from any category using the *Insert Function* dialog box. Display the dialog box by clicking the **Insert Function** button on the *Formulas* tab or the **Insert Function** button to the left edge of the *Formula* bar.

HOW TO: Choose a Function from the Insert Function Dialog Box

1. Click the cell for the function.
2. Click the **Insert Function** button on the left edge of the *Formula* bar.
   - The *Insert Function* dialog box opens (Figure 2-29).
   - The *Formula* bar icon is the same as the *Insert Function* button on the *Formulas* command tab.
3. Click the **Or select a category** drop-down list.
   - Function categories are listed.
4. Click to select a category.
   - Individual functions for the category are listed.
5. Choose the function name and click **OK**.
   - The function is inserted in the cell.
   - The *Functions Argument* dialog box opens.
6. Complete the function as needed.

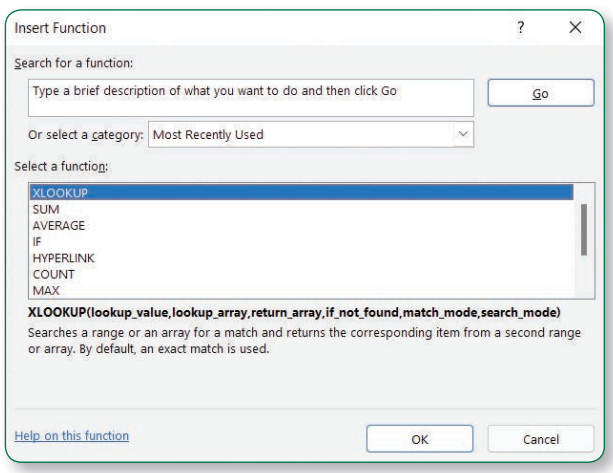


Figure 2-29 *Insert Function* dialog box

ANOTHER WAY

Shift+F3 opens the *Insert Function* dialog box.

The *Function Arguments* dialog box provides a way for you to learn proper syntax for any function. This dialog box opens when you choose a function name from a category on the *Formulas* tab or when you use the *Insert Function* dialog box. The *Function Arguments* dialog box shows each argument with an entry box and an explanation (Figure 2-30). You can select cells or type directly in the entry box.

ANOTHER WAY

Click a cell that already has a function and click the **Insert Function** button in the *Formula* bar to open the *Function Arguments* dialog box for editing.

In the *Function Arguments* dialog box and the *ScreenTip*, a required argument name is shown in bold. Optional function arguments generally add a level of refinement to the calculation. When you use *Formula AutoComplete* to build a function, the *ScreenTip* shows optional arguments in square brackets (for example, [type]).

HOW TO: Build a Function in the Function Arguments Dialog Box

1. Click the cell for the function.
2. Click the **Insert Function** button on the left edge of the *Formula* bar.
   - The *Insert Function* dialog box opens.
3. Choose the function name and click **OK**.
   - The *Function Arguments* dialog box opens for the selected function.
   - Move the dialog box as needed to see your data.
4. Click the first argument entry box.
   - Required argument names are bold.
   - Optional argument names are not bold.
5. Click a cell or drag to select a range.
   - The cell or range address displays in the entry box (Figure 2-30).
   - The dialog box collapses when you select cells.
6. Click the second argument entry box.
   - Some functions require more than one argument.
7. Click a cell or drag to select a range for the entry box.
8. Click **OK** when the arguments are complete.

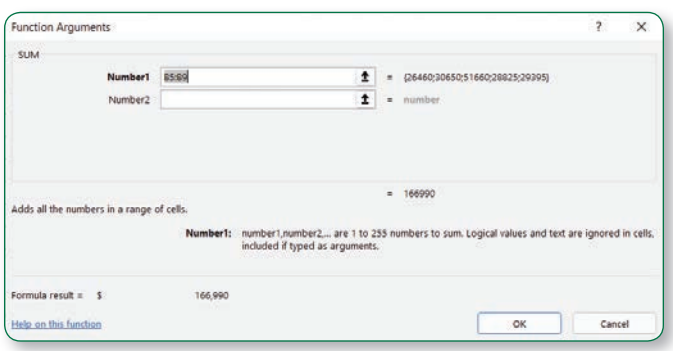


Figure 2-30 ***Function Arguments*** **dialog box for** ***SUM***

The MEDIAN and MODE Functions

The *Statistical* function category includes calculations that determine averages, counts, percentiles, and ranks. ***Central tendency*** measures the average, the middle, or the most common. You have already used the *AVERAGE* function to calculate the mean, a common measure of central tendency. The *MEDIAN* and the *MODE* functions determine two central tendency statistics for a range of values.

The MEDIAN function calculates the middle value in a range of cells. The *MEDIAN* function ignores labels and empty cells. When calculating the median, do not include total values in the range.

The *MEDIAN* function has one argument, *numberN*. A number argument can be a range such as D5:D19. You can look for the median among up to 255 numbers (or ranges). The proper syntax for a *MEDIAN* function is:

=MEDIAN(number1, [number2], [number3], . . .)

The *number1* argument is required which means you must have at least one value or cell range. Multiple arguments are separated by commas. When you use the *Function Arguments* dialog box to set multiple arguments, the commas are automatically supplied. Table 2-6 illustrates how multiple *number* arguments can be used in statistical functions.

Table 2-6: Number Argument in Statistical Functions

MEDIAN Functions	*NumberN* Arguments Used	Description
***MEDIAN*(D5:D19)**	Number1	One cell range
MEDIAN(D5:D19, E5:E19)	Number1, Number2	Two cell ranges
MEDIAN(D5:D19, E5, F12)	Number1, Number2, Number3	One range and two separate cells
MEDIAN(D5, D7, D9, D11)	Number1, Number2, Number3, Number 4	Four nonadjacent cells

HOW TO: Use the MEDIAN Function

1. Click the cell for the function.
2. Click the **More Functions** button [*Formulas* tab, *Function Library* group] and point to **Statistical**.
3. Scroll the list to find and click on **MEDIAN**.
   - The *Function Arguments* dialog box opens with an assumed *number1* argument range.
4. Select the cell range as needed (Figure 2-31).
   - You can type cell addresses rather than selecting cells.
   - When the selected cells have been named, the range name is substituted in the formula.
5. Press **Enter** or click **OK**.

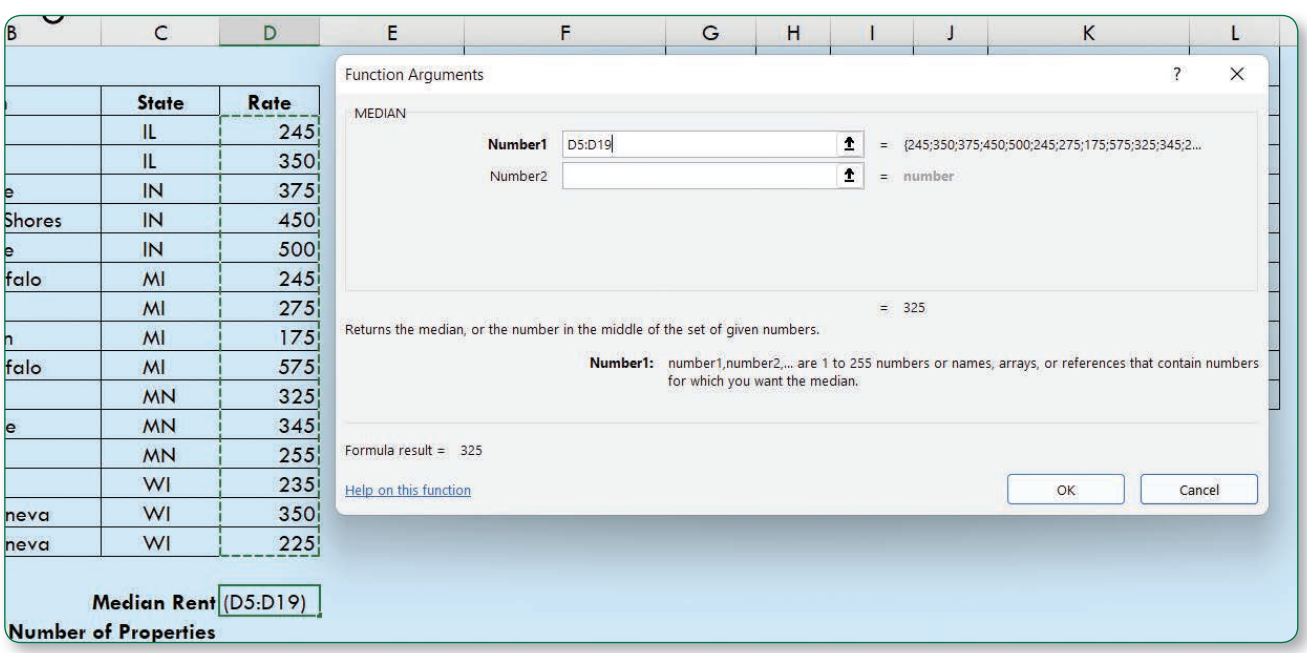


Figure 2-31 *MEDIAN* function and the *Function Arguments* dialog box

A *MODE* function calculates the one value that appears most often in a range, or you can choose to find the two or three most repeated values. The two *MODE* functions are *MODE.SNGL* and *MODE.MULT*. Both functions have one argument, *numberN*, but you can look for the most common value in up to 255 numbers (or ranges). The proper syntax for a *MODE* function is:

=MODE.SNGL(number1, [number2], [number3], . . .)
=MODE.MULT(number1, [number2], [number3], . . .)

HOW TO: Use the MODE.SNGL Function

1. Click the cell for the function.
2. Click the **Insert Function** button in the *Formula* bar.
   - The *Insert Function* dialog box opens.
3. Type mode in the *Search for a function* entry box.
4. Press **Enter**.
   - The dialog box lists function names that match the search string.
5. Select **MODE.SNGL** in the list and click **OK** (Figure 2-32).
   - The *Function Arguments* dialog box opens with an assumed *number1* argument range.
6. Select the cell range as needed.
   - You can type cell addresses rather than selecting cells.
   - When the selected cells have been named, the range name is substituted in the formula.
7. Press **Enter** or click **OK**.

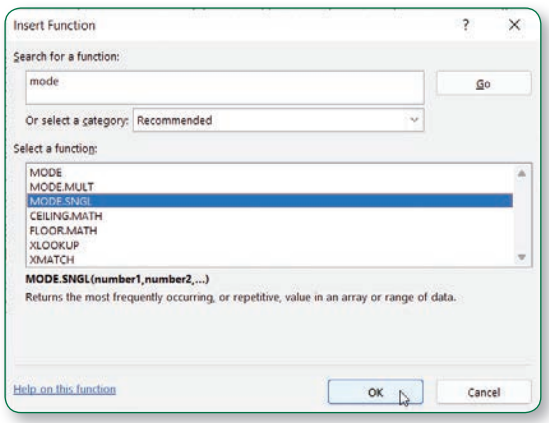


Figure 2-32 Search for a function in the *Insert Function* dialog box

Count Functions

Count functions tally the number of items in a range. Table 2-7 describes the *Statistical COUNT* functions.

MORE INFO

The *Database* function category includes *DCOUNT* and *DCOUNTA* functions. This category is available from the *Insert Function* dialog box.

Table 2-7: Count Functions

Count Functions	Description	Example Syntax
***COUNT* (Count Numbers)**	Counts the cells that contain values; ignores labels	=COUNT(A1:A15)
COUNTA	Counts the cells that contain any data type	=COUNTA(A1:A15)
COUNTBLANK	Counts empty cells	=COUNTBLANK(A1:A15)
COUNTIF	Counts the cells that meet the criteria argument	=COUNTIF(A1:A15, “Services”)
COUNTIFS	Counts the cells in one or more criteria ranges that meet respective criteria arguments	=COUNTIFS(B2:B5,“=A”,C2:C5,“=21”)

The *COUNT* function is an option on the *AutoSum* button, and it appears in the list as *Count Numbers*. This *COUNT* function includes only cells with values in its result. The *COUNT* function has one argument, *valueN*, and can include up to 255 cells or ranges. The proper syntax for a *COUNT* function is:

=COUNT(value1, [value2], [value3], . . .)

The *Value1* argument is required.

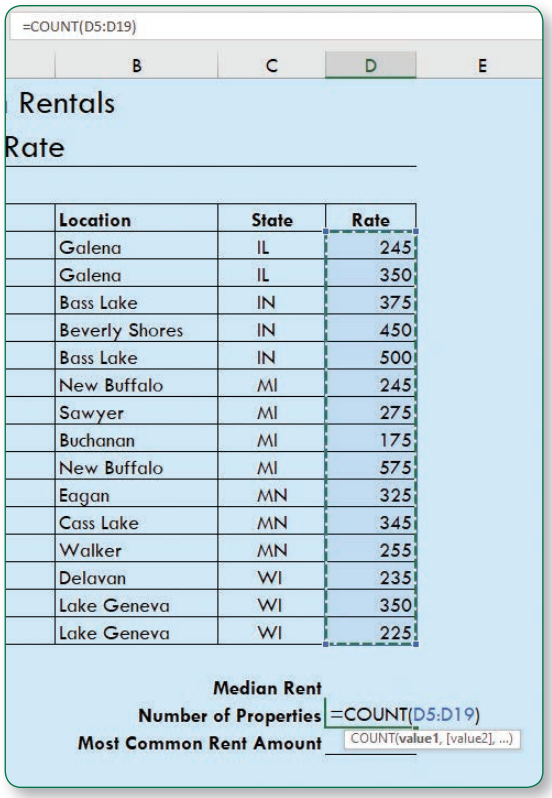


Figure 2-33 The *COUNT* function counts the number of cells in the range

HOW TO: Use the COUNT Function

1. Click the cell for the function.
2. Click the **arrow** beside the *AutoSum* button [*Formulas* tab, *Function Library* group].
3. Select **Count Numbers**.
   - The *COUNT* function is inserted with an assumed range.
   - The function appears in the cell and in the *Formula* bar (Figure 2-33).
4. Select the cell range.
   - Type cell addresses rather than selecting cells.
5. Press **Enter** or any completion key.

MORE INFO

If you use *COUNT* with a range of labels, the result is zero (0).

COUNTA and COUNTBLANK Functions

From the *Statistical* group, choose *COUNTA* to count cells with any type of data. It counts nonblank cells. COUNTA has one argument, *ValueN*, similar to the *NumberN* argument. You can count cells across up to 255 cells or ranges. Here is the proper syntax for the *COUNTA* function:

=COUNTA(value1, [value2], [value3], . . .)

The *COUNTBLANK* function counts cells that are empty in a single range of adjacent cells. Cells with values, labels, dates, or formulas are not counted. In many rows of data, you might use COUNTBLANK to determine how many cells are missing data. Here is the proper syntax for the *COUNTBLANK* function:

=COUNTBLANK(range)

HOW TO: Use the COUNTA and COUNTBLANK Functions

1. Click the cell for the function.
2. Click the **More Functions** button [*Formulas* tab, *Function Library* group] and point to **Statistical**.
3. Scroll the list and click **COUNTA**.
   - The *COUNTA Function Arguments* dialog box opens.

4. Verify or click the **Value1** entry box.
5. Click the first cell to be evaluated.
   - Select the first range as needed.
6. Click the **Value2** entry box.
   - Select or type each cell address or range to be counted.
7. Click **OK** when the *ValueN* arguments are complete (Figure 2-34).

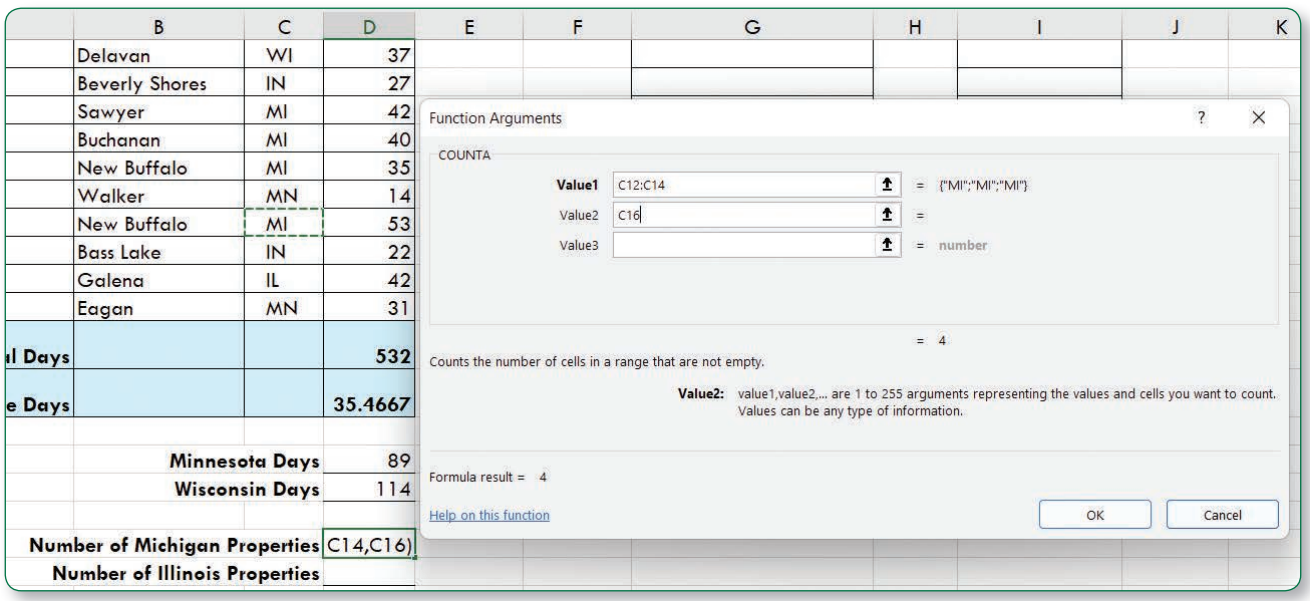


Figure 2-34 Use *COUNTA* to count the number of Michigan properties

8. Click the cell for the function.
9. Type =cou to display the *Formula AutoComplete* list.
10. Double-click **COUNTBLANK** in the list to insert the function.
    - You can also click the function name once and press **Tab** to insert it.
11. Select the cells for *range* argument (Figure 2-35).
12. Press **Enter**.
    - The closing right parenthesis is automatically supplied.

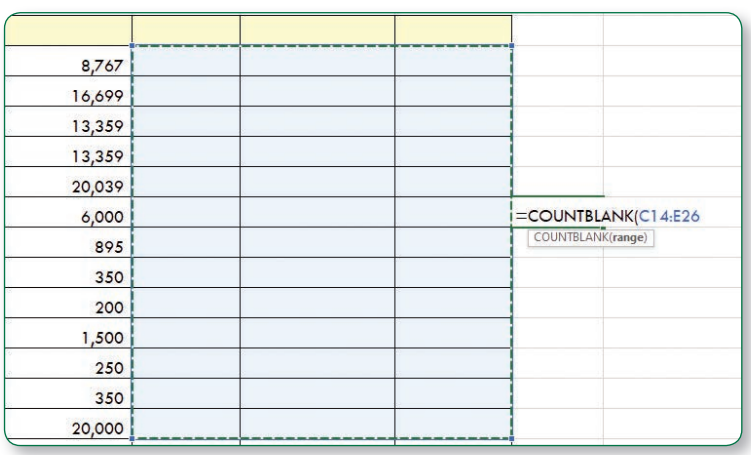


Figure 2-35 *COUNTBLANK* has one argument, the cell range.

AutoCalculate and Calculation Options

AutoCalculate enables you to see certain statistical results for selected cells. The *AutoCalculate* area is located on the right side of the *Status* bar. The calculations available for automatic display are *Average*, *Count*, *Numerical Count*, *Maximum*, *Minimum*, and *Sum*. Review or change what you see for your data by right-clicking the *Status* bar to open the *Customize Status Bar* menu.

Automatic calculation means that formulas are computed and recalculated after each entry or edit. For extremely large worksheets with millions of calculations, you might see lags in

speed as the whole sheet is recalculated for every change you make. You can set manual calculation to delay recalculation until your work is complete. The *Calculation* group on the *Formulas* tab includes command buttons that enable you to fine-tune automatic calculation as needed (Figure 2-36).

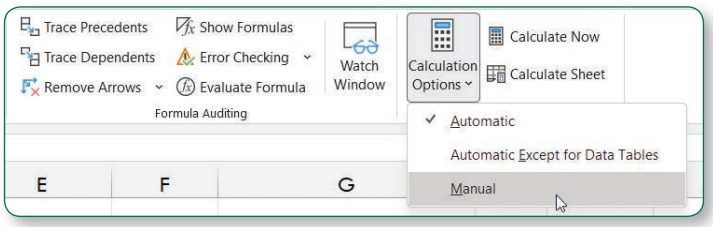


Figure 2-36 The *Calculate* group on the *Formulas* command tab

HOW TO: View AutoCalculate Results

1. Select the cell range or individual cells in the worksheet.
2. View the results on the *Status* bar.
   - Selected calculation results appear on the *Status* bar when appropriate; no *SUM* displays when you select labels.
3. Right-click the right side of the *Status* bar (Figure 2-37).
   - The *Customize Status Bar* menu opens.
   - If a function name has a check mark to its left, it is active.
4. Select a calculation name to activate it and show it on the *Status* bar.
5. Select a calculation name with a check mark to hide it from the *Status* bar.

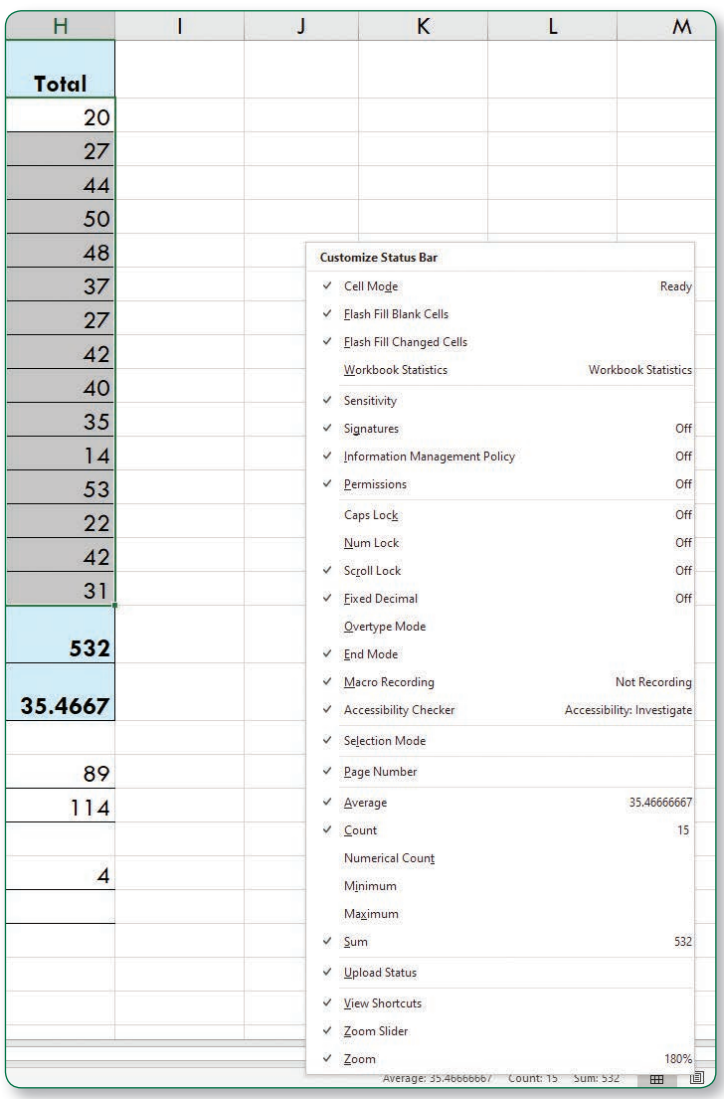


Figure 2-37 *AutoCalculate* results and *Customize Status Bar* options

TODAY and NOW Functions

The *Date & Time* function category includes calculations for date and time arithmetic, for converting dates and times to values, and for controlling how dates and times display.

Excel treats a date as a ***serial number***, a unique value assigned to each date. Excel starts by setting January 1, 1900, as number 1; January 2, 1900 is number 2, and so

on. January 1, 2022, is number 44562. You can determine the serial number for a date by applying the *General* format.

The *TODAY* function inserts the current date in the cell and updates each time the workbook opens. It uses the computer's clock, and the syntax is =TODAY(). The parentheses are necessary, but no arguments are required. The *NOW* function uses the syntax =NOW() and has no arguments. These two functions are ***volatile*** which means that the result depends on the current date, time, and computer.

You can format the results of either of these functions to display both the date and the time. The *Format Cells* dialog box has a *Date* category and a *Time* category with many preset styles. In addition, two date formats are available from the *Number Format* drop-down list [*Home* tab, *Number* group]; they are *Short Date* and *Long Date*.

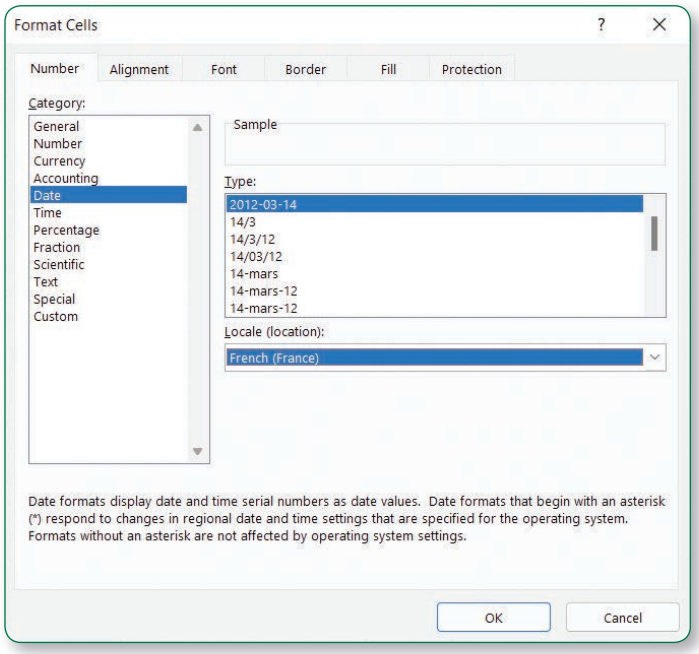


Figure 2-38 Set the *Locale* to control how dates display for selected formats

The *Number* tab in the *Format Cells* dialog box includes a *Locale* setting for selecting the location used for date and time formats. If you work in or with European clients, for example, you can choose a format that displays dates in the year/month/day format (Figure 2-38).

MORE INFO

Display the Excel *Options* dialog box [*File* tab] and select the *Advanced* pane to set a 1904 date system which matches the date system in the Macintosh operating system.

Select **TODAY** or **NOW** from the *Date & Time* function category. Because they are widely used and have no arguments, you may prefer to type either with the help of *Formula AutoComplete*.

HOW TO: Insert TODAY with Formula AutoComplete

1. Click the cell.
2. Type =to to display a filtered *Formula AutoComplete* list (Figure 2-39).
   - The list appears as soon as you type a character.
   - Function names display in uppercase characters before range names.
3. Point to and double-click the **TODAY** function name.
   - Alternatively, point and click to select the function name and then press **Tab**.
   - The name and parentheses are inserted.

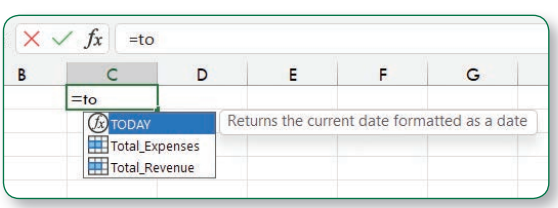


Figure 2-39 *Formula AutoComplete* list displays function and range names

- If you accidentally press **Enter** to select a name and see an error in the cell, delete the cell contents and try again.

4. Press **Enter** to complete the function.
   - The current date displays in the cell.
   - The *Short Date* default format is applied (mm/dd/yyyy) in the United States.
5. Select the cell with the *TODAY()* function.
   - The function name appears in the *Formula* bar.
   - Excel supplies the closing parenthesis for the function.
   - The *TODAY* function has no arguments.

SLO 2.6

Using Financial, Logical, and Lookup Functions

The *Financial* category includes functions that determine loan payments, the amount of interest earned, the rate of return on an investment, and more. An *IF* function from the *Logical* category can test if profit margin is above or below a specified rate and display "Yes" or "No" in the cell. The *Lookup & Reference* category is used to find and display information from a list in the workbook. For example, you might use a *Lookup* function to insert a price from a price list.

PMT Function

The *PMT* function in the *Financial* category calculates a constant payment amount for a period of time at a stated interest rate. When you borrow money for tuition or to buy a car, use the *PMT* function to determine your monthly payment for a selected payback time.

The *PMT* function has five arguments. Three of them are required: *rate*, *nper*, and *pv*. The other arguments are optional: *fv* and *type*. The proper syntax for a *PMT* formula is:

=PMT(rate, nper, pv, [fv], [type])

- ***Rate*** is the interest rate, a percentage of the amount borrowed. Most rates are set at a yearly rate. To determine monthly payments, you must divide the rate by 12.
- ***Nper*** is the total number of periods for repayment. If you make monthly payments for five years, the *nper* argument is 60.
- ***Pv*** is the present value, the amount borrowed.
- ***Fv*** is any future value after the last payment, an amount still owed at the end of the loan. When the *fv* argument is omitted, it means zero or that you have paid back the entire amount.
- ***Type*** indicates if payments are made at the beginning or the end of the period. Loan payments at the beginning of the period calculate to lower interest amounts. The number *1* sets the *type* argument at the beginning of the period.

Figure 2-40 shows a *PMT* function in cell B7 **=PMT(B6/12,B5*12,B4,,1)**. In the *Formula* bar, arguments are separated by commas. This formula omits the *fv* argument indicated by two commas with nothing between them in the *Formula* bar.

B6/12 is the interest *rate* divided by 12 to determine a monthly payment.
B5*12 is the *nper* argument, the number of years times 12, to determine the total number of payments.
B4 is the *pv* argument, the amount of money borrowed.
1 is the *type* argument and indicates that payment occurs at the beginning of the period.

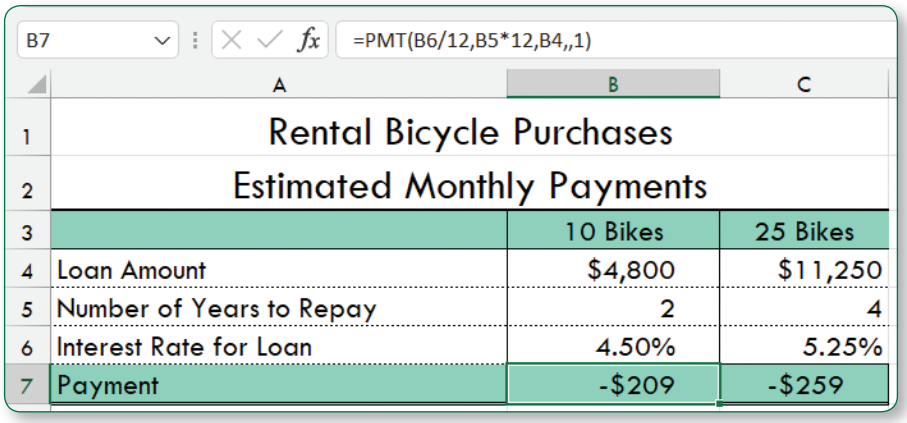


Figure 2-40 *PMT* function is in cell B7

MORE INFO

To show the payment as a positive value, type a minus sign (−) before the loan amount in the worksheet or before its cell address in the *Function Arguments* dialog box.

The *PMT* result is a negative number, because the function is calculated from the borrower's point of view. It is money paid out.

HOW TO: Use the PMT Function

1. Click the cell where function results should display.
2. Click the **Insert Function** button at the left of the *Formula* bar.
   - The *Insert Function* dialog box opens.
3. Type payment in the *Search for a function* box and click **Go**.
   - A list of functions that include types of payment displays.
4. Select **PMT** and click **OK**.
   - The *Function Arguments* dialog box opens.
   - The dialog box includes a description of the function.
5. Click the **Rate** box and click the cell with the interest rate.
   - You can type the rate in the entry box with the percent sign if it is not displayed in the worksheet.
   - An explanation of the argument displays.
6. Type /12 immediately after the address in the *Rate* box.
   - Divide by 12 for monthly payments.
   - If payments are quarterly, divide by 4.
7. Click the **Nper** box and click the cell that contains the loan term.
8. Type *12 immediately after the address in the *Nper* box.
   - If the loan term is years and payments are quarterly, multiply by 4.
   - If the cell already displays the total number of payments, just click to enter the address.
9. Click the **Pv** box and click the cell that contains the amount of the loan.

10. Click the **Type** box.
    - The *Fv* argument is usually omitted, because most loans require a zero balance at the end.
11. Type 1 in the *Type* box to set a payment at the beginning of the period (Figure 2-41).
    - Most loan payments are at the beginning, because the payment is less than if it were at the end of the period.

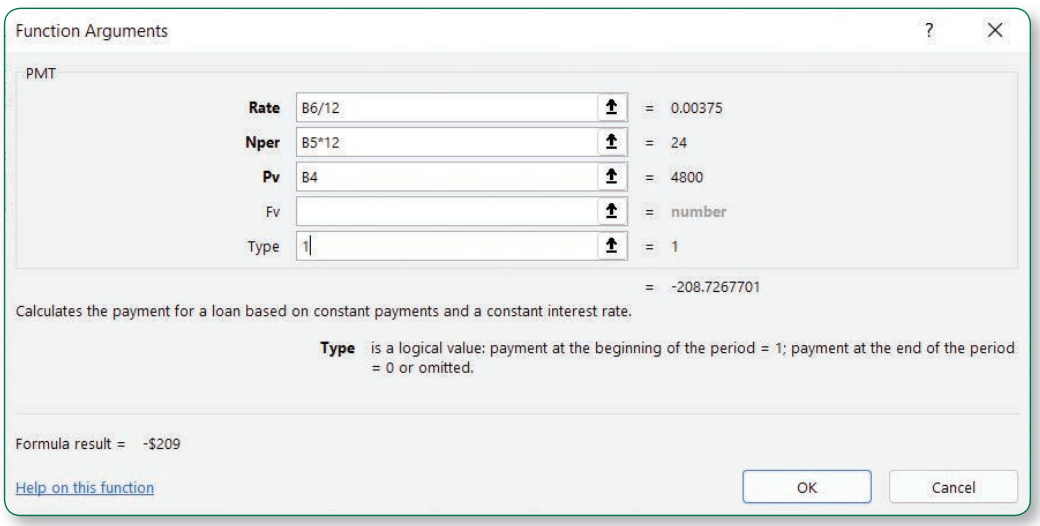


Figure 2-41 ***Function Arguments*** **dialog box for** ***PMT***

12. Click **OK**.

> **ANOTHER WAY**
>
> Choose the **PMT** function from the *Financial* button [*Formulas* tab, *Function Library* group].

IF Function

Most of the functions in the *Logical* category display TRUE or FALSE as the result. The *IF* function, however, returns custom results. The *IF* function tests a condition or statement; if it is true, a specified result displays; if it is false, an alternative result displays.

> **MORE INFO**
>
> An *IF* function is like an *IF* statement in many programming languages.

An *IF* function has three arguments, and its syntax is:
=IF (logical_test, value_if_true, value_if_false)

- The ***logical_test*** is the value or statement to be evaluated.
- The ***value_if_true*** is the result displayed in the cell when the *logical_test* is true. You can select a cell, enter text, or use a formula for this argument.
- The ***value_if_false*** is the result displayed in the cell when the *logical_test* is false. You can select a cell, enter text, or use a formula for this argument.

An *IF* function can use comparison or logical operators in its arguments. Table 2-8 describes the comparison operators.

Table 2-8: Comparison Operators

Operator	Description
=	Equal to
<>	Not equal to
>	Greater than
>=	Greater than or equal to
<	Less than
<=	Less than or equal to

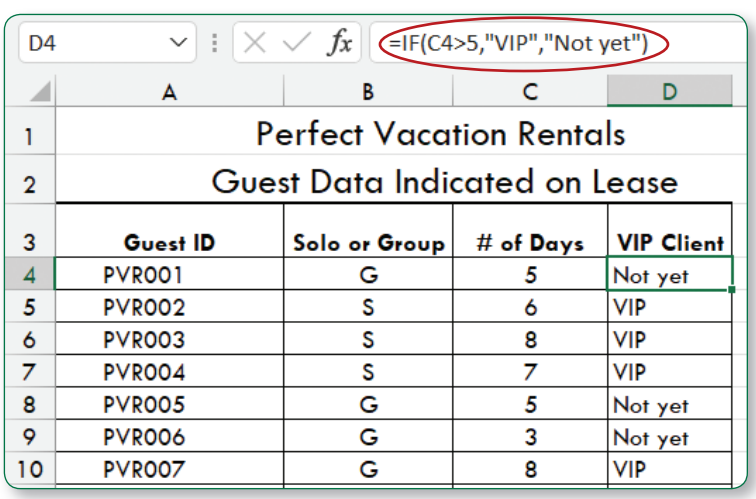
Figure 2-42 has an *IF* function in cell D4 **=IF(C4>=5,"Yes","Not Yet")**. When you use the *Function Arguments* dialog box, the commas to separate arguments and quotation marks to mark text to be displayed are handled automatically.

C4>=5 is the *logical_test*. It determines if the value in cell C4 is equal to or greater than 5. Cell **C4** is a relative reference so when the formula is copied, it will update to show the new row. The value **5** is a constant. It does not change when the formula is copied.

The *value_if_true* argument is **Yes**. If the number of days is 5 or more, the client is a VIP. The word "Yes" is enclosed in double quotation marks which marks it as a ***literal***. A literal is a value or label that should display exactly as shown between the quotation marks.

The *value_if_false* argument is **Not Yet**, another text literal. If the client has rented fewer than 5 days, he or she is not considered VIP. Literals are constant and do not change when the formula is copied.

Insert the *IF* function from the *Logical* category on the *Formulas* tab, from the *Insert Function* button, or by typing it. When you type an *IF* function, you must type the commas to separate arguments, and you must enclose literals within double quotation marks.



	A	B	C	D
1	Perfect Vacation Rentals			
2	Guest Data Indicated on Lease			
3	Guest ID	Solo or Group	# of Days	VIP Client
4	PVR001	G	5	Not yet
5	PVR002	S	6	VIP
6	PVR003	S	8	VIP
7	PVR004	S	7	VIP
8	PVR005	G	5	Not yet
9	PVR006	G	3	Not yet
10	PVR007	G	8	VIP

Figure 2-42 *IF* function in cell D4

HOW TO: Build an IF Function

1. Click the cell for the function.
2. Click the **Logical** button [*Formulas* tab, *Function Library* group].
   - The list of *Logical* functions opens.

3. Select **IF** in the list.
   - The *Function Arguments* dialog box for *IF* opens.
4. Click the **Logical_test** box.
5. Click the cell that will be evaluated.
   - If the cell has been named, the range name displays in the entry box.
   - Make the reference absolute if the formula will be copied and the reference should not change.
6. Type a comparison operator immediately after the cell address.
7. Type a value or click a cell to complete the expression to be tested.
   - You can build a statement such as B11 =K15 or B11<10000.
   - Make a cell reference absolute or mixed if necessary.
8. Click the **Value_if_true** box.
9. Type the label or click a cell that contains data that should display if the *logical_test* is true.
   - Type a value if appropriate as the *value_if_true*.
   - Type a label without quotation marks; they are inserted when you click the next argument entry box.
10. Click the **Value_if_false** box.
    - Quotation marks display for the *value_if_true* argument if it is text.
11. Type the label or click a cell that contains data that should display if the *logical_test* is false (Figure 2-43).
    - Results for the cell display in the *Function Arguments* dialog box.

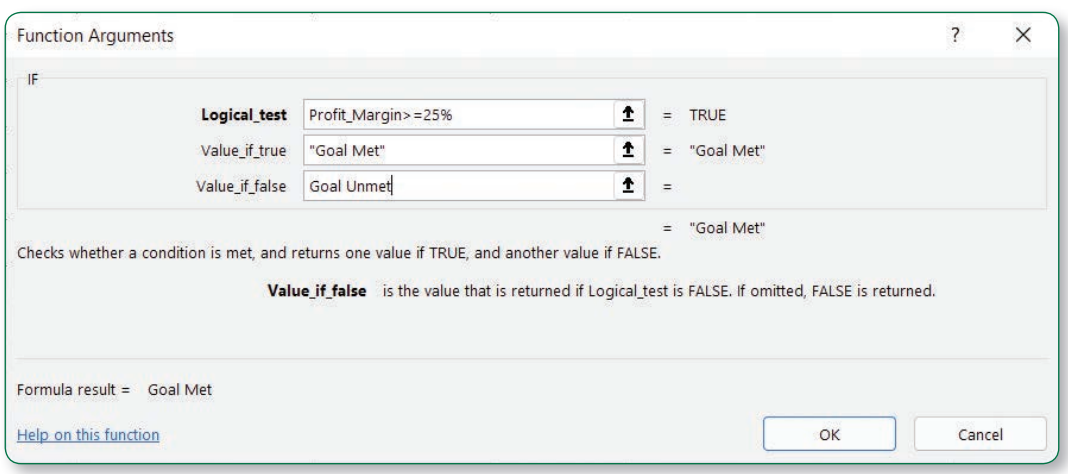


Figure 2-43 ***Function Arguments*** **dialog box for** ***IF***

12. Click **OK**.

MORE INFO

The *value_if_false* argument for the *logical_test* can be another *IF* function which tests for more than one possibility.

LOOKUP Functions

A *LOOKUP* function displays a piece of data from an existing list in the workbook. The *Cost* column data on the left in Figure 2-44 is missing the values; the costs are listed in alphabetical order by item name on a different sheet. The *XLOOKUP* function in cell C4 finds the corresponding cost and displays it.

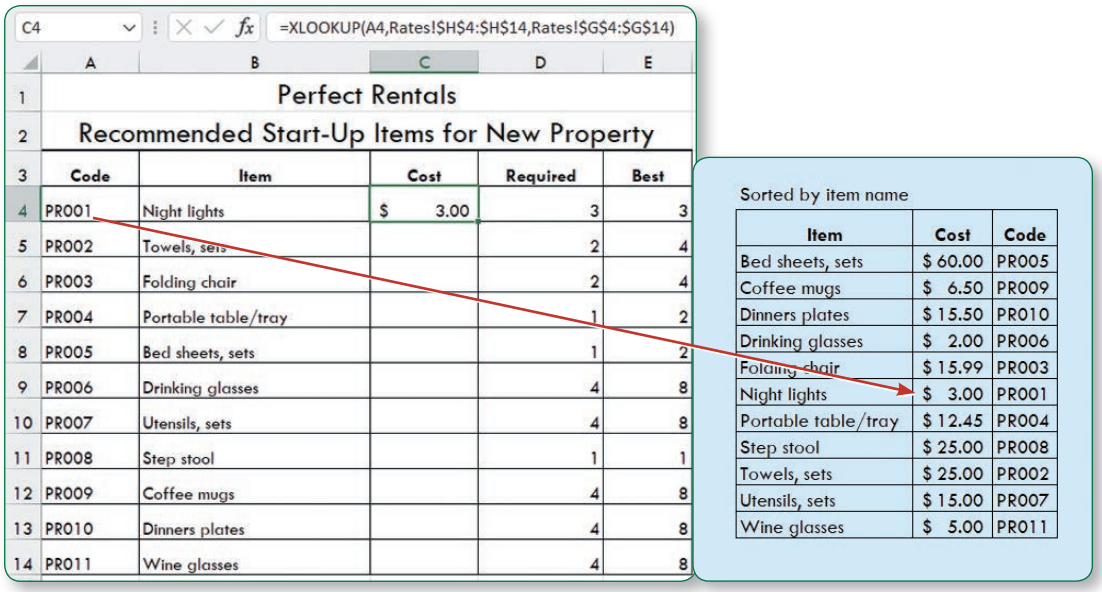


Figure 2-44 ***XLOOKUP*** **function in cell C4 on the left displays the cost from the list on the right**

Excel functions use the term ***array***, which is a collection of values. An array in a worksheet is typically a cell range. An *XLOOKUP* function has three required and three optional arguments. The syntax is:

=XLOOKUP (lookup_value, lookup_array, return_array, [if_not_found], [match_mode], [search_mode])

- The ***lookup_value*** is the data to be found or matched. It is usually a cell address, but you can type a value or a text string. The function locates this *lookup_value* in the *lookup_array*.
- The ***lookup_array*** is the range of cells to be searched. The range can be located on a different worksheet or in a different workbook. It is good practice to name the range so that its reference is absolute.
- The ***return_array*** is the range in which the result is matched. This range contains the data to display in the result.
- The ***[if_not_found]*** argument results when no match is found in the *lookup_array* for the *lookup_value*. The standard default message is *#N/A* but you can type a custom response such as "No such number."
- ***[Match_mode]*** determines if the function looks for an exact match or an approximate match. The default is an exact match.
- ***[Search_mode]*** is an option to specify if the search is first to last or last to first.

Table 2-9 lists the Match_mode and Search_mode arguments.

Table 2-9: Match_Mode and Search_Mode Arguments

Argument	How Search and Results
Match_Mode	
0	Exact match. If not found, display #N/A. This is the default.
–1	Exact match. If not found, display the next smaller result.
1	Exact match. If not found, display the next larger result.
2	Wildcard match using *, ?, ~

Argument	How Search and Results
Search_Mode	
1	Start searching at first item. This is the default.
–1	Start searching at last item.
2	Binary search that requires *look_up array* to be sorted in ascending order
–2	Binary search that requires *look_up array* to be sorted in descending order

MORE INFO

A binary search uses an algorithm to speed the process. Research this feature if you work with extremely large lists.

In Figure 2-44, the function in cell C4 needs only the three required arguments.
=XLOOKUP(A4,Rates!$H$4:$H$14,Rates!$G$4:$G$14)

- The l*ookup_value* argument is cell **A4**, the code PR001.
- The *lookup_array* argument is on the **Rates** sheet, cells **$H$4:$H$14**. The cell references are absolute so that the formula can be copied.
- The *return_array* argument is also on the **Rates** sheet in cells **$G$4:$G$14**.

XLOOKUP is the latest addition to the *LOOKUP* family of functions and is available in current subscription versions of Excel. Insert the *XLOOKUP* function from the *Lookup & Reference* category on the *Formulas* tab or by searching for it in the *Insert Function* dialog box. When you are experienced using the function, type it in the cell and use *Formula AutoComplete*.

HOW TO: Use the XLOOKUP Function

1. Click the cell for the function.
2. Click the **Lookup & Reference** button [*Formulas* tab, *Function Library* group] and select **XLOOKUP**.
   - The *Function Arguments* dialog box opens.
3. Click the **Lookup_value** box.
4. Click the cell to be matched or located.
   - The *lookup_value* is typically a cell in the same row as the function.
   - This reference is relative if the function will be copied.
5. Click the **Lookup_array** box.
6. Select the cell range with the lookup data.
   - When the lookup range is named, the name is substituted.
   - The *Function Arguments* dialog box collapses while you select cells.
   - The *lookup_array* can be located on another sheet.
7. Press **F4** (**FN+F4**) to make the reference absolute if cell addresses are used.
   - When a range name has been substituted, it is absolute.
8. Click the **Return_array** box.
9. Select the cell range that contains the data to be displayed (Figure 2-45).

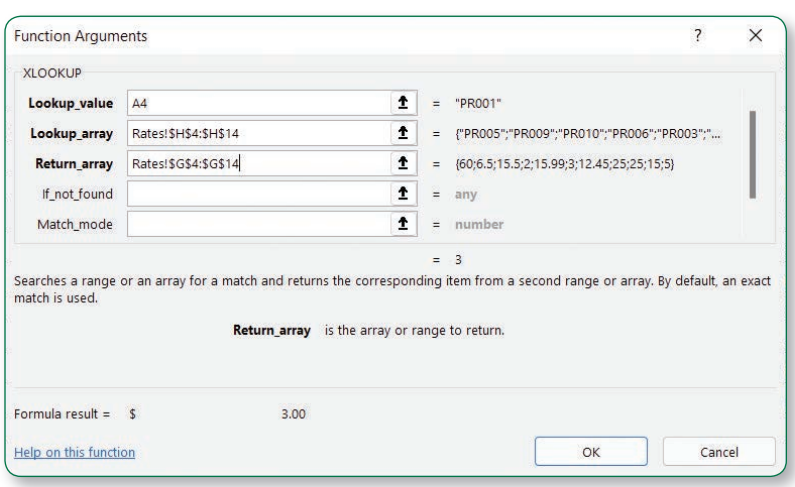


Figure 2-45 ***Function Arguments*** **dialog box for** ***XLOOKUP***

10. Press **F4** (**FN+F4**) to make the reference absolute if cell addresses are used.
    - The result for the current cell displays in the dialog box.
11. Click **OK**.
    - Three arguments are required.

All Excel versions include *VLOOKUP* (vertical) and *HLOOKUP* (horizontal). *VLOOKUP* requires a lookup range that is organized in columns, and *HLOOKUP* uses a range that is arranged in rows.

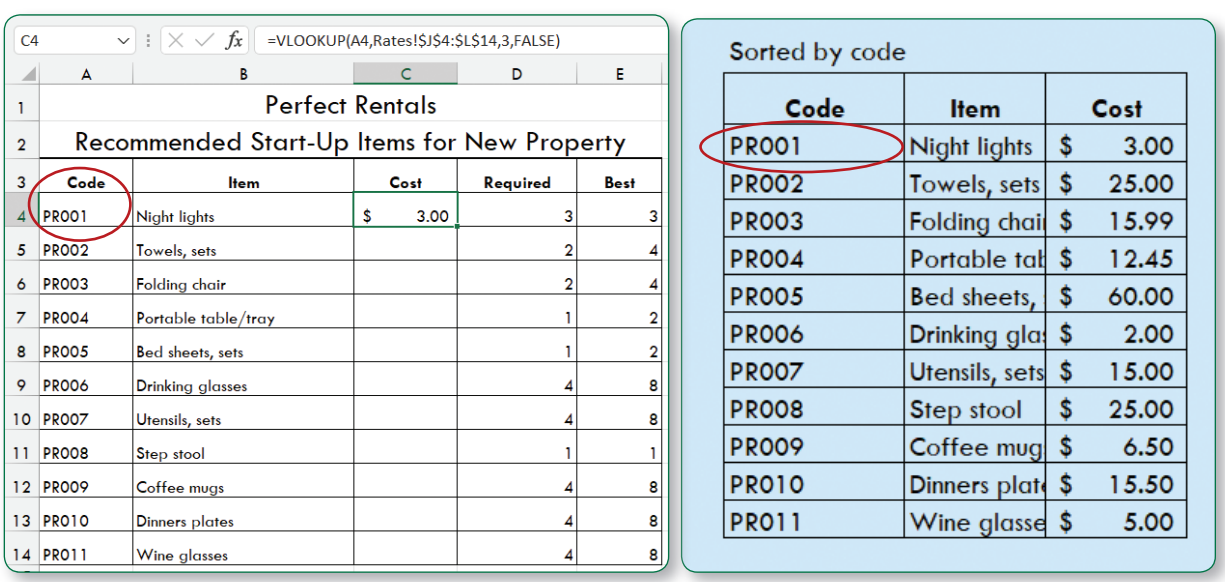
A *VLOOKUP* function has three required arguments and one optional argument, and the syntax is:

=VLOOKUP (lookup_value, table_array, col_index_num, [range_lookup])

- The ***lookup_value*** is the data to be searched. It is usually a cell address, but you can type a value or a text string. The function locates the *lookup_value* in the first column of the *table_array*. It then displays data from the designated column in the same row as the *lookup_value*.
- The ***table_array*** is a range of cells, sorted in ascending order by the first column. The range can be located on a different worksheet or in a different workbook. It is good practice to name the range so that its reference is absolute.
- The ***col_index_num*** sets which column in the *table_array* contains the data to display in the result. The columns are counted from left to right.
- The ***[range lookup]*** argument is either TRUE or FALSE. When you set this argument to FALSE, Excel finds an exact match and the data can be in any order. TRUE means that Excel finds the closest match to the *lookup_value*, which can return unexpected results.

Figure 2-46 shows a *VLOOKUP* function in cell C4 in the worksheet on the left. The result ($3.00) is from the third column in the table in the worksheet on the right. Both sheets are in the same workbook.

=VLOOKUP(A4,Rates!$J$4:$L$14,3,FALSE)



C4 =VLOOKUP(A4,Rates!$J$4:$L$14,3,FALSE)

	A	B	C	D	E
1	Perfect Rentals				
2	Recommended Start-Up Items for New Property				
3	Code	Item	Cost	Required	Best
4	PR001	Night lights	$ 3.00	3	3
5	PR002	Towels, sets		2	4
6	PR003	Folding chair		2	4
7	PR004	Portable table/tray		1	2
8	PR005	Bed sheets, sets		1	2
9	PR006	Drinking glasses		4	8
10	PR007	Utensils, sets		4	8
11	PR008	Step stool		1	1
12	PR009	Coffee mugs		4	8
13	PR010	Dinners plates		4	8
14	PR011	Wine glasses		4	8

Sorted by code

Code	Item	Cost
PR001	Night lights	$ 3.00
PR002	Towels, sets	$ 25.00
PR003	Folding chai	$ 15.99
PR004	Portable tab	$ 12.45
PR005	Bed sheets,	$ 60.00
PR006	Drinking gla	$ 2.00
PR007	Utensils, sets	$ 15.00
PR008	Step stool	$ 25.00
PR009	Coffee mug	$ 6.50
PR010	Dinners plat	$ 15.50
PR011	Wine glasse	$ 5.00

Figure 2-46 *VLOOKUP* function in cell C4 on the left

- The *lookup_value* argument is cell A4, the code PR001.
- The *table_array* argument is the layout on the right (Rates!$J$4:$L$14).
- The *col_index_num* argument is *3* so the result is from the third column, the "Cost" column, in the *table_array* range.
- The *range_lookup* argument is FALSE, a safeguard for an exact match. When the table is sorted in ascending order by the first column, you can omit this argument which shows as TRUE in the completed function.

HOW TO: Display Results Using VLOOKUP

1. Click the cell for the function.
2. Click the **Lookup & Reference** button [*Formulas* tab, *Function Library* group] and select **VLOOKUP**.
   - The *Function Arguments* dialog box opens.
3. Click the **Lookup_value** box.
4. Click the cell to be matched.
   - The *lookup_value* is typically a cell in the same row as the function.
   - This reference is usually relative.
5. Click the **Table_array** box.
6. Select the cell range with the lookup data.
   - When the lookup table is named, the range name is substituted.
   - The range includes the lookup values and the results to be displayed.
7. Press **F4** (**FN+F4**) to make the reference absolute if cell addresses are used.
   - When a range name has been substituted, you need not do this.
8. Click the **Col_index_num** box.
9. Type the column number, counting from the left in the table array, that contains the data to be displayed for the result (Figure 2-47).
   - The result for the current cell displays in the dialog box.
10. Type false in the entry box to find an exact match.
    - You can leave the *Range_lookup* argument box empty (TRUE) if the data in the table array is sorted in ascending order.
11. Click **OK**.

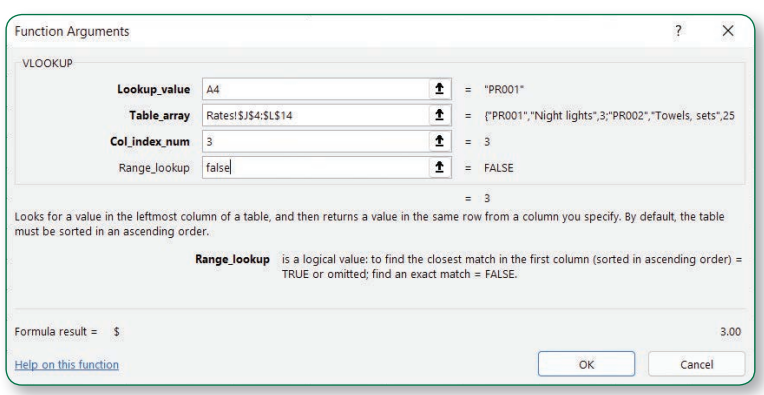


Figure 2-47 ***Function Arguments*** **dialog box for** ***VLOOKUP***

The *HLOOKUP* function has a *row_index_num* argument instead of the *col_index_num* argument. The *table_array* is set up horizontally in Figure 2-48, and the first row is arranged in alphabetical order from left to right. The descriptive labels ("Abbreviation" and "Spelled Out") are not part of the *table_array*. The *HLOOKUP* function is in cell D5 in the sheet on the left.

=HLOOKUP (lookup_value, table_array, row_index_num, [range_lookup])

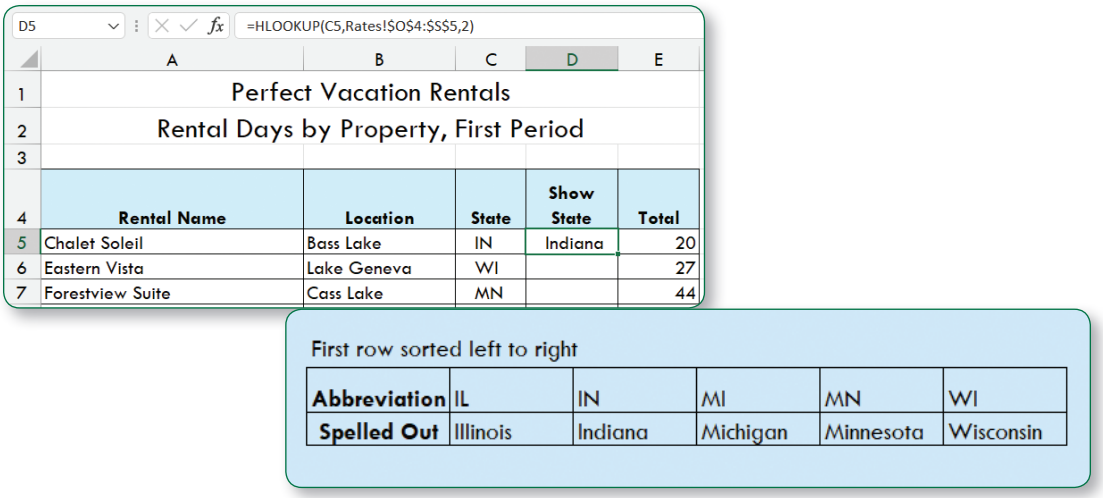


Figure 2-48 ***HLOOKUP*** **function in cell D5 on the left**

- The ***lookup_value*** is the data to be searched, usually a cell address. The function locates the *lookup_value* in the first row of the *table_array*. It then displays data from the designated row in the same column.
- The ***table_array*** is a range of cells, sorted in ascending order left to right. The range can be located on a different worksheet or in a different workbook. You can name the range so that its reference is absolute.
- The ***row_index_num*** sets which row in the *table_array* contains the data to display in the result. The rows are counted from top to bottom.
- The ***[range lookup]*** argument is either TRUE or FALSE. When you set this argument to FALSE, Excel finds an exact match and the data can be in any order.

Figure 2-48 shows an *HLOOKUP* function in cell D5 in the worksheet on the left. The result (Indiana) is from the second row in the table in the worksheet on the right.

=HLOOKUP(C5,$O$3:$S$5,2)

- The *lookup_value* argument is cell **C5**, the state abbreviation IN.
- The *table_array* argument is cells **$O$3:$S$5** in the **Rates** worksheet. The bold labels are not part of the array.
- The *row_index_num* argument is **2** so the data shown in cell D5 is from the second row of the horizontal table.
- The *range_lookup* argument is omitted, because the first row in the *table_array* is sorted alphabetically from left to right.

HOW TO: Use the HLOOKUP Function

1. Click the cell for the function.
2. Click the **Lookup & Reference** button [*Formulas* tab, *Function Library* group] and select **HLOOKUP**.
   - The *Function Arguments* dialog box opens.
3. Click the **Lookup_value** box.
4. Click the cell to be matched.
   - The *lookup_value* is typically a cell in the same row as the function.
   - This reference is usually relative.
5. Click the **Table_array** box.

6. Select the cell range with the lookup data.
   - When the lookup table is named, the range name is substituted.
7. Press **F4** (**FN+F4**) to make the reference absolute when cell addresses are used.
8. Click the **Row_index_num** box.
9. Type the row number, counting the first row of the *table_array* as 1 (Figure 2-49).
   - The result for the current cell displays in the dialog box.
10. Leave the *Range_lookup* argument box empty if the first row of data in the table array is arranged alphabetically from left to right.
    - Type **false** for the argument if you are not sure the data is sorted.
11. Click **OK**.

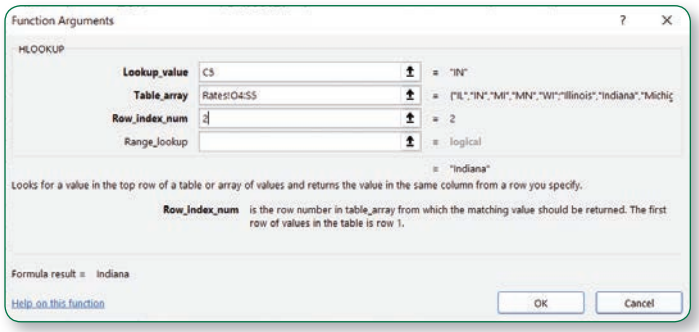


Figure 2-49 ***Function Arguments*** **dialog box for** ***HLOOKUP***

PAUSE & PRACTICE: EXCEL 2-2

For this project, you open your *Pause & Practice* file and insert *Statistical* functions to complete more of the worksheet. You also build *Financial*, *Logical*, and *Lookup* functions for the data.

File Needed: ***[your initials] PP E2-1.xlsx***
Completed Project File Name: ***[your initials] PP E2-2.xlsx***

1. Open the ***[your initials] PP E2-1.xlsx*** workbook completed in *Pause & Practice 2-1* and save it as [your initials] PP E2-2.
2. Calculate the median and mode for a range.
   a. Click the **Rates** sheet tab and select cell **D21**.
   b. Click the **More Functions** button [*Formulas* tab, *Function Library* group] and point to **Statistical**.
   c. Scroll the list to find and click **MEDIAN**.
   d. Select cells **D5:D19** and click **OK**. The result is 325.
   e. Select cell **D23**.
   f. Type =mo to display the *Formula AutoComplete* list.
   g. Double-click **MODE.SNGL** in the list (Figure 2-50).
   h. Select cells **D5:D19** and press **Enter**. The result is 245.

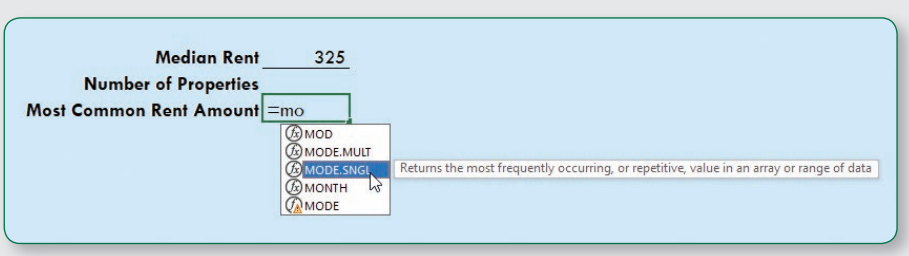


Figure 2-50 Choose ***MODE.SNGL*** **from** ***Formula AutoComplete*** **list.**

3. Use the *COUNT* function.
   a. Select cell **D22**.
   b. Type =cou to display the *Formula AutoComplete* list.
   c. Double-click **COUNT** in the list.
   d. Select cells **D5:D19** to count the number of values in the rate column.
   e. Press **Enter**. The final parenthesis is supplied and the result is 15. Because a rate displays for every property, this calculation is the same as counting the labels in columns A, B, or C.

4. Compare results with *AutoCalculate*.
   a. Select cells **D5:D19**.
   b. Right-click near the middle of the *Status* bar to display the options.
   c. Verify that **Count** is checked as are **Average** and **Sum**.
   d. Left-click the *Status* bar to close the menu.
   e. Compare the result in cell **D22** with the *Count* shown in the *Status* bar.
   f. Press **Ctrl+Home**.

5. Count labels in a range.
   a. Click the **Rental Days** sheet tab and select cell **D26**.
   b. Click the **More Functions** button [*Formulas* tab, *Function Library* group] and point to **Statistical**.
   c. Scroll and click **COUNTA**.
   d. Verify that the **Value1** entry box is active with a default range.
   e. Select cells **C12:C14** in the worksheet to replace the *Value1* entry. Move the *Function Arguments* dialog box as needed.
   f. Click the **Value2** entry box and select cell **C16**.
   g. Click **OK**. The result is 4.
   h. Select cell **D27**.
   i. Type =cou to display the *Formula AutoComplete* list.
   j. Double-click **COUNTA** in the list.
   k. Select cell **C9** and type , (a comma) to separate the arguments (Figure 2-51).
   l. Select cell **C18** and press **Enter**. The result is 2.

	Cass Lake	MN	44
	Lake Geneva	WI	50
	Galena	IL	48
	Delavan	WI	37
	Beverly Shores	IN	27
	Sawyer	MI	42
	Buchanan	MI	40
	New Buffalo	MI	35
	Walker	MN	14
	New Buffalo	MI	53
	Bass Lake	IN	22
	Galena	IL	42
	Eagan	MN	31
al Days			**532**
ge Days			**35.467**
		Minnesota Days	89
		Wisconsin Days	114
	Number of Michigan Properties		4
	Number of Illinois Properties		=COUNTA(C9,C18

COUNTA(value1, **[value2]**, [value3], ...)

Figure 2-51 Separate arguments by typing commas

6. Enter an *IF* function to determine if profit margin met the goal.
   a. Click the **P&L** tab and select cell **B31**.
   b. Click the **Logical** button [*Formulas* tab, *Function Library* group] and select **IF**.
   c. Click the **Logical_test** text box and click cell **B30**. The range name is substituted.
   d. Type >= for the *greater than or equal to* operator after "Profit_Margin" in the *Logical_test* box.
   e. Type 25% immediately after the = sign.
   f. Click the **Value_if_true** box and type Goal Met. You need not type quotation marks when you use the *Function Arguments* dialog box.
   g. Press **Tab** to move to the *Value_if_false* box. Excel supplies the quotation marks for "Goal Met."
   h. Type Goal Unmet (Figure 2-52).
   i. Click **OK**. For the prior period, the result is *Goal Met*.
   j. Click the **Center** button [*Home* tab, *Alignment* group].

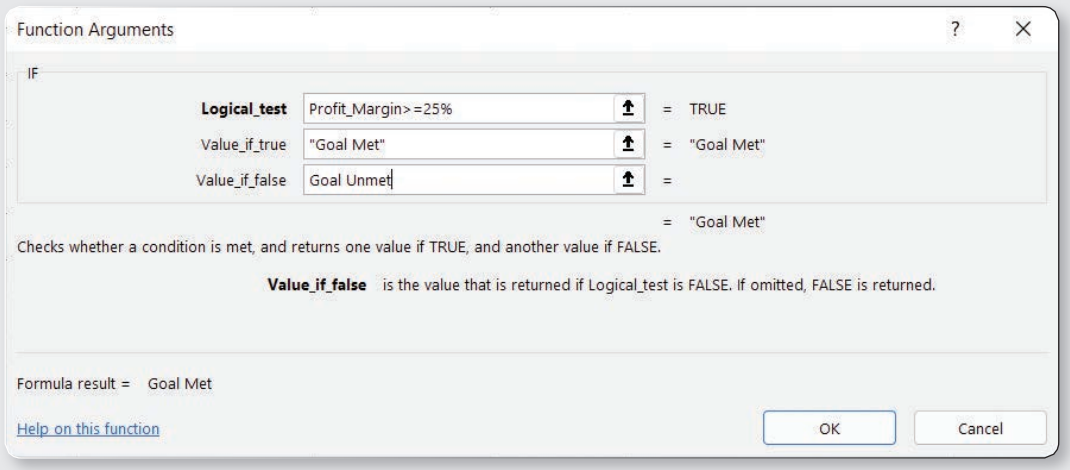


Figure 2-52 Range name substituted in formula and quotation marks supplied

7. Edit a range name and copy a formula.
   a. Use the *Fill* pointer to copy the formula in cell **B31** to cells **C31:D31**. The *Profit_Margin* range name currently identifies only cell **B30** and the copied formula shows inaccurate results.
   b. Click the **Name Manager** button [*Formulas* tab, *Defined Names* group].
   c. Click **Profit_Margin** in the list of range names to view its current reference.
   d. Click the **Refers to**: entry box.
   e. Click to select cells **B30:D30** in the worksheet.
   f. Verify that the new *Refers to*: entry is **$B$30:$D$30** on the **P&L** sheet.
   g. Click **Close** in the dialog box and then click **Yes** in the message box to redefine the range name and update formula results for cells C31 and D31.
   h. Press **Ctrl+Home**.

8. Build and copy an *IF* function to display results.
   a. Click the **Guest Data** tab and select cell **D4**.
   b. Click the **Recently Used** button [*Formulas* tab, *Function Library* group] and select **IF**.
   c. Click the **Logical_test** text box and click cell **C4**.
   d. Type > for the *greater than* operator after **C4** in the *Logical_test* box.
   e. Type 5 immediately after the **>** sign.
   f. Click the **Value_if_true** box and type VIP.
   g. Press **Tab** to move to the *Value_if_false* box. Excel supplies the quotation marks for "VIP."
   h. Type Not yet (Figure 2-53).
   i. Click **OK**. The first client is not yet at VIP level.
   j. Double-click the **Fill pointer** for cell **D4**.
   k. Press **Ctrl+Home**.

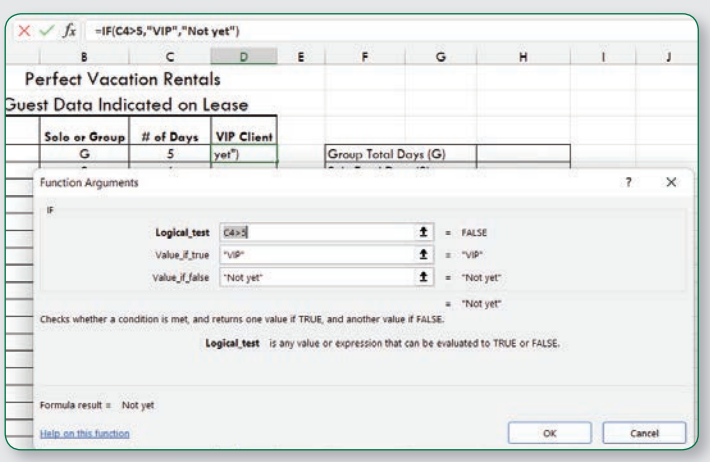


Figure 2-53 Build an *IF* function

9. Use the *PMT* function to determine payments for new bicycle purchases.
   a. Click the **Bicycles** sheet tab and click cell **B7**.
   b. Click the **Financial** button [*Formulas* tab, *Function Library* group] and select **PMT**.
   c. Click the **Rate** box and click cell **B6**.

d. Type /12 immediately after "B6," to divide the rate by 12 for monthly payments.
e. Click the **Nper** box and click cell **B5**. Type *12 to multiply by 12 for 12 months per year.
f. Click the **Pv** box and click cell **B4**. This is the amount of the loan.
g. Click the **Fv** box. Leave this blank to indicate no balance due at the end of the loan term.
h. Click the **Type** box and type 1. The payment will be made at the beginning of the month (Figure 2-54).
i. Click **OK**. The payment is −$209, a negative value because it is money paid out. This cell was formatted to show no decimal places.
j. Copy the formula in cell **B7** to cell **C7**. The result is −$259.
k. Press **Ctrl+Home**.

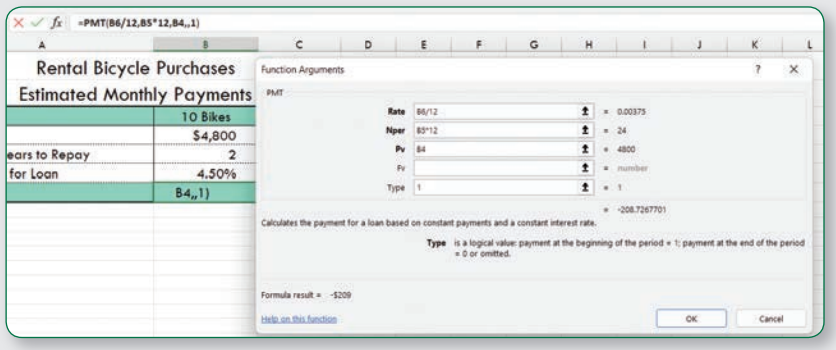


Figure 2-54 The *PMT* function

10. Use *XLOOKUP* to display costs. (If *XLOOKUP* is not available, use *VLOOKUP* and build this formula: **=VLOOKUP(A4,Rates!$J$4:$L$14,3,F ALSE)**).
a. Click the **Start-Up** sheet tab and select cell **C4**. Individual costs are missing, but they are listed on the **Rates** sheet.
b. Click the **Lookup & Reference** button [*Formulas* tab, *Function Library* group] and select **XLOOKUP**.
c. Verify or click the **Lookup_value** box and select cell **A4**.
d. Click the **Lookup_array** box. The table with costs is on the **Rates** sheet.
e. Click the **Rates** worksheet tab and select cells **H4:H14**. This array includes the item codes.
f. Press **F4** (**FN+F4**) to make the array an absolute reference.
g. Click the **Return_array** box. The focus returns to the **Start-Up** sheet.
h. Click the **Rates** worksheet tab and select cells **G4:G14**. This array includes the costs.
i. Press **F4** (**FN+F4**) to make the array an absolute reference (Figure 2-55).
j. Click **OK**. The cost for the first item is $3.00.
k. Copy the formula in cell **C4** to cells **C5:C14**.

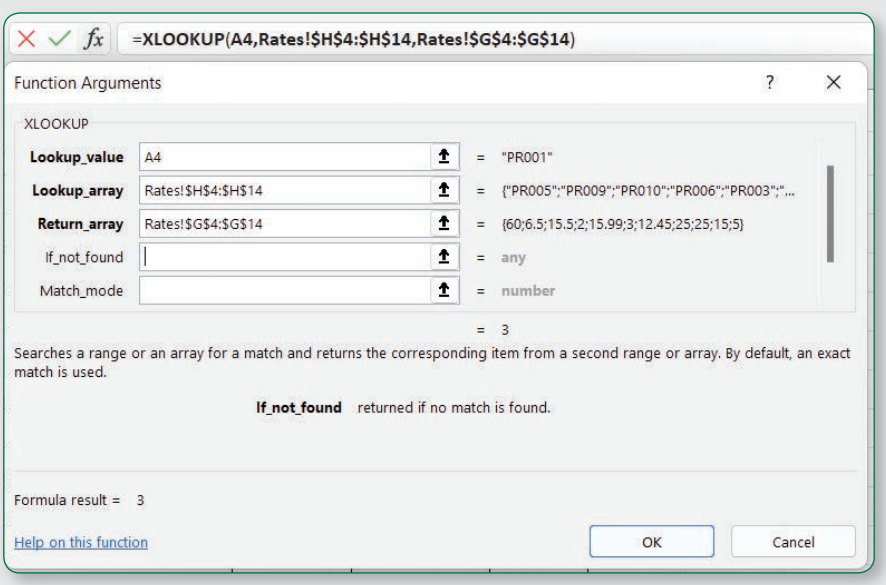


Figure 2-55 Build an *XLOOKUP* function

11. Insert the *TODAY* function.
    a. Select cell **A23**.
    b. Click the **Date & Time** button [*Formulas* tab, *Function Library* group].
    c. Find and select **TODAY**. The *Function Arguments* dialog box notes that this function does not have any arguments and that it is volatile (Figure 2-56).
    d. Click **OK**. The current date is inserted.
    e. Press **Ctrl+Home**.
12. Save and close the workbook (Figure 2-57).

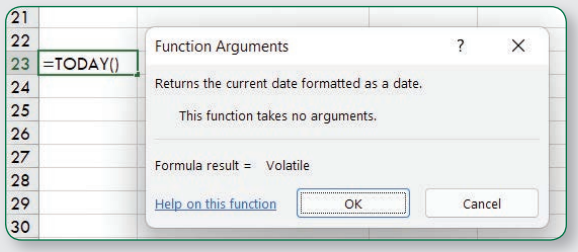


Figure 2-56 ***Function Arguments*** **dialog box for** ***TODAY***

Perfect Vacation Rentals
Rental Days by Property, First Period

Rental Name	Location	State	Total
Chalet Soleil	Bass Lake	IN	20
Eastern Vista	Lake Geneva	WI	27
Forestview Suite	Cass Lake	MN	44
Garden Suite	Lake Geneva	WI	50
Hilltop GetAway	Galena	IL	48
Lakeside Cabin West	Delavan	WI	37
Lakeside Cottage	Beverly Shores	IN	27
Lakeview 1	Sawyer	MI	42
Lakeview 2	Buchanan	MI	40
Lakeview 3	New Buffalo	MI	35
Our Weekend Cottage	Walker	MN	14
Seaside Villa	New Buffalo	MI	53
Serenity Suite	Bass Lake	IN	22
Treetop Cabin	Galena	IL	42
Wilderness Suite	Eagan	MN	31
Total Days			**532**
Average Days			**35.4667**

Minnesota Days	89
Wisconsin Days	114
Number of Michigan Properties	4
Number of Illinois Properties	2

	A	B	C	D
1	Perfect Vacation Rentals			
2	Published Daily Rate			
3				
4	**Rental Name**	**Location**	**State**	**Rate**
5	Hilltop GetAway	Galena	IL	245
6	Treetop Cabin	Galena	IL	350
7	Chalet Soleil	Bass Lake	IN	375
8	Lakeside Cottage	Beverly Shores	IN	450
9	Serenity Suite	Bass Lake	IN	500
10	Seaside Villa	New Buffalo	MI	245
11	Lakeview 1	Sawyer	MI	275
12	Lakeview 2	Buchanan	MI	175
13	Lakeview 3	New Buffalo	MI	575
14	Wilderness Suite	Eagan	MN	325
15	Forestview Suite	Cass Lake	MN	345
16	Our Weekend Cottage	Walker	MN	255
17	Lakeside Cabin West	Delavan	WI	235
18	Eastern Vista	Lake Geneva	WI	350
19	Garden Suite	Lake Geneva	WI	225
20				
21			**Median Rent**	325
22			**Number of Properties**	15
23			**Most Common Rent Amount**	245
24				
25				

Figure 2-57 PP E2-2 completed

Perfect Vacation Rentals
Guest Data Indicated on Lease

Guest ID	Solo or Group	# of Days	VIP Client
PVR001	G	5	Not yet
PVR002	S	6	VIP
PVR003	S	8	VIP
PVR004	S	7	VIP
PVR005	G	5	Not yet
PVR006	G	3	Not yet
PVR007	G	8	VIP
PVR008	S	4	Not yet
PVR009	S	2	Not yet
PVR010	S	8	VIP
PVR011	G	8	VIP
PVR012	S	7	VIP
PVR013	G	8	VIP
PVR014	S	7	VIP
PVR015	S	8	VIP
PVR016	G	4	Not yet
PVR017	G	7	VIP
PVR018	G	1	Not yet
PVR019	S	3	Not yet
PVR020	S	1	Not yet
PVR021	S	4	Not yet
PVR022	G	10	VIP
PVR023	G	1	Not yet
PVR024	S	8	VIP
PVR025	S	10	VIP
PVR026	S	8	VIP
PVR027	G	6	VIP
PVR028	G	7	VIP
PVR029	S	4	Not yet
PVR030	S	4	Not yet
PVR031	S	10	VIP
PVR032	S	3	Not yet
PVR033	S	1	Not yet
PVR034	G	3	Not yet
PVR035	S	4	Not yet

Perfect Rentals
Recommended Start-Up Items for New Property

Code	Item	Cost	Required	Best
PR001	Night lights	$ 3.00	3	3
PR002	Towels, sets	$ 25.00	2	4
PR003	Folding chair	$ 15.99	2	4
PR004	Portable table/tray	$ 12.45	1	2
PR005	Bed sheets, sets	$ 60.00	1	2
PR006	Drinking glasses	$ 2.00	4	8
PR007	Utensils, sets	$ 15.00	4	8
PR008	Step stool	$ 25.00	1	1
PR009	Coffee mugs	$ 6.50	4	8
PR010	Dinners plates	$ 15.50	4	8
PR011	Wine glasses	$ 5.00	4	8

Cost at Required Level	
Cost at Best Level	

Rounded Value at Required	
Rounded Value at Best	

3/13/2021

Rental Bicycle Purchases
Estimated Monthly Payments

	10 Bikes	25 Bikes
Loan Amount	$4,800	$11,250
Number of Years to Repay	2	4
Interest Rate for Loan	4.50%	5.25%
Payment	-$209	-$259

Figure 2-57 PP E2-2 completed

SLO 2.7

Working with Text Functions

Text functions split, join, or convert labels and values. With a *Text* function, you can format a value as a label to control alignment, display labels in uppercase or lowercase letters, and more.

The TEXTJOIN Function

The *TEXTJOIN* function combines strings of text, values, or characters. A common use of *TEXTJOIN* might be to display city and state in one cell or to display first and last name in a single cell.

The *TEXTJOIN* function has three required arguments and one optional argument. The syntax for a *TEXTJOIN* function is:

=TEXTJOIN(delimiter, ignore_empty, text1, [text2], …)

The ***delimiter*** argument is the character used to separate the *textN* arguments. This character is inserted after each *textN* argument except the last one. You can have up to 252 *textN* arguments but only one delimiter. A *text* argument is a cell reference or data that you type.

For most *TEXTJOIN* formulas, the delimiter is a space, but the delimiter can include multiple characters. For example, if you want to display "City, State" in a single cell, the delimiter

is a comma and space combination. *TEXTJOIN* results are often placed in a separate column or row, and the original data can be hidden when it is located on the same sheet. The source data must be accessible so that the function works.

HOW TO: Use the TEXTJOIN Function

1. Click the cell for the result.
2. Click the **Text** button [*Formulas* tab, *Function Library* group] and choose **TEXTJOIN**.
3. Click the **Delimiter** box and press the **Spacebar**.
   - A space character displays with quotation marks in the dialog box and the *Formula* bar.
   - Type other combinations of characters as needed.
4. Click the **Ignore_empty** box.
   - Leave this box empty for the default TRUE option.
   - A blank cell is ignored in the result so that a blank is not joined to or included with result data.
5. Click the **Text1** argument box.
6. Select the first cell with data to be joined.
   - Alternatively, type a text string, a value, or a punctuation character.
7. Click the **Text2** box and select the cell or type data to be joined (Figure 2-58).
   - You can use a combination of cell references and typed data among the *TextN* arguments.
8. Complete *TextN* argument boxes as needed.
   - The same delimiter is used after each *textN* argument.
9. Click **OK**.

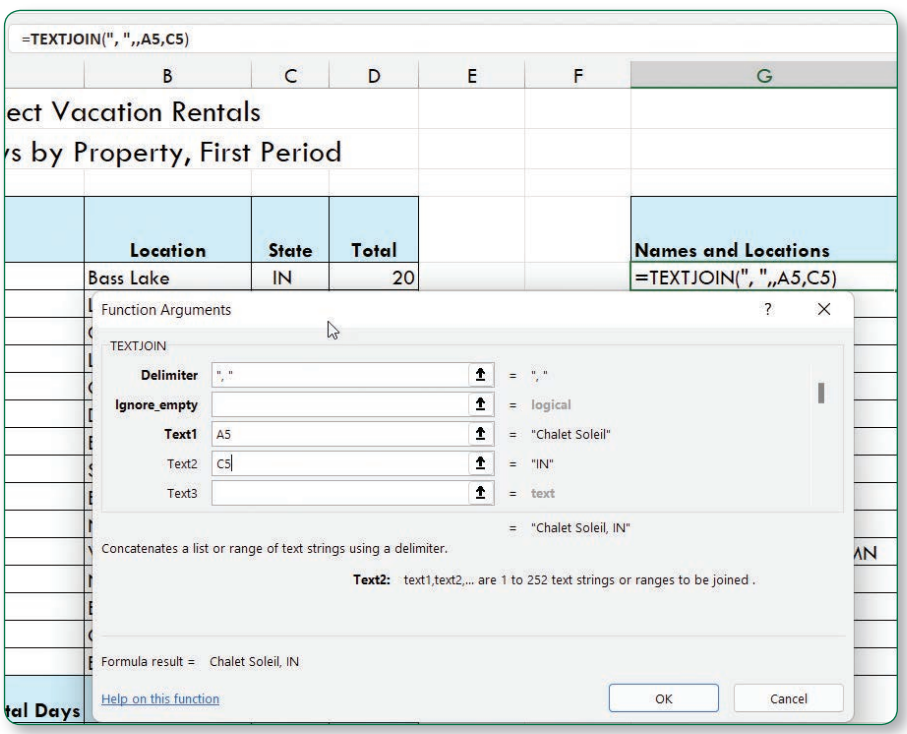


Figure 2-58 ***TEXTJOIN*** **function with a comma and a space as the** ***Delimiter***

The CONCAT Function

Excel has another *Text* function *CONCAT* that joins or combines data strings. The *CONCAT* function does not have a *delimiter* argument which enables you to determine how each two *textN* arguments are joined. You might use a comma and a space between the first two arguments but a period and a space between the next two. The *CONCAT* function was originally named *CONCATENATE* which means to link or join.

The syntax for a *CONCAT* function is:

= CONCAT(text1, [text2], ...)

The *CONCAT* function has one required argument *textN*, where *N* is a number from 1 to 255. The *text* argument can be cell references or any character strings that you type.

ANOTHER WAY

Join data in a formula by using the ampersand (**&**) as an operator. The formula **=A1&B1** returns the same result as **=CONCAT(A1,B1)**.

When you concatenate text strings, you need to plan for spacing between characters to separate words or values. Like *TEXTJOIN* results, *CONCAT* results are usually displayed in a separate column or row to preserve the source data.

HOW TO: Use the CONCAT Function

1. Click the cell for the result.
2. Click the **Text** button [*Formulas* tab, *Function Library* group] and choose **CONCAT**.
3. Click the **Text1** argument box.
4. Select the first cell with data as the *Text1* argument.
   - You can type a text string rather than selecting a cell.
5. Click the **Text2** box and enter the next string to be concatenated.
   - Type the character(s) that should follow the first argument.
   - Press the **Spacebar** or type punctuation as needed.
6. Click the **Text3** box and select the cell or type the next data (Figure 2-59).
   - You must include an argument for each occurrence of a space or punctuation character in your desired result.
7. Complete *TextN* argument boxes as needed.
8. Click **OK**.

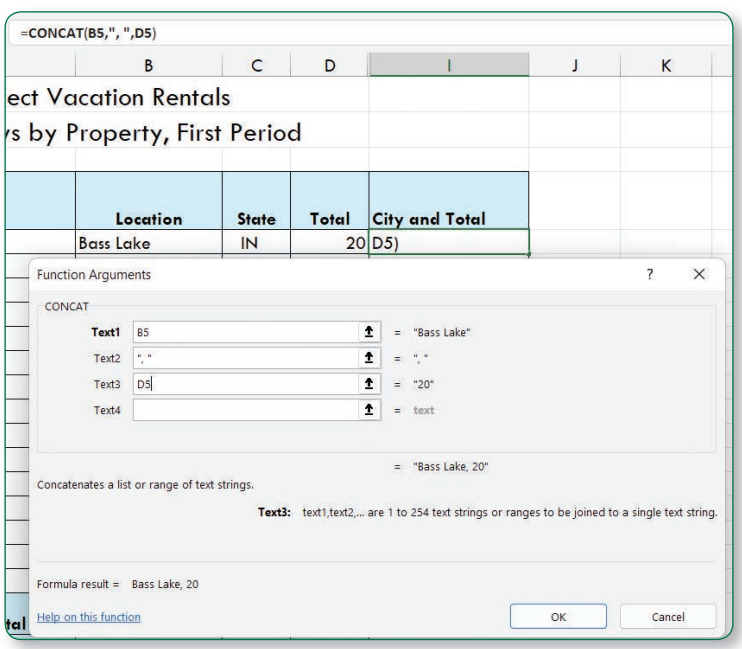


Figure 2-59 ***CONCAT*** **function that includes a comma and a space as the** ***Text2*** **argument**

SLO 2.8

Introducing Math & Trig Functions

The *Math & Trig* function category includes the *SUM* function and others that display the absolute value of data, calculate the cosine of an angle, or return the power of a number. You might recognize the function *PI* or π from a math class. Three *Math & Trig* functions that are discussed in this section are *ROUND*, *SUMIF*, and *SUMPRODUCT*.

ROUND Function

Rounding means that a value is adjusted to display a specified number of decimal places or a whole number. You can round the amounts on your tax return in the United States, which means that you need not show any cents, just dollars.

The *ROUND* function has two required arguments: *number* and *num_digits*.

=ROUND(number, num_digits)

- The ***number*** is the cell or the value to be adjusted.
- The ***num_digits*** sets the number of decimal places for rounding. When this argument is zero (0), the value displays as the nearest whole number. When the *num_digits* argument is greater than zero, the value is rounded to that number of decimal places. You can use a negative number for the *num_digits* argument, which rounds the value to the left of the decimal point. Make sure you understand mathematical results when you round to the left of the decimal point.

When a value used in rounding is 5 or greater, results round up to the next digit. If you round 5.523 to show zero (0) decimal places, it rounds up to display 6 because the value after the decimal point is 5. When 5.423 is rounded to zero (0) decimal places, it displays 5. If you round 5.423 to two places, it rounds to 5.42 because the value used for rounding is 3. The *Increase Decimal* and *Decrease Decimal* buttons follow these arithmetic rounding principles for displaying values in the cell, as do the *Accounting Number* and *Currency* formats. These formats, however, keep the unrounded value in the cell and use that value in calculations.

MORE INFO

When a value is rounded using the *ROUND* function, the rounded value is used in calculations, not the full unrounded number.

HOW TO: Type the ROUND Function

1. Click the cell for the function.
2. Type =rou and press **Tab**.
   - *Formula AutoComplete* inserts the function in the cell.
   - The *number* argument is bold in the *ScreenTip*.
3. Select the cell to be rounded.
   - The cell address appears in the cell and in the *Formula* bar.
   - You can type a value as the *number* argument.
4. Type , (a comma) to separate the arguments.
   - The *num_digits* argument is bold in the *ScreenTip*.
5. Type a number to set the number of decimal places (Figure 2-60).
6. Press **Enter**.
   - The closing right parenthesis is provided.

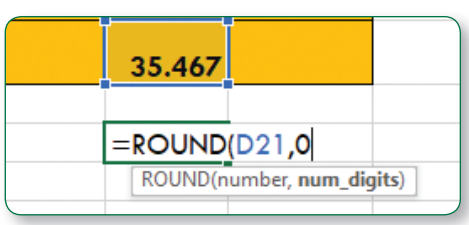


Figure 2-60 Type the *ROUND* function

MORE INFO

Excel has a *ROUNDDOWN* function that always rounds a number down or toward zero. The *ROUNDUP* function rounds a value up, away from zero.

SUMIF Function

The *SUMIF* function combines a sum with an *If* statement to limit which data are included in the total. It defines which cells are part of the calculation by criteria. ***Criteria*** are restrictions, conditions, or rules that must be met. In a *SUMIF* function, cell values are included in the sum only if they match the criteria.

The *SUMIF* function has two required arguments and one optional argument.

=SUMIF (range, criteria, [sum_range])

- The ***range*** is the range of cells to be evaluated or searched, the values that are compared to the criteria.
- The ***criteria*** argument defines which cells should be included in the sum. You can use comparison operators, cell references, a value, or text. When you use text or a comparison operator, the criteria must be enclosed in quotation marks.
- The ***[sum_range]*** is the cell range to be summed. Although this argument is optional, it is necessary when the *range* argument and the values to be summed are different. It can be omitted when the range to be summed is the same as the *range* argument.

Figure 2-61 illustrates a *SUMIF* function in cell H4 that totals the number of days for group guests.

=SUMIF($B$4:$B$38,"g",$C$4:$C$38)

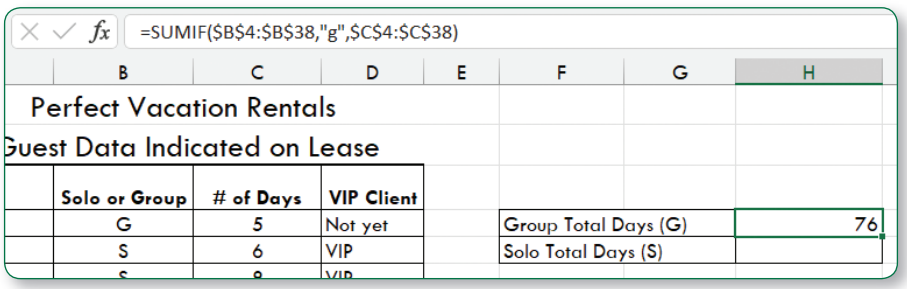


Figure 2-61 ***SUMIF* function in cell H4**

- The *range* argument is the solo or group column, cells B4:B38. It is an absolute reference so that the formula can be copied.
- The *criteria* argument is **g**, shown in quotation marks. The quotation marks are added automatically when you use the *Function Arguments* dialog box. Text arguments are not case sensitive.
- The *sum_range* argument is cells $C$4:$C$38, the cells to be added if the rental was for a group.

MORE INFO

You can use wildcards (* or ?) in a criteria argument. For example, to sum sales for items that begin with the letter S, use **s*** as the criteria.

HOW TO: Build a SUMIF Function

1. Click the cell for the function.
2. Click the **Math & Trig** button [*Formulas* tab, *Function Library* group] and select **SUMIF**.
3. Click the **Range** box.

4. Select the cell range to be compared against the criteria.
   - Make the reference absolute if the formula might be copied.
   - Press **F3** (**FN+F3**) to paste a range name rather than selecting the range.
5. Click the **Criteria** box.
   - Type text to be compared or a value to be matched.
   - Type an expression with operators to be evaluated.
   - Quotation marks are automatically supplied.
6. Click the **Sum_range** box (Figure 2-62).
   - Select the cells to be added.
   - If the cells to be added are the same as those in the *range* argument, leave the entry blank.
7. Click **OK**.

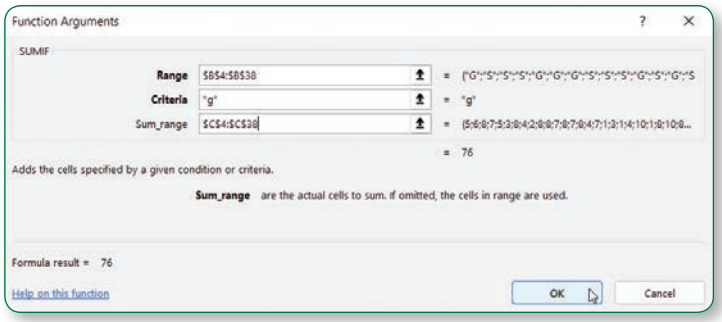


Figure 2-62 *Function Arguments* dialog box for *SUMIF*

SUMPRODUCT Function

The *SUMPRODUCT* function calculates the sum of the product of several ranges. It multiplies the cells identified in its *array* arguments and then totals those individual products. A ***product*** is the result of a multiplication problem; 4 is the product of 2 times 2. An array is a collection of values in a row, a column, or both, basically a range. An array has a ***dimension***, which is the number of columns or rows. The arrays A1:A5 and C1:C5 have the same dimension, five rows and one column each.

The *SUMPRODUCT* function has the following syntax.

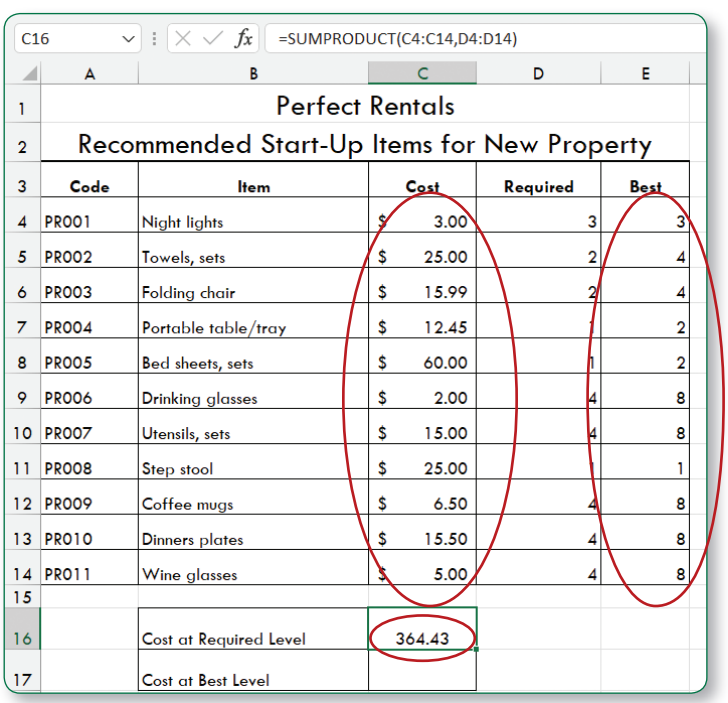
=SUMPRODUCT(array1, array2, [arrayN])

- The ***array1*** argument is the first range of cells for the multiplication.
- The ***array2*** argument is the range that is multiplied by the corresponding cells in the *array1* range. These two ranges must have the same number of cells, the same dimension.

It is possible to use more than two arrays so that you could have an *array3* argument or even more.

In Figure 2-63, the *SUMPRODUCT* function in cell C16 multiplies the first array C4:C14 by the corresponding values in cells D4:D14 and totals those products.

=SUMPRODUCT (C4:C14,D4:D14)



	A	B	C	D	E
1	Perfect Rentals				
2	Recommended Start-Up Items for New Property				
3	Code	Item	Cost	Required	Best
4	PR001	Night lights	$ 3.00	3	3
5	PR002	Towels, sets	$ 25.00	2	4
6	PR003	Folding chair	$ 15.99	2	4
7	PR004	Portable table/tray	$ 12.45	1	2
8	PR005	Bed sheets, sets	$ 60.00	1	2
9	PR006	Drinking glasses	$ 2.00	4	8
10	PR007	Utensils, sets	$ 15.00	4	8
11	PR008	Step stool	$ 25.00	1	1
12	PR009	Coffee mugs	$ 6.50	4	8
13	PR010	Dinners plates	$ 15.50	4	8
14	PR011	Wine glasses	$ 5.00	4	8
15					
16		Cost at Required Level	364.43		
17		Cost at Best Level			

Figure 2-63 *SUMPRODUCT* in cell C16

The value in cell C4 is multiplied by cell D4, cell C5 is multiplied by cell D5, and so on. Those individual products are summed, and the result is 364.43.

HOW TO: Build a SUMPRODUCT Function

1. Click the cell for the function.
2. Click the **Math & Trig** button [*Formulas* tab, *Function Library* group] and select **SUMPRODUCT**.
   - The *Function Arguments* dialog box opens.
3. Click the **Array1** box.
4. Select the first cell range to be multiplied.
5. Click the **Array2** box.
6. Select the next cell range to be multiplied (Figure 2-64).
   - All arrays must have the same number of cells and rows.
   - Use as many arrays as required for the calculation.
7. Click **OK**.

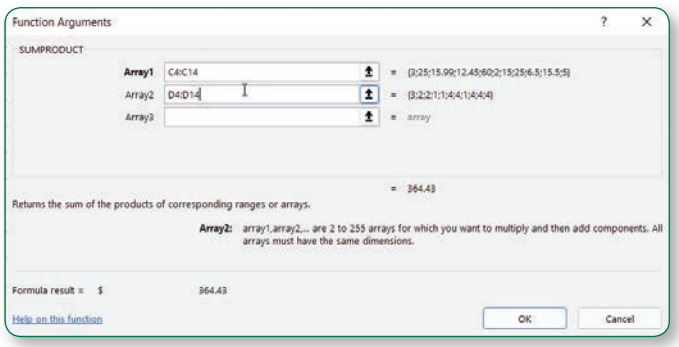


Figure 2-64 ***Function Arguments*** **dialog box for** ***SUMPRODUCT***

MORE INFO

If an array in a *SUMPRODUCT* formula includes an empty cell, Excel treats that value as 0, but the multiplication by zero does not affect the sum.

PAUSE & PRACTICE: EXCEL 2-3

For this project, you continue working on the workbook for Perfect Vacation Rentals. You use *Text* functions to display data as well as *SUMIF* and *SUMPRODUCT* to complete totals.

File Needed: ***[your initials] PP E2-2.xlsx***
Completed Project File Name: ***[your initials] PP E2-3.xlsx***

1. Open the ***[your initials] PP E2-2.xlsx*** workbook completed in *Pause & Practice 2-2* and save it as [your initials] PP E2-3.
2. Click the **Rental Days** worksheet tab.
3. Enter a *TEXTJOIN* function to display property and state names in the cell.
   a. Click cell **G5**.
   b. Click the **Text** button [*Formulas* tab, *Function Library* group] and select **TEXTJOIN**. The *Function Arguments* dialog box opens.
   c. Click the **Delimiter** entry box.
   d. Type , (a comma) and press the **Spacebar** to set a comma followed by a space as the delimiter characters.
   e. Click the **Text1** box and select cell **A5**. The *Ignore_empty* argument is blank or true, so that blank cells are ignored.

f. Click the **Text2** box and select cell **C5**. The result for the cell G5 displays in the dialog box. Verify that it is "Chalet Soleil, IN" (Figure 2-65).

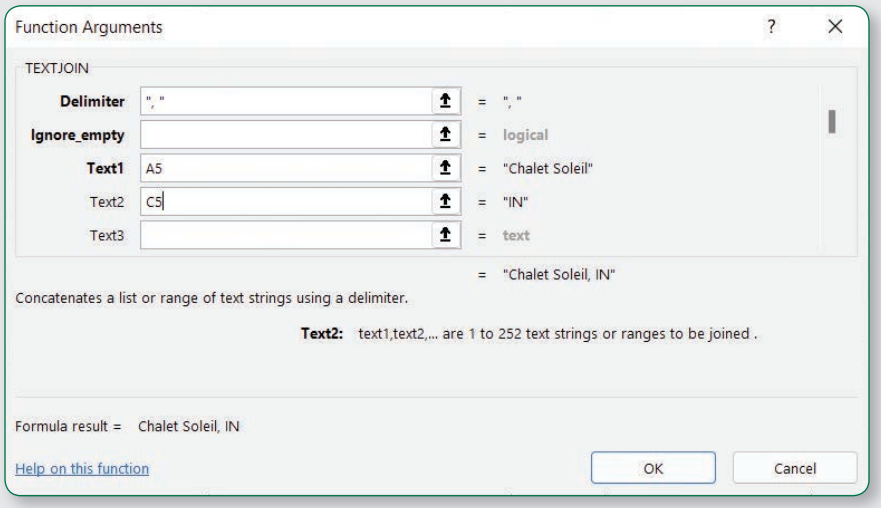


Figure 2-65 Build a *TEXTJOIN* function

g. Click **OK**.
h. Click and drag the **Fill pointer** to copy the formula in cell **G5** to cells **G6:G19**. Double-clicking the **Fill pointer** does not work because Excel needs data in the adjacent column to determine how far to fill.
i. *AutoFit* column **G**.

4. Use *CONCAT* to display city names and totals in the cell.
   a. Click cell **I5**.
   b. Click the **Text** button [*Formulas* tab, *Function Library* group] and select **CONCAT**.
   c. Click the **Text1** entry box and select cell **B5**.
   d. Click the **Text2** entry box.
   e. Type , (a comma) and press the **Spacebar** to set a comma followed by a space as the *Text2* argument.
   f. Click the **Text3** box and select cell **D5**. The result for cell I5 displays in the dialog box. Verify that it is "Bass Lake, 20" (Figure 2-66).

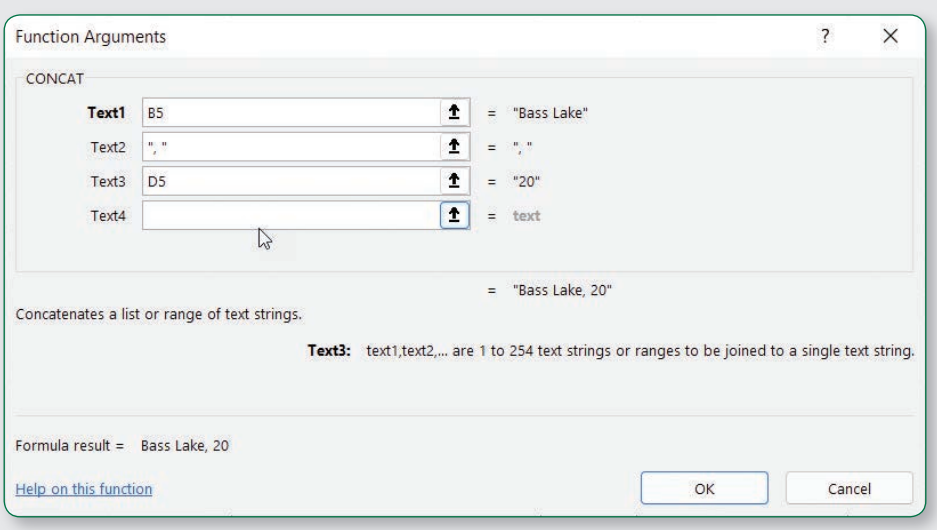


Figure 2-66 Build a *CONCAT* function

g. Click **OK**.
h. Click and drag the **Fill pointer** to copy the formula in cell **I5** to cells **I6:I19**.
i. *AutoFit* column **I**.
j. Press **Ctrl+Home**.

5. Use *SUMIF* to calculate results.
   a. Click the **Guest Data** worksheet tab.
   b. Select cell **H4**.
   c. Click the **Math & Trig** button [*Formulas* tab, *Function Library* group] and select **SUMIF**.
   d. Click the **Range** text box and select cells **B4:B38**.
   e. Press **F4** (**FN+F4**) to make the reference absolute.
   f. Press **Tab** and type g in the *Criteria* box. Criteria are not case-sensitive. The cells in column B will be checked to determine if they show "G."
   g. Click the **Sum_range** box, select cells **C4:C38**, and press **F4** (**FN+F4**). The values in this range will be summed for those rows in which the entry is G (Figure 2-67).
   h. Click **OK**. Rental days by groups are 76.
   i. Click cell **H4** and use the *Fill* pointer to copy the formula to cell **H5**.
   j. Edit the formula in cell **H5** to show s instead of "g."
   k. Press **Ctrl+Home**.

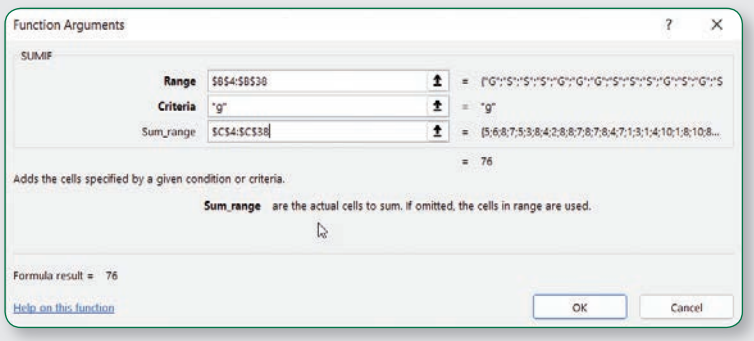


Figure 2-67 Build a *SUMIF* function

6. Use *SUMPRODUCT* to calculate start-up costs.
   a. Click the **Start-Up** sheet tab.
   b. Select cell **C16**.
   c. Click the **Math & Trig** button [*Formulas* tab, *Function Library* group] and select **SUMPRODUCT**.
   d. Click the **Array1** box and select cells **C4:C14**. The range includes 11 values.
   e. Click the **Array2** box and select cells **D4:D14**. The range includes 11 values, and each one will be multiplied by the corresponding value in the same row in column C.
   f. Click **OK**. The value at cost is 364.43.
   g. Click cell **C17**, type =sump, and press **Tab**. The function is inserted and the *ScreenTip* shows the next argument, *array1*.
   h. Select cells **C4:C14** and type , (a comma) to separate the first argument from the second.
   i. Select cells **E4:E14** (Figure 2-68). You need not type the closing parenthesis.

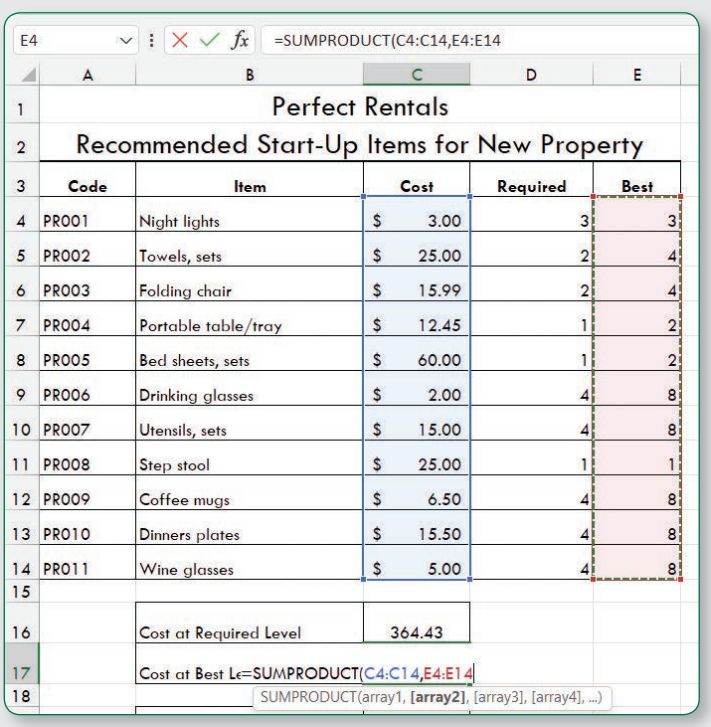
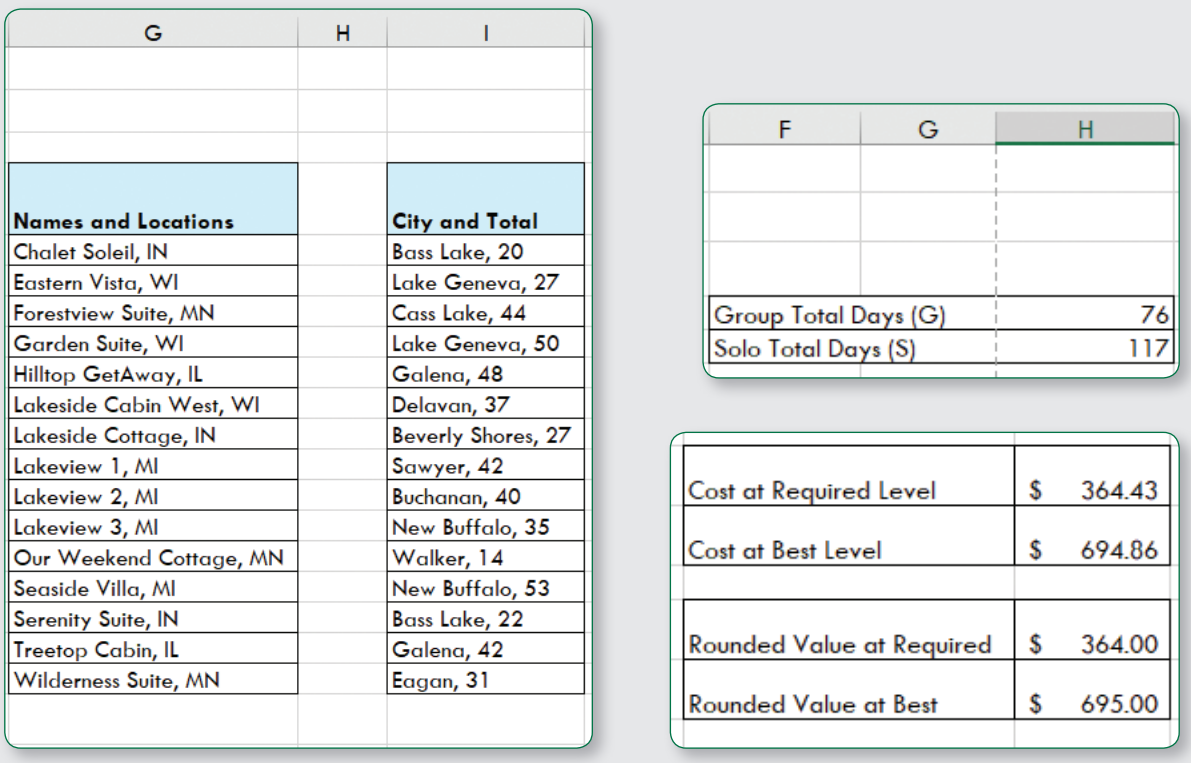


Figure 2-68 Type a *SUMPRODUCT* function

j. Press **Enter**. The value is 694.86.
k. Select cells **C16:C17** and apply the **Accounting Number Format**.

7. Use the *ROUND* function.
   a. Select cell **C19**.
   b. Click the **Math & Trig** button [*Formulas* tab, *Function Library* group] and choose **ROUND**.
   c. Click the **Number** text box if necessary and click cell **C16**.
   d. Type 0 in the *Num_digits* text box.
   e. Press **Enter**. The value is rounded down to $364.00.
   f. Copy the formula in cell **C19** to cell **C20**. The value from cell C17 is rounded up to $695.00.
   g. Press **Ctrl+Home**.

8. Save and close the workbook (Figure 2-69).



G	H	I
Names and Locations		**City and Total**
Chalet Soleil, IN		Bass Lake, 20
Eastern Vista, WI		Lake Geneva, 27
Forestview Suite, MN		Cass Lake, 44
Garden Suite, WI		Lake Geneva, 50
Hilltop GetAway, IL		Galena, 48
Lakeside Cabin West, WI		Delavan, 37
Lakeside Cottage, IN		Beverly Shores, 27
Lakeview 1, MI		Sawyer, 42
Lakeview 2, MI		Buchanan, 40
Lakeview 3, MI		New Buffalo, 35
Our Weekend Cottage, MN		Walker, 14
Seaside Villa, MI		New Buffalo, 53
Serenity Suite, IN		Bass Lake, 22
Treetop Cabin, IL		Galena, 42
Wilderness Suite, MN		Eagan, 31

F	G	H
Group Total Days (G)		76
Solo Total Days (S)		117

Cost at Required Level	$	364.43
Cost at Best Level	$	694.86
Rounded Value at Required	$	364.00
Rounded Value at Best	$	695.00

Figure 2-69 PP E2-3 completed

Chapter Summary

2.1 Build and edit basic formulas (p. E2-106).

- A ***formula*** is a calculation that uses arithmetic operators, worksheet cells, and constant values. Basic arithmetic operations are addition, subtraction, multiplication, and division.
- Type a formula in the cell or point and click to select cells.
- When you type a formula, ***Formula AutoComplete*** displays suggestions for completing the formula.
- Formulas are edited in the *Formula* bar or in the cell to change cell addresses, use a different operator, or add cells to the calculation.

2.2 Set mathematical order of operations in a formula (p. E2-109).

- Excel follows mathematics rules for the order in which operations are carried out when a formula has more than one operator.
- Control the sequence of calculations by placing operations that should be done first within parentheses.
- Use the following acronym to help remember the order of arithmetic operations: **P**lease **E**xcuse **M**y **D**ear **A**unt **S**ally (**P**arentheses, **E**xponentiation, **M**ultiplication, **D**ivision, **A**ddition, **S**ubtraction).

2.3 Use absolute, mixed, relative, and 3D references in a formula (p. E2-111).

- A ***relative cell reference*** in a formula is the cell address which, when copied, updates to the address of the copy.
- An ***absolute cell reference*** is the cell address with dollar signs, as in $A$5. This reference does not change when the formula is copied.
- A ***mixed cell reference*** contains one relative and one absolute address, as in $B5 or B$5. When copied, the absolute part of the reference does not change.
- A ***3D cell reference*** is a cell in another worksheet in the same workbook. It includes the name of the worksheet followed by an exclamation point, as in *Inventory!B2*.
- Name a single cell or a group of cells with a defined ***range name***.
- Use range names in formulas instead of cell addresses.
- *Formula AutoComplete* displays range names so that you can paste them in a formula.
- A named range is an absolute reference.
- Navigate from the *Name Box* to named ranges in the workbook.

2.4 Use formula auditing tools in a worksheet (p. E2-120).

- Excel highlights certain types of formula errors as you work, but you still need to review errors and make corrections.
- Excel automatically error-checks formulas based on its internal rules. A potential error is marked in the upper-left corner of the cell with a small triangle.
- ***Formula auditing*** tools include several commands to aid your review of workbook formulas and functions.
- The *Formula Auditing* group on the *Formulas* tab includes the *Trace Precedents* and *Trace Dependents* buttons.
- A ***circular reference*** is an error that occurs when a formula includes the address of the formula.
- Occasionally errors are noted as you press a completion key and can be quickly corrected by accepting the suggested correction in the message window.

2.5 Work with *Statistical* and *Date & Time* functions (p. E2-127).

- Use the *Insert Function* dialog box to search for a function from a category or by a description of your task.
- The *Function Arguments* dialog box details required and optional arguments and helps you complete a function according to its syntax.
- The *MEDIAN* function calculates the value that represents the precise middle of a range.
- The *MODE* functions find the most common value (*MODE.SNGL*) or values (*MODE.MULT*) in a range.
- The *COUNT* function tallies the number of cells in a range but only includes cells with values.
- Use *COUNTA* to count any type of data and *COUNTBLANK* to count empty cells.
- The ***AutoCalculate*** feature displays numerical results such as *Sum*, *Average*, and *Count* on the *Status* bar for selected cells.

- Excel defaults to automatic calculation so that all formulas are recalculated as soon as you make an edit.
- The *Date & Time* category includes a *TODAY* function and a *NOW* function that display the current date and time.

2.6 Use functions from the *Financial*, *Logical*, and *Lookup & Reference* categories (p. E2-135).

- The *PMT* function from the *Financial* category calculates a constant payment amount for a loan.
- The *Logical* function *IF* evaluates a statement or condition and displays a particular result when the statement is true and another result when the condition is false.
- A *Lookup* function displays data from a list located in another part of the workbook.
- *XLOOKUP* searches for a value in one range and displays the match from another range.
- An ***array*** is a collection of values, which usually maps to a range in Excel.
- All versions of Excel include *VLOOKUP* (vertical) and *HLOOKUP* (horizontal) functions.

2.7 Work with *Text* functions (p. E2-150).

- *Text* functions are used to manage strings of text, values, or characters.
- The *TEXTJOIN* function joins a series of labels or other data using a single delimiter between each item.
- A ***delimiter*** is a character that separates data items.
- *CONCAT* joins or combines data strings with specified separators for each item.
- When you use a *Text* function to join data, you must keep the source data in an accessible location so that the function can execute as expected.

2.8 Build functions from the *Math & Trig* category (p. E2-152).

- The *ROUND* function adjusts a value up or down based on the number of decimal places.
- The *SUMIF* function includes cells in a total only if they meet a set ***criteria*** or condition.
- The *SUMPRODUCT* function multiplies corresponding cells from an array and then totals the results of each multiplication.

Check for Understanding

The SIMbook for this text (within your SIMnet account) provides the following resources for concept review:

- Multiple-choice questions
- Short answer questions
- Matching exercises

Guided Project 2-1

Courtyard Medical Plaza (CMP) has doctor offices, a pharmacy, X-ray and lab services, insurance and billing support, optometry and dental facilities, and more. You will complete an inventory worksheet for the pharmacy as well as insurance and payment data for the optometry group.
[Student Learning Outcomes 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8]

File Needed: ***CourtyardMedical-02.xlsx*** *(Student data files are available in the* Library *of your SIMnet account.)*
Completed Project File Name: ***[your initials] Excel 2-1.xlsx***

Skills Covered in This Project

- Build and copy formulas.
- Name cell ranges and use them in formulas.
- Use the *XLOOKUP* function.
- Use relative, mixed, and absolute cell references in formulas.
- Use formula auditing tools.
- Use the *PMT* and *SUMPRODUCT* functions.
- Use *MEDIAN*, *MODE*, and *COUNTA*.
- Display data using *TEXTJOIN*.
- Use *SUMIF*.
- Check results with *AutoCalculate*.
- Set mathematical order of operations.
- Use the *TODAY* function in a formula.

1. Open the ***CourtyardMedical-02 .xlsx*** workbook from your student data files and save it as [your initials] Excel 2-1.

2. Enter and copy a subtraction formula.
   a. Verify or click cell **E2** on the **Lookup_Data** worksheet. To calculate the dollar amount of the margin, subtract the cost from the retail price.
   b. Type an equals sign (=) to start the formula.
   c. Click cell **D2**, the retail price.
   d. Type a minus sign or hyphen (–) to subtract and click cell **C2**, the cost.
   e. Click the **Enter** button (check mark) in the *Formula* bar. The pointer stays in the formula cell. The margin for acetaminophen is $1.49.
   f. Double-click the **Fill pointer** to copy the formula in cell **E2** to cells **E3:E16**. The *Auto Fill Options* button appears near cell E16.
   g. Click the **Auto Fill Options** button and choose **Fill Without Formatting** (Figure 2-70). This option copies the formula without the single bottom border from cell E1 and removes the currency symbols.
   h. Format cells **E2:E16** as **Currency** from the *Number Format* drop-down list.

3. Enter and copy a division formula.
   a. Click cell **F2**. The margin percentage is the dollar margin divided by the cost.
   b. Type an equals sign (=) to start the formula.
   c. Click cell **E2**, the dollar amount of the margin.
   d. Type a forward slash or diagonal (/) to divide and click cell **C2**, the cost.

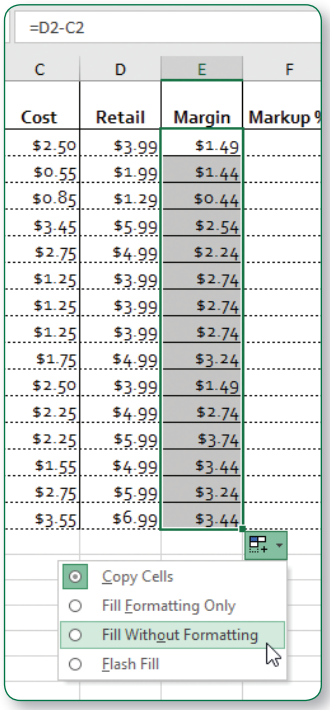


Figure 2-70 Copy without formatting to preserve borders

e. Click the **Enter** button (check mark) in the *Formula* bar. The result is 0.596 formatted as a *General* number.
f. Double-click the **Fill pointer** to copy the formula in cell **F2** to cells **F3:F16**. The *Auto Fill Options* button appears near cell F16.
g. Click the **Auto Fill Options** button and choose **Fill Without Formatting**.
h. Format cells **F2:F16** as **Percent Style** [*Home* tab, *Number* group]. The values are rounded to zero decimal places.

4. Name cell ranges.
   a. Select cells **C2:C16**. This named range will refer to the cost amounts.
   b. Click the **Name Box**.
   c. Type Cost in the *Name Box* and press **Enter**.
   d. Select cells **D1:F16** and click the **Create From Selection** button [*Formulas* tab, *Defined Names* group].
   e. Verify or select **Top row** in the dialog box and click **OK**.
   f. Select cells **H2:I5** and click the **Create From Selection** button [*Formulas* tab, *Defined Names* group].
   g. Verify or select **Left column** in the dialog box and click **OK**.
   h. Click the **arrow** with the *Name Box* to list the range names. The **Margin** range name ignores the **%** symbol in cell **F1**. The **Green_Cross** range name substituted an underscore for the space in the label in cell **H2** (Figure 2-71).
   i. Select cell **A1**.

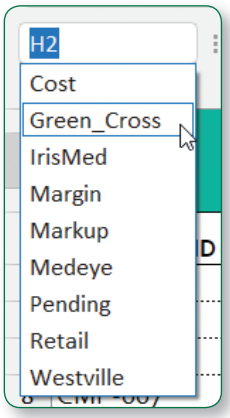


Figure 2-71 R ange names in the worksheet

5. Use *XLOOKUP* to display values. (If *XLOOKUP* is not available, build this formula **=VLOOKUP(A5,Lookup_Data!$A$2:$E$16,3,F ALSE)** in cell C5).
   a. Click the **Pharmacy** worksheet tab and select cell **C5**.
   b. Click the **Lookup & Reference** button [*Formulas* tab, *Function Library* group] and select **XLOOKUP**.
   c. Click the **Lookup_value** box if necessary and click cell **A5**. The ID in column A will be matched in the lookup array.
   d. Click the **Lookup_array** box. Prices are in the *Lookup_Data* sheet.
   e. Click the **Lookup_Data** sheet tab and select cells **A2:A16**.
   f. Press **F4 (FN+F4)** to make the reference absolute.
   g. Click the **Return_array** box. The focus returns to the **Pharmacy** sheet.
   h. Click the **Lookup_Data** sheet tab and select cells **C2:C16**. The range name is substituted (Figure 2-72).
   i. Leave the *If_not_found* argument empty.
   j. Leave the *Match_mode* argument empty. The default is an exact match.
   k. Click **OK**. The results display unformatted as 2.5.

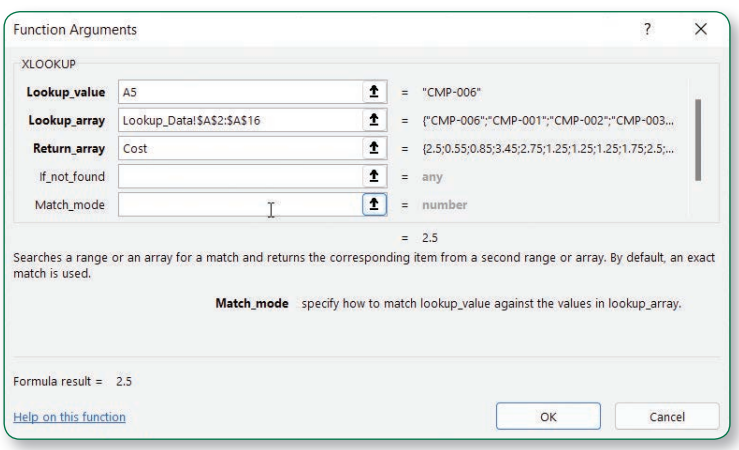


Figure 2-72 *XLOOKUP* and its arguments

6. Copy, audit, and edit an *XLOOKUP* function. (If you have used *VLOOKUP*, make the same corrections to the *lookup_value* argument. The *col_index_num* argument should be **4** for Retail and **5** for Margin.)
   a. Click and drag the **Fill pointer** for cell **C5** and copy the formula to cells **D5:E5**. A green error triangle and a standard error message #N/A displays in both cells (Figure 2-73).
   b. Select cell **D5** and click its **Trace Error** button to display the context menu. The value needed for the function is not available.

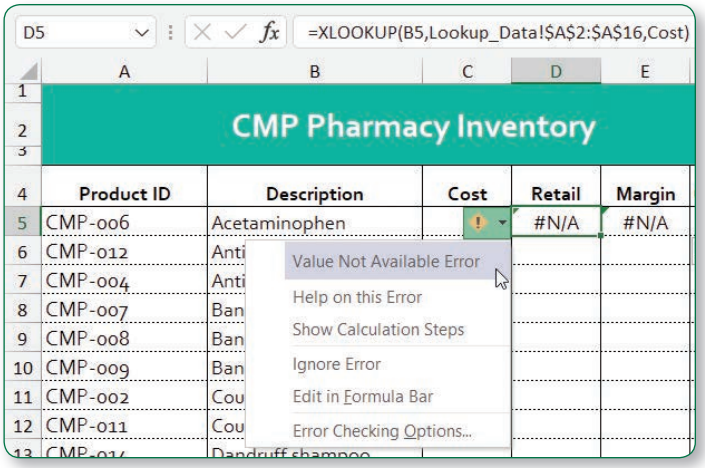


Figure 2-73 Error triangles and messages

   c. Click the **Trace Precedents** button [*Formulas* tab, *Formula Auditing* group]. The formula refers to cell **B5** (a label) and the range name on the **Lookup_Data** sheet. Both references contribute to the error.
   d. Click the **Remove Arrows** button [*Formulas* tab, *Formula Auditing* group].
   e. Select cell **C5** and click the *Formula* bar.
   f. Click between the **A** and the **5** to place the insertion point.
   g. Press **F4 (FN+F4)** to make the reference absolute.
   h. Press **F4 (FN+F4)** two times to make the mixed reference **$A5** (Figure 2-74).

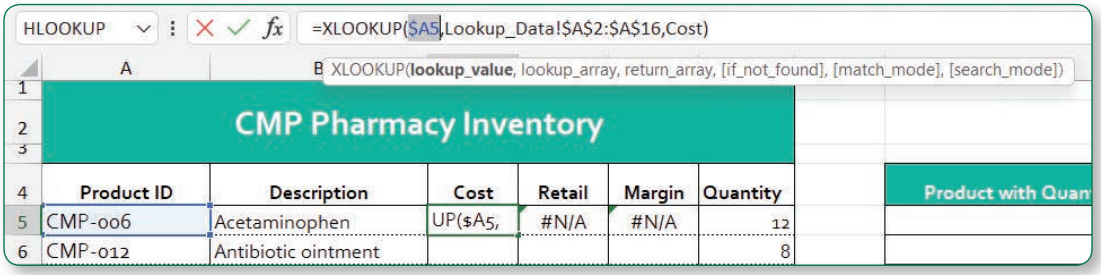


Figure 2-74 Edited reference to correct the formula

   i. Press **Enter** to complete the edit.
   j. Copy the formula in cell **C5** to cells **D5:E5** again. There are no error triangles, but the retail and margin amounts are not correct. They are the same as the cost. There is still something wrong.
   k. Select cell **D5**. The Cost range is an absolute reference but column **D** should refer to the Retail range. (In the *VLOOKUP* function, change the *col_index_num* arguments as noted in step 6.)
   l. Press **F2 (FN+F2)** to start **Edit** mode.
   m. Double-click **Cost** in the *ScreenTip* and press **F3 (FN+F3)** to open the *Paste Name* dialog box (Figure 2-75).

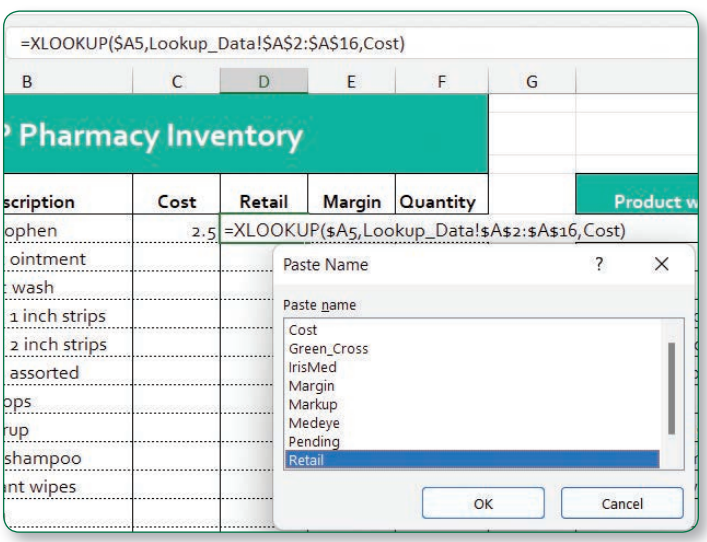


Figure 2-75 Replace the range name in the formula

n. Click the range name **Retail** in the dialog box, click **OK** to replace the name, and press **Enter**. The result is 3.99.
o. Select cell **D5** and click its **Trace Error** button. The formula is different from the formula in cell C5, but that is correct.
p. Select **Ignore Error**.
q. Select cell **E5** and replace the Cost range name with the Margin range name.
r. Select cells **C5:E5** and copy them to reach row **19**. If you use the *Fill* pointer, click the **AutoFill Options** button to ignore the formatting. If you use a *Copy* and *Paste* command, click the **Paste Options** button to copy only the formulas.
s. Format cells **C5:E19** as **Currency**.

7. Enter a *SUMPRODUCT* function to calculate inventory values.
   a. Click cell **C21**.
   b. Click the **Math & Trig** button [*Formulas* tab, *Function Library* group] and select **SUMPRODUCT**.
   c. Click the **Array1** box if necessary and select cells **C5:C19**.
   d. Click the **Array2** box and select cells **F5:F19**. Both arrays have the same dimension (Figure 2-76).
   e. Click **OK**. The result in cell C22 is 264.15. Each value in column C is multiplied by its corresponding value in column E, and those results are summed.

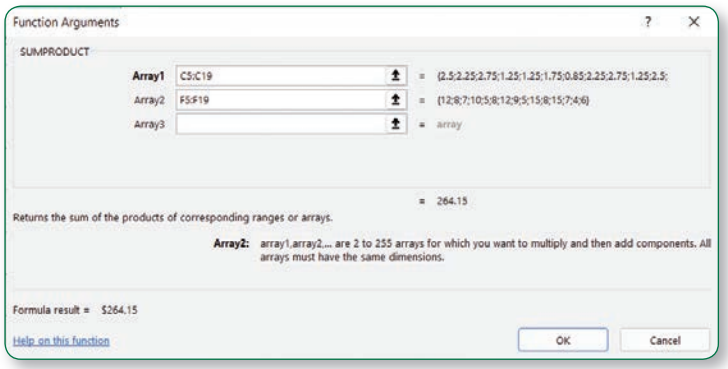


Figure 2-76 Two arrays for *SUMPRODUCT*

8. Type the *SUMPRODUCT* function.
   a. Click cell **C22**.
   b. Type =sump and press **Tab**. The first argument is *array1*.
   c. Select cells **D5:D19** and type a comma (,) to separate the arguments. The next argument is *array2*.
   d. Select cells **F5:F19** and press **Enter** (Figure 2-77). The result is 588.29.
   e. Format cells **C21:C22** as **Currency**.

9. Use *COUNTA*, *MEDIAN*, and *MODE*.
   a. Select cell **C25**.
   b. Type =cou and double-click **COUNTA** in the *Formula AutoComplete* list.
   c. Select cells **B5:B19** and press **Enter**. There are 15 product names.
   d. Select cell **C26**, click the **More Functions** button [*Formulas* tab, *Function Library* group], and point to **Statistical**.
   e. Find and click **MEDIAN** to open the *Function Arguments* dialog box.

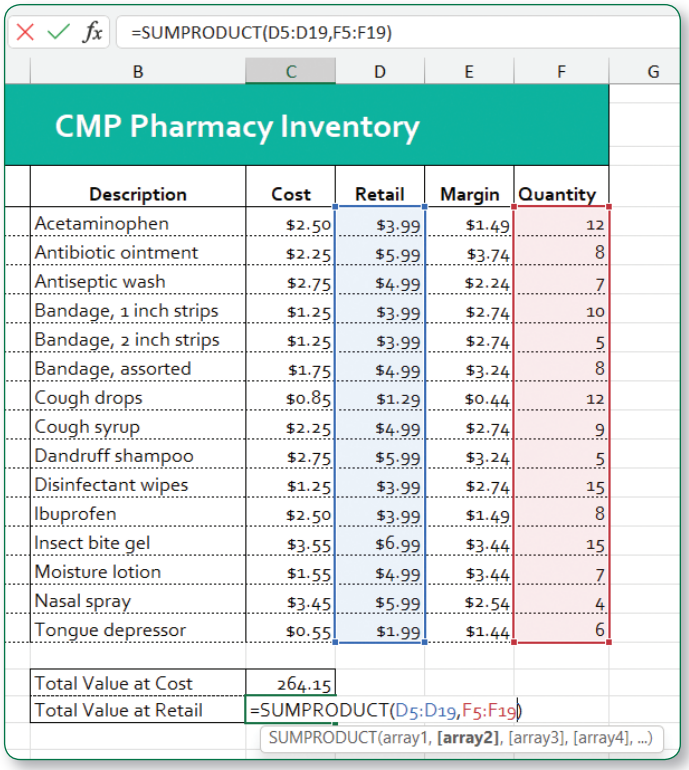


Figure 2-77 The arrays are highlighted in the sheet

f. Press **F3 (FN+F3)** to open the *Paste Names* dialog box.
g. Double-click **Retail** in the *Paste Names* dialog box to set it as the *Number1* argument.
h. Click **OK** in the *Function Arguments* dialog box.
i. Select cell **C27** and calculate the single mode value for costs.
j. Apply the **Currency** format to cells **C26:C27**.

10. Use *TEXTJOIN* to display data.
a. Select cell **H5**.
b. Click the **Text** button [*Formulas* tab, *Function Library* group] and select **TEXTJOIN**.
c. Click the **Delimiter** box and press the **Spacebar** three times.
d. Click the **Text1** box and select cell **B5**. The *Ignore_empty* box is blank.
e. Click the **Text2** box and select cell **F5**. Results for cell H5 display in the *Function Arguments* dialog box (Figure 2-78).

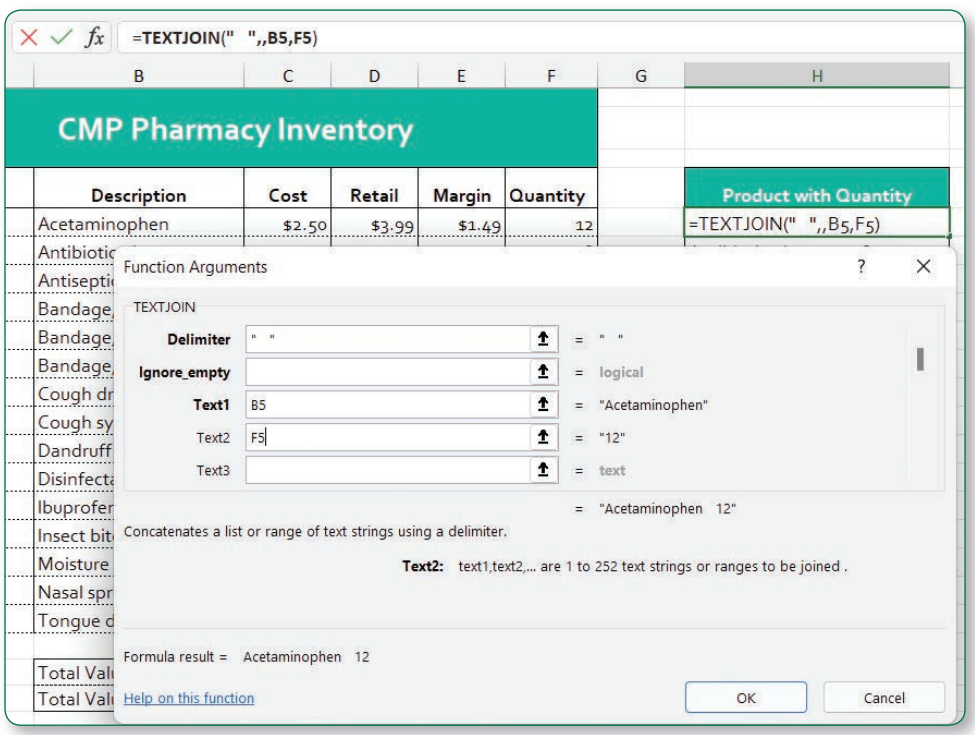


Figure 2-78 Arguments for *TEXTJOIN*

f. Click **OK**.
g. Copy the formula to row **19**. Double-clicking the **Fill pointer** will not copy the formula because the column to the left is empty; you can click and drag the **Fill pointer**.
h. Press **Ctrl+Home**.

11. Name a range and calculate totals using a subtraction formula and *SUMIF*.
a. Click the **Optometry** sheet tab and select cells **G5**:**G24**.
b. Click the **Name Box** and name the range Pending.
c. Select cell **G5** and type = to start the formula to subtract the patient's share from the billed amount.
d. Click cell **E5**, the billed amount.

e. Type –, click cell **F5**, and press **Enter**.
f. Copy the formula in cell **G5** to cells **G6:G24** without formatting to maintain the fill color.
g. Select cell **D27**.
h. Click the **Math & Trig** button [*Formulas* tab, *Function Library* group] and select **SUMIF**.
i. Click the **Range** box, select cells **C5:C24**, and press **F4 (FN+F4)** to make the reference absolute.
j. Click the **Criteria** box and select cell **C27** to use a relative reference to the company name.
k. Click the **Sum_range** text box and select cells **G5:G24**. The range name is substituted and is an absolute reference (Figure 2-79).
l. Click **OK**. The result is 1805, the amount pending from Green Cross.

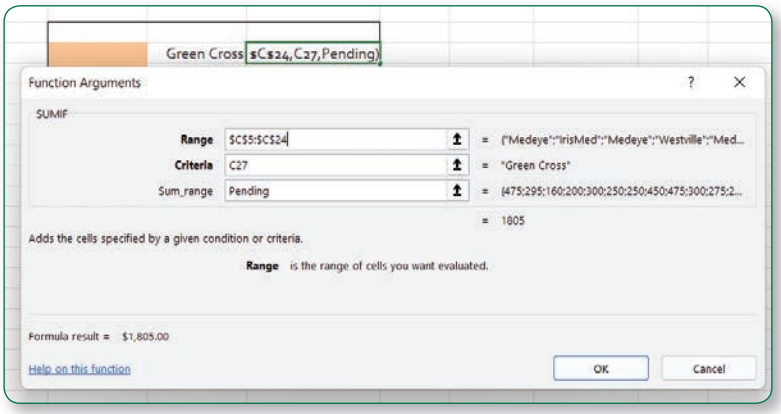


Figure 2-79 The *SUMIF Function Arguments* dialog box

12. Verify results with *AutoCalculate*.
    a. Select cells **G13:G15**.
    b. Press **Ctrl** and select cells **G20:G21**. These are pending amounts for Green Cross insurance.
    c. Compare the *SUM* in the *Status* bar with the result in cell **D27** (Figure 2-80).

13. Copy the *SUMIF* function with a relative reference.
    a. Select cell **D27**.
    b. Drag the **Fill pointer** to copy the formula in cell **D27** to cells **D28:D30**.
    c. Select cell **D28**. The relative reference is updated to cell C28 in the copied formula.
    d. Format cells **D27:D30** as **Currency** from the *Number Format* drop-down list.
    e. Press **Ctrl+Home**.

14. Unhide a column and set order of operations in a formula.
    a. Click the **Insurance** sheet tab. Column E is hidden.
    b. Point to the column **D** heading and click and drag to select columns **D:F**.
    c. Right-click either column heading and choose **Unhide**.
    d. Select cell **E5**. Column E uses *VLOOKUP* to display the service fee from the **Lookup_Data** sheet.

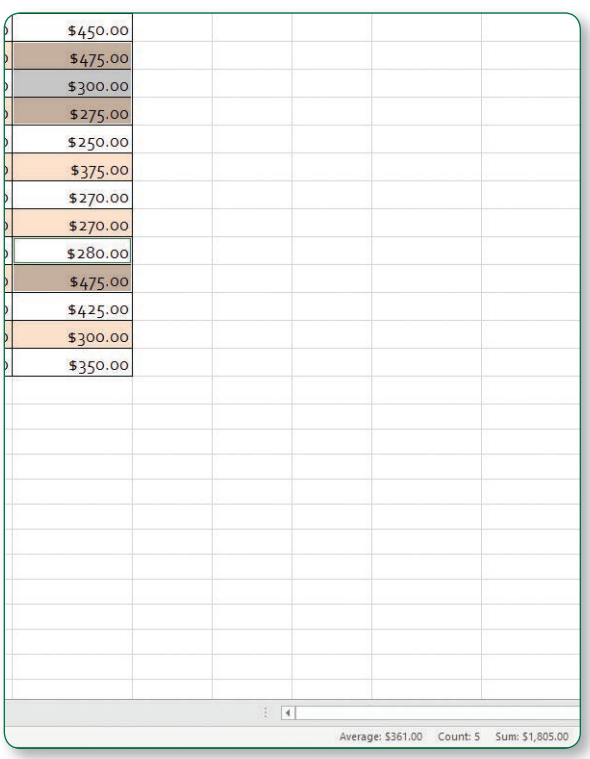


Figure 2-80 *AutoCalculate* results in *Status* bar

e. Select cell **F5**. The total with service charge is 1 plus the service fee multiplied by the amount.
f. Type = and click cell **D5**.
g. Type *(immediately after **D5**.
h. Type 1+ immediately after the left parenthesis.
i. Click cell **E5**. This part of the formula will be calculated first (Figure 2-81).
j. Press **Enter**. The missing parenthesis is not automatically supplied (Figure 2-82).
k. Click **Yes** to accept the suggested correction. The result is $536.29.
l. Copy the formula to cells **F6:F24**.

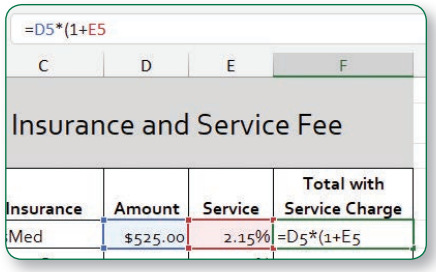


Figure 2-81 Set the order of the calculations in a formula

15. Use the *TODAY* function in a copied formula.
a. Select cell **B5**. It has the *TODAY* function.
b. Select cell **B6**. The formula adds 1 to today's date and displays tomorrow's date.
c. Copy cell **B6** to cells **B7:B24**. One day is added to each previous day. Your results will not match the figures in this text.
d. Press **Ctrl+Home**.

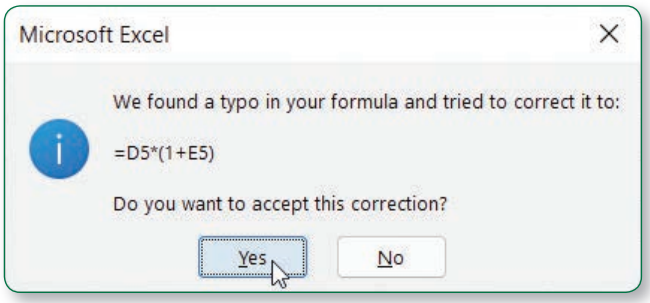


Figure 2-82 Formula correction message window

16. Use *PMT* to calculate patient payments.
a. Click the **CMP Financial** sheet tab and select cell **B5**.
b. Click the **Financial** button [*Formulas* tab, *Function Library* group] and select **PMT**.
c. Click the **Rate** box if necessary and type 2.75%/12. The rate is given in the label in cell B4, but you must type the value in this case. Divide a yearly rate by 12 for monthly payments.
d. Click the **Nper** box and type 24. The two-year plan is indicated in the label in cell A3. Two-year financing means 24 monthly payments.
e. Click the **Pv** box and click cell **A5**, the amount of a loan.
f. Press **F4 (FN+F4)** three times to display the mixed reference **$A5**. This will allow the formula to be copied down to other rows but always refer to column A.
g. Click the **Type** box and type 1 for payment at the beginning of the month. The *Fv* argument is blank (Figure 2-83).

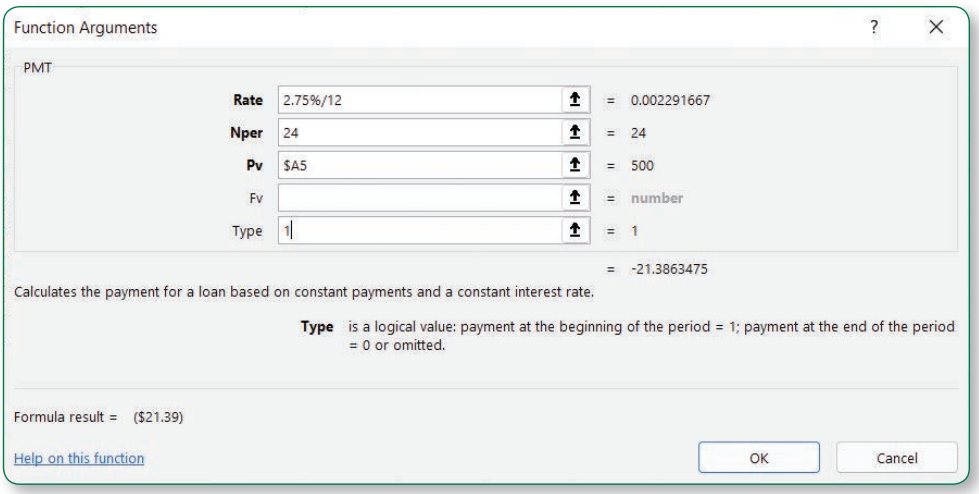


Figure 2-83 *PMT* arguments

h. Click **OK**. The payment for financing $500 is ($21.39). A value in red is a negative value.
i. Copy the formula to cells **B6:B10**. The reference to cell A5 is relative, and the *rate* and *nper* values that you typed are absolute.

17. Copy and edit a *PMT* function.
    a. Copy the formula in cell **B5** to cell **C5**.
    b. Select cell **C5** and click the **Insert Function** button in the *Formula* bar. The *Function Arguments* dialog box opens with the copied formula.
    c. Click the **Rate** text box and edit the calculation to 3.25%/12.
    d. Click **OK**. The payment for financing $500 at 3.25% is ($21.49).
    e. Copy the formula to cells **C6:C10**.
    f. Press **Ctrl+Home**.

18. Save and close the workbook (Figure 2-84).

Product ID	Description	Cost	Retail	Margin	Markup %
CMP-006	Acetaminophen	$2.50	$3.99	$1.49	60%
CMP-001	Tongue depressor	$0.55	$1.99	$1.44	262%
CMP-002	Cough drops	$0.85	$1.29	$0.44	52%
CMP-003	Nasal spray	$3.45	$5.99	$2.54	74%
CMP-004	Antiseptic wash	$2.75	$4.99	$2.24	81%
CMP-005	Disinfectant wipes	$1.25	$3.99	$2.74	219%
CMP-007	Bandage, 1 inch strips	$1.25	$3.99	$2.74	219%
CMP-008	Bandage, 2 inch strips	$1.25	$3.99	$2.74	219%
CMP-009	Bandage, assorted	$1.75	$4.99	$3.24	185%
CMP-010	Ibuprofen	$2.50	$3.99	$1.49	60%
CMP-011	Cough syrup	$2.25	$4.99	$2.74	122%
CMP-012	Antibiotic ointment	$2.25	$5.99	$3.74	166%
CMP-013	Moisture lotion	$1.55	$4.99	$3.44	222%
CMP-014	Dandruff shampoo	$2.75	$5.99	$3.24	118%
CMP-015	Insect bite gel	$3.55	$6.99	$3.44	97%

CMP Optometry

ID	Last Visit	Insurance	Prescription Type	Billed	Patient Share	Insurance Pending
01	3/3/2021	Medeye	Gas Permeable	$525.00	$50.00	$475.00
02	5/6/2022	IrisMed	Soft	$345.00	$50.00	$295.00
03	8/12/2021	Medeye	Glasses	$235.00	$75.00	$160.00
04	4/4/2021	Westville	Glasses	$275.00	$75.00	$200.00
05	7/8/2021	Medeye	Soft	$350.00	$50.00	$300.00
06	2/1/2020	IrisMed	Soft	$350.00	$100.00	$250.00
07	3/7/2020	IrisMed	Soft	$350.00	$100.00	$250.00
08	12/3/2021	Westville	Gas Permeable	$525.00	$75.00	$450.00
09	9/7/2021	Green Cross	Gas Permeable	$525.00	$50.00	$475.00
10	8/15/2020	Green Cross	Soft	$375.00	$75.00	$300.00
OP0011	11/14/2021	Green Cross	Soft	$375.00	$100.00	$275.00
OP0012	6/8/2020	IrisMed	Soft	$350.00	$100.00	$250.00
OP0013	5/3/2021	Medeye	Glasses	$475.00	$100.00	$375.00
OP0014	4/18/2021	IrisMed	Soft	$345.00	$75.00	$270.00
OP0015	3/17/2021	IrisMed	Soft	$345.00	$75.00	$270.00
OP0016	2/3/2020	Green Cross	Soft	$355.00	$75.00	$280.00
OP0017	4/12/2020	Green Cross	Gas Permeable	$525.00	$50.00	$475.00
OP0018	3/21/2021	Westville	Gas Permeable	$475.00	$50.00	$425.00
OP0019	2/18/2020	Westville	Soft	$375.00	$75.00	$300.00
OP0020	10/5/2021	Medeye	Glasses	$450.00	$100.00	$350.00

Total Pending by Company		
	Green Cross	$1,805.00
	IrisMed	$1,585.00
	Medeye	$1,660.00
	Westville	$1,375.00

CMP Pharmacy Inventory

Product ID	Description	Cost	Retail	Margin	Quantity
CMP-006	Acetaminophen	$2.50	$3.99	$1.49	12
CMP-012	Antibiotic ointment	$2.25	$5.99	$3.74	8
CMP-004	Antiseptic wash	$2.75	$4.99	$2.24	7
CMP-007	Bandage, 1 inch strips	$1.25	$3.99	$2.74	10
CMP-008	Bandage, 2 inch strips	$1.25	$3.99	$2.74	5
CMP-009	Bandage, assorted	$1.75	$4.99	$3.24	8
CMP-002	Cough drops	$0.85	$1.29	$0.44	12
CMP-011	Cough syrup	$2.25	$4.99	$2.74	9
CMP-014	Dandruff shampoo	$2.75	$5.99	$3.24	5
CMP-005	Disinfectant wipes	$1.25	$3.99	$2.74	15
CMP-010	Ibuprofen	$2.50	$3.99	$1.49	8
CMP-015	Insect bite gel	$3.55	$6.99	$3.44	15
CMP-013	Moisture lotion	$1.55	$4.99	$3.44	7
CMP-003	Nasal spray	$3.45	$5.99	$2.54	4
CMP-001	Tongue depressor	$0.55	$1.99	$1.44	6

Product with Quantity
Acetaminophen 12
Antibiotic ointment 8
Antiseptic wash 7
Bandage, 1 inch strips 10
Bandage, 2 inch strips 5
Bandage, assorted 8
Cough drops 12
Cough syrup 9
Dandruff shampoo 5
Disinfectant wipes 15
Ibuprofen 8
Insect bite gel 15
Moisture lotion 7
Nasal spray 4
Tongue depressor 6

Total Value at Cost	$264.15
Total Value at Retail	$588.29

Number of products	15
Median retail price	$4.99
Most common cost	$1.25

Figure 2-84 Excel 2-1 completed

CMP Optometry

Billed Insurance and Service Fee

Bill Date	Insurance	Amount	Service	Total with Service Charge
2/2/2022	IrisMed	$525.00	2.15%	$536.29
2/3/2022	Green Cross	$345.00	2.00%	$351.90
2/4/2022	Medeye	$235.00	1.75%	$239.11
2/5/2022	IrisMed	$275.00	2.15%	$280.91
2/6/2022	Westville	$350.00	2.00%	$357.00
2/7/2022	Westville	$350.00	2.00%	$357.00
2/8/2022	IrisMed	$350.00	2.15%	$357.53
2/9/2022	Medeye	$525.00	1.75%	$534.19
2/10/2022	Medeye	$525.00	1.75%	$534.19
2/11/2022	Medeye	$375.00	1.75%	$381.56
2/12/2022	Medeye	$375.00	1.75%	$381.56
2/13/2022	Green Cross	$350.00	2.00%	$357.00
2/14/2022	Westville	$475.00	2.00%	$484.50
2/15/2022	IrisMed	$345.00	2.15%	$352.42
2/16/2022	Green Cross	$345.00	2.00%	$351.90
2/17/2022	Westville	$355.00	2.00%	$362.10
2/18/2022	IrisMed	$525.00	2.15%	$536.29
2/19/2022	Green Cross	$475.00	2.00%	$484.50
2/20/2022	IrisMed	$375.00	2.15%	$383.06
2/21/2022	Green Cross	$450.00	2.00%	$459.00

CMP Financial

Two-Year Patient Payment Plan

Amount Financed	Payment @ 2.75%	Payment @ 3.25%
$500.00	($21.39)	($21.49)
$600.00	($25.66)	($25.79)
$700.00	($29.94)	($30.08)
$800.00	($34.22)	($34.38)
$900.00	($38.50)	($38.68)
$1,000.00	($42.77)	($42.98)

Figure 2-84 Excel 2-1 completed

Guided Project 2-2

Hamilton Civic Center (HCC) is a community center that provides services and activities for residents. The facility has classrooms, a dance studio, and municipal offices. In this project, you complete tasks related to monthly programs and develop a break even analysis for the fee structure.
[Student Learning Outcomes 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8]

File Needed: ***HamiltonCC-02.xlsx*** *(Student data files are available in the* Library *of your SIMnet account.)*
Completed Project File Name: ***[your initials] Excel 2-2.xlsx***

Skills Covered in This Project

- Name cell ranges.
- Use *XLOOKUP*.
- Create and copy formulas.
- Use relative and absolute references.
- Set mathematical order of operations.
- Use *CONCAT* to display a sentence.
- Trace dependents and precedents.
- Create an *IF* function.
- Create a *SUMIF* function.
- Use the *NOW* function.

1. Open the ***HamiltonCC-02.xlsx*** workbook from your student data files and save it as [your initials] Excel 2-2.

2. Name cell ranges.
   a. Select the **Programs** sheet, select cells **B6:B14**, and click the **Name Box**.
   b. Type ProNames in the *Name Box* and press **Enter**.
   c. Click the **Fees List** sheet tab.
   d. Select cells **A2:B10** and click the **Name Box**.
   e. Type ProFees in the *Name Box* and press **Enter**.

3. Use *XLOOKUP* to display values. (If *XLOOKUP* is not available, build this formula **=VLOOKUP(B6,ProFees,2,FALSE)** in cell C6).
   a. Click the **Programs** worksheet tab and select cell **C6**.
   b. Click the **Lookup & Reference** button [*Formulas* tab, *Function Library* group] and select **XLOOKUP**.
   c. Click the **Lookup_value** box and click cell **B6**. The label in column B will be matched in the lookup array.
   d. Click the **Lookup_array** box. Program names are in the *Fees List* sheet.
   e. Click the **Fees List** sheet tab and select cells **A2:A10**.
   f. Press **F4 (FN+F4)** to make the reference absolute.
   g. Click the **Return_array** box. The focus returns to the **Programs** sheet.
   h. Click the **Fees List** sheet tab and select cells **B2:B10**.
   i. Press **F4 (FN+F4)** to make the reference absolute.
   j. Leave the remaining arguments blank and click **OK** (Figure 2-85).
   k. Double-click the **Fill pointer** for cell **C6**. The formula is copied to row 15.
   l. Select cell **C15** and press **Delete**. You should not total the program fees.

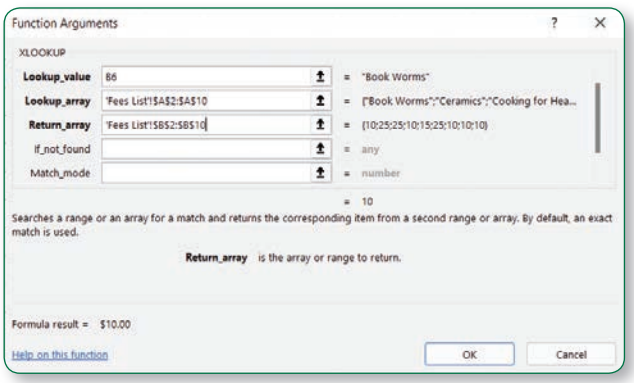


Figure 2-85 *XLOOKUP* and its arguments

4. Calculate the totals.
   a. Select cell **G6** and click the **AutoSum** button [*Formulas* tab, *Function Library* group].
   b. Select cells **D6:F6** as the range and press **Enter**. This is the total number of sessions.
   c. Copy the *SUM* formula to cells **G7:G14**.
   d. Select cells **D15:G15** and click the **AutoSum** button [*Formulas* tab, *Function Library* group].
   e. Select cell **L7** and type = to start the formula.
   f. Click cell **C6**, type * to multiply, click cell **G6**, and press **Enter** (Figure 2-86).
   g. Copy the multiplication formula to cells **L8:L15**.
   h. Select cell **L16** and double-click the **AutoSum** button [*Formulas* tab, *Function Library* group].

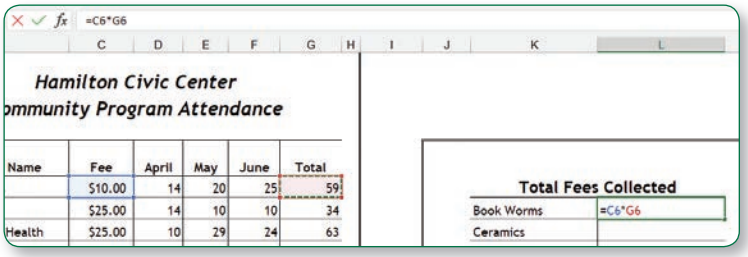


Figure 2-86 Multiplication formula

5. Insert the *NOW* function.
   a. Select cell **B19**, type =now, and press **Tab**.
   b. Press **Enter** to insert the date and time.
   c. Select cell **B19** and open the *Format Cells* dialog box.
   d. Click the **Number** tab and click **Time** in the *Category* list.
   e. Find and click the *Type* that displays the date as *mm/dd/yy* and the time using *AM/PM* (Figure 2-87).
   f. Click **OK**. Your results will display the current date and time.

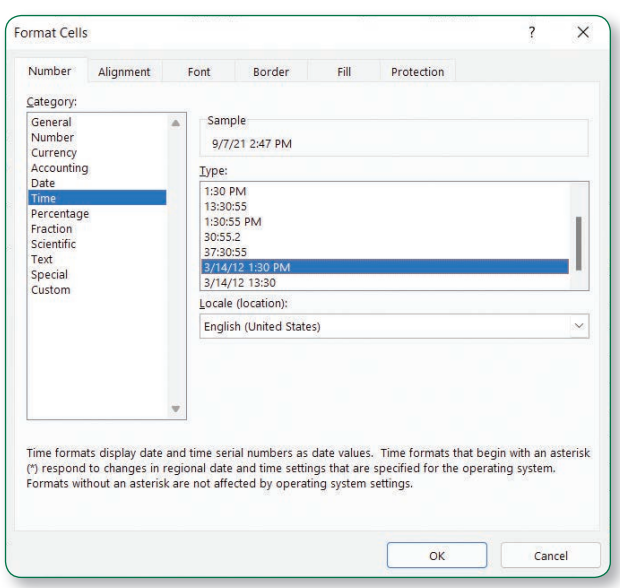


Figure 2-87 *Time* category in the *Format Cells* dialog box

6. Use *CONCAT* to display a sentence.
   a. Click the **CONCAT** sheet tab and select cell **B6**.
   b. Click the **Text** button [*Formulas* tab, *Function Library* group] and select **CONCAT**.
   c. Click the **Text1** box if necessary and select cell **A6**.
   d. Click the **Text2** box.
   e. Press the **Spacebar**, type had, and press the **Spacebar**. This will display the word "had" with a space before and after.
   f. Click the **Text3** box.
   g. Click the **Programs** sheet tab and select cell **G6**. This will display the total for the program.
   h. Click the **Text4** box.
   i. Press the **Spacebar** and type participants. including the period (Figure 2-88). This provides a space after the total from cell G6 and the final word.
   j. Click **OK**.
   k. Copy the formula to cells **B7:B14** and *AutoFit* the column.
   l. Select cell **B14** and apply **Thick Bottom Border**.
   m. Press **Ctrl+Home**.

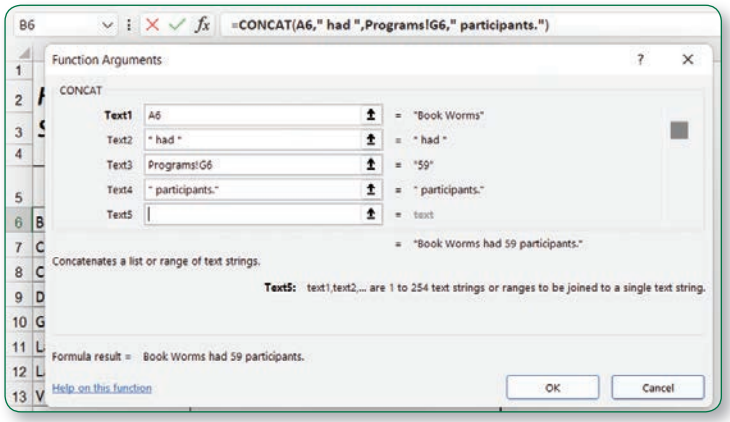


Figure 2-88 Arguments for *CONCAT*

7. Trace precedents and dependents.
   a. Click the **Fees List** sheet tab and select cell **A2**.
   b. Click the **Trace Dependents** button [*Formulas* tab, *Formula Auditing* group]. Dependent cells are on another sheet.
   c. Select cell **B2** and click the **Trace Dependents** button [*Formulas* tab, *Formula Auditing* group] again. All the data on this sheet are used in cells on other sheets in the workbook (Figure 2-89).

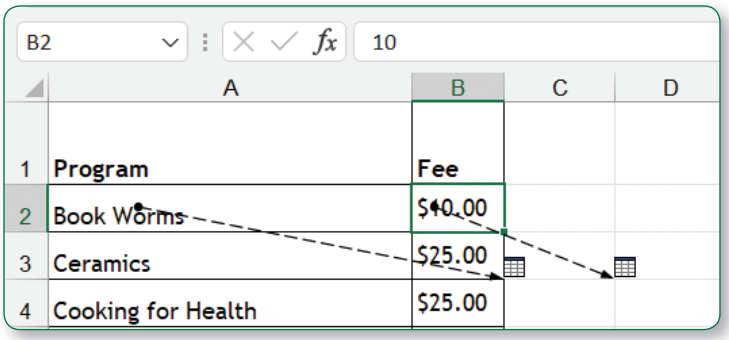


Figure 2-89 Dependent cells are in another worksheet

   d. Click the **Remove Arrows** button [*Formulas* tab, *Formula Auditing* group].
   e. Click the **Programs** sheet tab and select cell **C6**.
   f. Click the **Trace Precedents** button [*Formulas* tab, *Formula Auditing* group].
   g. Select cell **L7** and click the **Trace Precedents** button [*Formulas* tab, *Formula Auditing* group]
   h. Click the **Remove Arrows** button [*Formulas* tab, *Formula Auditing* group].

8. Build multiplication and subtraction formulas.
   a. Select the **ProgramBE** sheet and click cell **B11**.
   b. Type =, select cell **C6**, and press **Enter**. This is a reference to the proposed fee.
   c. Select cell **C11** and type = to start a multiplication formula.
   d. Click cell **C6**, type * to multiply, click cell **C7**, and press **Enter**. With a $15 program fee and 250 participants, total fee receipts are $3,750.
   e. Select cell **C12** and type = to start another multiplication formula.
   f. Click cell **B12**, type *, click cell **C7**, and press **Enter**. Cell **B12** is a variable cost of $5 for each program session ($1,250 for 250 participants).
   g. Select cell **B13**, type =, click cell **B11**, type − to subtract, click cell **B12**, and press **Enter**. There is a $10 surplus per participant at this fee.
   h. Copy the formula in cell **B13** to cell **C13**. This is the total surplus for 250 participants.
   i. Select cell **C15**. The total surplus or deficit is the total receipts minus the total variable costs minus the fixed costs.
   j. Type =, click cell **C11**, type − to subtract, click cell **C12**, type − again, click cell **C14**, and press **Enter**. This is a break even point because the receipts cover the costs with no surplus or deficit.

9. Set the order of operations in a formula.
   a. Select cell **C17**. The formula to calculate a break even amount is fixed costs divided by the fee minus the variable cost.
   b. Type =, click cell **C14**, and type / for division.
   c. Type (for the opening parenthesis. This forces the subtraction to be carried out first.
   d. Click cell **B11**, type −, and click cell **B12**.
   e. Type) for the closing parenthesis (Figure 2-90).
   f. Press **Enter**. The result is 250 which matches the results shown in the rows above.

	Per Participant	Total at This Level
	$15	$3,750
st	$5	$1,250
	$10	$2,500
ts		$2,500
		$0
		=C14/(B11-B12)

Figure 2-90 Subtraction done before division

10. Use absolute references in formulas.
   a. Select cell **E11**.
   b. Type 100, press **Enter**, and type 150 in cell **E12**. This sets a pattern or series.
   c. Fill the values to reach **550** in cell **E20**.
   d. Select cell **F11**. The formula multiplies the fee in cell B11 by the number of participants in cell E11.
   e. Type = and click cell **E11**.
   f. Type * to multiply, click cell **B11**. This should be an absolute reference.
   g. Press **F4 (FN+F4)** and press **Enter**.
   h. Select cell **G11**, type =, and click cell **C14** (Figure 2-91).
   i. Press **F4 (FN+F4)** and press **Enter**. There is no arithmetic in this column, just a reference to the amount in cell C14.

Fees Generated	Fixed Costs
=E11*$B$11	=$C$14

Figure 2-91 Absolute references

11. Set the order of operations and use absolute references.
   a. Select cell **H11**, type =, and click cell **G11**. Since fixed costs will repeat down column G, this can be left as a relative reference.
   b. Type + to add the total variable costs (instructor and materials).
   c. Type (for the opening parenthesis.
   d. Click cell **B12** and press **F4 (FN+F4)** to make an absolute reference. The instructor/material cost is always in cell B12.
   e. Type * to multiply and click cell **E11**, the number of participants.

f. Type) for the closing parenthesis (Figure 2-92) and press **Enter**.

Per Participant	Total at This Level		Participants	Fees Generated	Fixed Costs	Total Fixed + Instructor Cost	Surpl or Defic
$15	$3,750		100	$1,500	$2,500	=G11+($B$12*E11)	
$5	$1,250		150				
$10	$2,500		200				
	$2,500		250				

Figure 2-92 Absolute references and ordered operations

g. Select cell **I11**, type =, click cell **F11**, total receipts at the suggested fee.
h. Type − to subtract and click cell **H11**. Fees received minus total costs equals the surplus or deficit.
i. Press **Enter**. The result is −$1,500 at this fee with 100 participants.
j. Select cells **F11:I11** and copy them to complete the table. Confirm that the table calculates the same results for 250 participants as shown in column C.
k. Select cell **C6** and change the fee to $30. The break even point at this rate is 100 participants with no surplus or deficit.
l. Press **Ctrl+Home**.

12. Create an *IF* function to calculate a fee based on age.
a. Click the **Day Care** sheet tab and select cell **C4**.
b. Click the **Logical** button [*Formulas* tab, *Function Library* group] and select **IF**.
c. Click the **Logical_test** box and click cell **B4**.
d. Type >=4 to test if the child is 4 years old or greater.
e. Click the **Value_if_true** box and click cell **F12**. The fee for a child 4 years old or greater is $18.
f. Press **F4** (**FN+F4**) to make the reference absolute.
g. Click the **Value_if_false** box and click cell **F11**. If the child is not 4 years old or greater, the higher fee applies.
h. Press **F4** (**FN+F4**) to make the reference absolute (Figure 2-93).
i. Click **OK**. The fee for the first ID is 18.
j. Format the result as **Currency**.
k. Copy the formula to row **23**.
l. Repair any borders that were changed from your copy command.

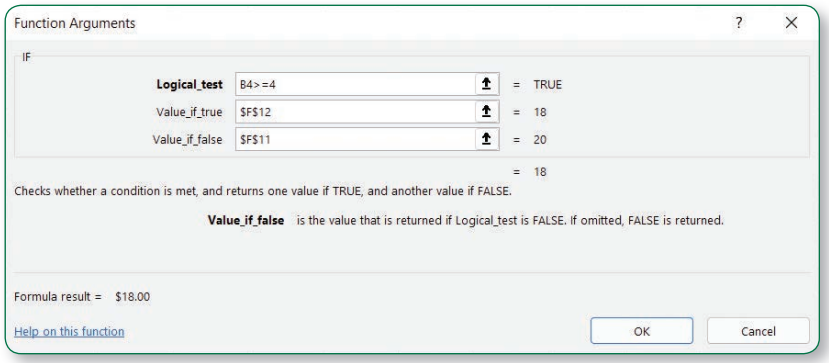


Figure 2-93 *IF* function to determine the fee

13. Build a *SUMIF* formula with absolute and relative references.
a. Select cell **F5** on the **Day Care** sheet.
b. Click the **Recently Used** button [*Formulas* tab, *Function Library* group].
c. Look for and choose **SUMIF**. (If you do not see *SUMIF* in the list, click the **Math & Trig** button to find and select **SUMIF**.)
d. Click the **Range** box and select cells **B4:B23**, the range that will be evaluated.
e. Press **F4** (**FN+F4**) to make the cell references absolute.

f. Click the **Criteria** box and type <4 to include those who are less than 4 years old. This is a constant and is an absolute reference.
g. Click the **Sum_range** box and select cells **C4:C23**, the values to be summed.
h. Press **F4** (**FN+F4**) to make the references absolute (Figure 2-94).
i. Click **OK**. The result is $240.

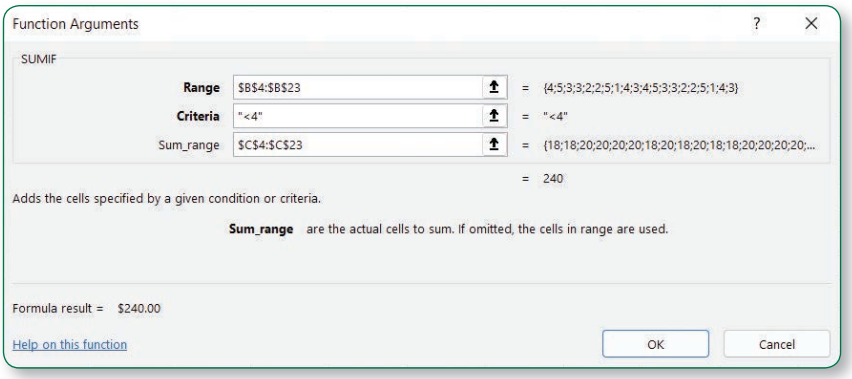
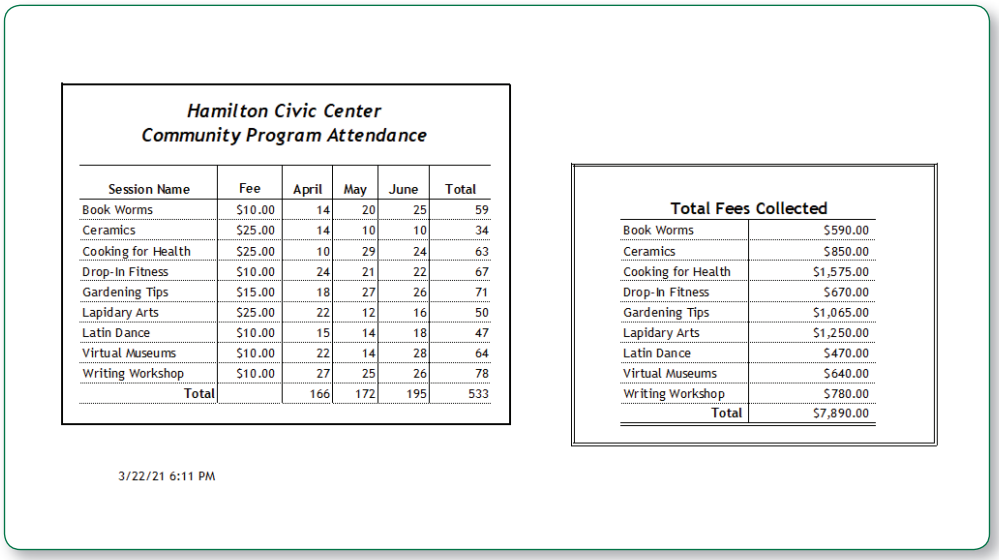


Figure 2-94 *SUMIF* arguments

14. Copy and edit a formula.
    a. Copy the formula in cell **F5** to cell **F6**.
    b. Select cell **F6** and click the **Insert Function** button in the *Formula* bar.
    c. Click the **Criteria** box and change the **<** symbol to >= to indicate equal to or greater than 4. Be careful to preserve the **4** and the quotation marks.
    d. Click **OK**.
    e. Press **Ctrl+Home**.
15. Save and close the workbook (Figure 2-95).



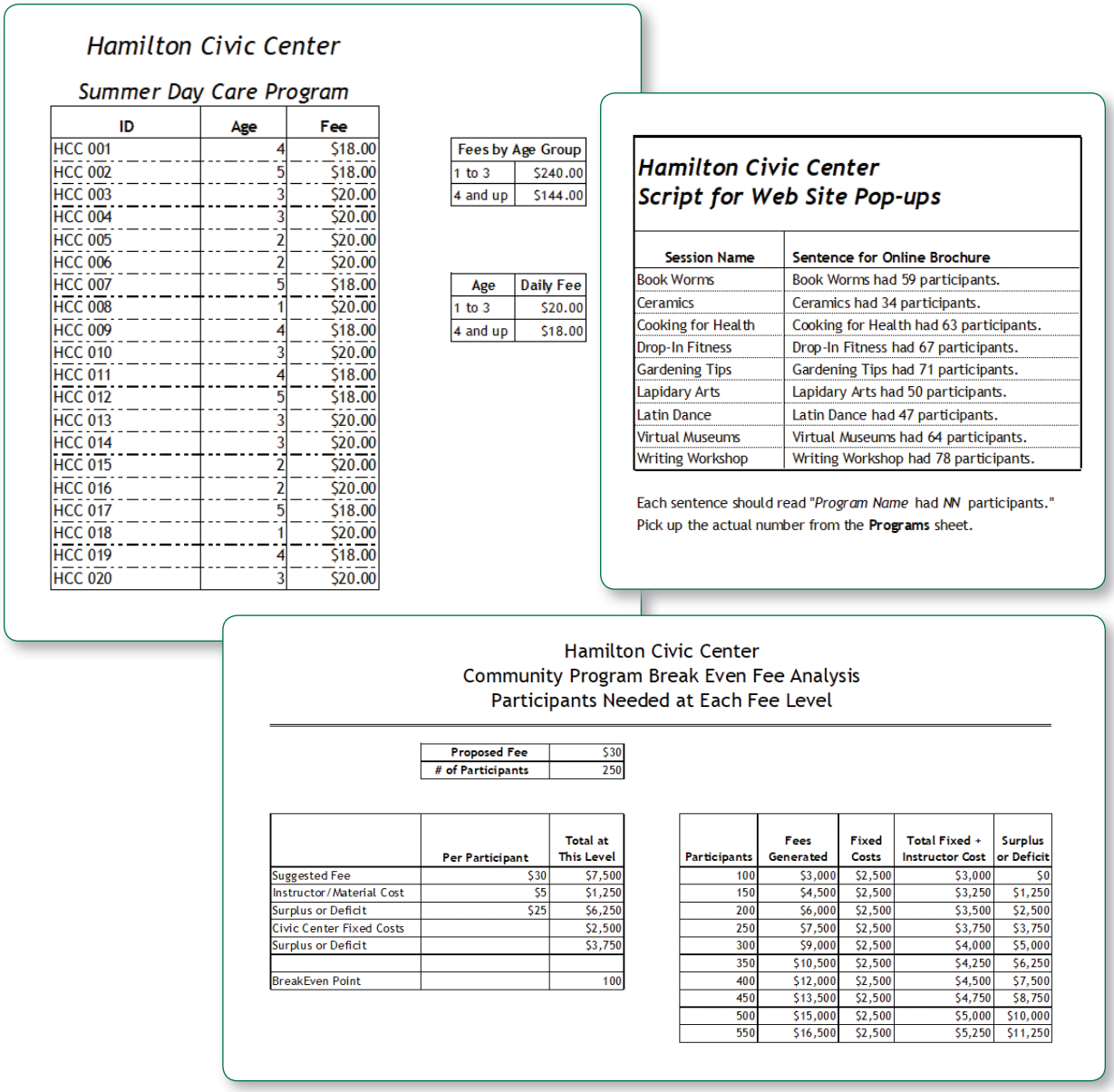
Hamilton Civic Center
Community Program Attendance

Session Name	Fee	April	May	June	Total
Book Worms	$10.00	14	20	25	59
Ceramics	$25.00	14	10	10	34
Cooking for Health	$25.00	10	29	24	63
Drop-In Fitness	$10.00	24	21	22	67
Gardening Tips	$15.00	18	27	26	71
Lapidary Arts	$25.00	22	12	16	50
Latin Dance	$10.00	15	14	18	47
Virtual Museums	$10.00	22	14	28	64
Writing Workshop	$10.00	27	25	26	78
Total		166	172	195	533

3/22/21 6:11 PM

Total Fees Collected	
Book Worms	$590.00
Ceramics	$850.00
Cooking for Health	$1,575.00
Drop-In Fitness	$670.00
Gardening Tips	$1,065.00
Lapidary Arts	$1,250.00
Latin Dance	$470.00
Virtual Museums	$640.00
Writing Workshop	$780.00
Total	$7,890.00

Figure 2-95 Excel 2-2 completed



Hamilton Civic Center

Summer Day Care Program

ID	Age	Fee
HCC 001	4	$18.00
HCC 002	5	$18.00
HCC 003	3	$20.00
HCC 004	3	$20.00
HCC 005	2	$20.00
HCC 006	2	$20.00
HCC 007	5	$18.00
HCC 008	1	$20.00
HCC 009	4	$18.00
HCC 010	3	$20.00
HCC 011	4	$18.00
HCC 012	5	$18.00
HCC 013	3	$20.00
HCC 014	3	$20.00
HCC 015	2	$20.00
HCC 016	2	$20.00
HCC 017	5	$18.00
HCC 018	1	$20.00
HCC 019	4	$18.00
HCC 020	3	$20.00

Fees by Age Group	
1 to 3	$240.00
4 and up	$144.00

Age	Daily Fee
1 to 3	$20.00
4 and up	$18.00

Hamilton Civic Center
Script for Web Site Pop-ups

Session Name	Sentence for Online Brochure
Book Worms	Book Worms had 59 participants.
Ceramics	Ceramics had 34 participants.
Cooking for Health	Cooking for Health had 63 participants.
Drop-In Fitness	Drop-In Fitness had 67 participants.
Gardening Tips	Gardening Tips had 71 participants.
Lapidary Arts	Lapidary Arts had 50 participants.
Latin Dance	Latin Dance had 47 participants.
Virtual Museums	Virtual Museums had 64 participants.
Writing Workshop	Writing Workshop had 78 participants.

Each sentence should read "*Program Name* had *NN* participants."
Pick up the actual number from the **Programs** sheet.

Hamilton Civic Center
Community Program Break Even Fee Analysis
Participants Needed at Each Fee Level

Proposed Fee	$30
# of Participants	250

	Per Participant	Total at This Level
Suggested Fee	$30	$7,500
Instructor/Material Cost	$5	$1,250
Surplus or Deficit	$25	$6,250
Civic Center Fixed Costs		$2,500
Surplus or Deficit		$3,750
BreakEven Point		100

Participants	Fees Generated	Fixed Costs	Total Fixed + Instructor Cost	Surplus or Deficit
100	$3,000	$2,500	$3,000	$0
150	$4,500	$2,500	$3,250	$1,250
200	$6,000	$2,500	$3,500	$2,500
250	$7,500	$2,500	$3,750	$3,750
300	$9,000	$2,500	$4,000	$5,000
350	$10,500	$2,500	$4,250	$6,250
400	$12,000	$2,500	$4,500	$7,500
450	$13,500	$2,500	$4,750	$8,750
500	$15,000	$2,500	$5,000	$10,000
550	$16,500	$2,500	$5,250	$11,250

Figure 2-95 Excel 2-2 completed

Guided Project 2-3

Sierra Pacific Community College District (SPCCD) consists of four community college campuses. The workbook for this project includes an amortization schedule for student loans and a fee and credit hour summary for several departments.
[Student Learning Outcomes 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.8]

File Needed: ***SPCCD-02.xlsx*** *(Student data files are available in the* Library *of your SIMnet account.)*
Completed Project File Name: ***[your initials] Excel 2-3.xlsx***

Skills Covered in This Project

- Name cell ranges.
- Use absolute references in formulas.
- Use the *PMT* function.
- Set mathematical order of operations.
- Create and copy formulas.
- Use *SUMIF* and *SUMPRODUCT*.
- Audit formulas to troubleshoot errors.
- Insert the current date as a function.

1. Open the ***SPCCD-02.xlsx*** workbook from your student data files and save it as [your initials] Excel 2–3.

2. Create range names for the workbook.
   a. Select the **Student Loan** sheet and select cells **B5:C8**.
   b. Press **Ctrl** and select cells **E5:F7**.
   c. Click the **Create from Selection** button [*Formulas* tab, *Defined Names* group].
   d. Verify that the **Left column** box in the *Create Names from Selection* dialog box is selected.
   e. Deselect the **Top row** box if it is checked and click **OK**.
   f. Click the **Name Manager** button [*Formulas* tab, *Defined Names* group] to view the names in the *Name Manager* dialog box (Figure 2-96). Notice that the cell references are absolute.
   g. Click **Close**.

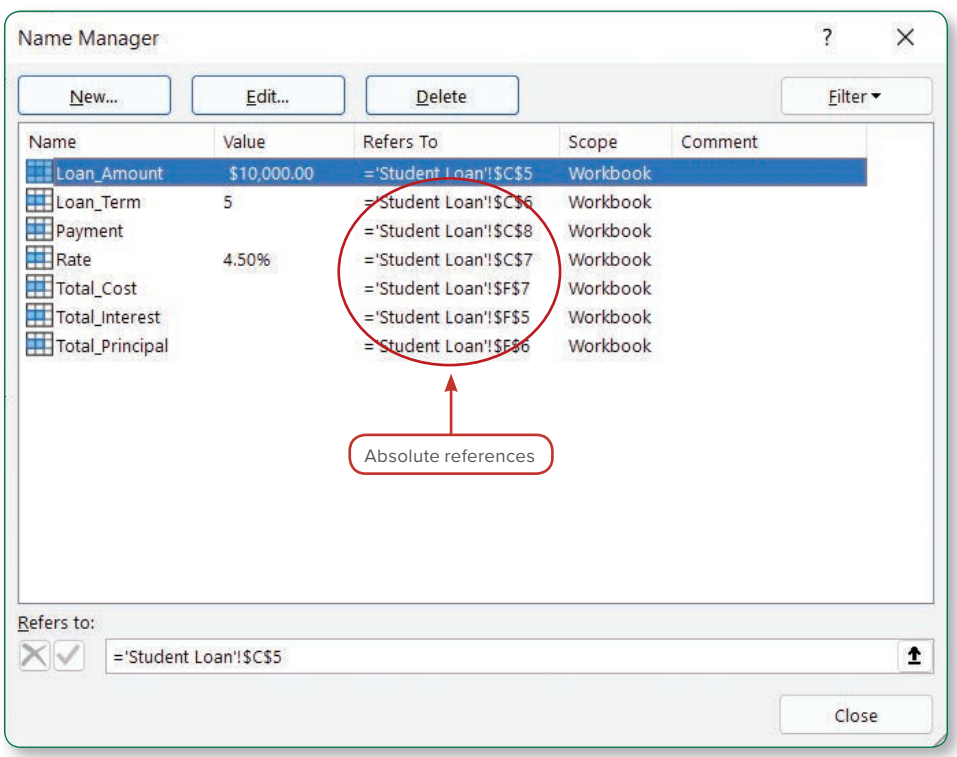


Figure 2-96 ***Name Manager*** **dialog box**

3. Enter a *PMT* function.
   a. Select **C8**.
   b. Click the **Financial** button [*Formulas* tab, *Function Library* group] and select **PMT**.
   c. Click the **Rate** box if necessary and click cell **C7**. The name *Rate* is substituted; range names are absolute references.
   d. Type /12 immediately after **Rate** to divide by 12 for monthly payments.
   e. Click the **Nper** box and click cell **C6**. The substituted range name is *Loan_Term*.
   f. Type *12 after **Loan_Term** to multiply by 12.

g. Click the **Pv** box and type a minus sign (−) to set the argument as a negative amount.
h. Click cell **C5** (*Loan_Amount*) for the *pv* argument. A negative loan amount reflects the lender's perspective, because the money is paid out now (Figure 2-97).
i. Leave the *Fv* and *Type* entry boxes empty.
j. Click **OK**. The payment for a loan at this rate is $186.43, shown as a positive value.
k. Format cell **C8** as **Accounting Number Format** to match cell **C5**.

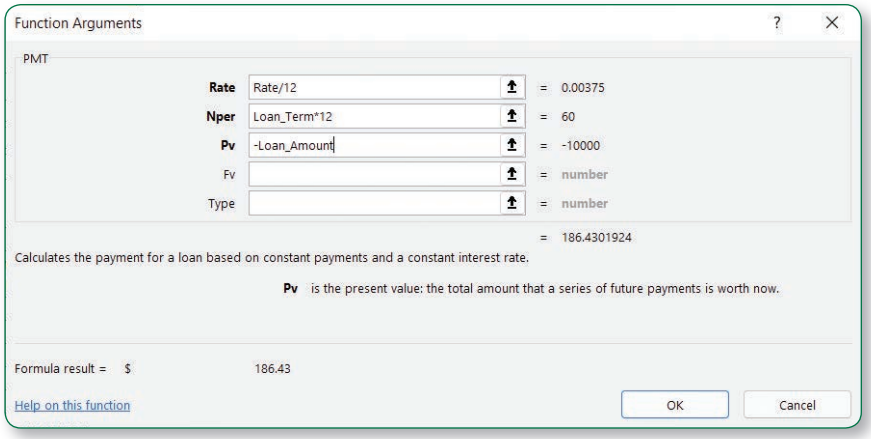


Figure 2-97 *Pv* argument is negative in the *PMT* function.

4. Create a total interest formula.
   a. Click cell **F5** (*Total_Interest*). This value is calculated by multiplying the monthly payment by the total number of payments to determine total outlay. From this amount, you subtract the loan amount.
   b. Type = and click cell **C8** (the *Payment*).
   c. Type * to multiply and click cell **C6** (*Loan_Term*).
   d. Type *12 to multiply by 12 for monthly payments. Values typed in a formula are constants and are absolute references.
   e. Type − immediately after ***12** to subtract.
   f. Click cell **C5** (the *Loan_Amount*). The formula is *Payment * Loan_Term * 12 – Loan_Amount*. Parentheses are not required, because the multiplications are done from left to right, followed by the subtraction (Figure 2-98).
   g. Press **Enter**. The result is $1,185.81.

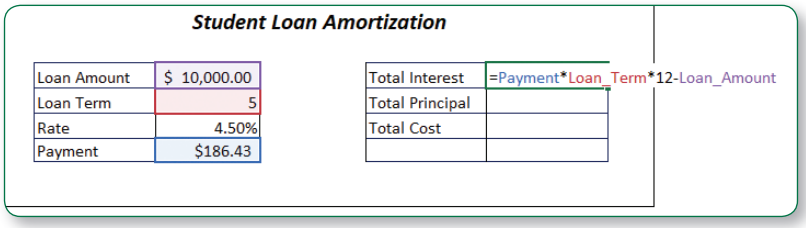


Figure 2-98 Left-to-right operations

5. Calculate the total loan cost.
   a. Select cell **F6** (*Total_Principal*). This is the loan amount in cell C5.
   b. Type = and click cell **C5** (the *Loan_Amount*). Press **Enter**.
   c. Click cell **F7**, the *Total_Cost* of the loan. This is the total principal plus the total interest.
   d. Type =, click cell **F5**, type +, click cell **F6**, and then press **Enter**. The result is $11,185.81.

6. Set order of mathematical operations to build an amortization schedule.
   a. Click cell **B13**. The beginning balance is the loan amount.
   b. Type =, click cell **C5**, and press **Enter**.

c. Format the value as **Accounting**.
d. Select cell **C13**. The interest for each payment is calculated by multiplying the balance in column B by the rate divided by 12.
e. Type = and click cell **B13**.
f. Type *(and click cell **C7**. Ignore the *Formula AutoComplete* list and note that the *Rate* range name is substituted.
g. Type /12). Parentheses are necessary so that the division is done first (Figure 2-99).
h. Press **Enter**.
i. Verify that the results ($37.50) are formatted as **Accounting**.
j. Select cell **D13**. The portion of the payment that is applied to the principal is calculated by subtracting the interest portion from the payment.

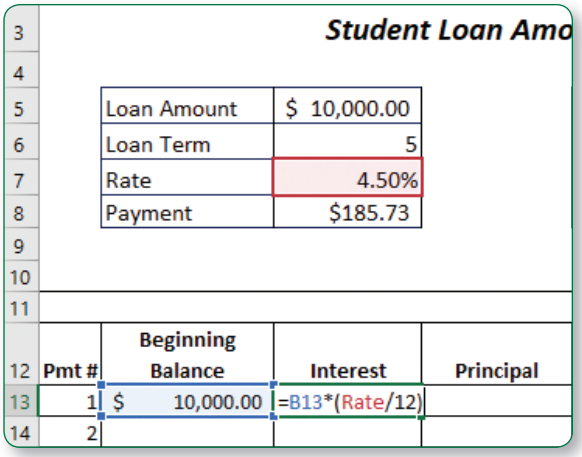


Figure 2-99 The interest formula

k. Type =, click cell **C8** (the *Payment*).
l. Type −, click cell **C13**, and press **Enter**. From the first month's payment, $148.93 is applied to the principal and $37.50 is interest.
m. Click cell **E13**. The total payment is the interest portion plus the principal portion.
n. Type =, click cell **C13**, type +, click cell **D13**, and then press **Enter**. The value matches the payment in cell **C8**.
o. Select cell **F13**. The ending balance is the beginning balance minus the principal payment. The interest is part of the cost of the loan.
p. Type =, click cell **B13**, type −, click cell **D13**, and then press **Enter**. The ending balance is $9,851.07.

B13	=Loan_Amount
C13	=B13*(Rate/12)
D13	=Payment-C13
E13	=C13+D13
F13	=B13-D13

7. Fill data and copy formulas.
a. Select cells **A13:A14**. This is a series with an increment of 1.
b. Drag the **Fill pointer** to reach cell **A72**. This sets 60 payments for a five-year loan term.
c. Select cell **B14**. The beginning balance for the second payment is the ending balance for the first payment.
d. Type =, click cell **F13**, and press **Enter**.
e. Double-click the **Fill pointer** for cell **B14** to fill the formula down to row **72**. The results are zero (displayed as a hyphen in *Accounting Number Format* until the rest of the schedule is complete.
f. Select cells **C13:F13**.
g. Double-click the **Fill pointer** at cell **F13**. All formulas are filled (copied) to row **72** (Figure 2-100).
h. Scroll to see the values in row **72**. The loan balance reaches 0.
i. Press **Ctrl+Home**.

8. Preview the document and insert print titles.
   a. Select cell **A12**. This row of labels should repeat on the second printed page.
   b. Click the **Page Layout** command tab and click the **Print Titles** button [*Page Setup* group].
   c. Click the **Rows to repeat at top** box and click **A12**.
   d. Click **Print Preview** in the dialog box.
   e. Click the **Next Page** button in the *Backstage* view to see the print titles.
   f. Click the **Page Setup** link at the bottom of the *Settings* group and center the page horizontally (*Margins* tab).
   g. Return to the worksheet.

12	Pmt #	Beginning Balance	Interest	Principal	Total Payment	Ending Balance
13	1	$ 10,000.00	$ 37.50	$ 148.93	$ 186.43	$ 9,851.07
14	2	$ 9,851.07	$ 36.94	$ 149.49	$ 186.43	$ 9,701.58
15	3	$ 9,701.58	$ 36.38	$ 150.05	$ 186.43	$ 9,551.53
16	4	$ 9,551.53	$ 35.82	$ 150.61	$ 186.43	$ 9,400.92
17	5	$ 9,400.92	$ 35.25	$ 151.18	$ 186.43	$ 9,249.74
18	6	$ 9,249.74	$ 34.69	$ 151.74	$ 186.43	$ 9,098.00
19	7	$ 9,098.00	$ 34.12	$ 152.31	$ 186.43	$ 8,945.69
20	8	$ 8,945.69	$ 33.55	$ 152.88	$ 186.43	$ 8,792.80
21	9	$ 8,792.80	$ 32.97	$ 153.46	$ 186.43	$ 8,639.35
22	10	$ 8,639.35	$ 32.40	$ 154.03	$ 186.43	$ 8,485.31
23	11	$ 8,485.31	$ 31.82	$ 154.61	$ 186.43	$ 8,330.70
24	12	$ 8,330.70	$ 31.24	$ 155.19	$ 186.43	$ 8,175.51
25	13	$ 8,175.51	$ 30.66	$ 155.77	$ 186.43	$ 8,019.74
26	14	$ 8,019.74	$ 30.07	$ 156.36	$ 186.43	$ 7,863.38
27	15	$ 7,863.38	$ 29.49	$ 156.94	$ 186.43	$ 7,706.44
28	16	$ 7,706.44	$ 28.90	$ 157.53	$ 186.43	$ 7,548.91
29	17	$ 7,548.91	$ 28.31	$ 158.12	$ 186.43	$ 7,390.79
30	18	$ 7,390.79	$ 27.72	$ 158.71	$ 186.43	$ 7,232.07
60	48	$ 2,361.15	$ 8.85	$ 177.58	$ 186.43	$ 2,183.57
61	49	$ 2,183.57	$ 8.19	$ 178.24	$ 186.43	$ 2,005.33
62	50	$ 2,005.33	$ 7.52	$ 178.91	$ 186.43	$ 1,826.42
63	51	$ 1,826.42	$ 6.85	$ 179.58	$ 186.43	$ 1,646.84
64	52	$ 1,646.84	$ 6.18	$ 180.25	$ 186.43	$ 1,466.58
65	53	$ 1,466.58	$ 5.50	$ 180.93	$ 186.43	$ 1,285.65
66	54	$ 1,285.65	$ 4.82	$ 181.61	$ 186.43	$ 1,104.05
67	55	$ 1,104.05	$ 4.14	$ 182.29	$ 186.43	$ 921.76
68	56	$ 921.76	$ 3.46	$ 182.97	$ 186.43	$ 738.78
69	57	$ 738.78	$ 2.77	$ 183.66	$ 186.43	$ 555.12
70	58	$ 555.12	$ 2.08	$ 184.35	$ 186.43	$ 370.77
71	59	$ 370.77	$ 1.39	$ 185.04	$ 186.43	$ 185.73
72	60	$ 185.73	$ 0.70	$ 185.73	$ 186.43	$ 0.00

Figure 2-100 Formulas copied down columns

9. Build a multiplication formula.
   a. Click the **Fees & Credits** sheet tab and select cell **F7**. Total fees from a course equals the number of students times the fee.
   b. Type =, click cell **D7**, type *, click cell **E7**, and press **Enter**.
   c. Double-click the **Fill pointer** for cell **F7** to copy the formula.
   d. Verify that cells **F7:F18** are **Currency** format.
   e. Set a single bottom border for cell **F18**.

10. Use *SUMIF* to calculate statistics by department.
   a. Select cell **C26**.
   b. Click the **Math & Trig** button [*Formulas* tab, *Function Library* group] and select **SUMIF**.
   c. Click the **Range** box and select cells **B7:B18**. This range will be matched against the criteria.
   d. Press **F4** (**FN+F4**) to make the reference absolute.
   e. Click the **Criteria** box and select cell **B26**.
   f. Press **F4** (**FN+F4**) three times to make the mixed reference $**B26**.
   g. Click the **Sum_range** box, select cells **D7:D18**.
   h. Press **F4** (**FN+F4**) to make the reference absolute.
   i. Click **OK**. Total number of students for the biology department is 37 (Figure 2-101).

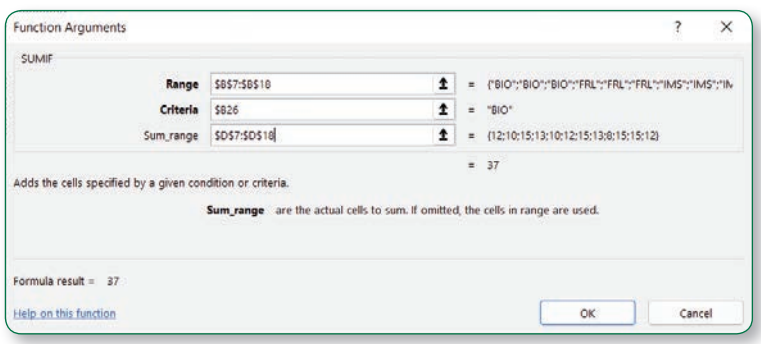


Figure 2-101 *Function Arguments* dialog box for *SUMIF*

11. Copy a *SUMIF* function.
    a. Click cell **C26** and drag its **Fill pointer** to copy the formula to cells **C27:C29** without formatting to preserve the borders (Figure 2-102).
    b. Copy the formula in cell **C26** to cells **D26:E26**.

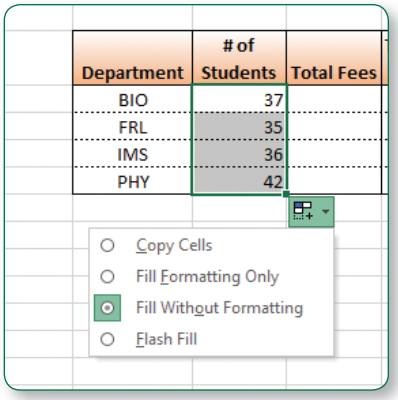


Figure 2-102 Formula is copied without formatting

12. Troubleshoot an error and edit a *SUMIF* formula.
    a. Select cell **D26**. This is obviously an error that has not been flagged.
    b. Click the **Trace Precedents** button [*Formulas* tab, *Formula Auditing* group]. The reference to column D is incorrect in the copied formula.
    c. Click the **Insert Function** button in the *Formula* bar.
    d. Select the entry in the *Sum_range* box, select cells **F7:F18**, and press **F4 (FN+F4)** (Figure 2-103).

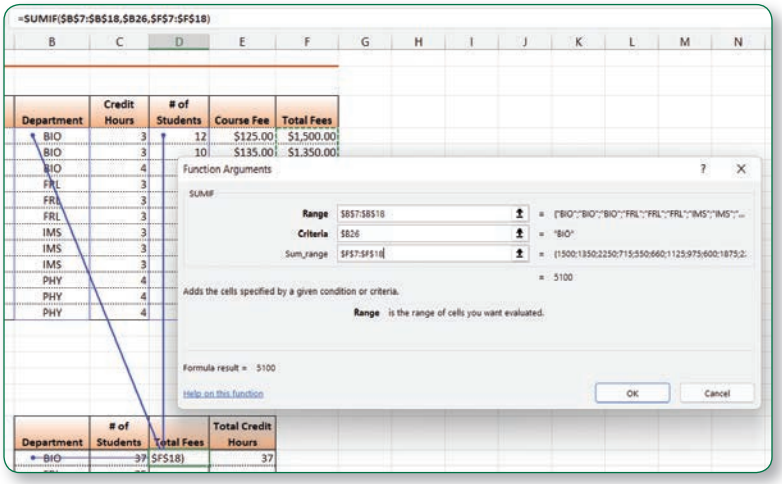


Figure 2-103 Precedent arrows help identify the error

    e. Click **OK**. The arrows are removed but now there is an error triangle.
    f. Click the **Trace Error** button for cell **D26** to display its menu. The formula is inconsistent with the formula in cell **C26**.
    g. Select **Ignore Error**.
    h. Copy cell **D26** to cells **D27:D29** without formatting
    i. Format cells **D26:D29** as **Currency** from the *Number Format* drop-down list.

13. Insert a *SUMPRODUCT* formula.
    a. Click cell **E26**. This was copied as a *SUMIF* formula, but it is not a *SUMIF* calculation. You need to multiply the values in column C by the values in column D.
    b. Press **Delete** to remove the *SUMIF* function.
    c. Click the **Math & Trig** button [*Formulas* tab, *Function Library* group] and select **SUMPRODUCT**.
    d. Click the **Array1** box if necessary and select cells **C7:C9** for the *Biology* department.
    e. Click the **Array2** box and select cells **D7:D9** for the *Biology* department (Figure 2-104).
    f. Click **OK**. The result is 126 total credit hours.

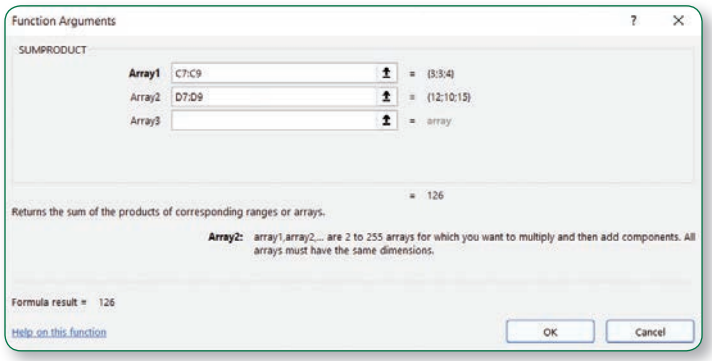


Figure 2-104 *SUMPRODUCT* and its arguments

g. Click the **Trace Error** button for cell **E26** to display its menu. The formula omits cells that are adjacent to the *array* arguments but it is not an error.
h. Select **Ignore Error**.
i. Complete *SUMPRODUCT* formulas for cells **E27:E29**. If you choose to copy the formula in cell E26, you need to edit each copy to use the correct *array* arguments. You can complete the formulas and then select the cells with error triangles and ignore the errors all at once.
j. Preserve or copy the formatting from cell **C26** for cells **E26:E29**.

14. Insert the current date.
    a. Select cell **F31**.
    b. Type =to and press **Tab** to select the function.
    c. Press **Enter**.
    d. Press **Ctrl+Home**.

15. Paste range names.
    a. Click the **New sheet** button in the sheet tab area.
    b. Name the new sheet **Range Names**.
    c. Press **F3** (**FN+F3**) to open the *Paste Name* dialog box.
    d. Click the **Paste List** button.
    e. *AutoFit* columns **A:B** and press **Ctrl+Home**.

16. Save and close the workbook (Figure 2-105).

Sierra Pacific Community College District
Financial Aid Office

Student Loan Amortization

Loan Amount	$ 10,000.00
Loan Term	5
Rate	4.50%
Payment	$ 186.43

Total Interest	$ 1,185.81
Total Principal	$ 10,000.00
Total Cost	$ 11,185.81

Pmt #	Beginning Balance	Interest	Principal	Total Payment	Ending Balance
1	$ 10,000.00	$ 37.50	$ 148.93	$ 186.43	$ 9,851.07
2	$ 9,851.07	$ 36.94	$ 149.49	$ 186.43	$ 9,701.58
3	$ 9,701.58	$ 36.38	$ 150.05	$ 186.43	$ 9,551.53
4	$ 9,551.53	$ 35.82	$ 150.61	$ 186.43	$ 9,400.92
5	$ 9,400.92	$ 35.25	$ 151.18	$ 186.43	$ 9,249.74
6	$ 9,249.74	$ 34.69	$ 151.74	$ 186.43	$ 9,098.00
7	$ 9,098.00	$ 34.12	$ 152.31	$ 186.43	$ 8,945.69
8	$ 8,945.69	$ 33.55	$ 152.88	$ 186.43	$ 8,792.80
9	$ 8,792.80	$ 32.97	$ 153.46	$ 186.43	$ 8,639.35
10	$ 8,639.35	$ 32.40	$ 154.03	$ 186.43	$ 8,485.31
11	$ 8,485.31	$ 31.82	$ 154.61	$ 186.43	$ 8,330.70
12	$ 8,330.70	$ 31.24	$ 155.19	$ 186.43	$ 8,175.51
13	$ 8,175.51	$ 30.66	$ 155.77	$ 186.43	$ 8,019.74
14	$ 8,019.74	$ 30.07	$ 156.36	$ 186.43	$ 7,863.38
15	$ 7,863.38	$ 29.49	$ 156.94	$ 186.43	$ 7,706.44
16	$ 7,706.44	$ 28.90	$ 157.53	$ 186.43	$ 7,548.91
17	$ 7,548.91	$ 28.31	$ 158.12	$ 186.43	$ 7,390.79
18	$ 7,390.79	$ 27.72	$ 158.71	$ 186.43	$ 7,232.07
19	$ 7,232.07	$ 27.12	$ 159.31	$ 186.43	$ 7,072.76
20	$ 7,072.76	$ 26.52	$ 159.91	$ 186.43	$ 6,912.86
21	$ 6,912.86	$ 25.92	$ 160.51	$ 186.43	$ 6,752.35
22	$ 6,752.35	$ 25.32	$ 161.11	$ 186.43	$ 6,591.24
23	$ 6,591.24	$ 24.72	$ 161.71	$ 186.43	$ 6,429.53
24	$ 6,429.53	$ 24.11	$ 162.32	$ 186.43	$ 6,267.21
25	$ 6,267.21	$ 23.50	$ 162.93	$ 186.43	$ 6,104.28
26	$ 6,104.28	$ 22.89	$ 163.54	$ 186.43	$ 5,940.74
27	$ 5,940.74	$ 22.28	$ 164.15	$ 186.43	$ 5,776.59
28	$ 5,776.59	$ 21.66	$ 164.77	$ 186.43	$ 5,611.82
29	$ 5,611.82	$ 21.04	$ 165.39	$ 186.43	$ 5,446.44
30	$ 5,446.44	$ 20.42	$ 166.01	$ 186.43	$ 5,280.43
31	$ 5,280.43	$ 19.80	$ 166.63	$ 186.43	$ 5,113.80
32	$ 5,113.80	$ 19.18	$ 167.25	$ 186.43	$ 4,946.55
33	$ 4,946.55	$ 18.55	$ 167.88	$ 186.43	$ 4,778.67
34	$ 4,778.67	$ 17.92	$ 168.51	$ 186.43	$ 4,610.16
35	$ 4,610.16	$ 17.29	$ 169.14	$ 186.43	$ 4,441.01
36	$ 4,441.01	$ 16.65	$ 169.78	$ 186.43	$ 4,271.24
37	$ 4,271.24	$ 16.02	$ 170.41	$ 186.43	$ 4,100.82
38	$ 4,100.82	$ 15.38	$ 171.05	$ 186.43	$ 3,929.77
39	$ 3,929.77	$ 14.74	$ 171.69	$ 186.43	$ 3,758.08
40	$ 3,758.08	$ 14.09	$ 172.34	$ 186.43	$ 3,585.74
41	$ 3,585.74	$ 13.45	$ 172.98	$ 186.43	$ 3,412.76
42	$ 3,412.76	$ 12.80	$ 173.63	$ 186.43	$ 3,239.13
43	$ 3,239.13	$ 12.15	$ 174.28	$ 186.43	$ 3,064.84
44	$ 3,064.84	$ 11.49	$ 174.94	$ 186.43	$ 2,889.91
45	$ 2,889.91	$ 10.84	$ 175.59	$ 186.43	$ 2,714.31
46	$ 2,714.31	$ 10.18	$ 176.25	$ 186.43	$ 2,538.06
47	$ 2,538.06	$ 9.52	$ 176.91	$ 186.43	$ 2,361.15
48	$ 2,361.15	$ 8.85	$ 177.58	$ 186.43	$ 2,183.57
49	$ 2,183.57	$ 8.19	$ 178.24	$ 186.43	$ 2,005.33
50	$ 2,005.33	$ 7.52	$ 178.91	$ 186.43	$ 1,826.42
51	$ 1,826.42	$ 6.85	$ 179.58	$ 186.43	$ 1,646.84
52	$ 1,646.84	$ 6.18	$ 180.25	$ 186.43	$ 1,466.58
53	$ 1,466.58	$ 5.50	$ 180.93	$ 186.43	$ 1,285.65
54	$ 1,285.65	$ 4.82	$ 181.61	$ 186.43	$ 1,104.05
55	$ 1,104.05	$ 4.14	$ 182.29	$ 186.43	$ 921.76
56	$ 921.76	$ 3.46	$ 182.97	$ 186.43	$ 738.78
57	$ 738.78	$ 2.77	$ 183.66	$ 186.43	$ 555.12
58	$ 555.12	$ 2.08	$ 184.35	$ 186.43	$ 370.77
59	$ 370.77	$ 1.39	$ 185.04	$ 186.43	$ 185.73
60	$ 185.73	$ 0.70	$ 185.73	$ 186.43	$ 0.00

Figure 2-105 Ex cel 2-3 completed

Sierra Pacific Community College District
Credit Hours and Fees by Department

Course Name	Department	Credit Hours	# of Students	Course Fee	Total Fees
General Biology	BIO	3	12	$125.00	$1,500.00
Intro to Microbiology	BIO	3	10	$135.00	$1,350.00
Anatomy & Physiology	BIO	4	15	$150.00	$2,250.00
Spanish I	FRL	3	13	$55.00	$715.00
French II	FRL	3	10	$55.00	$550.00
Mandarin I	FRL	3	12	$55.00	$660.00
Intro to MS Office	IMS	3	15	$75.00	$1,125.00
Intro to Excel	IMS	3	13	$75.00	$975.00
Access Programming	IMS	3	8	$75.00	$600.00
Chemistry Fundamentals	PHY	4	15	$125.00	$1,875.00
Organic Chemistry I	PHY	4	15	$150.00	$2,250.00
Fundamentals of Physics	PHY	4	12	$125.00	$1,500.00

Department	# of Students	Total Fees	Total Credit Hours
BIO	37	$5,100.00	126
FRL	35	$1,925.00	105
IMS	36	$2,700.00	108
PHY	42	$5,625.00	168

Today's Date

Loan_Amount	='Student Loan'!$C$5
Loan_Term	='Student Loan'!$C$6
Payment	='Student Loan'!$C$8
Rate	='Student Loan'!$C$7
Total_Cost	='Student Loan'!$F$7
Total_Interest	='Student Loan'!$F$5
Total_Principal	='Student Loan'!$F$6

Figure 2-105 Ex cel 2-3 completed

Independent Project 2-4

Central Sierra Insurance sets bonus percentages based on commissions earned by each agent and calculates totals by branch office. This workbook identifies business policies and displays agent names with their locations.
[Student Learning Outcomes 2.1, 2.2, 2.3, 2.5, 2.6, 2.7, 2.8]

File Needed: ***CentralSierra-02.xlsx*** *(Student data files are available in the* Library *of your SIMnet account.)*
Completed Project File Name: ***[your initials] Excel 2-4.xlsx***

Skills Covered in This Project

- Name cell ranges.
- Build an *XLOOKUP* function.
- Create, copy, and edit formulas.
- Set mathematical order of operations.
- Use absolute cell references in formulas.
- Use the *SUMIF* function.
- Calculate an average, the mode, and the median.
- Build an *IF* function.
- Display labels using *CONCAT*.

1. Open the ***CentralSierra-02.xlsx*** workbook from your student data files and save it as [your initials] Excel 2–4. Note the commissions indicated on the *Commissions* sheet and the commission amounts listed on the *Tables* sheet. They are not exact matches.
2. Select the **Tables** sheet, select cells **A1:B6** , and create range names using the **Create from Selection** button [*Formulas* tab, *Defined Names* group].
3. Create an *XLOOKUP* function to display the bonus rate. (If *XLOOKUP* is not available, build the following formula **=VLOOKUP(E5,Tables!$A$2:$B$6,2)**. Leave the *Range_lookup* argument empty so that *VLOOKUP* finds the closest match).
   a. Click the **Commissions** sheet tab and select cell **F5**.
   b. Start the *XLOOKUP* function and use cell **E5** as the *Lookup_value*.
   c. For the *Lookup_array* argument, use the **Commission_Level** range.
   d. For the *Return_array* argument, use the **Bonus_Rate** range.
   e. For the *Match_mode* argument, type −1 which finds the next smaller match (Figure 2-106).

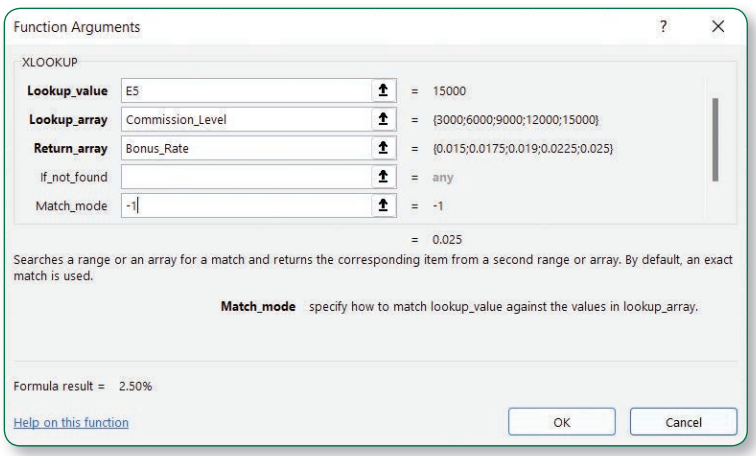


Figure 2-106 *XLOOKUP* function to display bonus rate

4. Format the result as **Percent Style** with two decimal places.
5. Copy the formula in cell **F5** to cells **F6:F14** .
6. Set order of operations to calculate the commission and bonus totals. (An alternative formula is **=E5*(1 +F5)**).
   a. Select cell **G5**. The total paid is the dollar amount of the commissions plus the commissions times the bonus rate.
   b. Start a formula and select cell **E5**.
   c. Add cell **E5** to the product of commissions amount times the bonus rate (Figure 2-107).
   d. Format the result to show zero decimal places.
   e. Copy the formula in cell **G5** to cells **G6:G14**.

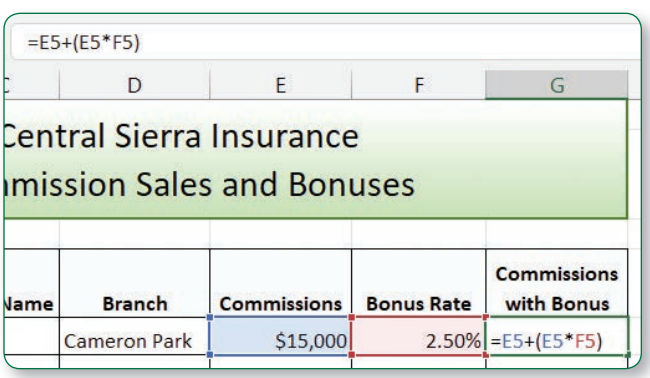


Figure 2-107 Use parentheses to set the arithmetic order

7. Create and copy a *SUMIF* function to calculate total earnings by branch office.
   a. Select cell **E18**.
   b. Start the *SUMIF* function with cells **$D$5:$D$14** as the *Range* argument.

c. Set the *Criteria* argument as a relative reference to cell **C18**.
d. Determine the *Sum_range* argument and make the references absolute.
e. Copy the formula in cell **E18** to cells **E19:E20** without formatting to preserve borders.
f. Format cells **E18:E21** as **Currency** with zero decimal places.

8. Total the earnings in cell **E21** .

9. Calculate the average, mode, and median values in cells **E22**, **E23**, and **E24** for the commission and bonus totals in column G.

10. Correct border and number format inconsistencies as needed.

11. Create and copy an *IF* function.
a. Select the **By Policy** sheet and click cell **F7**.
b. Start an *IF* function with the *logical_test* **E7="business policy"** to determine if the policy is for a business. If it is for an individual, it is a personal line policy. You must type the quotation marks because text follows the cell reference.
c. Type No as the *Value_if_true* argument. You need not type quotation marks for this argument because it is alone in the entry box.
d. Type Yes as the *Value_if_false* argument (Figure 2-108).
e. Copy the formula in cell **F7** to complete the column. If it is a business policy, the result is *No* because the label in cell F6 asks if it is a personal line.
f. Increase the indent two times for cells **F7:F27**.
g. Press **Ctrl+Home**.

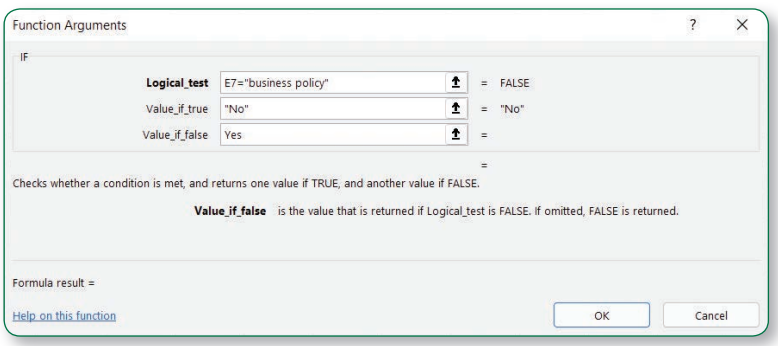


Figure 2-108 ***IF* function that uses text in the *logical_argument***

12. Display names and locations using *CONCAT*.
a. Select the **Tables** sheet and click cell **D2**.
b. Start a *CONCAT* function.
c. The **Text1** argument is cell **C5** on the **Commissions** sheet.
d. The **Text2** argument is a space.
e. The **Text3** argument is cell **B5** on the **Commissions** sheet.
f. The **Text4** argument is a comma and a space.
g. The **Text5** argument is cell **D5** on the **Commissions** sheet.
h. Copy the formula in cell **D2** to complete the list.

13. Select cell **D13** and paste the range names.

14. Press **Ctrl+Home**.

15. Group all the sheets and center the pages horizontally.

16. While the sheets are grouped, insert a footer with the file name in the right section.

17. Ungroup the sheets.

18. Save and close the workbook (Figure 2-109).

Central Sierra Insurance
Commission Sales and Bonuses

ID	Last Name	First Name	Branch	Commissions	Bonus Rate	Commissions with Bonus
101	Lingle	Bob	Cameron Park	$15,000	2.50%	$15,375
102	McCartney	Lanita	Folsom	$12,000	2.25%	$12,270
103	Santos	Eleesha	Cameron Park	$5,500	1.50%	$5,583
104	Baxter	Roy	Granite Bay	$4,500	1.50%	$4,568
105	Alaro	Jennifer	Folsom	$3,000	1.50%	$3,045
115	Chan	Tami	Cameron Park	$3,000	1.50%	$3,045
117	Althouse	Charlene	Granite Bay	$4,700	1.50%	$4,771
119	Taylor	Juan	Granite Bay	$4,000	1.50%	$4,060
120	Reza	Wayne	Cameron Park	$4,000	1.50%	$4,060
125	Nevens	Cheryl	Cameron Park	$12,000	2.25%	$12,270

Commisions and Bonuses by Branch	
Cameron Park	$40,333
Folsom	$15,315
Granite Bay	$13,398
Total	$69,046
Average	$6,905
Mode	$12,270
Median	$4,669

Commission Level	Bonus Rate
3000	1.50%
6000	1.75%
9000	1.90%
12000	2.25%
15000	2.50%

Policy Types
Automobile
Business Policy
Health
Homeowners
Life
Renters

Agent Name and Location
Bob Lingle, Cameron Park
Lanita McCartney, Folsom
Eleesha Santos, Cameron Park
Roy Baxter, Granite Bay
Jennifer Alaro, Folsom
Tami Chan, Cameron Park
Charlene Althouse, Granite Bay
Juan Taylor, Granite Bay
Wayne Reza, Cameron Park
Cheryl Nevens, Cameron Park

Bonus_Rate	=Tables!$B$2:$B$6
Commission_Level	=Tables!$A$2:$A$6

Excel 2-4

Central Sierra Insurance
Sales by Policy Type

ID	Last Name	First Name	Branch	Type of Policy	Personal Line?
101	Lingle	Bob	Cameron Park	Automobile	Yes
102	McCartney	Lanita	Folsom	Business Policy	No
103	Santos	Eleesha	Cameron Park	Health	Yes
104	Baxter	Roy	Granite Bay	Homeowners	Yes
105	Alaro	Jennifer	Folsom	Life	Yes
115	Chan	Tami	Cameron Park	Renters	Yes
117	Althouse	Charlene	Granite Bay	Renters	Yes
119	Taylor	Juan	Granite Bay	Automobile	Yes
120	Reza	Wayne	Cameron Park	Business Policy	No
125	Nevens	Cheryl	Cameron Park	Health	Yes
102	McCartney	Lanita	Folsom	Homeowners	Yes
103	Santos	Eleesha	Cameron Park	Life	Yes
117	Althouse	Charlene	Granite Bay	Business Policy	No
104	Baxter	Roy	Granite Bay	Health	Yes
105	Alaro	Jennifer	Folsom	Homeowners	Yes
105	Alaro	Jennifer	Folsom	Automobile	Yes
115	Chan	Tami	Cameron Park	Life	Yes
102	McCartney	Lanita	Folsom	Business Policy	No
103	Santos	Eleesha	Cameron Park	Health	Yes
104	Baxter	Roy	Granite Bay	Homeowners	Yes
105	Alaro	Jennifer	Folsom	Business Policy	No

Excel 2-4

Figure 2-109 Ex cel 2-4 completed

Independent Project 2-5

San Diego Sailing maintains a fleet of rental and charter boats. Your task is to fix a circular reference error, calculate projected rental rates, and calculate statistics about past rentals.
[Student Learning Outcomes 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.8]

File Needed: ***SanDiegoSailing-02.xlsx*** *(Student data files are available in the* Library *of your SIMnet account.)*
Completed Project File Name: ***[your initials] Excel 2-5.xlsx***

Skills Covered in This Project

- Use formula auditing tools.
- Create and copy formulas.
- Use relative, mixed, and 3D cell references.
- Set mathematical order of operations.
- Build an *IF* formula.
- Use the *COUNTIF* function.
- Use the *SUMIF* function.
- Fill a date series with the *TODAY* function.

1. Open the ***SanDiegoSailing-02.xlsx*** workbook from your student data files. When a workbook has a circular reference, a message box appears as you open it (Figure 2-110).

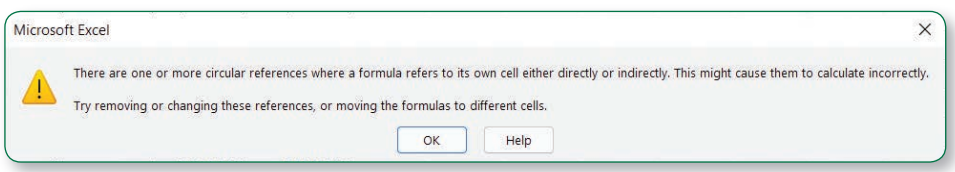


Figure 2-110 Circular reference message

2. Click **OK** in the message box. The *Status* bar indicates the workbook contains *Circular References* but does not specify where.
3. Save the workbook as [your initials] Excel 2-5.
4. Use formula auditing tools.
   a. Note that rental rates are in columns **H** and **I** on the *Fleet* sheet.
   b. Click the **New Prices** sheet tab. The *Status* bar identifies a cell in column **D** with a circular reference, and all the formulas in column D include the same error. New prices would not be $0.00.
   c. Click cell **D5**. The formula begins with 1 plus the value in cell D5, referring to itself.
   d. Click the **Formulas** tab and click the **Trace Precedents** button in the *Formula Auditing* group. The worksheet icon means that the formula has a 3D reference to another sheet.
   e. Click the **Evaluate Formula** button [*Formulas* tab, *Formula Auditing* group]. The circular reference is identified as cell D5 (Figure 2-111).
   f. Click **Close** and click the **Remove Arrows** button [*Formulas* tab, *Formula Auditing* group].

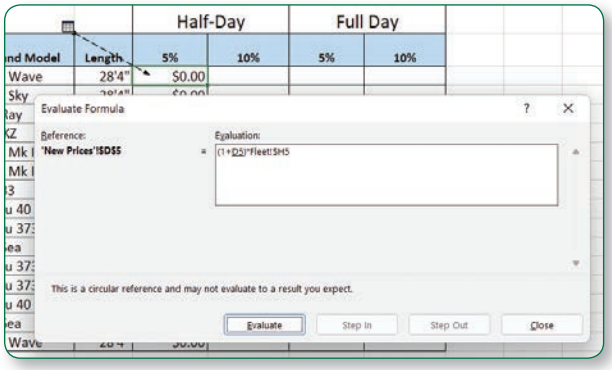


Figure 2-111 *Evaluate Formula* dialog box

5. Edit and copy a formula with mixed references.
   a. Edit the formula in cell **D5** to show D$4 instead of "D5." The formula should multiply one plus the percentage value in cell D4 by the current rate on the **Fleet** sheet ($H5). With absolute references to row 4 on this sheet and column H on the **Fleet** sheet, you can copy the formula down the column (Figure 2-112).
   b. Copy the edited formula in cell **D5** to cells **D6:D19** without formatting to preserve the border. When the circular reference message box opens, click **OK**.
   c. Select cells **D5:D19** and drag the **Fill pointer** to copy the formulas to cells **E5:E19**.
   d. Click cell **E6**. The formula is adjusted to use the percentage value in cell E4. Note also that the reference on the *Fleet* sheet ($H6) is adjusted to show the correct row.

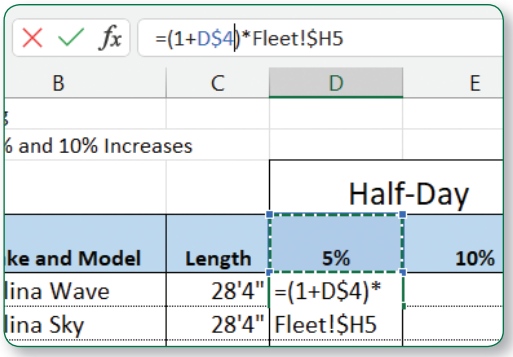


Figure 2-112 Mix ed reference in the edited formula

6. Build a formula with mixed references.
   a. Click cell **F5** and type =(1+ to start the formula.
   b. Select cell **F4** and make it an absolute reference to the row but not the column.
   c. Type)* for the closing parenthesis and multiplication.
   d. Click cell **I5** on the *Fleet* sheet, and make the reference absolute for the column but not the row (Figure 2-113).
   e. Copy the formula down column **F** without formatting to preserve the border.
   f. Format cells **F5:F19** as **Currency** from the *Number Format* drop-down list.
   g. Copy cells **F5:F19** to cells **G5:G19**.

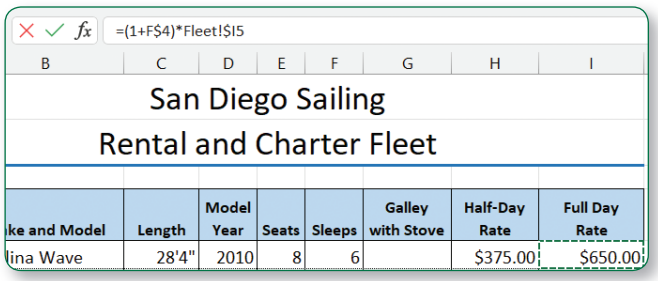


Figure 2-113 Mix ed references in the new formula

7. Complete formatting for the sheet.
   a. Select cells **A1:A2** and change the font size to **18** pt.
   b. Center the page horizontally.
   c. Insert a footer with the file name in the right section.

8. Build an *IF* function formula.
   a. Click the **Fleet** sheet tab and select cell **G5**. Rentals that seat 8 or more people must have a galley stove.
   b. Create an *IF* function in which the *logical_test* argument determines if there are 8 or more seats.
   c. Type Yes for the *value_if_true* argument.
   d. Type No for the *value_if_false* argument. (If you type the formula, enclose the text arguments within quotation marks.)
   e. Copy the formula to cells **G6:G19** without formatting to preserve borders.
   f. Select cells **G5:G19** and apply **Align Left** alignment.
   g. Increase the indent two times for cells **G5:G19**.

9. Create and copy a *COUNTIF* function to count bookings by boat manufacturer.
   a. Click the **Bookings** sheet tab.
   b. Select cell **D27**. The *COUNTIF* function calculates how many items match the criteria, like the *SUMIF* function.
   c. Click the **More Functions** button [*Formulas* tab, *Function Library* group] and point to **Statistical**.
   d. Scroll and click **COUNTIF**.

e. Select cells **$C$5:$C$22** as the *Range* argument.
f. Type the *Criteria* argument ben* to count boats manufactured by "Beneteau." If you type the formula, include quotation marks (Figure 2-114).
g. Copy the formula in cell **D27** to cells **D28:D30**.
h. Select cell **D28** and edit the criteria to cap* to count boats in the "Capri" group. You must enter enough characters to distinguish the manufacturer names.
i. Edit each of the formulas in cells **D29:D30** to count the indicated manufacturer's models.

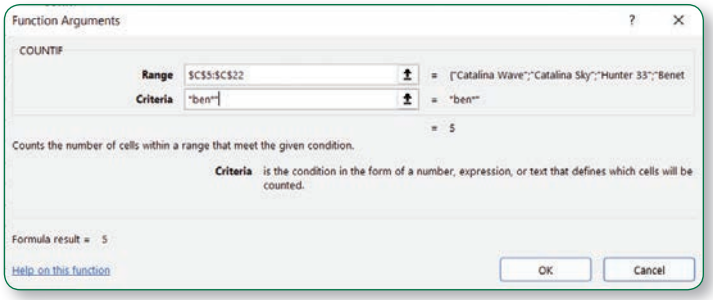


Figure 2-114 ***COUNTIF Function Arguments*** **dialog box**

10. Create and copy a *SUMIF* function to calculate total revenue by boat make.
a. Select cell **E27**.
b. Start the *SUMIF* function with cells **$C$5:$C$22** as the *Range*.
c. Type the *Criteria* argument ben* to include boats from "Beneteau." You cannot use relative references to the names in column B because each manufacturer has multiple models (Figure 2-115).

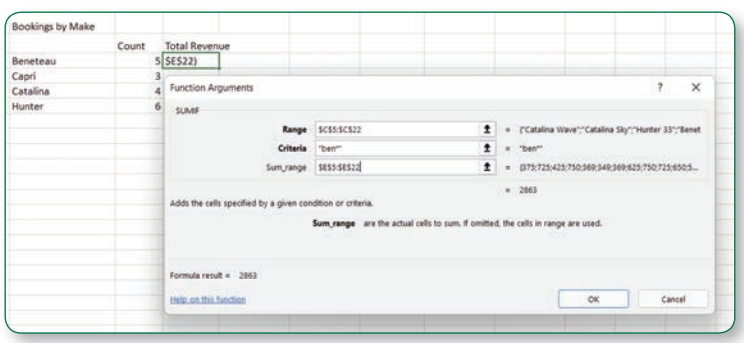


Figure 2-115 ***SUMIF*** **arguments**

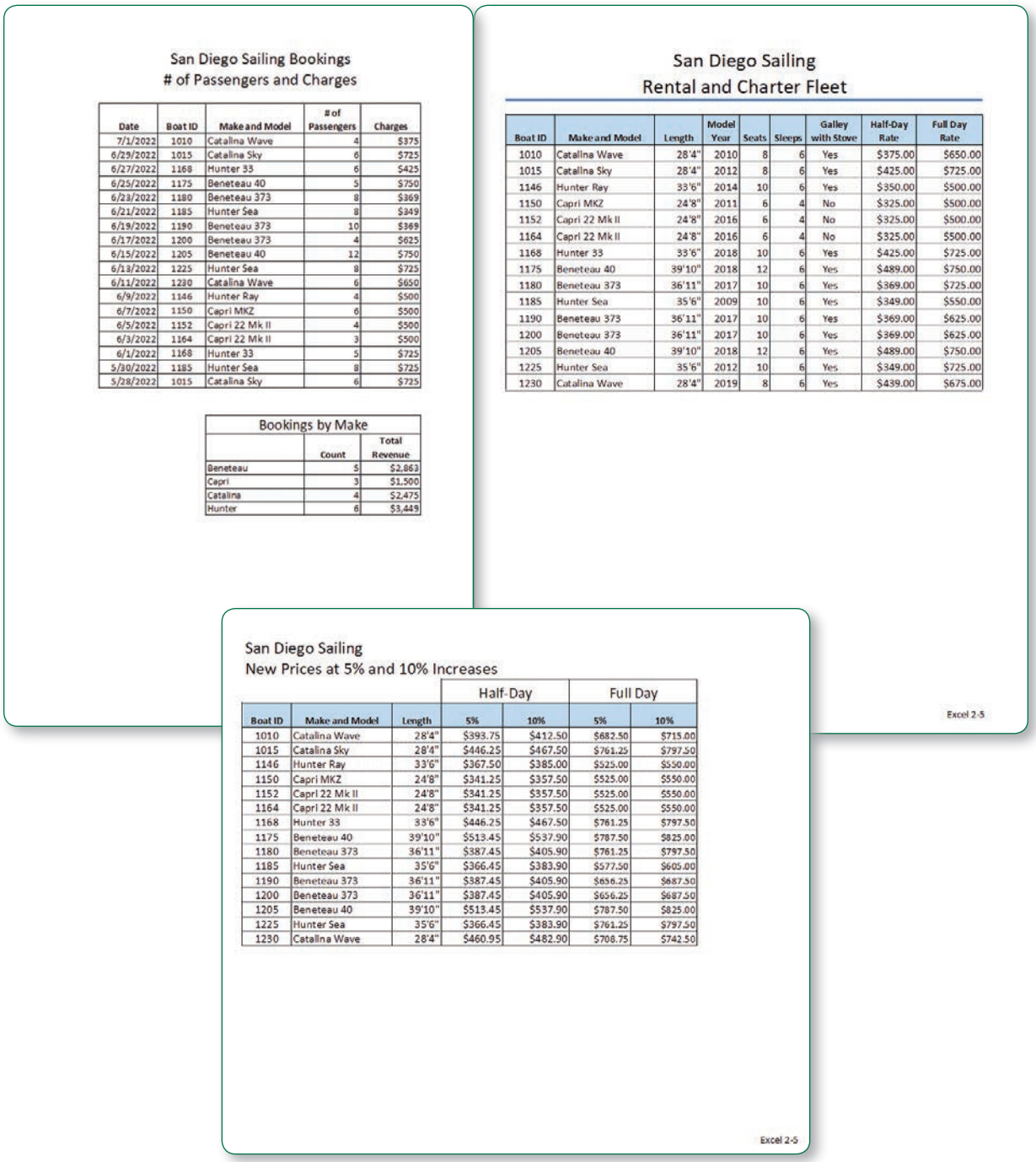
d. Set the *Sum_range* argument to cells **$E$5:$E$22** to display the sum from column **E**. The result for cell **E27** is 2863.
e. Copy the formula in cell **E27** to cells **E28:E30**.
f. Edit the criteria in each copied formula in cells **E28:E30** as needed.

11. Fill a series of dates.
a. Select cell **A5**. This cell has the *TODAY* function.
b. Select cell **A6**. The *TODAY* function minus 2 calculates a new date.
c. Copy cell **A6** to cells **A7:A22** to fill dates in column **A**. (Your dates are volatile and will not match Figure 2-116.)

12. Complete formatting for the worksheet.
a. Apply the **Currency** format with zero decimal places to all values that represent money.
b. Format the labels in cells **A1:A2** as **18** point.
c. Select cells **A1:E2** and click the **Alignment** launcher [*Home* tab, *Alignment* group]. Center the labels across the selection.
d. Merge and center the label in cell **C25** over cells **C25:E25** and format it at **16** points.
e. Bold and center the labels in rows **4** and **26**.
f. Select cells **A4:E22** and apply **All Borders**.
g. Apply **All Borders** to cells **C25:E30**.
h. Press **Ctrl+Home**.

13. Group the **Bookings** and the **Fleet** sheets. Center them horizontally and insert a footer with the file name in the right section.

14. Ungroup the sheets and save and close the workbook (Figure 2-116).



San Diego Sailing Bookings
# of Passengers and Charges

Date	Boat ID	Make and Model	# of Passengers	Charges
7/1/2022	1010	Catalina Wave	4	$375
6/29/2022	1015	Catalina Sky	6	$725
6/27/2022	1168	Hunter 33	6	$425
6/25/2022	1175	Beneteau 40	5	$750
6/23/2022	1180	Beneteau 373	8	$369
6/21/2022	1185	Hunter Sea	8	$349
6/19/2022	1190	Beneteau 373	10	$369
6/17/2022	1200	Beneteau 373	4	$625
6/15/2022	1205	Beneteau 40	12	$750
6/13/2022	1225	Hunter Sea	8	$725
6/11/2022	1230	Catalina Wave	6	$650
6/9/2022	1146	Hunter Ray	4	$500
6/7/2022	1150	Capri MKZ	6	$500
6/5/2022	1152	Capri 22 Mk II	4	$500
6/3/2022	1164	Capri 22 Mk II	3	$500
6/1/2022	1168	Hunter 33	5	$725
5/30/2022	1185	Hunter Sea	8	$725
5/28/2022	1015	Catalina Sky	6	$725

Bookings by Make

	Count	Total Revenue
Beneteau	5	$2,863
Capri	3	$1,500
Catalina	4	$2,475
Hunter	6	$3,449

San Diego Sailing
Rental and Charter Fleet

Boat ID	Make and Model	Length	Model Year	Seats	Sleeps	Galley with Stove	Half-Day Rate	Full Day Rate
1010	Catalina Wave	28'4"	2010	8	6	Yes	$375.00	$650.00
1015	Catalina Sky	28'4"	2012	8	6	Yes	$425.00	$725.00
1146	Hunter Ray	33'6"	2014	10	6	Yes	$350.00	$500.00
1150	Capri MKZ	24'8"	2011	6	4	No	$325.00	$500.00
1152	Capri 22 Mk II	24'8"	2016	6	4	No	$325.00	$500.00
1164	Capri 22 Mk II	24'8"	2016	6	4	No	$325.00	$500.00
1168	Hunter 33	33'6"	2018	10	6	Yes	$425.00	$725.00
1175	Beneteau 40	39'10"	2018	12	6	Yes	$489.00	$750.00
1180	Beneteau 373	36'11"	2017	10	6	Yes	$369.00	$725.00
1185	Hunter Sea	35'6"	2009	10	6	Yes	$349.00	$550.00
1190	Beneteau 373	36'11"	2017	10	6	Yes	$369.00	$625.00
1200	Beneteau 373	36'11"	2017	10	6	Yes	$369.00	$625.00
1205	Beneteau 40	39'10"	2018	12	6	Yes	$489.00	$750.00
1225	Hunter Sea	35'6"	2012	10	6	Yes	$349.00	$725.00
1230	Catalina Wave	28'4"	2019	8	6	Yes	$439.00	$675.00

Excel 2-5

San Diego Sailing
New Prices at 5% and 10% Increases

			Half-Day		Full Day	
Boat ID	Make and Model	Length	5%	10%	5%	10%
1010	Catalina Wave	28'4"	$393.75	$412.50	$682.50	$715.00
1015	Catalina Sky	28'4"	$446.25	$467.50	$761.25	$797.50
1146	Hunter Ray	33'6"	$367.50	$385.00	$525.00	$550.00
1150	Capri MKZ	24'8"	$341.25	$357.50	$525.00	$550.00
1152	Capri 22 Mk II	24'8"	$341.25	$357.50	$525.00	$550.00
1164	Capri 22 Mk II	24'8"	$341.25	$357.50	$525.00	$550.00
1168	Hunter 33	33'6"	$446.25	$467.50	$761.25	$797.50
1175	Beneteau 40	39'10"	$513.45	$537.90	$787.50	$825.00
1180	Beneteau 373	36'11"	$387.45	$405.90	$761.25	$797.50
1185	Hunter Sea	35'6"	$366.45	$383.90	$577.50	$605.00
1190	Beneteau 373	36'11"	$387.45	$405.90	$656.25	$687.50
1200	Beneteau 373	36'11"	$387.45	$405.90	$656.25	$687.50
1205	Beneteau 40	39'10"	$513.45	$537.90	$787.50	$825.00
1225	Hunter Sea	35'6"	$366.45	$383.90	$761.25	$797.50
1230	Catalina Wave	28'4"	$460.95	$482.90	$708.75	$742.50

Excel 2-5

Figure 2-116 Ex cel 2-5 completed

Independent Project 2-6

Placer Hills Real Estate has regional offices throughout central California and tracks its listings and sales data. For this project, you insert agent names, determine sale price as a percentage of list price, and prepare summary statistics.
[Student Learning Outcomes 2.1, 2.3, 2.5, 2.6, 2.7]

File Needed: ***PlacerHills-02.xlsx*** *[Student data files are available in the* Library *of your SIMnet account.]*
Completed Project File Name: ***[your initials] Excel 2-6.xlsx***

Skills Covered in This Project

- Name cell ranges.
- Use the *XLOOKUP* function.
- Create and copy formulas.
- Use relative and 3D cell references in formulas.
- Use dates in a subtraction formula.
- Use *AVERAGE*, *MEDIAN*, and *MODE*.
- Use *COUNTIF* to display statistics.
- Use *CONCAT* to display email addresses.

1. Open the ***PlacerHills-02.xlsx*** workbook from your student data files and save it as [your initials] Excel 2-6. Review the data on each sheet.

2. Name cell ranges.
   a. Select cells **D3:D25** on the **Listings** sheet tab.
   b. Press **Ctrl** and select cells **I3:I25**, **K3:K25**, and **L3:L25**.
   c. Use the **Top row** to create range names.
   d. Press **Ctrl+Home**.
   e. Format this sheet to fit one page, landscape orientation.
   f. Insert a header that displays the file name in the right section.

3. Use the *XLOOKUP* function to insert the agent's last name in a new column on the **Listings** sheet. (If *XLOOKUP* is not available, build this formula **=VLOOKUP(B4,Agents!$A$2:$B$7,2,FALSE)**).
   a. Insert a column at column **C**.
   b. Type Name in cell **C3** and click cell **C4**.
   c. Start an *XLOOKUP* function and set the agent ID (B4) as the *lookup_value* argument.
   d. Use an absolute reference to cells A2:A7 on the *Agents* sheet for the *lookup_array* argument. Do not include column titles in a lookup array.
   e. The *return_array* argument is an absolute reference to the "Last Name" column on the *Agents* sheet.
   f. Leave the *If_not_found* and *Match_mode* arguments blank.
   g. Copy the formula without formatting to preserve fill and borders.
   h. *AutoFit* column **C**.

4. Calculate the sold price as a percentage of the list price.
   a. Select cell **N4** and type =.
   b. Build a formula to divide the sale price by the list price.
   c. Copy the formula without formatting to preserve fill and borders.
   d. Format the column as **Percent Style** with two decimal places.

5. Calculate and display a series of dates.
   a. Insert the *TODAY* function in cell **O4**. The rest of the column calculates revised dates.
   b. Select cell **O5** and view the formula. It adds two to today's date.
   c. Select cell **P4**. The formula adds 45 days to the date in cell **O4**.
   d. Copy the formula without formatting. Some dates display as unformatted serial numbers (Figure 2-117).

e. Select cells **P4:P25** and select the **Short Date** format [*Home* tab, *Number* group]. Your dates will not match results shown in this text.

6. Calculate the average, the median, and the mode for the list price and count listings.
   a. Click the **Statistics** sheet tab and select cell **B4**.
   b. Click an **AutoSum** button arrow and choose *Average*. No assumed range displays.
   c. Press **F3** (**FN+F3**) to open the *Paste Name* dialog box.
   d. Choose **List_Price** and click **OK**. Press **Enter**. The average list price is $443,800.
   e. Select cell **B5** and calculate the median list price.
   f. Calculate the mode for the list price in cell **B6**.
   g. In cell **B7**, use *COUNTA* with a range name to count the number of listings. You can use any range name.

7. Use *COUNTIF* to calculate number of homes by construction type.
   a. Select cell **B9**.
   b. Click the **More Functions** button in the *Function Library* group, choose **Statistical**, and select **COUNTIF**.
   c. Use the range name **Construction** for the *Range* argument (Figure 2-118).
   d. Type br* for the *Criteria* and click **OK**. There are 8 brick homes.
   e. Copy the formula to cells **B10:B11**.
   f. Edit the criteria in the copied formulas to count by construction type as indicated.

8. Use *COUNTIF* to calculate number of homes by city.
   a. Select cell **B13** and click the **Recently Used** button [*Formulas* tab, *Function Library* group.
   b. Choose **COUNTIF**.

	Listed	Sale Date
6	3/23/2021	5/7/2021
6	3/25/2021	5/9/2021
6	3/27/2021	5/11/2021
6	3/29/2021	5/13/2021
6	3/31/2021	5/15/2021
6	4/2/2021	5/17/2021
6	4/4/2021	5/19/2021
6	4/6/2021	5/21/2021
6	4/8/2021	5/23/2021
6	4/10/2021	44341
6	4/12/2021	44343
6	4/14/2021	44345
6	4/16/2021	44347
6	4/18/2021	44349
6	4/20/2021	44351
6	4/22/2021	44353
6	4/24/2021	44355
6	4/26/2021	44357
6	4/28/2021	44359
6	4/30/2021	44361
6	5/2/2021	44363
6	5/4/2021	44365

Figure 2-117 Dates are formatted as *General numbers*

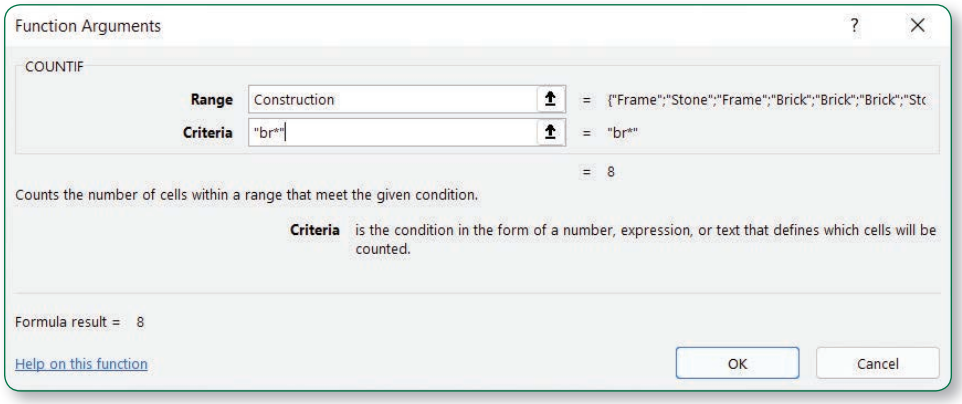


Figure 2-118 Arguments for *COUNTIF*

   c. Use the **City** range name for the *Range* argument.
   d. Click the **Criteria** box and type wildcard criteria to count Auburn. There are 8 homes in Auburn.
   e. Copy the formula to cells **B14:B16**.
   f. Edit the criteria in the copied formulas. Use criteria that will distinguish between city names that begin with "ro."
   g. Press **Ctrl+Home**.

9. Center the sheet horizontally.
10. Insert a header with the file name in the right section.
11. Use CONCAT to display email addresses.
    a. Click the **Agents** sheet tab and select cell **G2**.
    b. Start a *CONCAT* function.
    c. Select cell **B2** as the *Text1* argument.
    d. Type a period (.) for the *Text2* argument.
    e. Complete *Text3* and *Text4* arguments to display the data as shown in Figure 2-119.
    f. Copy the formula to complete the list.
    g. *AutoFit* column **G**.
    h. Press **Ctrl+Home**.
12. Save and close the workbook (Figure 2-120).

G
Proposed Email for New Site
Bidou.Simon@placerhills.net

Figure 2-119 Concatenated results

Excel 2-6

Placer Hills Real Estate
Listings and Sales

Listing ID	Agent ID	Name	Address	City	Sq Ft	Beds	Baths	Garage	Construction	Year Built	List Price	Sale Price	Percent of List Price	Listed	Sale Date
10025	160	Johnstone	3420 Milburn Street	Rocklin	1900	4	3	3 Car Attached	Frame	1988	$255,000	$228,900	89.76%	3/23/2021	5/7/2021
10027	127	Weatherby	2128 Wedgewood	Roseville	1184	3	2	1 Car Detached	Stone	1998	$335,000	$345,000	102.99%	3/25/2021	5/9/2021
10033	103	Bidou	4336 Newland Heights Drive	Rocklin	1840	2	2	2 Car Attached	Frame	1999	$334,500	$327,000	97.76%	3/27/2021	5/11/2021
10042	168	Duarte	131 Aeolia Drive	Auburn	1905	3	2	2 Car Detached	Brick	1940	$385,000	$385,000	100.00%	3/29/2021	5/13/2021
10045	168	Duarte	12355 Krista Lane	Auburn	2234	3	3	2 Car Attached	Brick	1984	$274,500	$260,000	94.72%	3/31/2021	5/15/2021
10052	103	Bidou	1096 Kinnerly Lane	Lincoln	1948	3	3	3 Car Attached	Brick	1995	$227,000	$238,000	104.85%	4/2/2021	5/17/2021
10054	168	Duarte	272 Lariat Loop	Lincoln	1571	2	1	2 Car Attached	Stone	2002	$297,000	$265,900	89.53%	4/4/2021	5/19/2021
10069	151	Chung	1255 Copperdale	Auburn	1456	3	2	2 Car Detached	Frame	1995	$239,600	$237,000	98.91%	4/6/2021	5/21/2021
10172	160	Johnstone	324 Center Point	Roseville	1480	2	2	3 Car Detached	Frame	1991	$329,000	$319,000	96.96%	4/8/2021	5/23/2021
10175	168	Duarte	1925 Greenville Lane	Auburn	1850	3	3	2 Car Detached	Brick	2006	$475,999	$489,500	102.84%	4/10/2021	5/25/2021
10177	160	Johnstone	3429 Maple Stree	Roseville	1900	4	3	2 Car Detached	Stone	2008	$500,000	$510,000	102.00%	4/12/2021	5/27/2021
10179	127	Weatherby	101 Lombard Road	Rocklin	1184	3	2	2 Car Attached	Frame	2009	$435,999	$415,000	95.18%	4/14/2021	5/29/2021
10181	103	Bidou	5721 Tuscany Lane	Auburn	1840	2	2	3 Car Attached	Stone	2011	$650,000	$635,000	97.69%	4/16/2021	5/31/2021
10183	168	Duarte	89 W Tenth Avenue	Auburn	1905	3	2	2 Car Attached	Brick	2015	$599,999	$538,000	89.67%	4/18/2021	6/2/2021
10185	160	Johnstone	9161 Sutton Court	Lincoln	2234	3	3	2 Car Detached	Stone	2019	$725,000	$705,000	97.24%	4/20/2021	6/4/2021
10187	127	Weatherby	13200 Centennial Drive	Lincoln	1948	3	3	3 Car Detached	Frame	2018	$585,000	$600,000	102.56%	4/22/2021	6/6/2021
10189	103	Bidou	3247 Mulranny Drive	Auburn	1571	2	1	2 Car Detached	Brick	1989	$355,000	$355,000	100.00%	4/24/2021	6/8/2021
10191	103	Bidou	578 Ann Street	Roseville	1456	3	2	2 Car Attached	Frame	1990	$475,000	$435,000	91.58%	4/26/2021	6/10/2021
10193	127	Weatherby	12222 Greenwood Street	Rocklin	1480	2	2	1 Car Detached	Frame	1975	$425,000	$430,000	101.18%	4/28/2021	6/12/2021
10195	160	Johnstone	809 Martin Lane	Auburn	1850	3	3	2 Car Attached	Brick	2005	$585,000	$595,000	101.71%	4/30/2021	6/14/2021
10197	151	Chung	7824 Hughes Court	Lincoln	2200	4	4	3 Car Detached	Brick	2015	$650,000	$636,000	97.85%	5/2/2021	6/16/2021
10199	151	Chung	907 September Lane	Lincoln	1950	3	3	2 Car Attached	Stone	2007	$625,000	$619,000	99.04%	5/4/2021	6/18/2021

Figure 2-120 Ex cel 2-6 completed

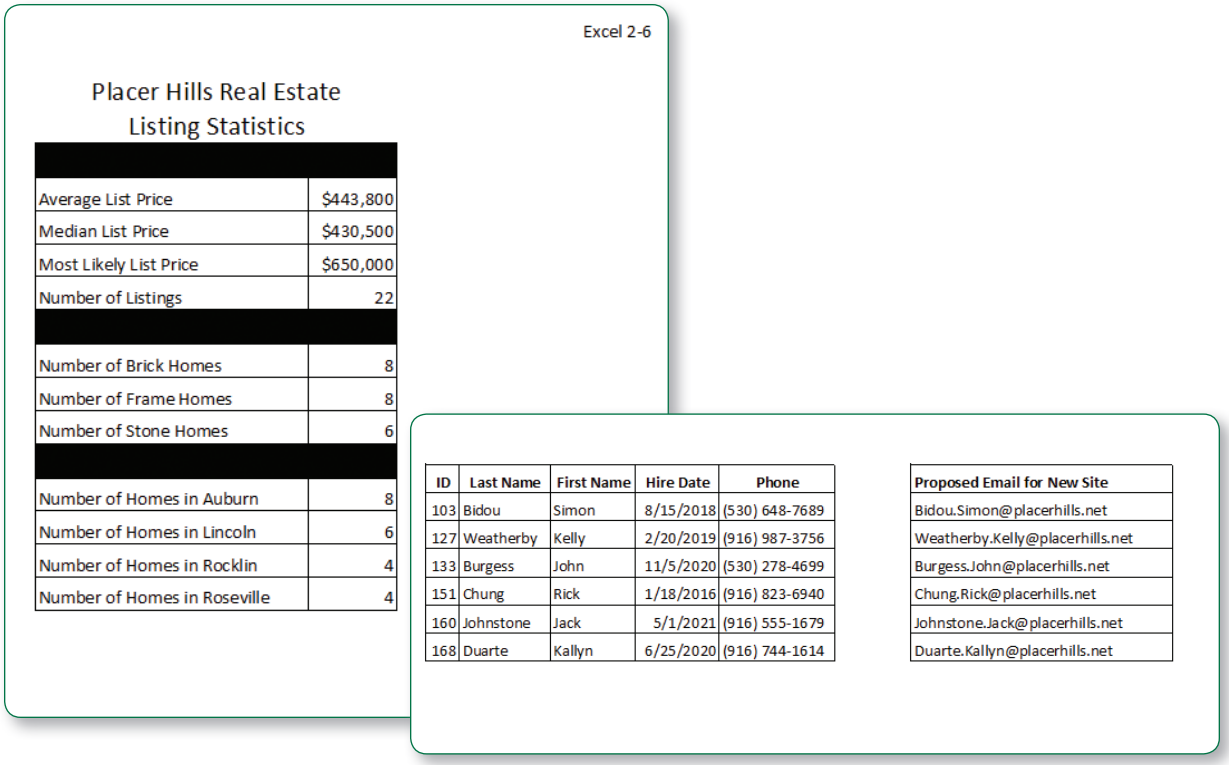


Figure 2-120 Ex cel 2-6 completed

Advanced Project 2-7

Mary's Equipment Rentals serves the light-to-heavy equipment needs of contractors and the general public. Data has been imported from an Access database and needs to be transformed for better management in Excel. Once that is done, you calculate several statistics for the company.
[Student Learning Outcomes 2.1, 2.3, 2.4, 2.6, 2.8]

File Needed: ***MarysRentals-02.xlsx*** *(Student data files are available in the* Library *of your SIMnet account.)*
Completed Project File Name: ***[your initials] Excel 2-7.xlsx***

Skills Covered in This Project

- Create, copy, and edit formulas.
- Name cell ranges.
- Use formula auditing tools.
- Use relative references and range names in formulas.
- Build an *XLOOKUP* function.
- Use *SUMIF* and *COUNTIF* functions.

1. Open the ***MarysRentals-02.xlsx*** workbook from your student data files and save it as [your initials] Excel 2–7. The *Inventory* sheet is a list of equipment available for rental.
2. Calculate weekly and monthly rates.
   a. Click cell **E2** on the *Inventory* sheet. The weekly rental rate is 96% of the daily rate for a 4% discount times 5 for a five-day week.
   b. Enter a formula in cell **E2** to multiply the daily rate by 96% times five days and copy it down the column.

c. Select cell **F2**. The monthly rate is 90% of the daily rate for a 10% discount times 30 for a standard 30-day month.
d. Build the formula in cell **F2** and copy it down the column.

3. Name cell ranges.
   a. Select cells **A1:A17**, press **Ctrl**, and select cells **D1:F17**.
   b. Create names from the selection [*Formulas* tab, *Defined Names* group].
   c. Verify that you have created four range names in the *Name Manager* dialog box.
   d. Press **Ctrl+Home**.

4. Evaluate and correct errors on the *Rentals* sheet.
   a. Click the **Rentals** tab. This data was imported from an Access database, and error triangles display in many cells.
   b. Select cells **A2:A47** and click the **Trace Error** button near cell A2 (Figure 2-121). This data was imported as text (labels) but should be set as values.
   c. Select **Convert to Number**. The data are formatted as values and are right-aligned.
   d. Trace the errors in cells **B2** and **C2**.
   e. Convert cells **B2:C47** to numbers.

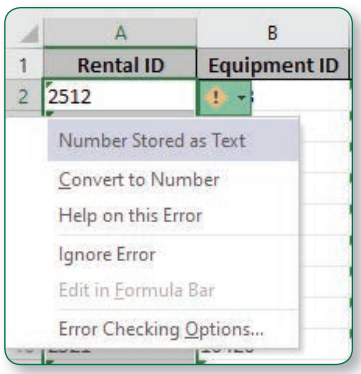


Figure 2-121 ***Trace Error*** **button for a selected range**

5. Create and copy an *XLOOKUP* function to display the rate. (If *XLOOKUP* is not available, build this formula **=VLOOKUP(B2,Inventory!$A$2:$F$17,4,F ALSE)**).
   a. Select cell **G2**. Notice that data in column **E** is sorted by type so that daily rates are first, followed by monthly, and then weekly.
   b. Start the *XLOOKUP* function with cell **B2** as the *Lookup_value* argument.
   c. The *Lookup_array* is the **Equipment_ID** range.
   d. The *Return_array* is the **Daily_Rental** range. The result for cell G2 is 250 (Figure 2-122).

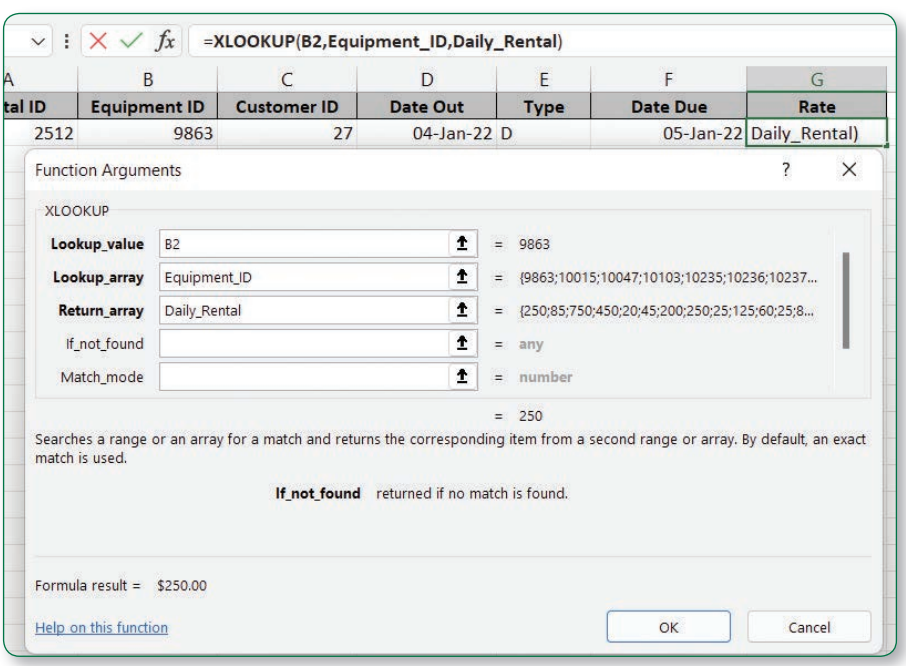


Figure 2-122 ***XLOOKUP*** **to display the rate**

e. Copy the formula in cell **G2** to cells **G3:G35**. You will edit the formula in cell G35 to display the monthly rate.
f. Select cell **G35** and click the **Insert Function** button in the *Formula* bar to open the *Function Arguments* dialog box.
g. Edit the *Return_array* to display the **Monthly_Rental** range. (If you used *VLOOKUP*, edit the *Col_index_num* range to **6** because the monthly rates are in the sixth column of the *table_array*.)
h. Copy the formula in cell **G35** to cell **G36:G37**.
i. Select cell **G37** and edit the formula to display the **Weekly_Rental** range. (In a *VLOOKUP* formula, the *Col_index_num* range is **5** for the weekly rate.)
j. Copy the formula in cell **G37** to complete the column.

6. Use *SUMIF* to calculate daily, weekly, and monthly income rentals.
a. Select cells **E1:E47** and **G1:G47**.
b. Create range names for this selection of cells and then press **Ctrl+Home**.
c. Click the **Revenue** sheet tab and select cell **B4**.
d. Start the *SUMIF* function with **Type** as the *Range* argument.
e. Type d for daily income as the *Criteria* argument. If you type the formula, remember to enclose the criteria within quotation marks.
f. Use the **Rate** range for the *Sum_range* argument. The result for daily income is 4590 (Figure 2-123).

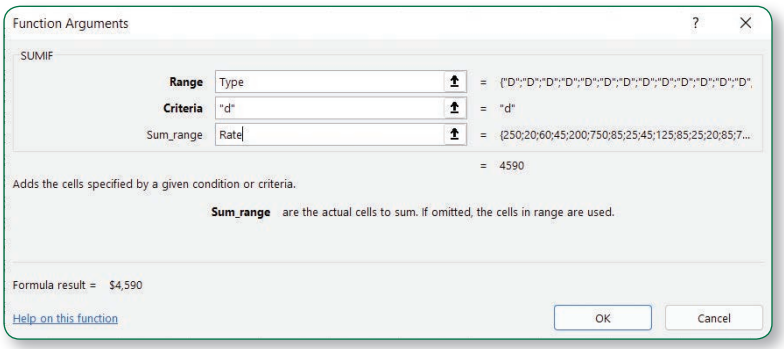


Figure 2-123 *SUMIF* to calculate revenue from daily rentals

g. Copy the formula to cells **B5:B6**.
h. Edit the copied formulas to change the criteria as needed.
i. Use *SUM* in cell **B7**.
j. Format cells **B4:B7** as **Currency** with no decimal places.

7. Use *COUNTIF* to count rentals by type.
a. Select cell **B9** and start the *COUNTIF* function from the *Statistical* category.
b. Use the range name **Type** as the *Range* argument. The *Criteria* is d.
c. Copy the formula to cells **B10:B11**.
d. Edit each copied formula to change its criteria as needed.

8. Add a border and fill.
a. Select cells **A4:B11** and open the *Format Cells* dialog box.
b. Verify or select the last *Style* option in the column on the left, a single solid border.
c. Click the **Outline** button in the *Presets* section.
d. Click the middle vertical position in the *Border* preview area.
e. Click the dotted line style (third option, first column) in the *Style* section.

f. Click the middle horizontal position in the *Border* preview area (Figure 2-124).
g. Click **OK**.
h. Select cells **A3:B3**, **A8:B8**, and **A12:B12**.
i. Apply **Black, Text 1, Lighter 50%** (second column) fill color.
j. Select cells **A1:B2** and use **Center Across Selection**.
k. Increase the font size for cells **A1:B2** to **16**.
l. Center the sheet horizontally.
m. Insert a header with the file name in the right section.
n. Press **Ctrl+Home**.

9. Save and close the workbook (Figure 2-125).

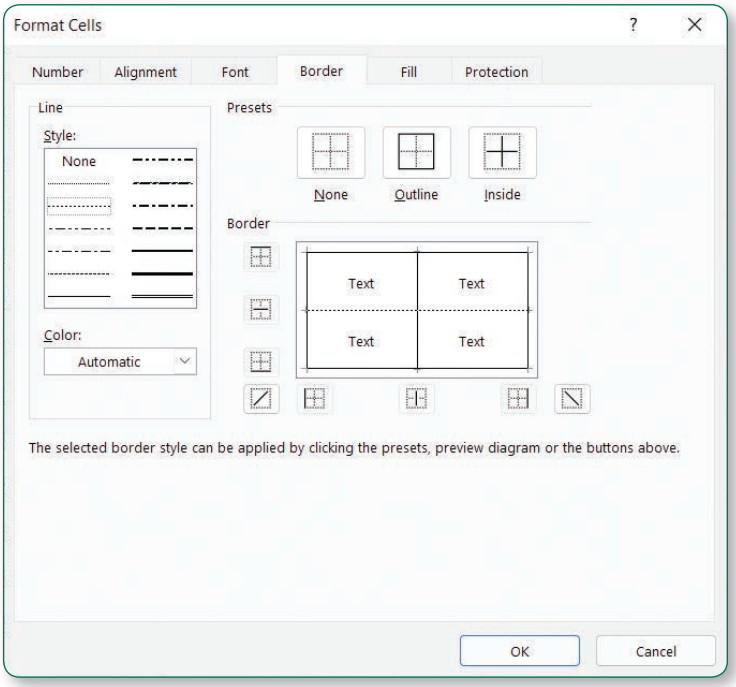


Figure 2-124 Build a custom border in the *Format Cells* dialog box

	A	B	C	D	E	F	G
1	Equipment ID	Name	Category	Daily Rental	Weekly Rental	Monthly Rental	Date Purchased
2	9863	BACKHOE COMPACT ALLMAND DIESEL	Tractors	$250.00	$1,200.00	$6,750.00	09-Sep-20
3	10015	GENERATOR PORTABLE MAKITA 1000W	Generators	$85.00	$408.00	$2,295.00	15-Dec-20
4	10047	SKIP LOADER 4X4	Tractors	$750.00	$3,600.00	$20,250.00	08-Mar-19
5	10103	GENERATOR TOWABLE POWERPRO 25KW	Generators	$450.00	$2,160.00	$12,150.00	20-Jul-19
6	10235	WHEELBARROW	Hand Tools	$20.00	$96.00	$540.00	01-Feb-21
7	10236	SNAKE DRAIN 1/2" ELECTRIC	Plumbing	$45.00	$216.00	$1,215.00	01-Feb-21
8	10237	PIPELINE INSPECTION CAMERA - 85'	Plumbing	$200.00	$960.00	$5,400.00	01-Feb-21
9	10283	GRINDER ANGLE 7" W/VACUUM	Sawing, Cutting & Grinding	$250.00	$1,200.00	$6,750.00	15-Mar-21
10	10368	METAL DETECTOR - GARRETT ACE 250	Hand Tools	$25.00	$120.00	$675.00	15-May-18
11	10375	SAW CIRCULAR 16"	Sawing, Cutting & Grinding	$125.00	$600.00	$3,375.00	01-Jul-18
12	10389	LEVEL SITE LASER	Hand Tools	$60.00	$288.00	$1,620.00	02-Aug-18
13	10400	WHEEL MEASURING	Hand Tools	$25.00	$120.00	$675.00	15-Sep-18
14	10425	GENERATOR PORTABLE MAKITA 1000W	Generators	$85.00	$408.00	$2,295.00	12-Feb-22
15	10426	SNAKE DRAIN 1/2" ELECTRIC	Plumbing	$45.00	$216.00	$1,215.00	12-Feb-22
16	10427	GRINDER ANGLE 7" W/VACUUM	Sawing, Cutting & Grinding	$250.00	$1,200.00	$6,750.00	12-Feb-22
17	10428	36" CHAINSAW	Sawing, Cutting & Grinding	$125.00	$600.00	$3,375.00	12-Feb-22

Figure 2-125 Ex cel 2-7 completed

Excel 2-7

Mary's Equipment Rentals
Rental Revenue

Daily Rental Income	$4,590
Weekly Rental Income	$12,480
Monthly Rental Income	$14,445
Total	$31,515
Number of Daily Rentals	33
Number of Weekly Rentals	11
Number of Monthly Rentals	2

Rental ID	Equipment ID	Customer ID	Date Out	Type	Date Due	Rate
2512	9863	27	04-Jan-22	D	05-Jan-22	$250.00
2513	10235	30	04-Jan-22	D	07-Jan-22	$20.00
2513	10389	30	04-Jan-22	D	07-Jan-22	$60.00
2514	10236	102	05-Jan-22	D	06-Jan-22	$45.00
2514	10237	102	05-Jan-22	D	06-Jan-22	$200.00
2516	10047	15	06-Jan-22	D	10-Jan-22	$750.00
2519	10015	44	07-Jan-22	D	10-Jan-22	$85.00
2520	10368	71	07-Jan-22	D	09-Jan-22	$25.00
2521	10426	17	08-Jan-22	D	12-Jan-22	$45.00
2523	10428	8	09-Jan-22	D	11-Jan-22	$125.00
2524	10015	31	10-Jan-22	D	12-Jan-22	$85.00
2525	10368	124	10-Jan-22	D	13-Jan-22	$25.00
2526	10235	111	10-Jan-22	D	11-Jan-22	$20.00
2527	10015	30	12-Jan-22	D	15-Jan-22	$85.00
2527	10047	30	12-Jan-22	D	15-Jan-22	$750.00
2527	10235	30	12-Jan-22	D	15-Jan-22	$20.00
2527	10283	30	12-Jan-22	D	15-Jan-22	$250.00
2529	10389	27	13-Jan-22	D	15-Jan-22	$60.00
2530	10235	94	13-Jan-22	D	14-Jan-22	$20.00
2530	10427	94	13-Jan-22	D	14-Jan-22	$250.00
2532	9863	75	15-Jan-22	D	16-Jan-22	$250.00
2534	10426	88	15-Jan-22	D	16-Jan-22	$45.00
2535	10428	91	16-Jan-22	D	17-Jan-22	$125.00
2537	10235	102	17-Jan-22	D	18-Jan-22	$20.00
2538	10237	83	17-Jan-22	D	20-Jan-22	$200.00
2538	10389	83	17-Jan-22	D	20-Jan-22	$60.00
2539	10368	51	17-Jan-22	D	18-Jan-22	$25.00
2540	10426	21	17-Jan-22	D	18-Jan-22	$45.00
2541	9863	58	17-Jan-22	D	18-Jan-22	$250.00
2545	10235	27	19-Jan-22	D	21-Jan-22	$20.00
2546	10425	111	20-Jan-22	D	23-Jan-22	$85.00
2548	10427	115	20-Jan-22	D	22-Jan-22	$250.00
2549	10236	94	20-Jan-22	D	22-Jan-22	$45.00
2533	10103	62	15-Jan-22	M	15-Feb-22	$12,150.00
2542	10015	31	19-Jan-22	M	19-Feb-22	$2,295.00
2515	10283	83	05-Jan-22	W	12-Jan-22	$1,200.00
2517	10103	21	06-Jan-22	W	13-Jan-22	$2,160.00
2518	9863	102	07-Jan-22	W	14-Jan-22	$1,200.00
2522	10237	56	09-Jan-22	W	16-Jan-22	$960.00
2522	10425	56	09-Jan-22	W	16-Jan-22	$408.00
2528	10236	39	12-Jan-22	W	19-Jan-22	$216.00
2531	10283	15	15-Jan-22	W	22-Jan-22	$1,200.00
2536	10047	46	17-Jan-22	W	24-Jan-22	$3,600.00
2543	9863	44	19-Jan-22	W	26-Jan-22	$1,200.00
2544	10368	124	19-Jan-22	W	26-Jan-22	$120.00
2547	10426	30	20-Jan-22	W	27-Jan-22	$216.00

Figure 2-125 Ex cel 2-7 completed

Challenge Project 2-8

For this project, you create a workbook for your business that displays current salaries and increased salaries at two proposed percentages. You order the arithmetic with parentheses to calculate new salaries and display average and median values.
[Student Learning Outcomes 2.1, 2.2, 2.3, 2.5, 2.6]

File Needed: None
Completed Project File Name: ***[your initials] Excel 2-8.xlsx***

Create and save a workbook as [your initials] Excel 2–8. Modify your workbook according to the following guidelines:

- In cells **A3:D3**, type the following labels: Staff ID, Current Salary, 10% Increase, and 15% Increase.
- Select cell **A4** and type an ID number for the first employee that can be autofilled. Use an alphanumeric identifier such as *AB001* or *EX200*. In cell **A5**, type the next ID in the series such *AB002* or *EX201*. Fill the IDs to reach row **15**.
- In cells **B4:B15**, type a yearly salary for each staff member. Format these values as **Currency** with no decimal places.
- Calculate the new salary with a 10% increase in column **C**.
- Calculate the new salary with a 15% increase in column **D**.
- Calculate total salaries at each level in row **16** and type Total in cell **A16**.
- In cells **A18:A19**, type Average and Median.
- Calculate the average and median salary for each column in cells **B18:D19**.
- Select cell **B21** and type this sentence: Type ID in cell B22. including the period. Type one of the staff IDs from column A in cell **B22**.
- Select cell **C22**. Build an *XLOOKUP* (or *VLOOKUP*) function to display the salary with a 10% increase for the staff ID shown in cell B22. Format the results as **Currency** with no decimals.
- Test your function by typing a different staff ID in cell B22.
- Type a name for the company in cell **A1** and a description of the data in cell **A2**.
- Insert the *TODAY* function in cell **D25**.
- Name the sheet Salaries.
- Complete formatting on the sheet to relate and highlight sections of the data. You can change the theme, set alignment, apply cell styles, build borders and fill, and more.
- Add a footer that shows the file name in the right section.
- Set document properties to show your name as the author and the company name as the title.

Challenge Project 2-9

For this project, you create a workbook for a personal shopper that represents the shopping list and calculates sales by category. You enter and format data, calculate totals, and use *SUMIF*.
[Student Learning Outcomes 2.1, 2.3, 2.4, 2.5, 2.8]

File Needed: None
Completed Project File Name: ***[your initials] Excel 2-9.xlsx***

Create and save a workbook as [your initials] Excel 2-9. Modify your workbook according to the following guidelines:

- In cells **A3:E3**, type the following labels:
  Item Name Category # of Units Price per Unit Total
- Select cell **B4**. The four categories are Grocery, Meats, Produce, and Refrig/Frozen. Type these labels in cells **B4:B7**.
- Fill in categories in column **B** to reach row **18**. You can use *AutoComplete*, *Pick From Drop-down List*, or *Copy* and *Paste*. Mix them up so that they do not follow a pattern.
- Select cell **A4** and type Item 1 Fill item numbers to reach row **18**.
- Enter the number of units purchased and a price per unit for each item. Format the values in column **D** as **Currency** with two decimal places.
- Calculate the total in column **E**.
- Calculate a total in cell **E19**.
- Type Sales by Category in cell **B21**.
- In cells **B22:B25**, copy or type the four category names.
- Select cell **C22** and use *SUMIF* to calculate the total for the category in cell **B22**. Use relative and absolute references so that you can copy the formula to cells **C23:C25**.
- Check results of the *SUMIF* formula in cell **C22** before you copy it by selecting the appropriate cells in column **E** for the category and viewing the *AutoCalculate* results in the *Status* bar.
- Copy the formula in cell **C22** to complete the sales by category. Check results with *AutoCalculate* as needed. Format the results as **Currency** with two decimal places.
- Calculate a total in cell **C26**.
- Type a fictitious shopper's name in cell **A1** followed by a comma and Order #1.
- Insert the *TODAY* function in cell **A2**.
- Complete formatting on the sheet to relate and highlight sections of the data. You can change the theme, set alignment, apply cell styles, build borders and fill, and more.
- Insert a footer that displays the file name in the right section.
- Set document properties to show your name as the author and a title of your choice.

Challenge Project 2-10

In this project, you create a workbook that calculates monthly payments for a loan at four possible interest rates and different payback periods. You build the first layout and copy it to display four possible scenarios in the worksheet.
[Student Learning Outcomes 2.1, 2.3, 2.5, 2.6]

File Needed: ***Challenge-02.xlsx*** *(Student data files are available in the* Library *of your SIMnet account.)*
Completed Project File Name: ***[your initials] Excel 2-10.xlsx***

Open the ***Challenge-02.xlsx*** workbook from your student data files and save it as [your initials] Excel 2–10. Modify your workbook according to the following guidelines:

- Enter main labels that identify the worksheet and your proposed purchase.
- Because you plan to copy the section, do not use range names.
- Fill in values for the loan amount, an interest rate, and the term. Include the percent sign when you type the interest rate. For the term, use the number of years or the number of months.
- Use *PMT* to calculate the payment made at the beginning of the month (*Type* argument). If you set months for the term, do not multiply the *Nper* argument by 12.
- Copy cells **A1:D10** to start in cell **A12**. Set the row height for rows **12:13** to match rows **1:2**.
- Select all the data and copy the cells to start in cell **F1**. Set the column widths to match the originals. You should have four possible payment scenarios on the sheet.
- Edit each section to change the name of the purchase. Edit the loan amount, the term, and the rate as needed to make sense for the purchase.
- Select cell **A1** and note that this is a merged cell with a gradient fill. Select the corresponding cell for one of the copied groups and open the *Format Cells* dialog box. On the *Fill* tab, click the **Fill Effects** button and choose a different color gradient.
- Change the fill color for remaining groups so that each group has a different fill.
- Insert the *TODAY* function in cell **H24**.
- Scale the sheet to fit a single page.
- Insert a footer that displays the file name in the right section.
- Set document properties to show your name as the author.

Source of screenshots Microsoft Office 365 (2021): Word, Excel, Access, PowerPoint.