

Microsoft Excel 2019

Module 2: Formulas, Functions, and Formatting

A Guide to this Instructor's Manual:

We have designed this Instructor's Manual to supplement and enhance your teaching experience through classroom activities and a cohesive module summary.

This document is organized chronologically, using the same headings in **red** that you see in the textbook. Under each heading you will find (in order): Lecture Notes that summarize the section, Teacher Tips, Classroom Activities, and Lab Activities. Pay special attention to teaching Tips, and activities geared toward quizzing your students, enhancing their critical thinking skills, and encouraging experimentation within the software.

In addition to this Instructor's Manual, our Instructor's Resources also contain PowerPoint Presentations, Test Banks, and other supplements to aid in your teaching experience.

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Objectives

Students will have mastered the material in Module 2 when they can:

- Use Flash Fill
- Enter formulas using the keyboard
- Enter formulas using Point mode
- Apply the MAX, MIN, and AVERAGE functions
- Verify a formula using Range Finder
- Apply a theme to a workbook
- Apply a date format to a cell or range
- Add conditional formatting to cells
- Change column width and row height
- Check the spelling on a worksheet

- Change margins and headers in Page Layout view
- Preview and print versions and sections of a worksheet

EX 2-1: Introduction

LECTURE NOTES

- Discuss the topics in this module, including:
 - Using option buttons
 - Verifying formulas
 - Applying a theme
 - Adding a border
 - Formatting numbers and text
 - Using conditional formatting
 - Changing column width and row height
 - Checking spelling
 - Alternative types of worksheet displays and printouts
 - Adding page headers and footers

CLASSROOM ACTIVITIES

1. Critical Thinking: Based on what you have learned so far about working with Excel, list two business activities and two non-business activities in which using Excel to analyze and chart data could be helpful.

EX 2-2: Project—Worksheet with Formulas and Functions

LECTURE NOTES

- Use Figure 2-1 to describe the project
- Use Figures 2-2 and 2-3, the requirements document and sketch, to review requirements for the worksheet

CLASSROOM ACTIVITIES

1. Group Activity: Divide the class into small groups. Ask each group to refer to the requirements document and the sketch in Figures 2-2 and 2-3 on page EX 2-3 and discuss the requirements document and the sketch, making certain students understand the needs, source of data, required calculations, and formatting for this project.

2. Critical Thinking: What are the aesthetics and functional issues to be resolved in implementing the information in the requirements document and sketch? Refer to Figures 2-2 and 2-3, if necessary, in your answer.

3. Critical Thinking: Why is a salary report a good choice to illustrate the power of Excel to produce timely and accurate data analyses? Refer to Figure 2-1 in your answer.

4. Critical Thinking: When designing and developing a worksheet, which comes first, function or aesthetics? Why?

EX 2-4: Entering the Titles and Numbers into the Worksheet

LECTURE NOTES

- Review the steps to enter worksheet title and subtitle, and column titles
- Review the steps to enter the salary data
- Use Table 2-1 to discuss entering the salary data

TEACHER TIP

You might choose to demonstrate how to enter numbers in a selected range. Point out that pressing the ENTER key activates the next cell down in the same column in the range; pressing the TAB key activates the next cell to the right in the same row in the range. Pressing the SHIFT+TAB keys activates the previous cell in the same row in the range. Warn students not to press an ARROW key to complete an entry, as this will deselect the range. Note that this technique is particularly effective when you have a large amount of data to enter and you are using the numeric keypad to do so.

CLASSROOM ACTIVITIES

1. Group Activity: Excel offers multiple ways to perform most tasks. Group students into small teams. Ask each team to start Excel and identify and list at least two ways to wrap text in a cell, change line height and column width, and delete cell contents.
2. Quick Quiz:
 - 1) If cell A3 contains a word that has 6 characters, such as “Stocks,” and cell A8 contains 5 words causing the text to wrap within the cell, what effect does this have on cell A3? (Answer: The height of cell A3 would be increased due to the height that cell A8 required for text.)
3. Critical Thinking: Why do most professionals prefer to see four-digit years in worksheet dates?
4. Critical Thinking: Why take the time to rename a worksheet if you are the only person using the workbook?

LAB ACTIVITIES

1. Have students research the Web for information about Excel tips for working with worksheets. Have them bring their most interesting tip to share with the class.

EX 2-6: Flash Fill

LECTURE NOTES

- Define Flash Fill
- Use Figures 2-4 and 2-5 to illustrate using Flash Fill
- Review the steps to enter the row titles using Figure 2-6
- Review the steps to change the sheet tab name and color

CLASSROOM ACTIVITIES

1. Quick Quiz:

1) What is meant by Flash Fill? (Answer: Flash Fill is an Excel feature that looks for patterns in the data and automatically fills or formats data in remaining cells.)

EX 2-9: Entering Formulas

LECTURE NOTES

- Define the terms formula, circular reference, direct circular reference, and indirect circular reference
- Use Figures 2-7 and 2-8 to illustrate how to enter a formula using the keyboard, pointing out the equal sign and the asterisk in Figure 2-7
- Use Table 2-2 to describe arithmetic operators listed in order of operations
- Define order of operations
- Use Table 2-3 to illustrate examples of Excel formulas
- Explain what Point mode is
- Use Figures 2-9 through 2-13 to illustrate entering formulas using Point mode
- Define source range, destination range, and relative references
- Use Figure 2-14 to illustrate how to copy formulas using the fill handle

TEACHER TIPS

A formula can be defined as an equation with more than one variable that is used to solve practical problems. Students probably have worked with formulas in mathematics, science, and business classes. Perhaps surprisingly, however, formulas also are used in psychology, anthropology, sports, art, music, the language arts, and other areas. Formulas can ascertain abstract possibilities, such as an object's length as its speed approaches the speed of light. Worksheets make formulas even more powerful.

One common error is to create a formula with a circular reference. This occurs when a cell reference in a formula refers to the formula's result. For example, the formula = B1 + B2 + B3 in cell B3 is a circular reference because the result of the formula in cell B3 depends on the value in cell B3. Therefore, Excel is unable to determine the formula's result. When a formula with a circular reference is entered, Excel immediately points out the problem and offers Help.

You might choose to use the following simple example to emphasize the importance of understanding the order of operations Excel follows when performing calculations and how to alter that order using parentheses.

Enter 5 in cell A1; enter 5 in cell B1; enter 2 in cell C1; and enter the following formula in cell D1: =A1+B1/C1. Intuitively, students will expect the result to be 5 ($5+5=10/2=5$). However, following the order of operations, Excel first divides B1 by C1 and then adds the result of that calculation to A1 returning a result of 7.5 ($5/2=2.5+5=7.5$).

Next, edit the formula in D1 to place the addition step in parentheses. The formula becomes =(A1+B1)/C1 and returns the expected result of 5.

CLASSROOM ACTIVITIES

1. Class Discussion: Explore the effect of parentheses by presenting an expression, such as $3 * 4 ^ 2 - 12 / 2 + 1$, evaluating it using the order of operations (43), then adding parentheses in one or more places, such as $(3 * 4) ^ 2 - 12 / (2 + 1)$, and reevaluating the expression (140), noting how the result has changed. Write the following expression on the board: $6 * 2 ^ 4 - 12 / 3 + 1$. Have students determine all of the different values that can be derived from this expression, depending on where pairs of parentheses are placed.

2. Class Discussion: Cell references are an integral part of a formula. When the value in a cell changes, the result of the formula used with that cell automatically changes. Therefore, specific numbers should be used in formulas only if they are constants (i.e., if they will not change). What are some examples in which entering specific numbers in formulas would be appropriate?

3. Quick Quiz:

- 1) When more than one arithmetic operator is involved in a formula, Excel follows the same basic order of operations that you use in _____. (Answer: algebra)
- 2) A(n) _____ is created by a formula that contains a reference to the cell that contains the formula. (Answer: circular reference)
- 3) Excel reads a formula from _____ and performs each calculation following a strict _____. (Answer: left to right; order of operations)

4. Critical Thinking: What are the advantages or disadvantages of building a formula in Point mode (selecting cell references using the mouse) over entering a formula manually using the keyboard?

5. Critical Thinking: Why is it important to understand the order of operations Excel follows in performing calculations before you begin to construct your formulas?

6. Critical Thinking: How can you integrate the guidelines for constructing formulas into the planning and development phase for a worksheet?

LAB ACTIVITIES

1. Have students create a new blank workbook and add column titles, row titles, and numbers of their choice to cells. Then explore using the keyboard and the mouse to build formulas for a variety of calculations.

2. Have students use Excel Help to research the types of error messages they might encounter when building formulas. Students should be prepared to list the error messages and explain what causes the error.

EX 2-14: Option Buttons

LECTURE NOTES

- Use Table 2-4 to explain the circumstances in which Excel displays an Option button while students are working in a worksheet
- Review the steps to determine totals using the AutoSum button, as shown in Figure 2-15

- Use Figure 2-16 to illustrate determining the total tax percentage

CLASSROOM ACTIVITIES

1. Quick Quiz:

- 1) The _____ option button selection lists error-checking options following the assignment of an invalid formula to a cell. (Answer: Trace Error)
- 2) The _____ option button lists formatting options following an insertion of cells, rows, or columns. (Answer: Insert Options)

2. Critical Thinking: Compare completing a formula entry by 1) tapping or clicking the Enter box or 2) pressing the ENTER key. Which method do you prefer? Why? Does one method have any advantages or disadvantages over the other method? If yes, what are they?

3. Critical Thinking: Compare selecting a range using the keyboard, using the mouse pointer, or using the SHIFT+click and CTRL+click keyboard/mouse combination. Under what circumstances would you choose each method? Why is it important to be familiar with and use all three selection methods?

EX 2-16: Using the AVERAGE, MAX, MIN, and other Statistical Functions

LECTURE NOTES

- Explain the uses of the MAX function, MIN function, and AVERAGE function
- Discuss the five methods for entering a function
- Use Figures 2-17 through 2-19 to illustrate how to determine the highest number in a range of numbers using the Insert Function dialog box
- Use Figures 2-20 through 2-23 to determine the lowest number in a range of numbers using the Sum menu
- Use Figures 2-24 through 2-26 to determine the average of a range of numbers using the keyboard
- Use Figure 2-27 to illustrate copying a range of cells across columns to an adjacent range using the fill handle

TEACHER TIP

Function arguments vary by function and can be numbers, text, logical values (such as TRUE or FALSE), constants, arrays (specially arranged groups of constants or areas of cells), error values (such as #N/A), cell references, formulas, or other functions. The argument designated must produce a valid value for that function.

CLASSROOM ACTIVITIES

1. Quick Quiz:

- 1) The _____ function is used to determine the smallest value in a range. (Answer: MIN)
- 2) The _____ function is used to calculate the average of values in a range. (Answer: AVERAGE)
- 3) The _____ function is used to determine the largest value in a range. (Answer: MAX)

2. Critical Thinking: You can use the keyboard/mouse, Insert Function box, and Sum button menu to insert functions in a formula. Which method do you prefer? Why? Does it depend on the circumstances, for example, the function you choose to use?

3. Critical Thinking: Which method of inserting a function into a formula would you use if you were not certain which function is needed to perform the calculation? Why?

4. Critical Thinking: Sometimes, it is just as easy simply to scan a list and pick out the highest value as it is to use the MAX function. Consider various numerical lists, such as a list of the ages of family members, a list of class grades, a list of city populations, and so on. When would it make more sense to use the MAX function than simply to scan the list to determine the highest value? Why? Does the answer depend on the amount of data, the type of data, or both? Why?

LAB ACTIVITIES

1. Have the students work in small groups. Have each group select six stocks—two technology stocks, two retail stocks, and two bank stocks. This can be done using online research. Each student should submit the stock names, their symbols, and a stock price. Have each group create a sketch for a worksheet that lists the stock name, symbol, price, and number of shares for each stock (500 shares as the number of shares for all stocks). Then create a requirements document and sketch necessary to produce a useful and appropriately formatted worksheet.

Break Point: A good time to take a break, if necessary, is at the end of using the AVERAGE, MAX, MIN, and other statistical functions and before verifying formulas using range finder. Be sure to save the file, and then exit Excel. To resume later, start Excel, open the file, and continue following the steps. **EX 2-22: Verifying Formulas Using Range Finder**

LECTURE NOTES

- Define the term Range Finder
- Use Figure 2-28 to illustrate how to verify a formula using Range Finder

CLASSROOM ACTIVITIES

1. Class Discussion: Ask students to refer to Figure 2-28 to define the Range Finder feature and explain how it is used. How do you turn on Range Finder? How do you turn it off? What does Range Finder illustrate?

2. Quick Quiz:

- 1) You can use _____ to verify the cell references contained in a formula. (Answer: Range Finder)

3. Critical Thinking: Ask students to consider the following scenario: “Your classmate Jimmy comments that because Excel automatically calculates formulas they must be correct; so why bother with a feature like Range Finder.” How would you respond to Jimmy?

EX 2-23: Formatting the Worksheet

LECTURE NOTES

- Use Figures 2-29a and 2-29b to illustrate the unformatted and formatted worksheets
- Use Figures 2-30 and 2-31 to illustrate changing the workbook theme
- Review the steps to format worksheet titles and use Figure 2-32 to show the results

- Use Figures 2-33 through 2-36 to illustrate changing the background color and applying a box border to the worksheet title and subtitle
- Review the steps to apply a cell style to the column headings and format the total rows and use Figure 2-37 to show the results
- Use Figures 2-38 and 2-39 to illustrate formatting dates and centering data in cells
- Describe the Accounting number format and the Comma style format
- Use Figure 2-40 to illustrate applying the Accounting number format and the Comma style format using the ribbon
- Use Figures 2-41 and 2-42 to illustrate applying a Currency style format with a floating dollar sign using the Format Cells dialog box
- Use Figure 2-43 to illustrate applying a Percent style format and using the Increase Decimal button
- Discuss conditional formatting and use Figures 2-44 through 2-49 to illustrate applying conditional formatting
- Refer to Table 2-5 to summarize conditional formatting relational operators
- Define character and pixel
- Define best fit
- Use Figures 2-50 through 2-53 to illustrate changing the widths of columns
- Use Figures 2-54 through 2-56 to illustrate changing the heights of rows

TEACHER TIP

In many financial documents, such as this worksheet, dollar signs (\$) are displayed only in the first row where values appear and in the summary rows (e.g., total, average, highest, and lowest).

CLASSROOM ACTIVITIES

1. **Class Discussion:** Have the class brainstorm about the circumstances in which they would choose to have a cell stand out from similar cells and determine in what way the cell will stand out. For example, placing a different background color in cells that show losses could be an appropriate format for a column.
2. **Class Discussion:** Hold up various color chips (from the paint store, for example) or a color wheel, or point to a color from among the available themes in Excel. Ask the students to write down what mood this color puts them in, and what is the first thing they think of when they see this color. Do about four or five colors. Have the class share their results.
3. **Quick Quiz:**
 - 1) The _____ format displays numbers with a fixed dollar sign to the far left of the number with spaces between the dollar sign and the first digit in the cell. (Answer: Accounting number)
 - 2) To assign a floating dollar sign that appears immediately to the left of the first digit with no spaces, apply the _____ format. (Answer: Currency style)
 - 3) You can format an entire column at once. T/F? (Answer: True)
4. **Critical Thinking:** What are at least three decisions you must make as you determine the appearance and characteristics of a new worksheet?

5. Critical Thinking: When planning the layout of a worksheet, is the arrangement of the data significant to the development of the necessary calculations? Why or why not?

6. Critical Thinking: Think about background colors for text. Do they interfere with thinking? Do they really enhance a worksheet or detract from it? Think about borders. Do they feel too confining or do they help to group some idea or related group of data? Think about the position of text headings in a column. Do they look better centered within the cell or better left-aligned? How would their position affect the contents of the column they head? For example, would a centered heading look good at the top of a column of right-aligned numbers? Would a left-aligned heading look good over a right-aligned column of numbers?

7. Critical Thinking: Which of the following statements best represents your opinion?

- (1) It is better to change fonts before any data is entered.
- (2) It is better to change fonts as you enter data.
- (3) It is better to change fonts after all the data is entered.

8. Critical Thinking: Ask students to consider the following scenario: “You have just finished a complex worksheet for an important meeting. Your co-worker, Lin, suggests that you give the worksheet a polished look by applying a theme.” What factors should you consider when thinking about applying a theme to your worksheet?

9. Critical Thinking: Would the format you choose for numbers in a worksheet depend on the worksheet's purpose? Give specific examples to support your answer.

10. Critical Thinking: What is the purpose of conditional formatting? When would you use it? What are the advantages and disadvantages, if any, to using conditional formatting?

LAB ACTIVITIES

1. Ask students to use online or offline resources to research color theory. Then prepare a list of suggestions for applying a colorful theme to a worksheet prepared for a school assignment, a worksheet prepared to complete a personal task, and a worksheet prepared to complete a professional project.

2. Ask students to open the workbook of their choice, save it with a new name, and then practice applying different themes to the workbook.

3. Ask students to create a new workbook and enter the numbers of their choice in a worksheet. Then practice applying different number formatting to the numbers.

4. Ask students to create a new workbook and enter the numbers of their choice in a worksheet. Then practice applying conditional formatting to the numbers.

Break Point: A good time to take a break, if necessary, is at the end of formatting the worksheet and before checking spelling. Be sure to save the file, and then exit Excel. To resume later, start Excel, open the file, and continue following the steps.

EX 2-39: Checking Spelling

LECTURE NOTES

- Define the term spelling checker
- Use Figures 2-57 and 2-58 to illustrate checking the spelling in the worksheet
- Use the bulleted list on page EX 2-41 to review additional spell checker considerations

TEACHER TIP

Stress to students that running a spell checker does not take the place of careful proofreading. One way to maximize the benefit of proofreading is to exchange a hardcopy of your worksheets with a classmate and proof his or her worksheet instead of your own.

CLASSROOM ACTIVITIES

1. Group Activity: Explain that when spell checkers first became available, they did not recognize first names and suggested some very unusual alternatives such as “Dive” for the name “Dave” and “Start” for “Stewart.” Brainstorm with the class about types of spelling errors that could easily be undetected by a spell checker. Also think of funny spelling suggestions that the students have seen offered by Microsoft Excel or other spell check programs.
2. Quick Quiz:
 - 1) You can check the spelling of your worksheet by pressing the _____ key. (Answer: F7)
3. Critical Thinking: Why should you always take the time to check the spelling in a worksheet before submitting the worksheet to your supervisor? What types of errors might occur with your spelling?
4. Critical Thinking: The AutoCorrect feature is a very valuable feature. Why? Can you think of ways to use the AutoCorrect feature to improve your productivity?

EX 2-41: Printing the Worksheet

LECTURE NOTES

- Define header and footer
- Define Page Layout view
- Use Figures 2-59 through 2-63 to illustrate changing the worksheet's margins, header, and orientation in Page Layout view
- Review the steps to print a worksheet as shown in Figure 2-64
- Use Figures 2-65 and 2-66 to illustrate printing a section of a worksheet

TEACHER TIP

You might choose to invite a guest speaker to discuss the importance of green computing and how students can participate in green computing.

CLASSROOM ACTIVITIES

1. Quick Quiz:
 - 1) What is the default view for working in Excel? (Answer: Normal view)

- 2) A(n) _____ is text and graphics that prints at the top of each page of a worksheet. (Answer: header)

2. Critical Thinking: Ask students to consider the following scenario: “Tonya, who works in the accounting department, wants to add the workbook’s file name and the file path to the bottom of her worksheets; she asks if you can give her a tip on how to add this information.” What can you tell Tonya?

3. Critical Thinking: Do you have to set a worksheet’s page orientation each time you print it? If yes, why? If no, why not?

4. Critical Thinking: What is the relationship between a worksheet’s layout and its hardcopy distribution?

5. Critical Thinking: Compare working in Normal view with working in Page Layout view. How is working in these two views the same? How is it different? Why do you think Normal view, rather than Page Layout view, commonly is used to enter and edit cell contents?

6. Critical Thinking: What factors should you consider when determining how you want a printed worksheet to appear on the page? Why are headers and footers a good idea? Is landscape orientation the only acceptable way to layout a worksheet on a printed page?

7. Critical Thinking: In what circumstances would you choose to print only a portion of a worksheet?

8. Critical Thinking: What benefits accrue (and to whom) by printing draft quality worksheets whenever possible?

EX 2-46: Displaying and Printing the Formulas Version of the Worksheet

LECTURE NOTES

- Define the term debugging
- Use Figures 2-67 through 2-69 to illustrate displaying the formulas in the worksheet and fitting the printout on one page
- Review the steps to change the Print Scaling option back to 100%

TEACHER TIP

The term “debugging” is said to have originated with famed computer programmer Grace Hopper (inventor of COBOL), who traced a computer malfunction to a bug (a moth) in the machine.

CLASSROOM ACTIVITIES

1. Quick Quiz:

- 1) How do you use the keyboard to toggle between the values version and the formulas version of a worksheet? (Answer: Press CTRL+` (ACCENT MARK))

- 2) How does Excel make a worksheet fit on one page when you choose the Fit to option?
(Answer: Excel automatically changes to the Fit to scaling percentage required to fit the printout on one page.)

2. Critical Thinking: Ask students to consider the following scenario: “Jake, a classmate, tells you that he didn’t have time to enter the formulas in his worksheet and, instead, calculated the correct result using his calculator and entered the result of his calculations in the cells instead of the formulas.” Could any problems arise because of Jake’s actions? If so, what kinds of problems?

3. Critical Thinking: How does displaying the worksheet in formulas version make it easier to find and correct errors?

EX 2-49: Summary

LECTURE NOTES

- Review the skills learned in this module

End of Module Material

- **Apply Your Knowledge** is an assignment that helps students reinforce their skills and apply the concepts learned in this module.
- **Extend Your Knowledge** is an assignment that challenges students to extend the skills learned in this module and to experiment with new skills. Students may need to use Help to complete the assignment.
- **Analyze, Correct, Improve** is an assignment that asks students to analyze a document and correct all errors and/or improve the document’s design.
- **In the Lab** is a series of assignments that ask students to design and/or format a document using the guidelines, concepts, and skills presented in this module.

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